6EN PROJECT PLAN

In-Stream Monitoring Project at the Tributary of North Bird Creek Area

Pawhuska, Osage County, Oklahoma

Prepared by:

Jeanne Eckhart, Carl Wills, and Chris Lister

6EN-W

Prepared for:

U.S. Environmental Protection Agency
Region 6
Compliance Assurance and Enforcement Division (6EN)
1445 Ross Avenue
Dallas, TX 75202-2733

May 23, 2017

SECTION A – PROJECT MANAGEMENT

A.1 Title of Plan and Approval

In-Stream Monitoring at Tributary of North Bird Creek Area Project Plan

Prepared by:

Jeanne Eckhart

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Date: 2017.05.23 23:00:33 -05'00'

Date: _____

Jeanne Eckhart, Project Team Member, (6EN-WR)

Approvals:

_____ Date: _____

Carl Wills, Project Team Leader, (6EN-WC)

_____ Date: _____

Chris Lister, Project Team Member, (6EN-WC)

_____ Date: _____

Esteban Herrera, Section Chief, (6EN-WC)

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A.3 / A.4 Project Organization and Distribution List

The individuals participating in the project and their specific roles and responsibilities are shown below. These individuals will receive copies of the approved Project Plan and subsequent revisions:

Table A.1: Roles & Responsibilities/Distribution List

Individual(s) Assigned:	Responsible for:	Authorized to:
Carl Wills US EPA, Region 6 214-665-7276	Lead Inspector / Project Manager	Project Decisions, Lead and Assist Team Member(s), Collect and Assess Data
Chris Lister US EPA, Region 6 214-665-6672	Inspection/Sampling Team Member(s)	Inspect / Sample / Collect Data
Jeanne Eckhart US EPA, Region 6 214-665-8174		

A.5 Problem Definition and Background

Issue to be addressed:

This Project Plan will address in-stream monitoring along the tributary of North Bird Creek, North Bird Creek, and Bird Creek, which are current areas of concern related to previous inspections conducted by US EPA Region 6 Water Enforcement. The monitoring will assess water quality parameters associated with produced water from oil and gas operations that has been identified in the tributary. This water quality data will be used to further investigate, provide baseline monitoring, and provide monitoring over short increments of time to further enhance the ongoing investigation in the area.

Historical & background information:

A tributary of North Bird Creek and downstream areas, north of Pawhuska, Oklahoma in Osage County are the areas of concern for the ongoing EPA investigation. Pollutants in the tributary were identified in August 2016 and subsequent EPA Region 6 Water Enforcement inspections. The pollutants identified in the tributary during grab sampling and field parameters have shown elevated levels of salinity, total dissolved solids (TDS), and temperature. The produced water, or brine, grab samples, field samples, and EPA inspections have identified that the wastewater is consistent with produced brine related to oil and gas production. There are several operators in the nearby area involved with oil and gas production, injection of produced water and other associated oil and gas activities. EPA continues to work with these operators, the tribal partners, other agencies, and state partners throughout the investigation. The US EPA has primacy over the Underground Injection Control (UIC) program in Osage County, Oklahoma within the Safe

Drinking Water Act (SDWA) and also regulates oil and gas related activities that affect surface waters identified as waters of the U.S. through the Clean Water Act (CWA).

A.6 Project/Task Description

The in-stream sampling will be continuous after initial deployment and data will be collected from the in stream instruments intermittently, as deemed necessary with funding and for the investigation. The sampling equipment will be deployed between May 22 – and May 25, 2017. The continuous monitors will be placed at the bottom of the water column and at higher depths, if deemed necessary. The team will deploy equipment to collect conductivity and temperature data every 15 minutes for the needed period of time during the investigation. Monitoring data will be verified by the team the following week to verify the monitors are recording accurately. The team members will calibrate the equipment as needed, will deploy and secure the continuous monitoring equipment, and will download and collect the data throughout the investigation. During the inspection, grab samples with field equipment will be collected by the team to document current field conditions, including pH, conductivity, temperature, salinity, and TDS. The equipment used for each measurement will be documented accordingly in the field notes and calibration information related to each piece of equipment will also be noted within the field notes used during the initial deployment of the water quality in-stream monitoring. This information will also be reflected in the final report prepared after the investigation is complete.

For sampling locations, please see the attached maps in Appendix A, Proposed In-stream Sampler Locations, which show the different areas where two different types of samplers can be deployed. Please see Appendix B for the associated Table 1: *Proposed In-Stream Sampling Locations in the Tributary of North Bird Creek Area of Concern*.

For calibration information related to each water quality monitoring probe, please see the associated calibration books, which are held by the Lead Inspector. Calibration information will also be reflected in the field notes.

<u>This Project Plan has been prepared to:</u>

Supplement the investigation being conducted by EPA Region 6 to identify the in-stream water quality conditions of the areas of concern over time.

<u>The work to be performed includes:</u>

1) SDWA inspection and CWA inspection of areas of concern, as needed for the ongoing investigation.
2) Deployment of in-stream and continuous water quality sampling equipment.
3) Verification of functioning in-stream monitoring equipment to provide data over the investigation time period.

<u>List samples/measurements to be collected/made and data to be obtained:</u>

The data to be obtained from the in-stream monitoring equipment after deployment will be provided by two probe types and will include:

1) YSI 6920 Data Sonde (Range of conductivity measurements: 0 to 100,000 uS/cm)
    a. Conductivity
    b. Temperature
    c. Relative depth

Other associated equipment with the YSI 6920 Data Sonde includes the YSI Handheld Controller.

2) HOBO Data Logger (Range of conductivity measurements: 0 to 10,000 uS/cm)
    a. Conductivity
    b. Temperature

Other associated equipment with the HOBO Data Logger includes the HOBO Shuttle, HOBO Coupler 2-C, and the HOBO Protective Rubber Caps. Appendix C shows an inventory of the in-stream monitoring equipment utilized for this project.

Also, during initial deployment of the in-stream monitoring additional field parameters will be collected including data taken from a YSI 30 Pro conductivity meter and a pH meter. The data collected to gather information about the current tributary conditions include: conductivity, temperature, TDS, salinity, and pH.

Special personnel or equipment requirements:

In-stream monitoring will be set up by EPA personnel. Observations will be recorded by EPA personnel. All field sampling will be conducted by EPA personnel in level C or D protection, based on current field conditions.

Please see Appendix D for approved Health and Safety Plan (HASP) related to the in-stream monitoring for the EPA team members.

Proposed work schedule (dates and time of sample collection):

EPA personnel will have an approved travel authorization with the appropriate work schedule reflected through that authorization.

Products to be produced:

As a part of the on-going investigation a report and/or summary of this monitoring will be provided as needed and at the conclusion of the investigation.

A.7 Quality Objectives & Criteria

This inspection will be conducted under the authority of Section 308 of the Clean Water Act, and in accordance to 40 CFR 136 40 CFR Part 136 - Guidelines Establishing Test Procedures for the Analysis of Pollutants.

To support this requirement, EPA has developed a systematic planning process based on a graded approach for environmental decision making called the Data Quality Objectives (DQO) Process. The DQO Process is the Agency's preferred planning process and provides quality objectives and performance criteria based on the user's determination of tolerable error in the results. For details on the DQO Process and guidance on how and when it may be used, see the "*Guidance on Systematic Planning Using the Data Quality Objectives Process (EPA QA/G-4) (EPA, February 2006).*" This process has limited applicability to most enforcement inspection activities, since generally only Special Projects lend themselves to development of formal DQOs and defining of error limits, hypothesis testing, etc.

All data collected shall be in accordance with the appropriate EPA methodologies and protocols found in the appropriate regulatory guidance. The data shall be used to determine the following:

- The in-stream water quality over time as a part of an ongoing investigation in the area of concern.

The data must meet the approved method accuracy requirements such as those found in EPA's Standard Methods for Examination of Water and Waste Water. All supporting QA/QC information shall be provided. The data may be used to support any future enforcement actions.

A.8 Special Training/Certification

At a minimum, field personnel have completed the required Health and Safety 24-hour initial and 8-hour annual training that is mandatory under OSHA 29 CFR 1910.120(e)(8) and EPA Order 3500.1 requirements. Under various programs, this training is mandatory to maintain inspector credentials. All non-credentialed personnel (e.g. inspectors in training) must meet the 29 CFR 1910.120(e)(8) requirements, and should be in accompanied by credentialed personnel while inspecting/sampling at the facility/site.

Additional Special Training:
Training to be assessed by EPA personnel to the project team related to the use of the data software for the YSI Data Sondes and the HOBO Data Loggers. The needed software to assist in data collection and analyzing data are:

- Ecowatch Lite - v1.0.5.15
  - https://www.ysi.com/customer-support/software-firmware-downloads
  - To analyze data from the YSI 6920 Data Sondes
- HOBOware Graphing and Analysis
  - http://www.onsetcomp.com/products/software/hoboware

  - To collect data from the HOBO Data Loggers
- HOBOware Pro Graphing and Analysis
  - http://www.onsetcomp.com/products/software/hoboware
  - To further analyze data from the HOBO Data Loggers

A.9 Documents and Records

The records for this project will include miscellaneous correspondence, field notes, photo logs, and/or inspection reports. Field notes will include observations about facility conditions at the site(s) where samples are collected. Any noteworthy deviation from the procedures specified in the Project Plan will be recorded in the field activity logs.

The EPA Project Manager will disseminate copies of the Project Plan to the people listed in the distribution list once it is approved. Any revisions to the Project Plan will be numbered sequentially. It will be the responsibility of the EPA Project Manager to ensure that each person on the distribution list receives copies of any revisions.

All EPA records and documents from this project will be handled according to the following EPA Region 6 Field Activities Quality System Procedures:

- Records Management - R6PROC-003
- Management of Sampling and Environmental Data - R6PROC-004
- Field Documentation - R6PROC-005
- Field Equipment Inventory and Management - R6PROC-006
- Field Inspections and Investigations - R6PROC-007
- Field Activities Report Preparation and Distribution- R6PROC-008

SECTION B – DATA GENERATION & ACQUISITION

B.1 Process Design

The in-stream monitoring deployment will provide continuous monitoring of the water quality parameters designated in this Project Plan. The continuous monitoring will be in a tributary that has a high potential to have flash flooding conditions during rainfall events and also low flow during dry events. The in-stream monitors will be continuously monitoring in fifteen (15) minute increments. The design of the in-stream monitoring equipment will reflect both of these types of flow that can be experienced in the tributary.

The decision on whether or not to place in-stream monitoring equipment at a particular location will be contingent upon the following factors:

1. Water depth
2. Tributary/creek width
3. Previous investigation monitoring results
4. Proximity to the areas of concern
5. Width of tributary/creek
6. On-site locational conditions
7. Other conditions deemed appropriate to consider by the project team during the deployment or subsequent following data collection events of the project

The project team has identified potential sampling locations, which are reflected in Appendix A.

The in-stream monitoring equipment beyond the probes that will be used, include:

- Approximately 1,000 feet of Stainless steel 3/16-inch cable
  - To be used to stabilize the in-stream monitoring probes in the middle of the tributary at the location over the investigation period.
- Flotation devices (at least 6 to 12)
  - To assist in floating the HOBO Data Logger probe at a different location in the water columns at identified areas where two probes are needed to monitor the tributary/creek water column.
- 5 feet tall T-Posts (at least 30)
  - To stabilize the cables over the tributary/creek, which are attached to the probe(s) that have a cable line that drops into the tributary/creek
- T-Post Driver
  - To place the t-posts in the appropriate and stable location
- Sleeves/Clamps (aluminum and stainless steel)
  - To clamp the cable to the t-posts and assist with stabilize the probes
- Tipping Bucket
  - To assess rainfall events at the site and provide appropriate weather related information that could affect the data analysis.

The data will be collected in 15 minute increments and analyzed using the appropriate software. The analysis will be provided as deemed appropriate in a final report/summary as a part of the investigation report.

Sampling network design & rationale for design:
The actual locations of monitoring equipment will be determined after the stream has been assessed by the survey that will be conducted by the project team See Appendix A, which has maps that show the proposed locations for monitoring equipment prior to the stream survey conducted on May 22 and 23, 2017. Background sample locations will also be collected for quality assurance and investigation purposes. The water quality information is helpful in evaluating conditions and giving aid to determine future investigation needs.

B.2 Sampling Methods

Identify sample collection procedures:

In stream sampling will be conducted after the appropriate calibration of the equipment has been done and the calibration of that equipment meets the accepted requirements to verify accuracy of the equipment.

Identify sampling methods and equipment:

Sampling methods:
EPA personnel will follow the appropriate water quality methods related to field parameters during the field sampling events.

Sampling equipment available during the inspection/sampling event:
The sampling equipment can be seen in Appendix C.

Implementation requirements:

Will be based on based on the field team's field observations, field conditions, and on-site operations, as needed.

Decontamination procedures:

Wet decontamination procedure can be found at http://www.epa.gov/quality/field-equipment-cleaning-and-decontamination.

Specific performance requirements for the sampling methods:

Detection limits will be assessed to address the concerns of the in-stream sampling, including usage for livestock, natural wildlife, and other concerns within the investigation, as needed. Reporting limits are not applicable at this time.

If a failure in the sampling or measurement system occurs, the Lead Inspector/Project Manager must be notified. The Lead Inspector/Project Manager will be responsible for any decision concerning corrective action. Corrective action in the field will be documented in the field notes based on the action(s) required.

B.3 Data Collection

The data collected will be assessed and downloaded appropriately, as required within each probe's operations manual. The data will be assessed and compared with rainfall events during the analysis process.

B.4 Analytical Methods

Analytical methods:
The data analysis will be conducted with the appropriate software and procedures related to the data analysis will be outlined in the final report and/or summary. The data obtained will be compared with rainfall events in the area over the period of time being analyzed. Other factors will be assessed and identified during data analysis as needed, for the ongoing investigation.

Identify procedures to follow when failures occur:
If failure(s) occurs during the analysis, the Project Team members will contact the Lead Inspector/Project Manager, and communicate the failure and identify potential corrective remedies. The Lead Inspector/Project Manager will make the determination on the remedy. The failure(s) and corrective remedies will be documented via email appropriately.

Identify individuals responsible for corrective action and appropriate documentation:
The project team will be responsible for documentation of data analysis and all subsequent actions related to the data collection and analysis.

B.5 Quality Control

Quality control will be assessed during the continuous in stream monitoring by providing upstream measurements from the affected tributary. These measurements will assist in providing background measurements from an unaffected portion of the tributary to compare to the data being collected in the affected portion of the tributary of concern.

B.6 Instrument/Equipment Testing, Inspection, and Maintenance

EPA field personnel will use the calibration methods for the equipment as appropriate based on the project-specific field parameter needs and/or Health and Safety conditions. Along with data collection, measurements from this instrument may be used to alert field personnel to potential hazardous conditions. In addition, readings collected by the instrument may be documented in the field logbook and included in the final inspection report. The instrument will be maintained in accordance with the manufacturer's recommendations detailed in the instrument manual.

B.7 Instrument/Equipment Calibration and Frequency

Please see Appendix C for a full list of in-stream sampling equipment to be utilized for this project.

The equipment calibration will be conducted using certified equipment and standards with known valid relationships to recognized performance standards and in accordance with the procedures listed in the instruction manual for each type of equipment being used to assist in data analysis. The calibration will be recorded in each calibration notebook associated with the equipment, and a copy will be provided in the final report/summary at the completion of the ongoing investigation. The calibrations will be done prior to equipment deployment and also throughout data collection over the time periods of the investigation, as deemed appropriate by the project team. Should the equipment fail the calibration, the equipment will be recalibrated and tested again, and this will be documented appropriately, if needed.

EPA field personnel shall record field usage in the maintenance and calibration logbook that is maintained with the equipment along with the project field notes.

B.8 Inspection/Acceptance of Supplies & Consumables

The EPA Project Team will be responsible for equipment inventory, assessment of equipment functionality, and equipment conditions prior to the equipment deployment and after the equipment has been collected at the end of the project.

B.9 Data Acquisition Requirements for Non-Direct Measurements

Records gathered during field operations may be collected during the inspection event to document activities at the areas of concern. Documents may be requested for a period of up to five (5) years prior to the project event. These records will be used in the ongoing investigation at the area of concern.

B.10 Data Management

Data for this project will be produced both onsite and at EPA Region 6 during the analysis of the data. Data collected during the inspection may be designated as Confidential Business Information (CBI) by representatives of operating companies in the area of concern. For any information for which a CBI claim is made that information will be handled in accordance with the provisions specified the EPA Project Team. All records and documents generated during this project will be handled in accordance with EPA's "Standard Operating Procedures for Record and Information Management"

SECTION C – ASSESSMENT AND OVERSIGHT

C.1 Assessments and Response Actions

Documentation and analytical results collected during this project will be evaluated to determine the compliance status as it applies to the ongoing investigation requirements under the SDWA. Results of this evaluation will determine what action, if any, the Agency should take in response to any Areas of Concern identified during the inspection. The magnitude and breadth of any concerns identified will determine the appropriate response on the part of the Agency, which includes but is not limited to the issuance of administrative orders, administrative penalty orders, or judicial referral.

C.2 Reports to Management

This project will result in the generation of a final report or summary, which will include an inspection narrative, a photographic log, documents collected during the inspection, and analysis results for data collected over time, if any.

SECTION D – DATA VALIDATION AND USABILITY

D.1 Data Review, Verification, and Validation

Data will be accepted if they meet the following criteria:

1. Field logs are complete.
2. The project team will assess the QA/QC procedures and outline that assessment in the final report/summary provided. Any non-conforming data will be addressed, if needed.
3. Field data is reviewed to ensure that they are complete; that sample collection information is thoroughly documented; and that any deviations from the Project Plan are noted.
4. Actual sampling locations are documented in the inspection logbook and with maps. Locations were determined using GPS instrumentation, linear measurements, and/or photographic references.

Any deviations from the Project Plan are to be reported in the field logs. The Project Team will verify the contents of these logs. If the data fails to meet the criteria they will be flagged as estimated. Any flagged data will be discussed with management as needed to assist with the ongoing investigation.

D.2 Verification and Validation Methods

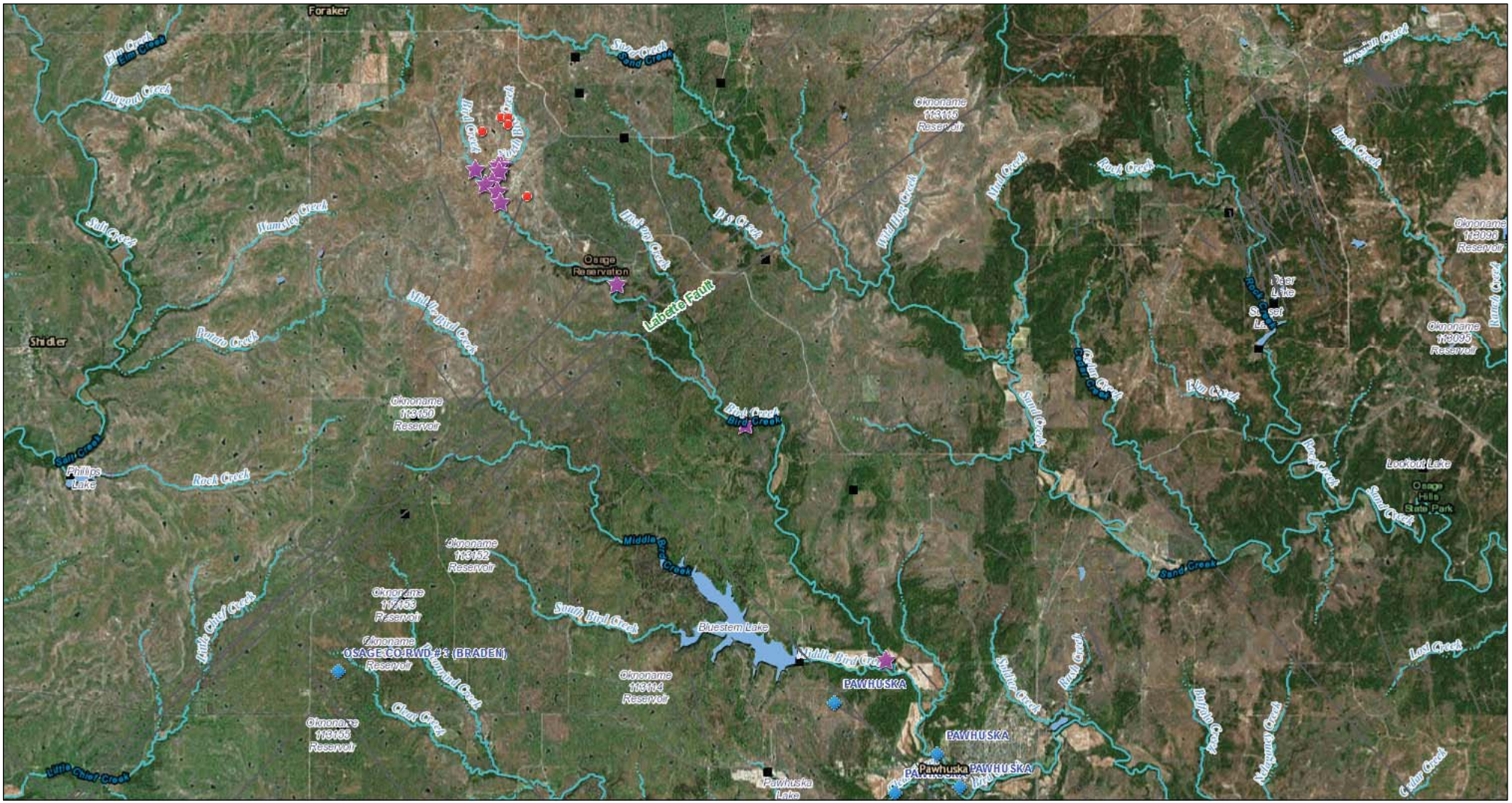
Field data will be validated by the Lead Inspector/Project Manager, and any problems identified during this project will be documented in the field logs. The Lead Inspector/Project Manager will review and verify field logs and analytical data reports. Any problems or deviations identified will be discussed with the project team and the first-line supervisor to determine corrective action measures.

D.3 Reconciliation with User Requirements

The data will be kept in the appropriate location as deemed relevant by the Project Team. The data will be used to support any future enforcement actions or litigation and the ongoing investigation.

APPENDIX A: In-Stream Sampling Location Maps

Monitoring Locations in North Bird Creek Area, Osage County, Oklahoma



May 10, 2017

1:144,448

0 1.75 3.5 7 mi

0 2.75 5.5 11 km

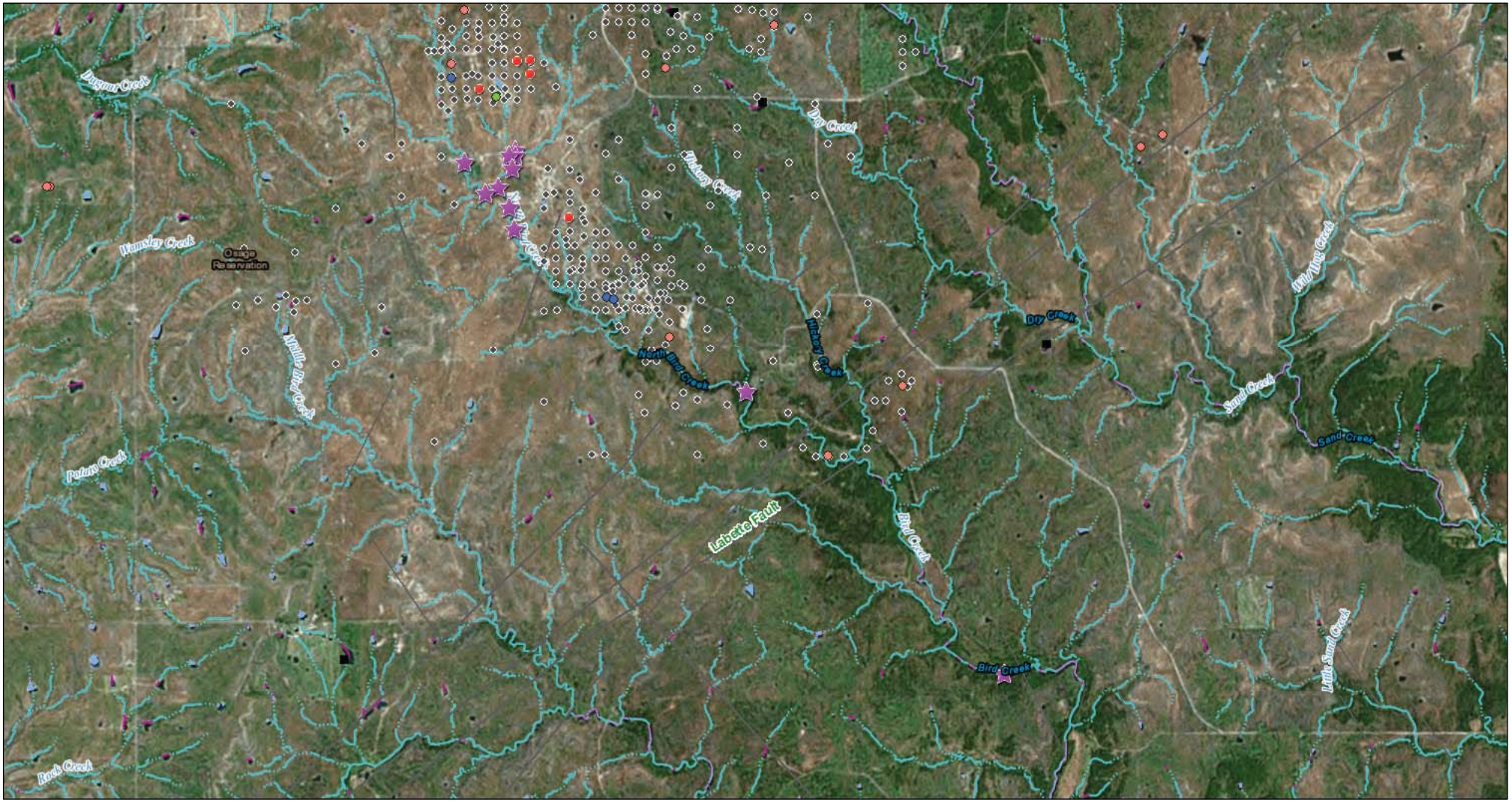
- In-Stream Water Monitoring Proposed Locations
- Active Injection Wells of Concern
- Public Water Supply (PWS)
- Osage County Fault Lines

USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,

Jeanne Eckhart

Earthstar Geographics, CNES/Airbus DS | Esri, HERE, Garmin | USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.

Monitoring Locations in North Bird Creek Area, Osage County, Oklahoma



May 10, 2017

1:72,224

0 0.75 1.5 3 mi

0 1.25 2.5 5 km

In-Stream Water Monitoring Proposed Locations

Active Injection Wells of Concern

Bird Creek All Injection Wells

Active

Inactive

Plugged

Production Wells - Status Unknown

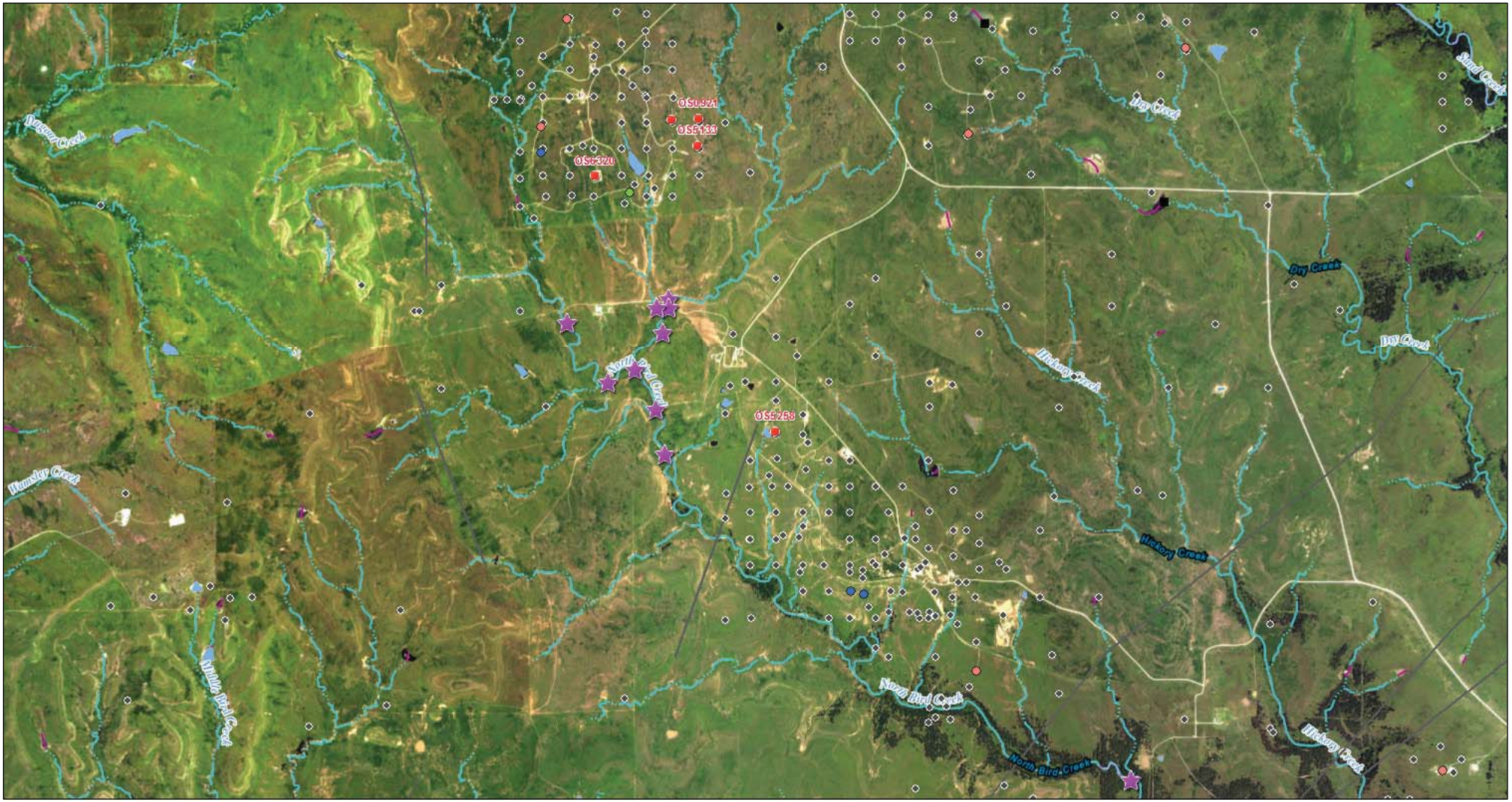
Osage County Fault Lines

USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,

Jeanne Eckhart

Earthstar Geographics, CNES/Airbus DS | Esri, HERE, Garmin | USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.

Monitoring Locations in North Bird Creek Area, Osage County, Oklahoma



May 10, 2017

In-Stream Water Monitoring Proposed Locations

Active Injection Wells of Concern

Bird Creek All Injection Wells

Active

Inactive

Plugged

Production Wells - Status Unknown

Osage County Fault Lines

1:36,112

0 0.45 0.9 1.8 mi

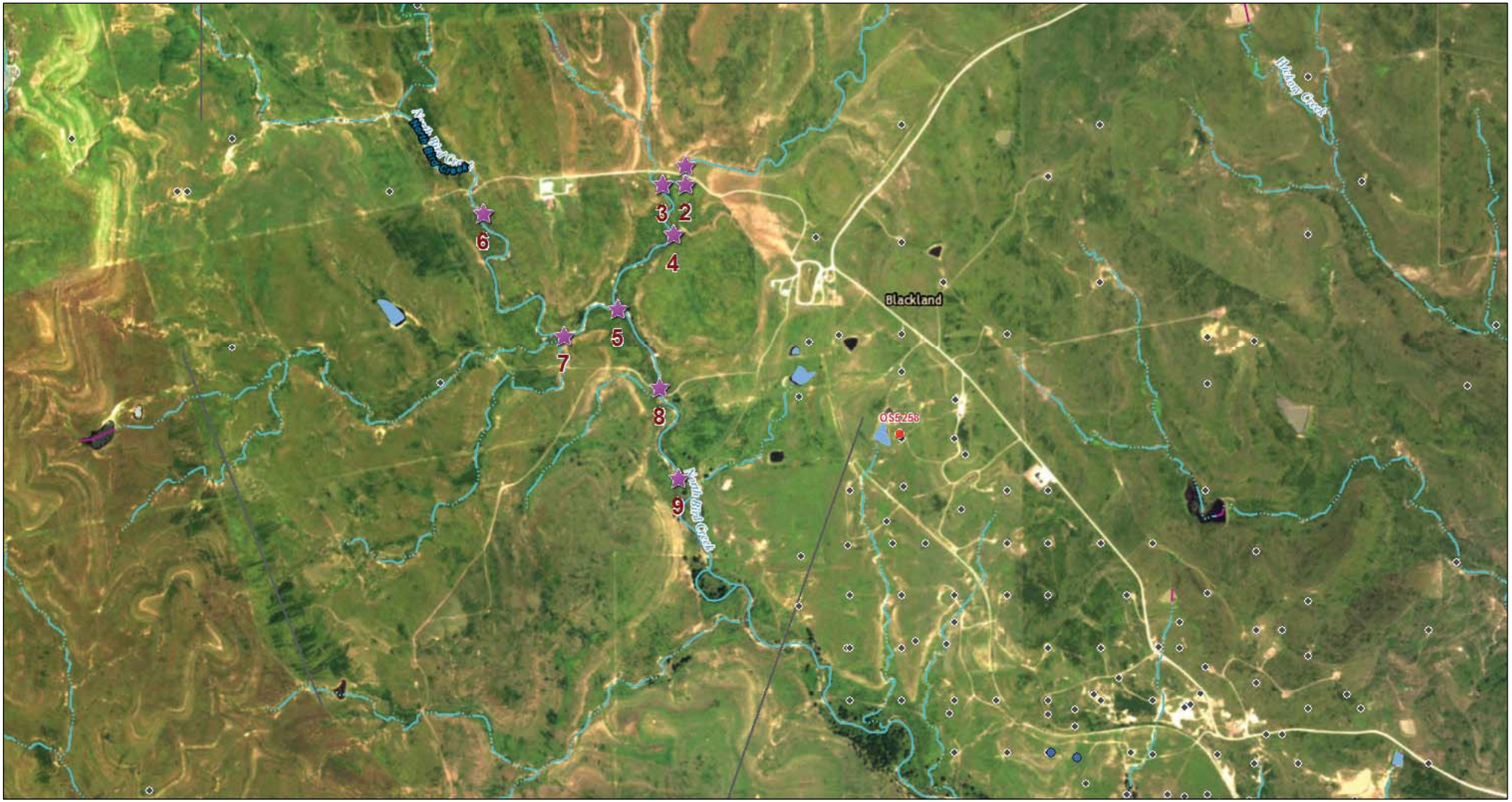
0 0.5 1 2 km

USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,

Jeanne Eckhart

USDA FSA, Microsoft | Esri, HERE, Garmin | USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.

Monitoring Locations in North Bird Creek Area, Osage County, Oklahoma



May 10, 2017

1:18,056

0 0.225 0.45 0.9 mi

0 0.35 0.7 1.4 km

In-Stream Water Monitoring Proposed Locations

Active Injection Wells of Concern

Bird Creek All Injection Wells

Active

Inactive

Production Wells - Status Unknown

Osage County Fault Lines

USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,

Jeanne Eckhart

USDA FSA, Microsoft | Esri, HERE, Garmin, iPC | USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.

Monitoring Locations in North Bird Creek Area, Osage County, Oklahoma

May 10, 2017

1:4,514

0 0.05 0.1 0.2 mi

0 0.075 0.15 0.3 km

In-Stream Water Monitoring Proposed Locations

Livestock Usage Interpretation of TDS

Avoid Use (7,000 to 10,000 ppm TDS)

Unsafe (>10,000 ppm TDS)

Production Wells - Status Unknown

USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,

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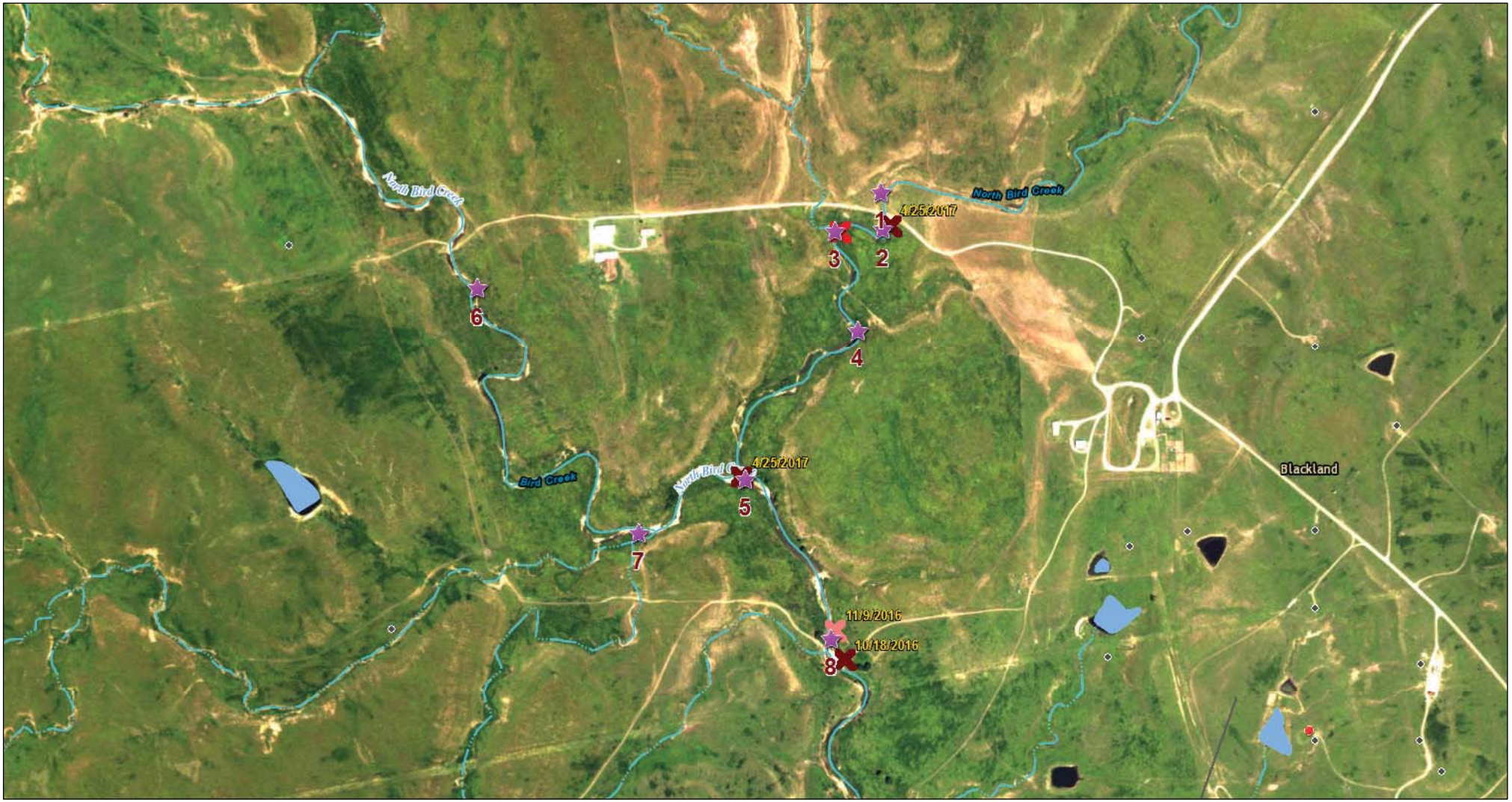
USDA FSA, Microsoft | Esri, HERE, Garmin, iPC | USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.

Monitoring Locations in North Bird Creek Area, Osage County, Oklahoma



May 10, 2017

1:9,028

0 0.1 0.2 0.4 mi

0 0.175 0.35 0.7 km

In-Stream Water Monitoring Proposed Locations

Livestock Usage Interpretation of TDS

Semi-Marginal (5,000 to 6,999 ppm TDS)

Avoid Use (7,000 to 10,000 ppm TDS)

Unsafe (>10,000 ppm TDS)

Active Injection Wells of Concern

Bird Creek All Injection Wells

Active

Production Wells - Status Unknown

Osage County Fault Lines

USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,

Jeanne Eckhart

USDA FSA, Microsoft | Esri, HERE, Garmin, iPC | USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.

Monitoring Locations in North Bird Creek Area, Osage County, Oklahoma

May 10, 2017

1:9,028

0 0.1 0.2 0.4 mi

0 0.175 0.35 0.7 km

In-Stream Water Monitoring Proposed Locations

Livestock Usage Interpretation of TDS

- Semi-Usable (1,000 to 2,999 ppm TDS)
- Marginal (3,000 to 4,999 ppm TDS)
- Semi-Marginal (5,000 to 6,999 ppm TDS)
- Unsafe (>10,000 ppm TDS)
- Active Injection Wells of Concern

Bird Creek All Injection Wells

- Active
- Inactive
- Production Wells - Status Unknown

Osage County Fault Lines

USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,

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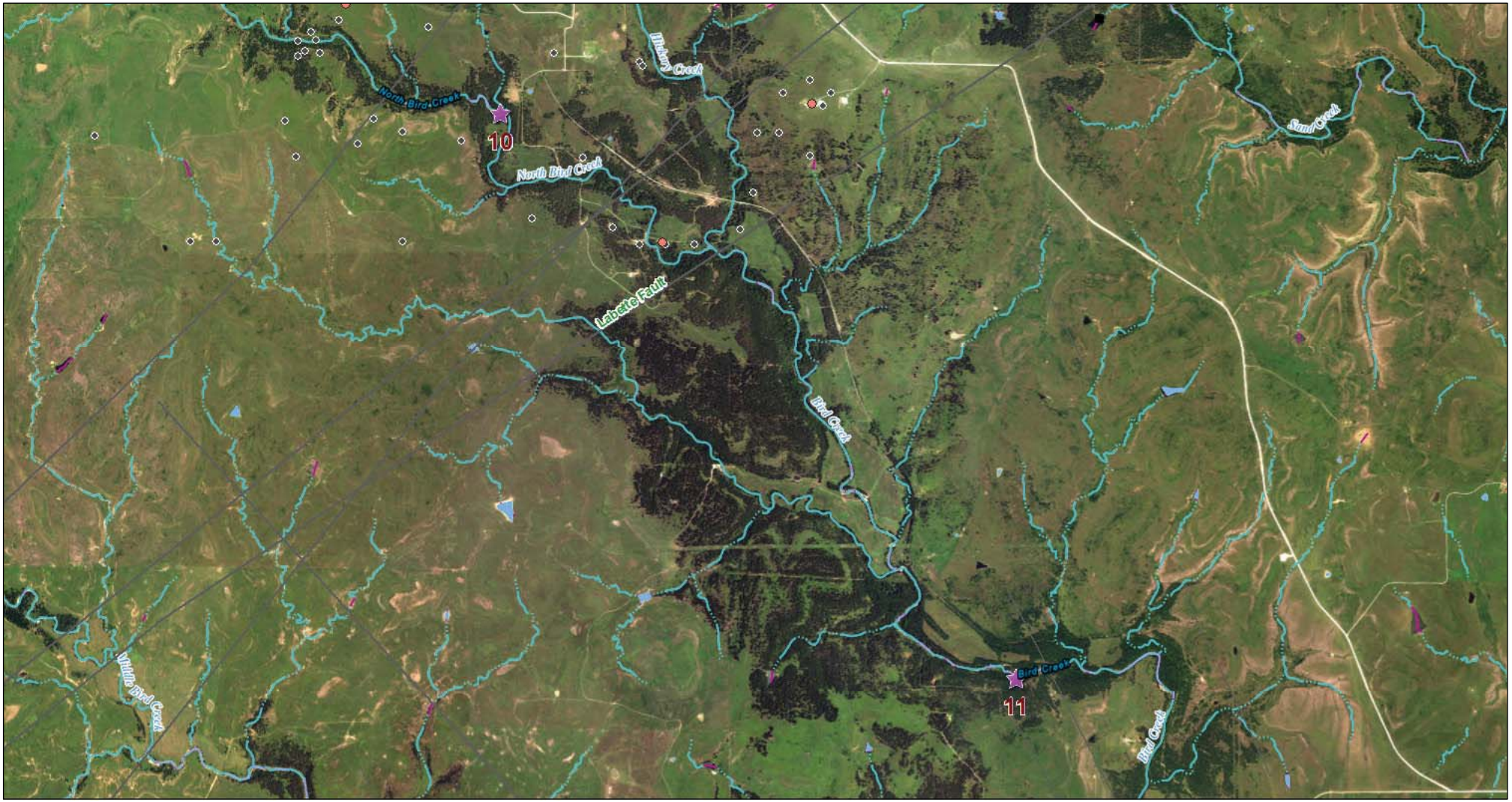
Monitoring Locations in North Bird Creek Area, Osage County, Oklahoma



May 10, 2017

1:36,112

0 0.45 0.9 1.8 mi

0 0.5 1 2 km

In-Stream Water Monitoring Proposed Locations

Bird Creek All Injection Wells

- Active
- Production Wells - Status Unknown

Osage County Fault Lines

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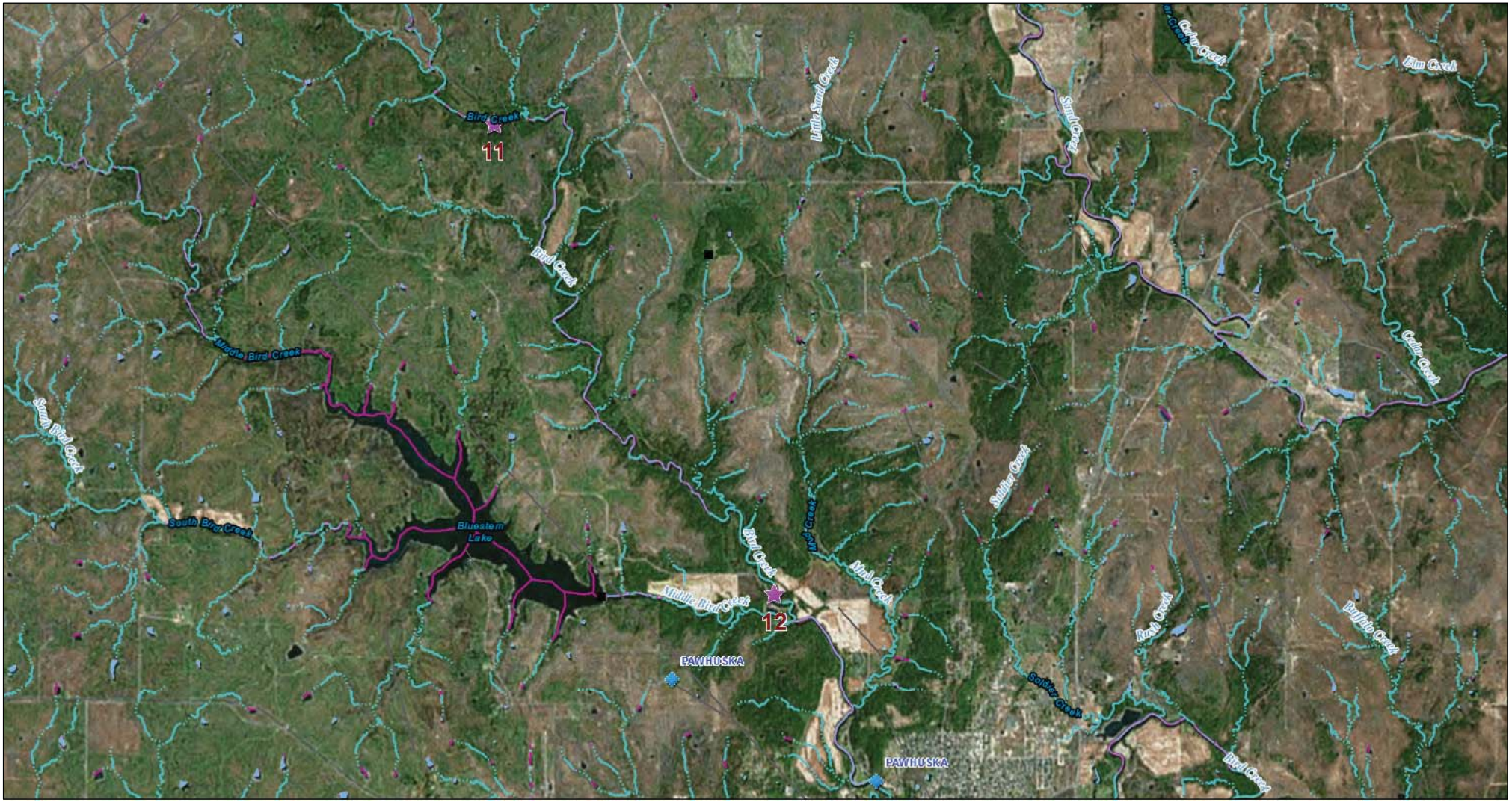
USDA FSA, Microsoft | Esri, HERE, Garmin | USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.

Monitoring Locations in North Bird Creek Area, Osage County, Oklahoma



May 10, 2017

1:72,224

0 0.75 1.5 3 mi

0 1.25 2.5 5 km

In-Stream Water Monitoring Proposed Locations

Public Water Supply (PWS)

Osage County Fault Lines

USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,

Jeanne Eckhart

Earthstar Geographics, CNES/Airbus DS | Esri, HERE, Garmin | USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.

APPENDIX B: Table 1 – Proposed In-Stream Sampling Locations

In Stream Monitoring Proposed Locations

(SE 11-Range 25 - Township 11) near Pawhuska, Osage County, Oklahoma

Probe types: Hobo Instream monitoring probe (takes higher conductivity readings) and YSI instream probe (only takes low conductivity readings)

Location Number (for reference purposes)	Probe Types Needed:	Latitude	Longitude	Locational Comment	Priority of Location	Comments
1	HOBO	36.832778	-96.498622	Upstream (Background)	High	
2	HOBO and YSI	36.832133	-96.498583	Pool 1 - downstream of culverts	High	
3	HOBO and YSI	36.832106	-96.499594	Pool 2 - downstream of culverts	High	
4	HOBO and YSI	36.830392	-96.499114	Approx. 0.2 miles downstream of Pool 1	Medium	
5	HOBO and YSI	36.827808	-96.501533	Approx. 1/2 mile downstream of Pool 1	High	
6	HOBO	36.831117	-96.507319	Upstream 2 (Background)	High	
7	HOBO	36.826883	-96.503839	Upstream 3 (Background)	Low	
8	HOBO and YSI	36.825061	-96.499694	Approx. 0.7 miles downstream of Pool 1	High	
9	HOBO	36.821951	-96.498898	Approx. 1 mile downstream of Pool 1	Medium	
10	HOBO	36.799481	-96.458742	Approx. 4.7 miles downstream of Pool 1	Medium	Different landowner
11	HOBO	36.760428	-96.414231	Approx. 10.6 miles downstream of Pool 1	Medium	Different landowner
12	HOBO	36.695311	-96.365947	Approx. 18.7 miles downstream of Pool 1	High	Do we need to put a HOBO monitor here too? Different landowner

** All monitoring locations dependent on site conditions during in-stream monitoring set up

APPENDIX C: Equipment Inventory

Items #	Description	EPA Decal #	Serial #	Acquisition Cost
	YSI 6920 Data Sonde	926119	98H1754AA	
	YSI 6920 Data Sonde	926110	98F0902AB	
	YSI 6920 Data Sonde	926104	98F0952AA	
	YSI 6920 Data Sonde	926160	05M1623AC	
	YSI 6920 Data Sonde	926107	98F0853AC	
	YSI 6920 Data Sonde	926108	98F0902AC	
	YSI 6920 Data Sonde	926129	01F0063AA	
	YSI 6920 Data Sonde	926161	051858AA	
	YSI 6920 Data Sonde	926154	04J16151AA	
	YSI 6920 Data Sonde	S15750	08J100335	
	YSI Handheld Controller			
	HOBO Data Logger		10405474	
	HOBO Data Logger		10405475	
	HOBO Data Logger		10212846	
	HOBO Data Logger		10212844	
	HOBO Data Logger		10405481	
	HOBO Data Logger		10212851	
	HOBO Data Logger		10212869	
	HOBO Data Logger		10212870	
	HOBO Data Logger		10212841	
	HOBO Data Logger		10212848	
	HOBO Data Logger		10212847	
	HOBO Data Logger		10212857	
	HOBO Shuttle		9788856	
	HOBO Coupler2-C			
	HOBO Protective Rubber Caps - 12			

APPENDIX D: Approved Health and Safety Plan (HASP)

HEALTH AND SAFETY PLAN

GENERAL INFORMATION	
Company/Facility Name or Site Location:	Inspection (Bird Creek) near Pawhuska, Oklahoma Site GPS: 32.495353, -94.854310
Description of Activities:	Oil and Gas; Produced Water Inspection(s)
Date(s):	05/15/2017 - 05/19/2017; 05/22/2017 - 05/26/2017; 05/29/2017 - 06/02/2017
Personnel & Contact Numbers:	Carl Wills (x7276), Chris Lister(x6672), and Jeanne Eckhart (x8174)

EMERGENCY INFORMATION	
Non-911 Emergency Phone: (Direct to police, fire, hospital and Facility)	Police: (918) 287 - 3131, Osage County Sherrif Office, Pawhuska, Oklahoma Fire: (918) 287 - 1234, Pawhuska Fire Dept., Pawhuska, Oklahoma Hospital: (918) 287 - 3232, Pawhuska Hospital, Inc. (24 HR ER), Pawhuska, Oklahoma Facility: (918) 557 - 1615
Site Specific Emergency Responder Procedures:	If the emergency is minor, take the injured to the hospital. If the emergency is major, call 911; when in doubt, call 911.
Medical Facilities: (Name and Address)	**Pawhuska Hospital, Inc.** **1101 East 15th Street, Pawhusak, Oklahoma 74056**
Directions to Local Medical Facilities:	(see attached map with directions)

EHS RESOURCES	Name	Work Phone	Cell
R6 SHEMP Manager:	Kendra Gomez	(214) 665-7225	(214) 205-7643
Workmen's Comp Manager:	Yolanda Nixon	(214) 665-2738	(214) 402-0230
Supervisor:	Willie Lane	214-665-8460	469-236-7031

HAZARDS & SAFETY			
Applicable JHA: (attached)	**Gas/Oil Well Site Inspection (Clean Water Act)**		
Check Potential Hazards:			
☐ Radiation	☒ Toxics	☒ Fire/Explosion	☐ Corrosives
☐ O_2 Deficiency	☒ Noise	☒ Physical	☒ Biological
☒ Dusts	☒ Heat/Cold Stress	☐ Other:	
Hazard Description: (i.e. potential hazards, routes of entry, quantity of chemicals present, etc.)	In stream surface water monitoring in a rural area;		
Safety Monitoring Equipment Required: (list equipment)	H2S monitor, gloves, waders, steel toed boots, snake guards, rubber boots, hard hat, and safety goggles		
Use of Emergency Escape Respirator Required:	☐ Yes ☒ No		
Prevention:	*All site safety procedures shall be followed. Areas with potential exposure to chemical, physical and explosive hazards shall be avoided if at all possible. Team members shall not enter confined spaces or areas with potential unexploded ordinance. In case of emergency, all inspection staff shall exit and allow site personnel to contain and manage incident.*		
Safety Supplies:	Reference attached JHA		

Company/Facility Name or Site Location:	Stream monitoring - Pawhuska, Osage County, Oklahoma
Date(s):	05/15/2017 - 05/19/2017; 05/22/2017 - 05/26/2017; 05/29/2017 - 06/02/2017

This site HASP has been reviewed and constitutes the minimum anticipated safety requirements for personnel engaged in field activities at this project site.

By signing below, I certify that I have read and understand the JHA applicable to this HASP, have completed all required health and safety training, and possess all required personal protective equipment.

Project Leader:	Carl Wills		05/08/17
	Print	*Signature*	*Date*
Team Member(s):	Chris Lister		5/8/2017
	Print	*Signature*	*Date*
	Jeanne Eckhart		5/8/2017
	Print	*Signature*	*Date*
	Print	*Signature*	*Date*
	Print	*Signature*	*Date*

Section Chief:	Willie Lane	*Phone:*	214-665-8460
	Lane, Willie Digitally signed by Lane, Willie Date: 2017.05.08 11:44:47 -05'00'		
	Signature		*Date*

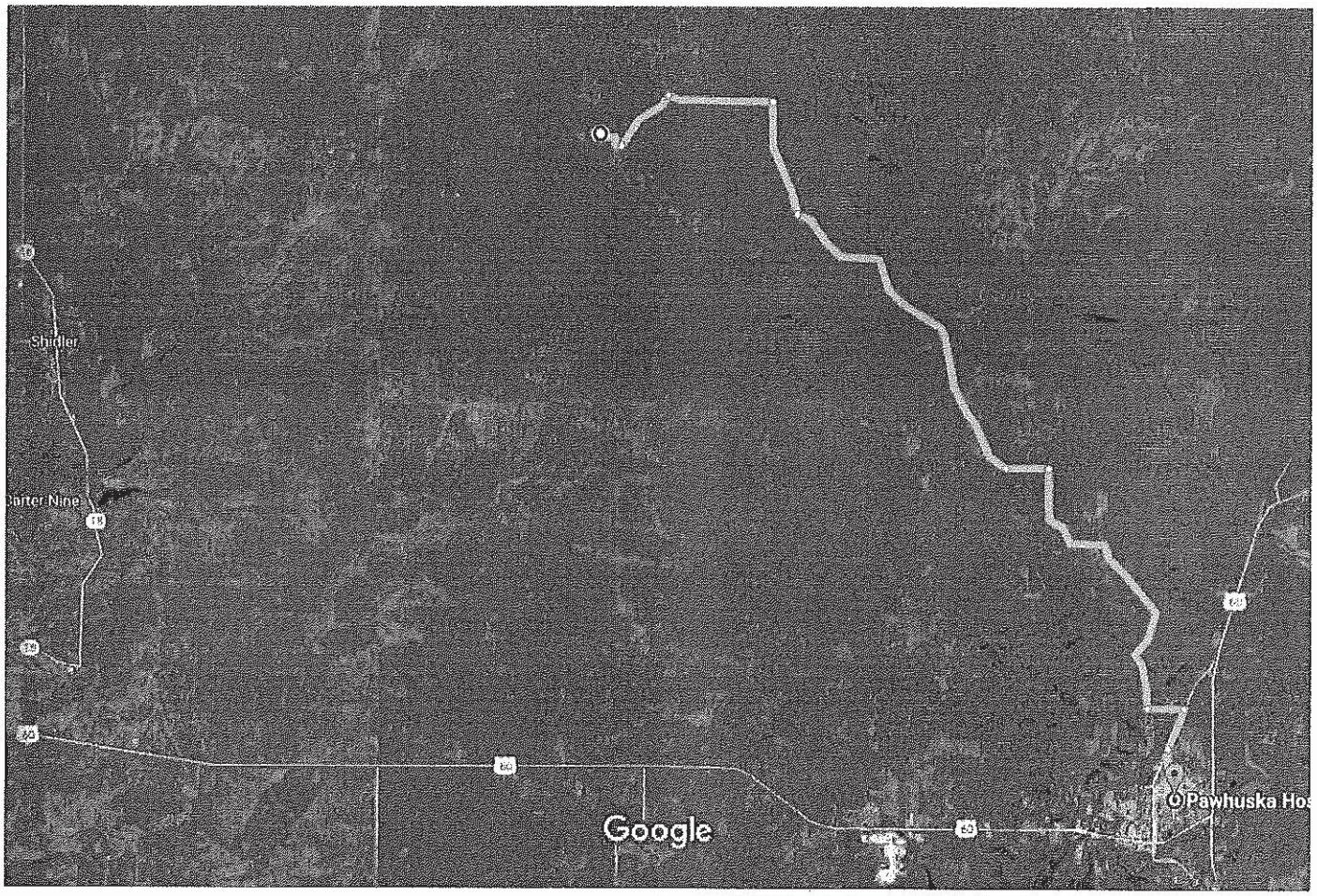
☑ Approved ☐ Disapproved

Health & Safety Officer:	Kendra C. Gomez	*Phone:*	(214) 205-7643
			5-10-17
	Signature		*Date*

NOTE: ***After approval of the HASP and before departing to the field, the project leader must provide a copy to his/her supervisor and email a signed PDF copy to the QA Officer. The project leader must carry and maintain a signed hardcopy in the field and have it accessible for all team members.***

Google Maps 36°49'56.18"N, 96°29'54.70"W to Pawhuska Hospital Drive 19.6 miles, 38 min

Bird Creek Area to Hospital



Imagery ©2017 Google, Map data ©2017 Google 2 mi

36°49'56.18"N, 96°29'54.70"W

Take Co Rd 4201 to Lynn Rd/Old US Hwy 60 in Pawhuska

34 min (17.9 mi)

1. Head east toward Co Rd 4450 — 0.5 mi
2. Turn left onto Co Rd 4450 — 1.2 mi
3. Turn right onto Co Rd 4650 — 1.8 mi
4. Turn right onto Co Rd 4201 — 1.9 mi
5. Turn left to stay on Co Rd 4201 — 5.9 mi
6. Slight left onto Co Rd 4220 — 0.7 mi

7. Turn right onto Co Rd 4201

5.2 mi

8. Turn left onto Co Rd 4070/Hog Hill
   Continue to follow Co Rd 4070

0.6 mi

9. Turn right onto Lynn Rd/Old US Hwy 60
   Continue to follow Lynn Rd

54 s (0.7 mi)

Follow McKenzie Rd to E 15th St in Pawhuska

3 min (0.9 mi)

10. Slight left onto McKenzie Rd

0.8 mi

11. Turn left onto E 15th St
    Destination will be on the left

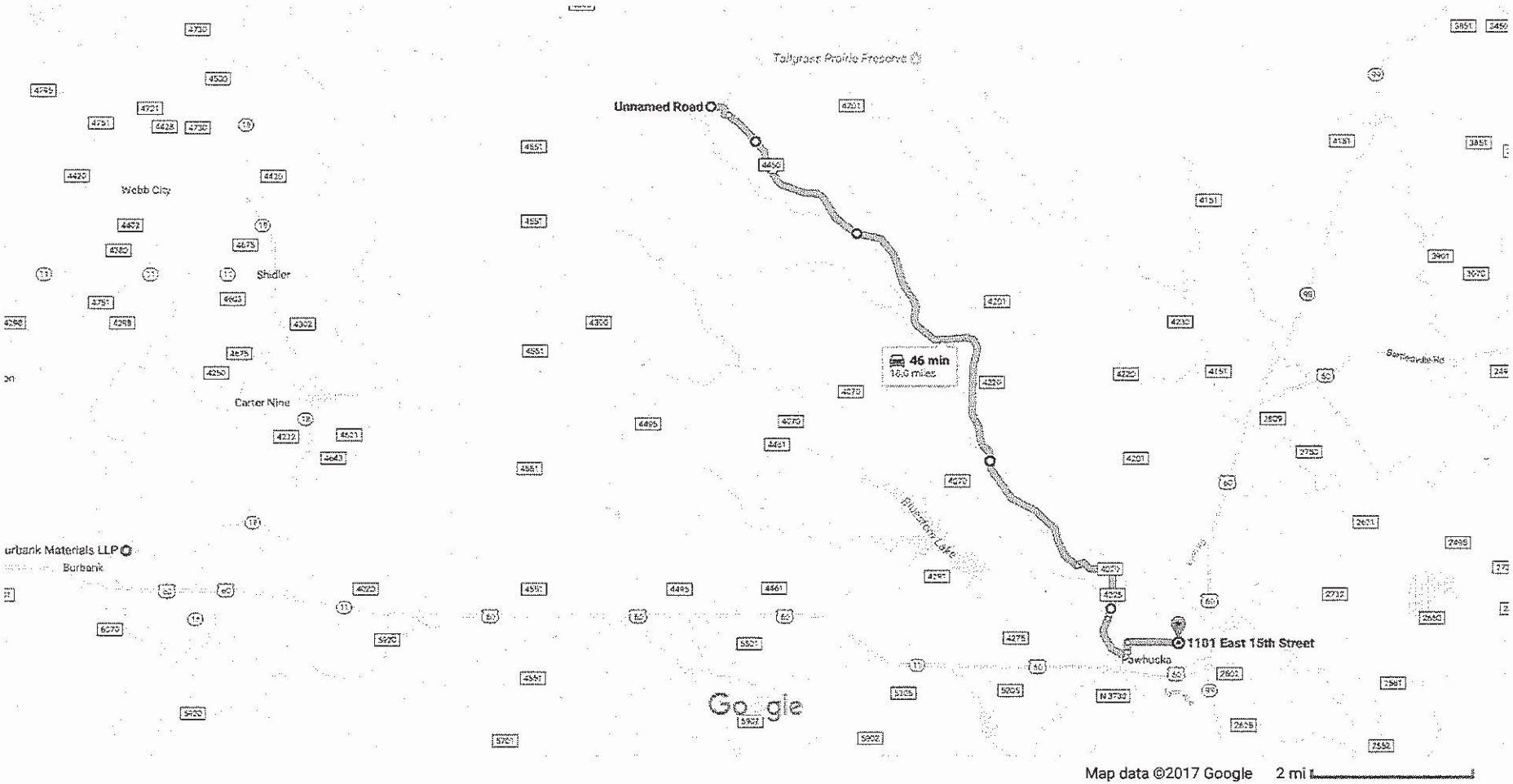
476 ft

Pawhuska Hospital

1101 E 15th St, Pawhuska, OK 74056

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Google Maps Unnamed Road, Shidler, OK 74652 to 1101 E 15th St, Pawhuska, OK 74056 Drive 18.0 miles, 46 min



Unnamed Road

Shidler, OK 74652

1. Head east toward Co Rd 4450 — 0.6 mi
2. Turn right onto Co Rd 4450 — 1.5 mi

3. Sharp right — 367 ft
4. Turn left — 11.6 mi
5. Turn left onto Co Rd 4070 — 0.8 mi
6. Turn right onto Co Rd 4225 — 1.1 mi
7. Continue onto Old Lake Rd — 1.0 mi
8. Turn left onto Tinker Ave — 413 ft
9. Turn right onto W 11th St — 144 ft
10. Turn left onto West Ave — 0.2 mi
11. Turn right onto W 15th St — 1.0 mi

1101 E 15th St
Pawhuska, OK 74056

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

JOB HAZARD ANALYSIS

Hazard Types (HT)

1. Toxic Chemic
2. Flammable Chemicals
3. Corrosive Chemicals
4. Environmental
5. Explosion (Chemical Reaction)
6. Explosion (Over pressurization)
7. Mechanical/Vibration
8. Electrical (Shock, Short Circuit)
9. Electrical (Fire)
10. Electrical (Static, ESD)
11. Electrical (Loss of Power)
12. Ergonomic (Overexertion)
13. Ergonomic (Human Error)
14. Vibration
15. Fall (Slips/Trips)
16. Fall (To a Different Level)
17. Excavation (Collapse)
18. Fire, Heat, Thermal, Cold
19. Noise
20. Radiation (Ionizing/Non-Ionizing)
21. Visibility
22. Weather
23. Caught (In, On, Between)
24. Struck (By, Against)
25. Driving
26. Confined Space
27. Other

Job Task: Concentrated Animal Feeding Operation (CAFO) Inspection

Job Frequency/Duration:
10/year; 3 hr - 1 day/site;
May conduct several site inspections during one trip

Tools Used:
Digital Camera
GPS (occasionally)
Cell Phone
Laptop
Calculator

Chemicals Used:
None

CRITICAL TO SAFETY (CTS)

Risk Estimation Matrix

Probability of Occurrence of Harm	SEVERITY OF HARM			
	Catastrophic	Serious	Moderate	Minor
VERY LIKELY	Extreme	High	High	Medium
LIKELY	High	High	Medium	Low
UNLIKELY	Medium	Medium	Low	Negligible
REMOTE	Low	Low	Negligible	Negligible

* High = CTS tasks should receive engineering controls prior to assigning administrative or PPE controls.

Job Description: Personnel conduct compliance evaluations to determine compliance with permit and/or regulatory requirements. Areas of concerns at CAFO sites include the process areas (i.e. animal pens, milking barns, feed storage, equipment areas, lagoons, and fuel tanks) and the land management units (i.e. land application sites for waste water and manure).

Step #	Procedures (LOP Procedure Step)	Potential Hazards	HT	Check CTS	Required Safe Practice	PPE
1	Conduct file review; develop site-specific Health & Safety Plan; Consult with appropriate EPA Enforcement Officer. Contact either the State Veterinarian or Animal Plant Health Inspection Service to determine potential diseases with CAFO site.	None	NA	NA	NA	NA
2	Orgainze personnel/equipment/supplies; Deploy to location either by car or airplane (personnel drive the majority of times).	Ergonomics, Driving, Weather	13, 21, 22, 24, 25	Medium	Careful lifting techniques, secure grip, packing at desk level or higher; Drive defensivly; do not text while driving	None
3	Prior to site entry, personnel notify owner/operator of their presence. Ensure appropriate biosecurity measures are implemented.	None	NA	NA	NA	NA
4	Site Entry: Personnel conduct opening meeting with site personnel. Personnel then begin to inspect the CAFO site for unpermitted discharges and/or ensure best management practices are being followed at process areas and land management units. Throughout this process, personnel must adhere to biosecurity measures. Personnel may observe the site on foot or by vehicle. Personnel may, at times, conduct sampling of soils, well waters, and wastes.	Insects, chemicals, thermal/cold stress, , slips/trips/falls, biological, electricity	4, 8, 15, 18, 22, 27	Medium	Reference table below and PPE Hazard Assessment Form	
5	At the conclusion of the inspection, personnel conduct an exit meeting with facility personnel to discuss discrepancies.	None	NA	NA	NA	NA
6	If applicable, personnel drive to next industrial facility the following day and repeat steps 3 – 5 above. If not, personnel proceed to step 7 below.	Reference Steps 3 - 5				
7	At completion of visit, return to Regional Office and proceed with post inspection procedures (administrative in nature).	Ergonomics, Driving, Weather	13, 21, 22, 24, 25	Medium	Careful lifting techniques, secure grip, unpacking at desk level or higher; Drive defensivly; do not text while driving	None

HAZARDS—NOTE ALL POTENTIAL HAZARDS ASSOCIATED WITH THE JOB (CHECK ALL THAT APPLY)

Physical						
General	☒	heat	☒	cold	☐	noise
	☐	explosion	☐	fire	☒	weather
	☐	fatigue	☐	violence	☒	illness/injury
Radiation	☐	ionizing	☐	microwave	☐	light
Vehicles	☒	traffic	☐	heavy equip	☐	forklift
	☐	helicopter	☐	small aircraft	☐	boat
Boat Ops	☐	sediment sampling	☐	rapid water	☐	open water
	☐	diving	☐	electrofish		
Industrial	☐	comp gas	☒	electricity	☐	confined space
	☐	equip	☐	moving parts		
Overhead	☐	obstruction	☐	falling objects		
Elevation	☐	roof	☐	scaffold	☐	ladder
	☐	stairs	☐	catwalk		
Slips/trips	☒	terrain	☒	debris	☒	slippery
	☐	trench	☒	pits/holes		
Other physical hazards:			☐			

Biological						
Agriculture	☒	CAFO	☐	fish	☒	farm animals
Animals	☒	dogs	☒	feral animals	☒	snakes
Insects	☒	spiders	☒	mosquitoes	☒	wasp/hornet
	☒	bees				
Pathogens	☐	bloodborne	☒	sewage	☐	med/lab
Other Biological:	☒	Animal manure, poisonous plants				

Chemical						
Containers	☒	ammonia	☐	chlorine	☐	other
VOCs	☐	solvents	☒	fuel	☒	oils
Wastes	☐	sewer	☐	landfill	☐	smoke/dust/fume
	☐	metals	☐	PCBs	☐	paints/surfacing
Particulates	☐	fibers	☒	diesel	☐	asbestos
Sampling	☐	acids	☐	bases		
Other Chemicals:	☒	Fertilizers and fly bait				

REQUIRED PERSONAL PROTECTIVE EQUIPMENT (PPE) (CHECK ALL THAT APPLY)

Feet:	☐	safety boots	☒	steel-toe boots	☐	shank
	☐	rubber boots	☐	waders	☒	Other: booties
Gloves:	☐	leather	☐	cotton	☐	cut-resistant
	☐	chemical resist	☒	disposable (nitrile or neoprene)		
Body:	☐	safety vest	☐	pfd	☐	harness
	☒	tyvek	☐	sarnex-tyvek	☐	coveralls
Eyes:	☒	safety glasses	☒	sunglasses	☐	goggles
Head:	☒	hard hat	☐	hearing protection	☐	respirator

OTHER REQUIRED SAFETY EQUIPMENT/TRAINING

☐	dosimetry	☒	communication	☐	decon
☐	first aid kit	☐	fire extinguish	☐	flares
☐	chains/studs	☐	eye wash/shower		

☐	24 hr HAZWOPER	☐	40 hr HAZWOPER	☐	HAZWOPER Annual Refresher
☐	TLD Program	☐	RPP Program	☒	Medical Surveillance
☒	1st Aid/CPR	☒	Other: 1) EPA 24hr Health & Safety Training; 2) Annual EPA H&S Refresher; 3) Defensive Driving (every 3 yrs)		

COMMENTS:

Personnel may be potentially exposed to various chemicals during inspections; however, potential exposures would only occur in the event of spills/leaks/releases. Chemicals primarily include ammonia, in refrigerated holding areas, fuels, oils, fertilizers, and fly bait. Due to the small quantity and limited duration, potential chemical exposures are negligible. Biological hazards are viable; however, personnel implement biosecurity measures to reduce potential exposures. Some biosecurity measures include PPE, such as booties, and administrative controls, such as not entering animal houses and pens. Employees engage in field activities during all types of weather conditions, to include extreme heats. Thermal stress is a viable hazard; therefore personnel must ensure adequate hydration and appropriate field gear is worn while engaging in field activities. In addition, field acitivies are conducted on various terrain and in remote locations where pits, holes, and trenches are encountered. Personnel need to be cognizant of their surroundings and take evasive actions to avoid contact with such hazards. Electrical and barbwire fences are also potential hazards. REFERENCE PPE HAZARD ASSESSMENT FORM FOR SPECIFIC EXPLANATION OF HAZARDS ASSOCIATED WITH THIS JOB HAZARD ANALYSIS.

CERTIFICATION OF HAZARD ASSESSMENT

SUPERVISOR: DATE: 4-23-15

SAFETY/HEALTH REPRESENTATIVE: DATE: 3-31-15

PPE Hazard Assessment Form

HEALTH AND SAFETY HAZARDS		
Chemical Hazards		**Description/Mitigation**
X	Vapors/gases	Personnel may be potentially exposed to various chemicals during inspections; however, potential exposures would only occur in the event of spills/leaks/releases.
X	Liquid splash	Personnel may be potentially exposed to various chemicals during inspections; however, potential exposures would only occur in the event of spills/leaks/releases.
Comments:		Chemicals primarily include ammonia, in refrigerated holding areas, fuels, oils, fertilizers, and fly bait. Due to the small quantity and limited duration, potential chemical exposures are negligible.
Physical Hazards		**Description/Mitigation**
X	Ergonomics	Personnel may experience repetitive motions, frequent or heavy lifting, pushing, pulling, or carrying of heavy objects; and prolonged awkward postures. Vibration and cold may add risk to these work conditions. The level of risk depends on the intensity, frequency, and duration of the exposure to these conditions. Careful lifting techniques along with secure grips and packing at desk level or higher will reduce potential exposures.
X	Heat —high temperatures	Employees engage in field activities during all types of weather conditions, to include extreme heats. Heat stress is a viable hazard; therefore personnel must ensure adequate hydration and appropriate field gear (light weight, loose fitting and light-colored clothing) is worn while engaging in activities. Personnel should be trained on the signs and symptoms of heat stress, heat stroke, and heat exhaustion and understand corrective measures to take.
X	Cold ---cold temperatures	Employees engage in field activities during all types of weather conditions, to include cold weather. Although field activities are performed in termperate climates, cold weather may be a potential hazard. Therefore personnel must ensure adequate hydration and appropriate field gear (layers, protecting the extremities especially fingers, toes, nose, and ears) is worn while engaging in activities. Personnel should be trained on the signs and symptoms of frost bite and hypothermia and understand corrective measures to take.
X	Electricity	Employees may be exposed to electrical fences during routine activities. Maintain a safe distance from all electrical components. If exposed lines are present, do not touch any metal objects/equipment nor stand in nearby pools/puddles of water. Personnel adhere to site-specific safety procedures to reduce potential exposures.
X	Slips/Trips/Falls	Field acitivies are conducted outside where pits, holes, and various terrains are encountered. Personnel need to be cognizant of their surroundings, utilize steel-toed safety boots, and take evasive actions to avoid contact with such hazards.
X	Other	Vehicular accidents and traffic are potential hazards encountered while driving to and from sites. Personnel are required to take Defensive Driving Training every 3 years.
Biological Hazards		**Description/Mitigation**
X	Animals/Insects	Employees may encounter a variety of insects and snakes while in the field. These include snakes, mosquitos, bees, wasps, spiders, feral animals, and various wildlife. Personnel are not to engage animals no matter how friendly they seem and utilize the buddy system at all times. Personnel should wear appropriate field gear depending upon the location (e.g. long sleeves, long pants, snake chaps, insect repellent, etc). Personnel ned to be cognizant of their surroundings and take evasive actions to avoid contact with such animals/insects.
X	Other	Employees are often in remote locations, in which poison ivy and other poisonous plants are present. In addition, personnel are potentially exposed to animal manuer and raw wastewater. Personnel adhere to strict biosecurity measures to reduce potential biological exposures. Personnel wear booties and/or tyvek suits and nitrile/neoprene gloves to protect against biological contamination. Also, personnel must be trained to ensure they are aware of the surroundings and avoid plants to prevent injury/iillness.

Completed by: Kendra Gomez & Willie Lane **Date: September 8, 2011**
Updated by: Kendra Gomez **Date: November 4, 2014**
SHEMP Review _____ **Date:** 3-31-15

Required Personal Protective Equipment

Where engineering and administrative controls are not feasible or sufficient for controlling hazards, PPE must be used to protect workers. The following PPE is required for the noted tasks above:

Eye and Face Protection			
X	Safety glasses with side shields		Reflective goggles/face shield
	Chemical splash goggles		Cutting/brazing/welding eye protection
	Face shield	X	Other: Sunglasses
Head Protection			
X	Hard hat		Helmet, cowl, hood
	Welding helmet/mask	X	Other: Hats to protect from sun exposures
Foot Protection			
X	Steel-toed safety boots	X	Other: booties to prevent biological cross-contamination
	Chemical-resistant boots		
Body Protection			
	Apron (splash, work)		Head-reflective garments
	Lab coat		Sleeves (cut-resistant)
X	Coveralls (work, chemical-resistant) Type chemical: Biological Type coverall: Tyvek	X	Other: Appropriate field gear for the weather (thermal/cold stress)
Respiratory Protection			
	Respirator		Type of respirator:
Hand Protection			
	Rubber insulating gloves		Rubber insulating sleeves
	Rubber insulating hoods	X	Other: Nitrile or neoprene gloves for use against biological contaminants

Other:
Sunscreen *(personal issue item)*
Insect repellent *(personal issue item)*

HEALTH & SAFETY TRAINING REQUIREMENTS

EPA employees (without HAZWOPER training) must have at a **minimum** the following:

Course Name	Training Location	Training Frequency
24hr EPA H&S Training for Field Activities (OTH 952)	Skillport Website	Initial – One time
8hr EPA H&S Training for Field Activities Refresher (OTH 952) that includes the following modules: • EPA's Occupational Health and Safety Program • Planning and Preparation for Field Activities • Hazard Communication • Occupational Noise • Heat and Cold Stress • Human Factors/ Ergonomics • Biological Safety • Natural Hazards • Personal Protective Clothing and Equipment	Skillport Website (EPA E-Learning)	Annual
Defensive Driving	GSA Website	Every 3yrs
First Aid/CPR	In-Class	Every 2yrs

EPA employees who **maintain HAZWOPER certification** are required to have the following:

Course Name	Training Location	Training Frequency
24/40 hr HAZWOPER Training	In-Class	Initial – One time
8hr HAZWOPER Refresher	In-Class	Annual
Defensive Driving	GSA Website	Every 3yrs
First Aid/CPR	In-Class	Every 2yrs

OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAM (OMSP)

Employees enrolled in the OMSP will receive their periodic exam under Work Order 080, "NPDES Inspectors".

CAFO INSPECTION

I HAVE READ OR BEEN BRIEFED ON THE HAZARDS AND PROTECTIVE MEASURES IDENTIFIED FOR THE ABOVE-LISTED TASKS AND FULLY UNDERSTAND THE JOB-SPECIFIC REQUIREMENTS THAT HAVE BEEN ESTABLISHED.			
DATE	EMPLOYEE NAME	EMPLOYEE SIGNATURE	EMPLOYER NAME
04/23/2015	Carl E. Wills	Carl E. Wills	U.S. EPA
4/23/2015	Chris A. Lister	Chris A. Lister	U.S. EPA
4/23/2015	Abu Senkayi	A Senkayi	EPA
4/23/2015	Juan Barra	Juan Barra	EPA
5/13/2015	Paul Juarez	Paul Juarez	EPA
5-21-15	Shellita Garrett	Shellita Garrett	EPA Saunders GEN

JOB HAZ D ANALYSIS

Hazard Types (HT)

1. Toxic Chemic
2. Flammable Chemicals
3. Corrosive Chemicals
4. Environmental
5. Explosion (Chemical Reaction)
6. Explosion (Over pressurization)
7. Mechanical/Vibration
8. Electrical (Shock, Short Circuit)
9. Electrical (Fire)
10. Electrical (Static, ESD)
11. Electrical (Loss of Power)
12. Ergonomic (Overexertion)
13. Ergonomic (Human Error)
14. Vibration
15. Fall (Slips/Trips)
16. Fall (To a Different Level)
17. Excavation (Collapse)
18. Fire, Heat, Thermal, Cold
19. Noise
20. Radiation (Ionizing/Non-Ionizing)
21. Visibility
22. Weather
23. Caught (In, On, Between)
24. Struck (By, Against)
25. Driving
26. Confined Space
27. Other

Job Task: Gas/Oil Well Site Inspection (Clean Water Act)

Job Frequency/Duration: 40/year; 1 day/site may conduct several site inspections during one trip

Tools Used: Conductivity meter

Chemicals Used: Calibration solution

CRITICAL TO SAFETY (CTS)

Risk Estimation Matrix

Probability of Occurrence of Harm	SEVERITY OF HARM			
	Catastrophic	Serious	Moderate	Minor
VERY LIKELY	Extreme	High	High	Medium
LIKELY	High	High	Medium	Low
UNLIKELY	Medium	Medium	Low	Negligible
REMOTE	Low	Low	Negligible	Negligible

* High = CTS tasks should receive engineering controls prior to assigning administrative or PPE controls.

Job Description: Personnel conduct site inspections at various gas and oil well sites to determine compliance with the CWA regulatory requirements.

Step #	Procedures (LOP Procedure Step)	Potential Hazards	HT	Check CTS	Required Safe Practice	PPE
1	Pre-inspection: Review site records and develop site safety plan	None	NA	NA	NA	NA
2	Orgainze personnel/equipment/supplies; Conduct pre-inspection meeting at RO; Deploy to location either by car or airplane (personnel drive the majority of times).	Ergonomics, Driving, Weather	13, 21, 22, 24, 25	Medium	Careful lifting techniques, secure grip, packing at desk level or higher; Drive defensivly; do not text while driving	None
3	Prior to site entry, personnel calibrate the conductivity meter. Generally done at warehouse prior to inspection trip.	None	NA	NA	NA	NA
4	Personnel inspect the produced water tank battery site and its perimeter to determine if a discharge has or is taking place. If unauthorized discharge is noted, If any discharges are noted, personnel communicate them to site personnel.	Insects, chemicals, thermal/cold stress, noise, slips/trips/falls, noise	1-4, 12, 15, 18, 22, 24	Medium	Reference table below and PPE Hazard Assessment Form	
5	If applicable, personnel drive to next industrial facility and repeat steps 3 – 4 above. If not, personnel proceed to step 6 below.	Reference Steps 3 &4				
6	At completion of visit, return to Regional Office and proceed with post inspection procedures (administrative in nature).	Ergonomics, Driving, Weather	13, 21, 22, 24, 25	Medium	Careful lifting techniques, secure grip, unpacking at desk level or higher; Drive defensivly; do not text while driving	None

HAZARD ASSESSMENT – LIST ALL POTENTIAL HAZARDS ASSOCIATED WITH THE JOB (CHECK ALL THAT APPLY)

Physical

General	☒	heat	☒	cold	☒	noise
	☐	explosion	☐	fire	☒	weather
	☐	fatigue	☐	violence	☒	illness/injury
Radiation	☐	ionizing	☐	microwave	☐	light
Vehicles	☒	traffic	☐	heavy equip	☐	forklift
	☐	helicopter	☐	small aircraft	☐	boat
Boat Ops	☐	sediment sampling	☐	rapid water	☐	open water
	☐	diving	☐	electrofish		
Industrial	☐	comp gas	☐	electricity	☐	confined space
	☒	equip	☒	moving parts		
Overhead	☐	obstruction	☐	falling objects		
Elevation	☐	roof	☐	scaffold	☐	ladder
	☐	stairs	☐	catwalk		
Slips/trips	☒	terrain	☒	debris	☒	slippery
	☒	trench	☒	pits/holes		
Other physical hazards:			☒	Creek banks		

Biological

Agriculture	☐	CAFO	☐	fish	☐	farm animals
Animals	☒	dogs	☒	feral animals	☒	snakes
Insects	☒	spiders	☒	mosquitoes	☒	wasp/hornet
	☒	bees				
Pathogens	☐	bloodborne	☐	sewage	☐	med/lab
Other Biological:	☒	scorpions, poisonous plants				

Chemical

Containers	☐	ammonia	☐	chlorine	☐	other
VOCs	☐	solvents	☒	fuel	☒	oils
Wastes	☐	sewer	☐	landfill	☒	smoke/dust/fume
	☐	metals	☐	PCBs	☐	paints/surfacing
Particulates	☐	fibers	☒	diesel	☐	asbestos
Sampling	☐	acids	☐	bases		
Other Chemicals:	☒	Produced waters may contain low levels of H_2S, benzene, toluene, ethylbenzene, xylene, sulfides, CO_2, liquid natural gas, methane, ethane, amine solutions, etc				

REQUIRED PERSONAL PROTECTIVE EQUIPMENT (PPE) (CHECK ALL THAT APPLY)

Feet:	☐	safety boots	☒	steel-toe boots	☐	shank
	☐	rubber boots	☐	waders		
Gloves:	☐	leather	☐	cotton	☐	cut-resistant
	☐	chemical resist	☐	disposable		
Body:	☒	safety vest	☐	pfd	☐	harness
	☐	tyvek	☐	samex-tyvek	☒	coveralls
Eyes:	☒	safety glasses	☒	sunglasses	☐	goggles
Head:	☒	hard hat	☒	hearing protection	☐	respirator

OTHER REQUIRED SAFETY EQUIPMENT/TRAINING

☐	dosimetry	☒	communication	☐	decon
☐	first aid kit	☐	fire extinguish	☐	flares
☐	chains/studs	☐	eye wash/shower		

☐	24 hr HAZWOPER	☐	40 hr HAZWOPER	☐	HAZWOPER Annual Refresher
☐	TLD Program	☐	RPP Program	☒	Medical Surveillance
☒	1st Aid/CPR	☒	Other: 1) 24hr EPA H&S Training; 2) 8hr EPA H&S Annual Refresher; 3) Defensive Driving Training (every 3yrs)		

COMMENTS:

Personnel may be potentially exposed to various chemicals while inspecting wells and storage tanks. Chemicals primarily include methane (at 80%), BTEX, sulfides, ethane, carbon dioxide, liquid natural gas, hydrogen sulfide and amine solutions. Methane is a simple asphyxiate and may displace oxygen in an enclosed space. Personal air sampling data is not available to document potential inhalation exposures. Further analysis is required. Although personnel approach these sources from upwind, the wind direction could change at any time and potential inhalation hazards are prevalent. Due to flammability within the inspection environment, fire hazards do exist and inspectors should have fire retardant clothing/overalls available for situational use Personnel are not routinely exposed to hazardous noise; however, exact sound levels are not known at this time. Further analysis is required. Sources of hazardous noise include pumps and well service vehicles. Personnel are required to wear ear plugs and/or muffs while working around hazardous noise sources. Employees engage in field activities during all types of weather conditions, to include extreme heats. Thermal stress is a viable hazard; therefore personnel must ensure adequate hydration and appropriate field gear is worn while engaging in field activities. In addition, field acitivies are conducted on various terrain and in remote locations where pits, holes, and trenches are encountered. Personnel need to be cognizant of their surroundings and take evasive actions to avoid contact with such hazards REFERENCE PPE HAZARD ASSESSMENT FORM FOR SPECIFIC EXPLANATION OF HAZARDS ASSOCIATED WITH THIS JOB HAZARD ANALYSIS.

CERTIFICATION OF HAZARD ASSESSMENT

SUPERVISOR: DATE: 4-23-15

SAFETY/HEALTH REPRESENTATIVE: DATE: 4-23-15

PPE Hazard Assessment Form

HEALTH AND SAFETY HAZARDS		
Chemical Hazards		**Description/Mitigation**
	Vapors/gases	Personnel may be potentially exposed to various chemicals while inspecting tanks and well sites. Chemicals primarily include methane (at 80%), BTEX, sulfides, ethane, carbon dioxide, liquid natural gas, hydrogen sulfide, and amine solutions. Methane is a simple asphyxiant and may displace oxygen in enclosed spaces.

Comments: Personnel approach the unit from upwind to limit potential inhalation exposures. Personal air sampling data is not available to document potential inhalation exposures. Further analysis is required. Although personnel approach these sources from upwind, the wind direction could change at any time and potential inhalation hazards are possible. Use of H_2S monitors are required.

In addition, personnel may be exposed to chemicals during an emergency release/spill/leak. VOC sensors and/or toxic vapor analyzers (Photoionization Detectors) are to be carried into the field and used whenever the inspector has knowledge, based on their best professional judgment or when so advised by the SHEMP manager, that monitoring may be needed. This prior knowledge of potential contaminants should be obtained by a thorough review of the following prior to site entry:

1. Previous case history of the site from previous EPA inspections
2. Knowledge obtained from interviewing other inspectors who had gone to this site
3. SIC code lookups
4. Company history on either the EPA site or Industry internet search
5. Past EPCRA reporting
6. Companies that have a history of past releases
7. Chemical inventories obtained from the company
8. Industrial hygiene data obtained from the company.
9. Monitoring is to be done on all uncontrolled Hazardous Waste Sites (per 29 CFR1910.120 HAZWOPER)

If exposures are expected at any time that would be ½ of the TLV or PEL (whatever is more conservative) or if monitoring equipment (carried into the field) indicates exposures at greater than or equal to this "action limit", then the inspector is required evacuate the area immediately.

Physical Hazards		**Description/Mitigation**
X	Ergonomics	Personnel may experience repetitive motions, frequent or heavy lifting, pushing, pulling, or carrying of heavy objects; and prolonged awkward postures. Vibration and cold may add risk to these work conditions. The level of risk depends on the intensity, frequency, and duration of the exposure to these conditions. Careful lifting techniques along with secure grips and packing at desk level or higher will reduce potential exposures.
X	Heat —high temperatures	Employees engage in field activities during all types of weather conditions, to include extreme heats. Heat stress is a viable hazard; therefore personnel must ensure adequate hydration and appropriate field gear (light weight, loose fitting and light-colored clothing) is worn while engaging in activities. Personnel should be trained on the signs and symptoms of heat stress, heat stroke, and heat exhaustion and understand corrective measures to take.
X	Cold —cold temperatures	Employees engage in field activities during all types of weather conditions, to include cold weather. Although field activities are performed in termperate climates, cold weather may be a potential hazard. Therefore personnel must ensure adequate hydration and appropriate field gear (layers, protecting the extremities especially fingers, toes, nose, and ears) is worn while engaging in activities. Personnel should be trained on the signs and symptoms of frost bite and hypothermia and understand corrective measures to take.
X	Struck by / Compressions — pinch, crush,	Well service vehicles may be present while personnel are conducting site inspections, which may present a potential struck-by hazard. Personnel need to be cognizant of their surroundings and take evasive actions to avoid contact with such hazards. Personnel must also wear a reflective safety vest to ensure maximum visibility to operators.
X	Noise	Personnel are routinely exposed to hazardous noise; however, exact sound levels are not known at this time. Further analysis is required. Sources of hazardous noise include pumps and well service vehicles. Personnel are required to wear ear plugs and/or muffs while working around hazardous noise sources.
X	Slips/Trips/Falls	Slips/trips/falls are always likely when walking walking through an industrial plant. In addition, many of the field acitivies are conducted outside where pits, holes, and various terrains are encountered. Personnel need to be cognizant of their surroundings, utilize steel-toed safety boots, and take evasive actions to avoid contact with such hazards.
X	Elevation - Falls	Personnel will not climb O&G tank batteries. Care should be taken when walking creek banks to protect from sloughing or falling in to creek banks. Personnel climb stairways with approriate handrails and/or ladders affixed to various units. Personnel must inspect stairways/walkways to ensure structural integrity and/or question site personnel regarding structural stability prior to climbing. As a general rule, personnel do not climb free-standing ladders.
X	Other	Vehicular accidents and traffic are potential hazards encountered while driving to and from sites. Personnel are required to take Defensive Driving Training every 3 years.

ogical Hazards	**Description/Mitigation**

X	Animals/Insects	Employees may encounter a variety of insects and snakes while in the field. These include snakes, mosquitos, bees, wasps, spiders, scorpions, etc. Personnel are not to engage animals no matter how friendly they seem and utilize the buddy system at all times. Personnel should wear appropriate field gear depending upon the location (e.g. long sleeves, long pants, snake chaps, insect repellent, etc). Personnel need to be cognizant of their surroundings and take evasive actions to avoid contact with such animals/insects.
X	Other	Employees are often in remote locations, in which poison ivy and other infectious plants are present. Personnel should remain congnizant of their surroundings and avoid plants to prevent injury/illness.

Completed by: Kendra Gomez & Willie Lane **Date: September 8, 2011**
Updated by: Kendra Gomez **Date: April 22, 2015**
SHEMP Review _____ **Date:** 4-23-15

Required Personal Protective Equipment			
Where engineering and administrative controls are not feasible or sufficient for controlling hazards, PPE must be used to protect workers. The following PPE is required for the noted tasks above:			
Eye and Face Protection			
X	Safety glasses with side shields		Reflective goggles/face shield
	Chemical splash goggles		Cutting/brazing/welding eye protection
	Face shield	X	Other: Sunglasses
Head Protection			
X	Hard hat, bump cap		Helmet, cowl, hood
	Welding helmet/mask		Other:
Foot Protection			
X	Steel-toed boots		Other:
	Chemical-resistant boots		
Body Protection			
	Apron (splash, work)		Head-reflective garments
	Lab coat		Sleeves (cut-resistant)
X	Coveralls (work, chemical-resistant) Type: Fire Type coverall: fire retardant/Nomex (situational dependent)	X	Other: Appropriate field gear for the weather (thermal/cold stress); Reflective Safety Vest
Respiratory Protection			
	Respirator (situational dependant)		Type of respirator:
Hand Protection			
	Rubber insulating gloves		Rubber insulating sleeves
	Rubber insulating hoods		Other:

Other:
plugs and/or muffs
Sunscreen *(personal issue item)*
Insect repellent *(personal issue item)*
H_2S monitors

Personnel are not authorized to wear contacts during inspections due to the potential chemical vapor hazards. Prescription safety glasses are available through the R6 Health & Safety Office.

HEALTH & SAFETY TRAINING REQUIREMENTS

EPA employees (without HAZWOPER training) must have at a **minimum** the following:

Course Name	Training Location	Training Frequency
24hr EPA H&S Training for Field Activities (OTH 952)	Skillport Website	Initial – One time
8hr EPA H&S Training for Field Activities Refresher (OTH 952) that includes the following modules: • EPA's Occupational Health and Safety Program • Planning and Preparation for Field Activities • Hazard Communication • Chemical Hazards & Reactions • Occupational Noise • Heat and Cold Stress • Human Factors/ Ergonomics • Biological Safety • Natural Hazards • Personal Protective Clothing and Equipment	Skillport Website (EPA E-Learning)	Annual
Defensive Driving	GSA Website	Every 3yrs
First Aid/CPR	In-Class	Every 2yrs

EPA employees who **maintain HAZWOPER certification** are required to have the following:

Course Name	Training Location	Training Frequency
24/40 hr HAZWOPER Training	In-Class	Initial – One time
8hr HAZWOPER Refresher	In-Class	Annual
Defensive Driving	GSA Website	Every 3yrs
First Aid/CPR	In-Class	Every 2yrs

OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAM (OMSP)

Employees enrolled in the OMSP will receive their periodic exam under Work Order 080, "NPDES Inspectors".

GAS & OIL WELL SITE INSPECTION

I HAVE READ OR BEEN BRIEFED ON THE HAZARDS AND PROTECTIVE MEASURES IDENTIFIED FOR THE ABOVE-LISTED TASKS AND FULLY UNDERSTAND THE JOB-SPECIFIC REQUIREMENTS THAT HAVE BEEN ESTABLISHED.

DATE	EMPLOYEE NAME	EMPLOYEE SIGNATURE	EMPLOYER NAME
4/23/2015	Matthew Rudolph	Matthew Rudolph	US EPA Region 6
4/23/15	Dale Selgrath	Dale Selgrath	EPA Region 6
4.23.15	DAVID AGUINAGA	[illegible]	EPA REGION 6
5-6-15	Ken W SANBORN	Ken Sanborn	" "
5-6-15	Rickey Davis	[illegible]	" "
5/6/15	JACK ARIAS	[illegible]	US EPA R6
5-21-15	Shellita Garrett	Shellita Garrett	EPA 6EN Saunders
9/23/15	JEANNE ECKHART	[illegible]	US EPA R6

6EN QUALITY ASSURANCE PROJECT PLAN

Stream Sampling Project at the Tributary of North Bird Creek Area

Pawhuska, Osage County, Oklahoma

Prepared by:

Jeanne Eckhart, Carl Wills, and Chris Lister

6EN-W

Prepared for:

U.S. Environmental Protection Agency
Region 6
Compliance Assurance and Enforcement Division (6EN)
1445 Ross Avenue
Dallas, TX 75202-2733

June 23, 2017

SECTION A – PROJECT MANAGEMENT

A.1 Title of Plan and Approval

Tributary of North Bird Creek
Quality Assurance Project Plan

Prepared by:

CARL WILLS

Digitally signed by CARL WILLS
DN: c=US, o=U.S. Government, ou=USEPA, ou=Staff, cn=CARL WILLS, dnQualifier=0000013910
Date: 2017.06.23 05:45:26 -05'00'

Date: _____

Carl Wills, Project Team Leader, (6EN-WC)

Approvals:

Jeanne Eckhart

Digitally signed by Jeanne Eckhart
DN: cn=Jeanne Eckhart, o=EPA, ou=6EN-WR, email=eckhart.jeanne@epa.gov, c=US
Date: 2017.06.23 14:35:24 -05'00'

Date: _____

Jeanne Eckhart, Project Team Member, (6EN-WR)

Lister, Chris

Digitally signed by Lister, Chris
DN: cn=Lister, Chris, email=Lister.Chris@epa.gov
Date: 2017.06.23 14:39:42 -05'00'

Date: _____

Chris Lister, Project Team Member, (6EN-WC)

Esteban Herrera

Date: 6/23/16

Esteban Herrera, Section Chief, (6EN-WC)

CARL WILLS

Digitally signed by CARL WILLS
DN: c=US, o=U.S. Government, ou=USEPA, ou=Staff, cn=CARL WILLS, dnQualifier=0000013910
Date: 2017.06.23 18:17:14 -05'00'

Date: _____

Paul James, CAED's Quality Assurance Officer (6EN-H2)

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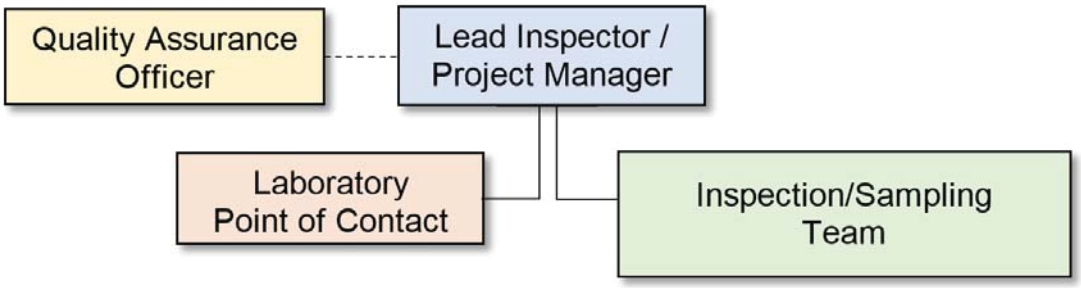
A.3 / A.4 Project Organization and Distribution List

The individuals participating in the project and their specific roles and responsibilities are shown below. These individuals will receive copies of the approved Quality Assurance Project Plan (QAPP) and subsequent revisions:

Table A.1: Roles & Responsibilities/Distribution List

Individual(s) Assigned:	Responsible for:	Authorized to:
Carl Wills 6EN-WC 214-665-7276	Lead Inspector / Project Manager	Project Decisions, Lead and Assist Team Member(s), Collect and Assess Data
Paul James 6EN-H2 214-665-6445	Quality Assurance Officer	Review and Approve QAPP
Christy Warren 6MD-HL 281-983-2137	Laboratory Point of Contact	Lab coordination for scheduling, analyses, validation, and deliverables.
Barbara McCray OSU-SWFAL 405-744-6630	Laboratory Point of Contact	Lab coordination for scheduling, analyses, validation, and deliverables.
Carl Wills 6EN-WC 214-665-7276	Inspection/Sampling Team Member(s)	Inspect / Sample / Collect Data
Jeanne Eckhart 6EN-WR 214-665-8174		
Chris Lister 6EN-WC 214-665-6672		
Kent Sanborn 6EN-WR 918-557-1615		

Figure A.1: Project Organization Chart



For current 6EN Organization Chart, click on the following link:

http://region6a.epa.gov/intranet/org/6en.pdf

A.5 Problem Definition and Background

Problem(s) to be resolved, decision(s) to be made and/or hypothesis to be tested:

This QAPP will address sample collection of stream samples collected adjacent to locations of in-stream monitoring in the tributary of North Bird Creek, North Bird Creek, and Bird Creek, which are current areas of concern related to previous inspections conducted by US EPA Region 6 Water Enforcement. The sampling will complement the current in-stream monitoring which is assessing water quality parameters associated with produced water from oil and gas operations adjacent to the tributary. This water quality data will be used to further investigate, provide baseline monitoring, and provide monitoring over short increments of time to further enhance the ongoing investigation in the area.

Historical & background information:

A tributary of North Bird Creek and downstream areas, north of Pawhuska, Oklahoma in Osage County are the areas of concern for the ongoing EPA investigation. Pollutants in the tributary were identified in August 2016 and subsequent EPA Region 6 Water Enforcement inspections. The pollutants identified in the tributary during grab sampling and field parameters have shown elevated levels of salinity, total dissolved solids (TDS), and temperature. Because of aforementioned elevated levels, laboratory conformation sampling is being required to determine if there is a possibly of any additional oilfield contaminates in the waterway. There are several operators in the nearby area involved with oil and gas production, injection of produced water and other associated oil and gas activities. EPA continues to work with these operators, the tribal partners, other agencies, and state partners throughout the investigation. The US EPA has primacy over the Underground Injection Control (UIC) program in Osage County, Oklahoma within the Safe Drinking Water Act (SDWA) and also regulates oil and gas related activities that affect surface waters identified as waters of the U.S. through the Clean Water Act (CWA).

A.6 Project/Task Description

Currently, there are ten in-stream monitoring locations and of those eight have two data sondes, with one being approximately one-foot below the stream surface and the other being placed on the bottom of the stream channel. The in-stream monitoring will be continuous after initial deployment and data will be collected from the in-stream instruments intermittently, as deemed necessary with funding and for the investigation. The monitoring equipment was initially deployed (first six locations) between May 22 – and May 26, 2017, with the last four locations deployed between May 31 and June 2, 2017. The team will deploy additional equipment to collect conductivity and temperature data every 15 minutes for the needed period of time during the investigation. Monitoring data will be verified by the team the following week to verify the monitors are recording accurately. The team members will calibrate the equipment as needed, will deploy and secure the continuous monitoring equipment, and will download and collect the data throughout the investigation. During this investigation, portable water quality probes will be utilized to document current stream conditions, including pH, conductivity, temperature, salinity, and TDS. The equipment used for each measurement will be documented accordingly in the field notes and calibration information related to each piece of equipment will also be noted within the field notes used during the initial deployment of the water quality in-stream monitoring. This information will also be reflected in the final report prepared after the investigation is complete. To supplement the in-stream monitoring data and investigation, water quality samples will be taken to have further analyses of the information and to investigate and compare water quality samples between the different sampling locations.

For sampling locations, please see the attached maps in Appendix A, Monitor/Sampling Location Map, which shows the different locations for water samples to be collected. Please see Appendix B for the associated Table 1: Monitoring/Sampling Locations.

For calibration information related to each water quality monitoring probe, please see the associated calibration books, which are held by the Lead Inspector. Calibration information will also be reflected in the field notes.

<u>This QAPP has been prepared to address:</u>

Supplement the investigation being conducted by EPA Region 6 with the in-stream water quality conditions of the area of concern over time by collecting water samples at select locations to determine if there are other analytes of concern.

<u>The work to be performed includes:</u>

1) SDWA inspection and CWA inspection of area of concern, as needed for the ongoing investigation.

2) Redeployment of in-stream and continuous water quality sampling equipment.
3) Collection of field data and field observations.
4) Verification of functioning in-stream monitoring equipment to provide data over the investigation time period.
5) Collection of water samples at select locations to evaluate/analyze any possible contaminates that might be present due to adjacent oil and gas activities.

List samples/measurements to be collected/made and data to be obtained:

VOA, ABN, TPH, Total Metals, Anions, Experimental (LC/MS/MS) and Irrigation parameters will be utilized to evaluate potential impacts and determine whether or not the sources of these impacts are from oil and gas operations adjacent to an area of North Bird Creek in Osage County, Oklahoma.

Special personnel or equipment requirements:

Because the liquid of concern is oilfield brine (denser than fresh water) it will be at the bottom of the creek and because of this an intrinsically safe electric submersible pump will be utilized to collect those samples from the creek bottom.

Proposed work schedule (dates and time of sample collection):

All sampling efforts will be conducted at the beginning of the week. Due to holding times, laboratory sample preparations and shipping concerns, the field team will need to ship the samples no later than Wednesday with 24-hour shipping requirements. If the situation arises and sampling occurs on Thursday, the laboratories will need to be notified that they will be receiving additional samples on Friday along with the number to be received.

Products to be produced:

At the conclusion of the investigation, a report will be produced which will include the laboratory reports along with the appropriate QA/QC review.

A.7 Quality Objectives & Criteria

This inspection will be conducted under the authority of Section 308 of the Clean Water Act, and in accordance to 40 CFR 136 40 CFR Part 136 - Guidelines Establishing Test Procedures for the Analysis of Pollutants.

To support this requirement, EPA has developed a systematic planning process based on a graded approach for environmental decision making called the Data Quality Objectives (DQO) Process. The DQO Process is the Agency's preferred planning process and provides quality objectives and performance criteria based on the user's

determination of tolerable error in the results. For details on the DQO Process and guidance on how and when it may be used, see the "*Guidance on Systematic Planning Using the Data Quality Objectives Process (EPA QA/G-4) (EPA, February 2006).*" This process has limited applicability to most enforcement inspection activities, since generally only Special Projects lend themselves to development of formal DQOs and defining of error limits, hypothesis testing, etc.

All data collected shall be in accordance with the appropriate EPA methodologies and protocols found in the appropriate regulatory guidance. The data shall be used to determine the following:

1. What is the quality of the stream at this time (tributary of North Bird Creek and North Bird Creek)?
2. Where are the identified impacts and is that consistent with the in-stream monitoring data?
3. Where is the impact coming from, if possible to identify and which facility is similar to that identified water quality?
4. Has there been contamination due to a loss of confinement within the identified confining zone of injected fluids in the area, is possible to make that conclusion?
5. The data will be used to assess the future options and to determine the next step in the plan of action regarding the Bird Creek area of concern.

The data must meet the approved method accuracy requirements such as those found in EPA's Standard Methods for Examination of Water and Waste Water. All supporting QA/QC information shall be provided. The data may be used to support any future enforcement actions.

A.8 Special Training/Certification

At a minimum, field personnel have completed the required Health and Safety 24-hour initial and 8-hour annual training that is mandatory under OSHA 29 CFR 1910.120(e)(8) and EPA Order 3500.1 requirements. Under various programs, this training is mandatory to maintain inspector credentials. All non-credentialed personnel (e.g. inspectors in training) must meet the 29 CFR 1910.120(e)(8) requirements, and should be in accompanied by credentialed personnel while inspecting/sampling at the facility/site. Inspection personnel must be familiar with and follow bio-security procedures.

Additional Special Training:
Training to be assessed by EPA personnel to the project team related to the use of the data software for the YSI Data Sondes and the HOBO Data Loggers. The needed software to assist in data collection and analyzing data are:

1. Ecowatch Lite - v1.0.5.15
    a. https://www.ysi.com/customer-support/software-firmware-downloads
    b. To analyze data from the YSI 6920 Data Sondes

2. HOBOware Graphing and Analysis
    a. http://www.onsetcomp.com/products/software/hoboware
    b. To collect data from the HOBO Data Loggers
3. HOBOware Pro Graphing and Analysis
    a. http://www.onsetcomp.com/products/software/hoboware
    b. To further analyze data from the HOBO Data Loggers

A.9 Documents and Records

The records for this project will include miscellaneous correspondence, field notes, laboratory analytical reports, photo logs, and inspection reports. All laboratory reports will be submitted to the EPA Lead Inspector/Project Manager. Field notes will include observations about facility conditions at the site(s) where samples are collected. Any noteworthy deviation from the procedures specified in the QAPP will be recorded in the field activity logs. Laboratory analytical reports will be generated for all of the samples received by the laboratory. Each set of samples will include a chain of custody form signed by the samplers and the laboratory recipient. All samples will be delivered by UPS overnight delivery and/or an EPA Field Team Member.

The EPA Project Manager will disseminate copies of the QAPP to the people listed in the distribution list once it is approved. Any revisions to the QAPP will be numbered sequentially. It will be the responsibility of the EPA Project Manager to ensure that each person on the distribution list receives copies of any revisions.
All EPA records and documents from this project will be handled according to the following EPA Region 6 Field Activities Quality System Procedures:

- Records Management - R6PROC-003
- Management of Sampling and Environmental Data - R6PROC-004
- Field Documentation - R6PROC-005
- Field Equipment Inventory and Management - R6PROC-006
- Field Inspections and Investigations - R6PROC-007
- Field Activities Report Preparation and Distribution- R6PROC-008
- Field DO Measurement, January 8, 2014
- Field pH Measurement, January 29, 2013
- Field Measurement of Oxidation-Reduction Potential, January 29, 2013
- Field Screening of Total Residual Chlorine, August 20, 2015
- Field Specific Conductance Measurement, July 13, 2016
- Field Temperature Measurement, October 23, 2014
- Surface Water Sampling, February 28, 2013

The designated and/or contracted laboratory/ies will manage the testing and original raw data from this project (both hard copy and electronic) in accordance with their established and accredited procedures. Any deviations from these procedures shall be approved by the EPA Project Manager before implementation.

SECTION B – DATA GENERATION & ACQUISITION

B.1 Sampling Process Design (Experimental Design)

Describe the experimental data generation or data collection design for the project:
The decision on whether or not to collect a sample will be contingent upon the following factors:

1. Water depth
2. Tributary/creek width
3. Previous investigation monitoring results
4. Proximity to the areas of concern
5. Width of tributary/creek
6. On-site locational conditions
7. Other conditions deemed appropriate to consider by the project team during the deployment or subsequent following data collection events of the project

Because these samples are to be the result of an inspection and/or a one-time inspection/sampling event, a detail process design is not feasible or appropriate. However, the procedures to be followed from initiation to final report could be described as followed:

Step 1: Lead Inspector assembles sampling equipment, chain of custody forms, pre-inspection plan, QAPP, sampling equipment/containers, ice chests, etc. and notifies laboratory to expect samples of a particular matrix for a specific analysis (see Table B.1).

Step 2: Inspection Team proceeds to field for observation, data gathering, and sample collection, if the situation warrants.

Step 3: Inspection Team transports/ships sample(s) along with chain of custody forms to the laboratory for analytical testing.

Step 4: Analytical results received from laboratory, inspector evaluates data, attaches to report along with a QA/QC review, and takes any required action.

<u>Types and number of samples required</u>:
See Table B.1.

<u>Sampling network design & rationale for design</u>:
The autonomous in-stream water quality monitoring and manual site monitoring during the deployment and subsequent site visits will allow us to better understand stream quality at multiple water depths and locations. This water quality information along with the laboratory analytical results will be helpful to in evaluating stream conditions and possible sources for the impacted areas and aid in determining future courses of action. Background samples will also be collected to aid in determining quality assurance and additional investigation purposes.

Table B.1 Samples by Matrix

Matrix	# of Matrix Samples	# of Field Blank**	# of Trip Blank*	# of Blind Duplicate	# of MS/MSD	Total # of Samples	Analysis *Example:* *TCLP RCRA 8 Metals SW846 6010C/7471*
Water	11	3	3	2	1	20	Total VOA 8260C
Water	11	3		2	1	17	Total ABN 8270D
Water	11	3		2	1	17	TPH Texas Method 1005
Water	11	3		2	1	17	Total Metals 6010D, 6020B, 7470A
Water	11	3		2	1	17	Anions 300.1
Water	11	3		2	1	17	Experimental LC/MS/MS
Water	11	3		2		16	Irrigation – OSU SWAFL

Note: *Trip blanks are for VOC analyses only. ** Field blanks column may also include rinsate blanks.

Typical Analytical Method No.

Volatile Organics by GC/MS
SW846 - 8260B
EPA500 - 524.2
EPA600 - 624
CLP - VOA – MC
CLP - VOA – LC
Std. Methods 6210B
Std. Methods 6210C
Std. Methods 6210D

Volatile Organics by GC
SW-846 - 8021B
EPA500 - 502.2
EPA600 - 601
EPA600 - 602
Std. Methods 6220B
Std. Methods 6220C
Std. Methods 6230B
Std. Methods 6230C
Std. Methods 6230D

Semi-Volatile Organics by GC/MS
SW846 - 8270D
EPA500 - 525.2
EPA600 - 625
CLP - SVOA - MC
CLP - SVOA - LC
CLP - PEST - LC
Std. Methods 6410

PAH
SW846 - 8310 (HPLC)

Inorganic Analytes
SW- 846 7000 Series (AA)
SW- 846 6010C (ICP)
SW- 846 6020A (ICP-MS)
EPA 200 Series (AA)
EPA 200.7 (ICP)
EPA 200.8 (ICP-MS)
CLP Inorganic Method (ICP)
CLP Inorganic Method (AA)
Std Methods 3000 Series (AA)
Std. Method 3120 (ICP)

Herbicides
SW846 - 8151A
EPA 500 - 515.4
EPA 500 - 515.2
Std. Methods 6640

Pesticides & PCBs
SW846 - 8081B
SW846 - 8082A
EPA500 - 508
EPA600 - 608
CLP-PEST- MC
Std. Methods 6630

Sampling locations & frequency of sampling:
Sampling locations have been determined utilizing historical and current stream monitoring data along with information gathered from the instream autonomous data loggers.

Sample matrices:
See Table B.1.

Classification of measurement parameters:
Critical – For environmental compliance

Validation study information, for non-standard situations:
N/A: Standard laboratory validation is required.

B.2 Sampling Methods

Identify sample collection procedures:

Samples will be either collected directly into the appropriate sample containers or utilize an intrinsically safe electric submersible pump and associated tubing to transfer liquids into the appropriate containers for the analytes of interest. The pump and associated tubing will be decontaminated between each sample location using alconox and laboratory grade deionized water.

Identify sampling methods and equipment:

Sampling methods and regulatory citation: The analytical methods, sample containers, holding times, and sample preservation requirements are presented in Table B.4 and apply to EPA Sampling Methods:
8260C, 8270D, Texas Method 1005, 6010D, 6020B 7470A, 300.1, 200.7 and possibly other approved methods determined necessary to evaluate chemicals utilized by the oil and gas operators in the area.

Sampling equipment available during the inspection/sampling event:
Either the containers themselves or via pump and associated tubing referenced above.

Implementation requirements: Will be based on the Lead Inspector's field observations, field conditions, facility operations and/or timing.

Sample preservation requirements: See Table B.4 – Analytical Methods, Preservatives and Containers for Samples

Decontamination procedures: Wet decontamination procedure (http://www.epa.gov/quality/field-equipment-cleaning-and-decontamination)

Any support facilities needed: At this time, no support appears to be needed.

Specific performance requirements for the sampling methods:

Detection limits are defined in the methods of interest.

Reporting limits are defined in the methods of interest as well.

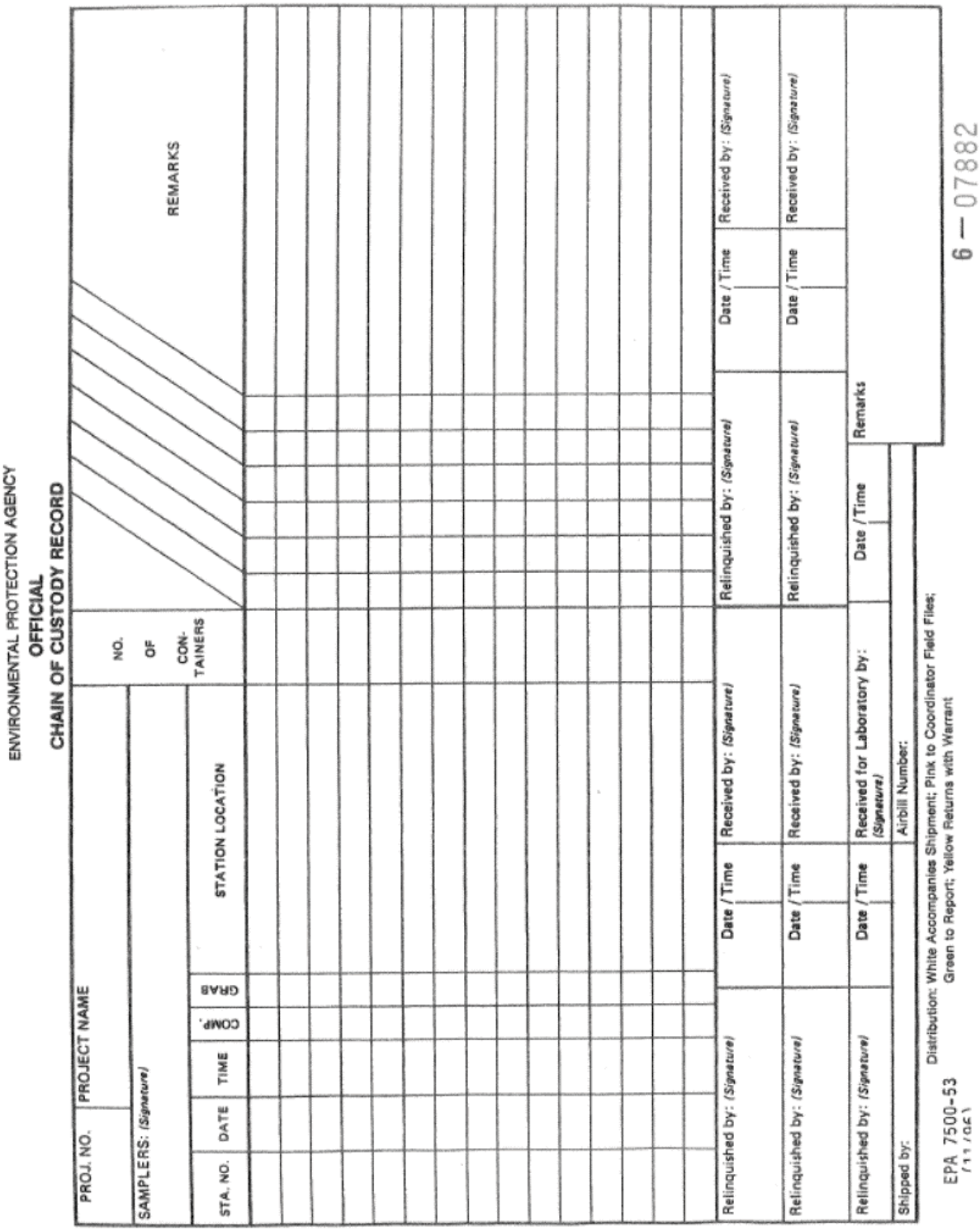
If a failure in the sampling or measurement system occurs, the Lead Inspector/Project Manager must be notified. The Quality Assurance Officer and/or Laboratory Point of Contact will act as advisors to the Lead Inspector/Project Manager. The Lead Inspector/Project Manager will be responsible for any decision concerning corrective action. Corrective action in the field or in the laboratory will be documented in the field notes and/or in the final laboratory analytical report based on the action(s) required.

B.3 Sampling Handling & Custody

The date and time of sample collection will be recorded on the field activity log and on all samples: additionally, that information will be recorded on the Chain of Custody (COC) form. The desired analytical tests to be performed and any preservatives used will also be noted on the COC form. An example COC format is attached in Figure B.3.

Prior to shipment, all samples shall be in custody with the inspection/sampling team. Sample team shall keep all samples in an environment that maintain its preservation (e.g., inside cooler(s) with double bagged ice and packing material). In lieu of tied on tags, stick on sample labels may be used as long as they contain the following information: sampler name, date, time, station location, sampler signature, sample # and analysis requested. Custody seals shall be used on each sample container and sample coolers, unless samples are hand delivered to the designated laboratory by a member of the inspection/sampling team along as the custody chain is not breached.

Figure B.3. Official Chain of Custody Example



ENVIRONMENTAL PROTECTION AGENCY
OFFICIAL
CHAIN OF CUSTODY RECORD

PROJ. NO. | PROJECT NAME | NO. OF CON-TAINERS | REMARKS

SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
Shipped by:		Airbill Number:			

Distribution: White Accompanies Shipment; Pink to Coordinator Field Files; Green to Report; Yellow Returns with Warrant

EPA 7500-53 (11/85)

6 — 07882

B.4 Analytical Methods

Identify analytical methods to be followed (with all options) & required equipment:
See Table B.4 – Analytical Methods, Preservatives and Containers for Samples.

Specify any specific method performance criteria:
None at this time.

Provide validation information for non-standard methods:
Please provide information and procedures used for any of these non-standard methods.

Identify procedures to follow when failures occur:
If failure(s) occur during the analysis, the Laboratory Point of Contact will contact the Lead Inspector/Project Manager within 24-hours, and communicate the failure and identify potential corrective remedies. The Lead Inspector/Project Manager will make the determination on the remedy. The failure(s) and corrective remedies will be document via email and cc: the first-line supervisor and the QA Officer.

Identify individuals responsible for corrective action and appropriate documentation:
Jeanne Eckhart, Carl Wills and Chris Lister.

Table B.4 – Analytical Methods, Preservatives and Containers for Samples

Sample Matrix	# of Samples	Analyte / Analyte Sweep	Analytical Method No.	Holding Time (Days)	Size and Type of Containers	# of Containers per Sample	Preservatives
Water	20	VOA	8260C	14-Days	40-mL glass vials	44	HCl w/ Ice (<6°c)
Water	17	ABN	8270D	7-Days	1-L amber glass	38	Ice (<6 °c)
Water	17	TPH	Texas Method 1005	14-Days	40-mL glass vials	38	HCl w/ Ice (<6°c)
Water	17	Total Metals	6010D, 6020B, 7470A	28-Days for Hg, 6-Months for other metals	1-L HDPE	18	HNO3 w/ Ice (<6 °c)
Water	17	Anions	300.1	48-Hours	1-L HDPE	36	Ice (<6 °c)
Water	17	Experimental	N/A	N/A	40-mL glass vials	34	Ice (<6 °c)
Water	16	Irrigation	200.7	14-Days	125-mL HDPE	16	Ice (<6 °c)
Liquid	6	Unknown Operator Added Treatment Agents	N/A	N/A	40-mL glass vials	12	Ice (<6 °c)

Typical Analytical Method No.

Volatile Organics by GC/MS
SW846 - 8260B
EPA500 - 524.2
EPA600 - 624
CLP - VOA – MC
CLP - VOA – LC
Std. Methods 6210B
Std. Methods 6210C
Std. Methods 6210D

Volatile Organics by GC
SW-846 - 8021B
EPA500 - 502.2
EPA600 - 601
EPA600 - 602
Std. Methods 6220B
Std. Methods 6220C
Std. Methods 6230B
Std. Methods 6230C
Std. Methods 6230D

Semi-Volatile Organics by GC/MS
SW846 - 8270D
EPA500 - 525.2
EPA600 - 625
CLP - SVOA - MC
CLP - SVOA - LC
CLP - PEST - LC
Std. Methods 6410

PAH (HPLC)
SW846 - 8310

Inorganic Analytes
SW- 846 7000 Series (AA)
SW- 846 6010C (ICP)
SW- 846 6020A (ICP-MS)
EPA 200 Series (AA)
EPA 200.7 (ICP)
EPA 200.8 (ICP-MS)
CLP Inorganic Method (ICP)
CLP Inorganic Method (AA)
Std Methods 3000 Series (AA)
Std. Method 3120 (ICP)

Herbicides
SW846 - 8151A
EPA 500 - 515.4
EPA 500 - 515.2
Std. Methods 6640

Pesticides & PCBs
SW846 - 8081B
SW846 - 8082A
EPA500 - 508
EPA600 - 608
CLP-PEST- MC
Std. Methods 6630

B.5 Quality Control

Identified below are a number of quality control samples that will be collected.

Trip Blanks

Number of Blank(s): One (1) per each sample shipping container that contains samples for VOCs analysis.

Trip Blank Type: Deionized Water.

Describe Preparation: For each trip blank, type II reagent grade water for the R6-Addison wet lab (Room 104) will be placed in two (2) 40-mL vials and preserved with HCl (pH<2). The VOC analysis will be the consistent with the analysis on the environmental/waste samples.

Field Blanks

Number of Blank(s): Example: One (1) per each sampling event for all analytes listed.

Field Blank Type: Deionized Water.

Describe Preparation: Type II reagent grade water from the R6-Addison wet lab (Room 104) will be placed in sample containers appropriate for analytes of interest with appropriate preservation.

Equipment Rinsate Blanks

Two (2) will be collected, with one prior to any samples being collected and the other after the final water sample is collected for all analytes listed.

Rinsate Type: Deionized Water.

Describe Preparation: Type II reagent grade water from the R6-Addison wet lab (Room 104) will be placed in sample containers appropriate for analytes of interest with appropriate preservation.

Blind Replicate or Duplicate Samples

Number of Samples: One (1) blind replicate/duplicate sample for every ten (10) samples will be collected. The laboratory will perform replicates as required per their NELAC certification.

Sample Matrix: Water.

Location: To be determined in the field.

Matrix Spike (MS) / Matrix Spike Duplicate (MSD) Samples

Field personnel will determine which sampling location will have the Laboratory QC (MS/MSD) which will be collected for the QMP. Therefore, collections of triple volumes for VOA, ABN, and TPH and double volumes for Total Metals and Anions will occur.

Sample Matrix: Water.

Location: To be determined in the field.

B.6 Instrument/Equipment Testing, Inspection, and Maintenance

EPA field personnel will use the Hydrolab Data Sonde DS5 as appropriate based on the project-specific field parameter needs and/or Health and Safety conditions. Along with data collection, measurements from this instrument may be used to alert field personnel to potential hazardous conditions. In addition, readings collected by the instrument may be documented in the field logbook and included in the final inspection report. The instrument will be maintained in accordance with the manufacturer's recommendations detailed in the instrument manual.

B.7 Instrument/Equipment Calibration and Frequency

Identify all tools, gauges, instruments, and other sampling, measuring, and test equipment used for data generation or collection activities affecting quality that must be controlled and calibrated:
The Hydrolab and the YSI Pro30 will be calibrated per the manufactures' requirements and noted in the equipment calibration log.

Describe or reference how calibration will be conducted using certified equipment and/or standards with known valid relationships to nationally recognized performance standards. If no such nationally recognized standards exist, document the basis for the calibration:
The Hydrolab and the YSI Pro30 will be calibrated per the manufactures' requirements and noted in the equipment calibration log.

EPA field personnel shall record field usage in the maintenance/calibration logbook that is maintained with the equipment along with the inspection/sampling logbook.

B.8 Inspection/Acceptance of Supplies & Consumables

The EPA Project Manager will be responsible for inspecting sample containers prior to leaving for the inspection. Only new sample containers accompanied by the manufacturer's certification of pre-cleaning will be used. The sample containers will be inspected for cracks, ill-fitting lids, or other defects prior to use and will be discarded if defects are found.

B.9 Data Acquisition Requirements for Non-Direct Measurements

Records may be collected during the inspection/sampling event to document activities at the facility. Documents may be requested for a period of up to 5 years prior to the inspection/sampling event. These records will be used for determining the facility's compliance with the requirements of CWA.

B.10 Data Management

Data for this project will be produced both onsite and at the designated/approved Laboratory. Laboratory data will be submitted to the EPA Project Manager and will be included in the subsequent inspection report. Data collected during the inspection may be designated as Confidential Business Information (CBI) by representatives of CRS. For any information for which a CBI claim is made that information will be handled in accordance with the provisions specified for CWA CBI. All records and documents generated during this project will be handled in accordance with EPA's "Standard Operating Procedures for Record and Information Management"

SECTION C – ASSESSMENT AND OVERSIGHT

C.1 Assessments and Response Actions

Documentation and analytical results collected during this project will be evaluated to determine the compliance status as it applies to the facility's requirements under CWA. Results of this evaluation will determine what action, if any, the Agency should take in response to any Areas of Concern identified during the inspection. The magnitude and breadth of any concerns identified will determine the appropriate response on the part of the Agency.

C.2 Reports to Management

This project will result in the generation of an inspection report which will include an inspection narrative, a photographic log, documents collected during the inspection, and analytical reports for all samples collected, if any.

SECTION D – DATA VALIDATION AND USABILITY

D.1 Data Review, Verification, and Validation

Data will be accepted if they meet the following criteria:

1. Field logs are complete.
2. Prior to releasing the analytical data, the laboratory staff will review both the sample and QC data to verify sample identity, instrument calibration, quantitation limits, dilution factors, numerical computations, accuracy of transcriptions, and chemical interpretations. In addition, the QC data are tabulated and the results reviewed to ascertain whether they were within the project-required limits for accuracy and precision. Any non-conforming data will be discussed in the data package case narrative. If necessary, qualifiers are applied based on this information. The laboratory staff review will consist of a Peer review, a Senior Chemist review, a Point of Contact review, and a QA Officer review. The review will follow the US EPA National Functional Guidelines for Organic Methods Data Review (SOM02.2), and US EPA National Functional Guidelines for Inorganic Data Review (ISM02.2).
3. Field data is reviewed to ensure that they are complete; that sample collection information is thoroughly documented; and that any deviations from the QAPP are noted.
4. Actual sampling locations is documented in the inspection logbook. Locations were determined using GPS instrumentation, linear measurements, and/or photographic references.
5. Sample handling procedures are documented on chain of custody forms.

Any deviations from the QAPP are to be reported in the field logs. The Lead Inspector/Project Manager will verify the contents of these logs. If the data fails to meet the criteria they will be flagged as estimated. Any flagged data will be discussed with management to determine if the data point will be rejected and/or re-sampling done.

D.2 Verification and Validation Methods

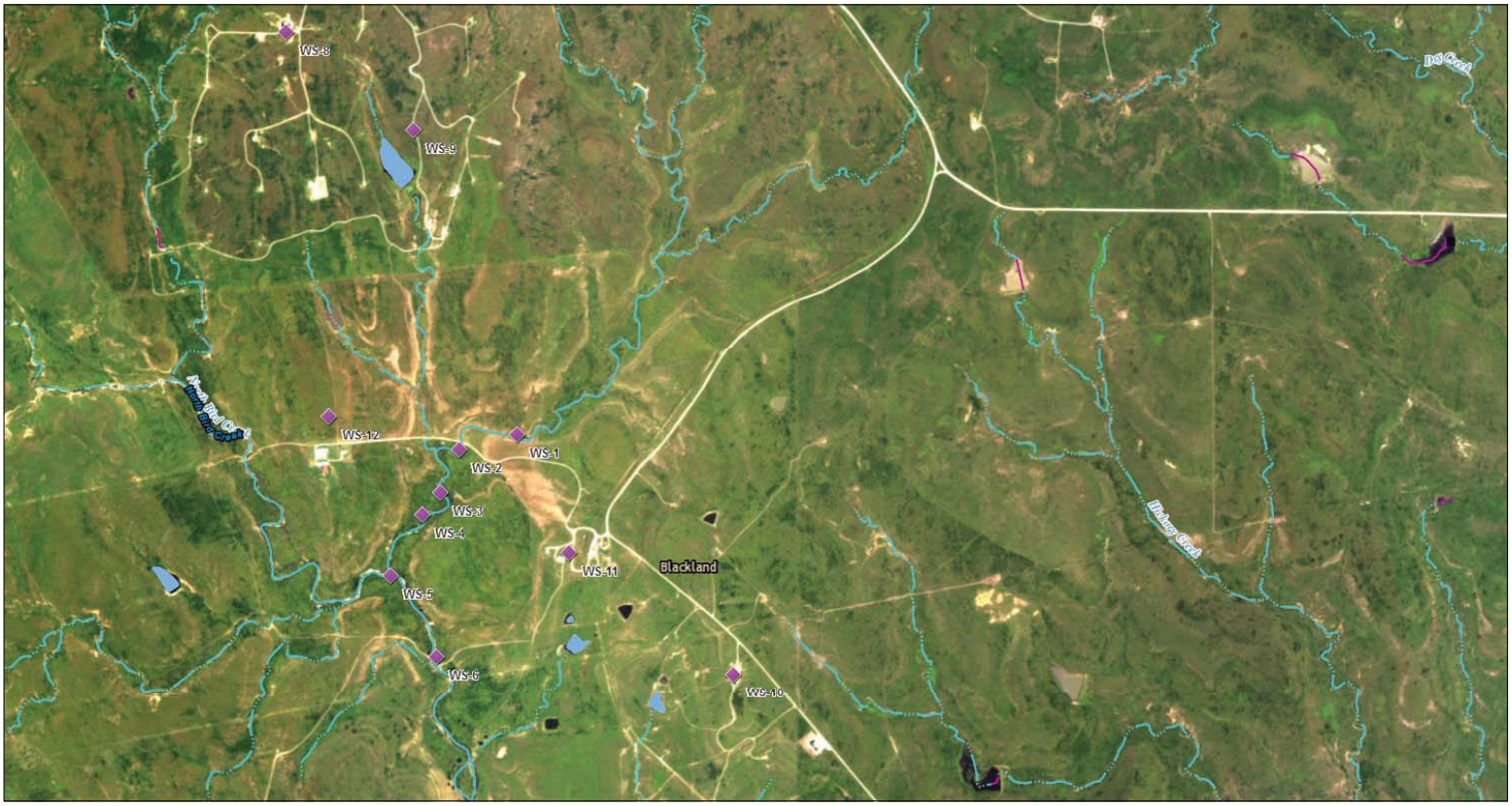
Field data will be validated by the Lead Inspector/Project Manager, and any problems identified during this project will be documented in the field logs. The laboratory supervisor will validate laboratory data according to methods established in their QA Plan.
The Lead Inspector/Project Manager will review and verify field logs and analytical data reports. Any problems or deviations identified will be discussed with the project team and the first-line supervisor to determine corrective action measures.

D.3 Reconciliation with User Requirements

The designated laboratory will provide a final laboratory report along with the supporting electronic data in a usable spreadsheet format. All laboratory bench sheets and equipment calibrations will be maintained by the designated laboratory and will be available upon request. The data will be used to support any future enforcement actions or litigation.

APPENDIX A: MONITORING/SAMPLING LOCATION MAP

Sampling Locations in North Bird Creek Area, Osage County, Oklahoma



June 22, 2017

1:18,056

Water Sample Proposed Locations

0 0.225 0.45 0.9 mi

0 0.35 0.7 1.4 km

USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,

Jeanne Eckhart

USDA FSA, Microsoft | USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017. | Esri, HERE, Garmin, iPC

APPENDIX B: TABLE OF MONITORING/SAMPLING LOCATIONS

Water Sampling Locations
Bird Creek, Osage County, Oklahoma

Water Sample ID	Latitude	Longitude	Locational Comments
WS-1	36.832660	-96.496177	Background, Monitoring Station 1
WS-2	36.832135	-96.498664	Monitoring Station 2
WS-3	36.830668	-96.499461	Monitoring Station 3
WS-4	36.829906	-96.500244	Monitoring Station 4
WS-5	36.827810	-96.501613	Monitoring Station 6
WS-6	36.825031	-96.499648	Monitoring Station 7
WS-7	N/A	N/A	Replicate 1; location TBD in field during sampling event
WS-8	36.846536	-96.506097	Jireh Tank Battery
WS-9	36.843175	-96.500638	Warren American Tank Battery
WS-10	36.824405	-96.486825	Gray Horse Tank Battery
WS-11	36.828592	-96.493931	East Domestic Water Well
WS-12	36.833258	-96.504278	West Domestic Water Well
WS-13	N/A	N/A	Field Blank
WS-14	N/A	N/A	Replicate 2; location TBD in field during sampling event
WS-15	N/A	N/A	Equipment Blank 1 (Before Sampling Begins)
WS-16	N/A	N/A	Equipment Blank 2 (After Final Sample Collected)
WS-17	N/A	N/A	QA/QC (Extra Volume of WS-6 - required by QMP)

Soil, Water & Forage Analytical Laboratory

Oklahoma State University Division of Agricultural Sciences and Natural Resources
045 Agricultural Hall
Stillwater, OK 74078
Email: soiltesting@okstate.edu
Website: www.soiltesting.okstate.edu

WATER QUALITY REPORT

CARL E. WILLS (6EN-WR)
CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 1A-Upstream (North of Road)

Location : Bird Creek (SE 12-T27N-R7E)
Osage County, OK

Lab ID No.: : 820711
Customer Code : 1361
Sample No. : 1
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	17	Nitrate-N (ppm)	<1	pH	7.5
Calcium (ppm)	47	Chloride (ppm)	87	EC (µmhos/cm)	454
Magnesium (ppm)	7	Sulfate (ppm)	35		
Potassium (ppm)	8	Boron (ppm)	0.02		
		Bicarbonate (ppm)	56		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Salts (TDS in ppm)	299.6	Sodium Percentage	19.9 %
Sodium Adsorption Ratio (SAR)	0.6	Hardness (ppm)	146.0
Potassium Adsorption Ratio (PAR)	0.2	Hardness Class	Hard
		Alkalinity (ppm as CaCO3)	45.6

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

The total dissolved salt and sodium content of this water are low enough that no problem should result from its use.

Kendal Henderson
Signature

Oklahoma State University, U.S. Department of Agriculture, state and local goverments cooperating. Oklahoma Cooperative Extension Service offers its programs to all eligible persons regardless of race, color, national origin, religion, sex, age or disability and is an Equal Oppurtunity Employer.

Soil, Water & Forage Analytical Laboratory

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WATER QUALITY REPORT

CARL E. WILLS (6EN-WR)
CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 1A-Upstream (North of Road)
Location : Bird Creek (SE 12-T27N-R7E) Osage County, OK

Lab ID No.: : 820711
Customer Code : 1361
Sample No. : 1
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	0.02	< 5 ppm
Calcium (ppm)	47.33	No Guidelines
Chloride (ppm)	86.87	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	1.26	No Guidelines
Magnesium (ppm)	6.79	No Guidelines
Manganese (ppm)	0.01	No Guidelines
Nitrate-N (ppm)	0.64	< 100 ppm
Potassium (ppm)	8	No Guidelines
Sodium (ppm)	16.64	< 1000 ppm
Sulfate (ppm)	35.06	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	454	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	146.0	No Guidelines
Hardness Class	Hard	No Guidelines
pH	7.5	5.5-9.0
Total Dissolved Salts(TDS) (ppm)	299.6	<3000 ppm

* DL : Detection Limit

Kendal Henderson
Signature

Oklahoma State University, U.S. Department of Agriculture, state and local goverments cooperating. Oklahoma Cooperative Extension Service offers its programs to all eligible persons regardless of race, color, national origin, religion, sex, age or disability and is an Equal Oppurtunity Employer.

Soil, Water & Forage Analytical Laboratory

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WATER QUALITY REPORT

CARL E. WILLS (6EN-WR)
CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : 1A-Upstream (North of Road)
Location : Bird Creek (SE 12-T27N-R7E) Osage County, OK

Lab ID No.: : 820711
Customer Code : 1361
Sample No. : 1
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	0.02	< 2.4
Calcium (ppm)	47.33	No Guidelines
Chloride (ppm)	86.87	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	1.26	< 0.3 ppm (#)
Magnesium (ppm)	6.79	No Guidelines
Manganese (ppm)	0.01	< 0.05 ppm (#)
Nitrate-N (ppm)	0.64	< 10 ppm
Potassium (ppm)	8	No Guidelines
Sodium (ppm)	16.64	No Guidelines
Sulfate (ppm)	35.06	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	454	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	146.0	No Guidelines
Hardness Class	Hard	< 120
pH	7.5	6.5 - 8.5 (#)
Sodium Percentage (%)	19.9	No Guidelines
Total Dissolved Solids (TDS) (ppm)	299.6	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advise from the Oklahoma Department of Environmental Quality or local Health Department.
This water analysis does NOT include testing for bacteria, organic chemicals, and heavy metals. This lab is not certified by DEQ for drinking water analysis.

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Soil, Water & Forage Analytical Laboratory

Oklahoma State University Division of Agricultural Sciences and Natural Resources
045 Agricultural Hall
Stillwater, OK 74078
Email: soiltesting@okstate.edu
Website: www.soiltesting.okstate.edu

WATER QUALITY REPORT

CARL E. WILLS (6EN-WR)
CARL E WILLS (6EN-WR)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : **1B-Pool (South of Road)**

Location : **Bird Creek (SE 12-T27N-R7E)**
Osage County, OK

Lab ID No.: : **820712**
Customer Code : **1361**
Sample No. : **2**
Received : **10/6/2016**
Report Date : **10/10/2016**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	20812	Nitrate-N (ppm)	<1	pH	6.9
Calcium (ppm)	4751	Chloride (ppm)	40699	EC (µmhos/cm)	99500
Magnesium (ppm)	1365	Sulfate (ppm)	49		
Potassium (ppm)	58	Boron (ppm)	1.47		
		Bicarbonate (ppm)	61		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Salts (TDS in ppm)	67795.3	Sodium Percentage	72.2 %
Sodium Adsorption Ratio (SAR)	68.5	Hardness (ppm)	17470.8
Potassium Adsorption Ratio (PAR)	0.1	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	49.8

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.
Boron toxicity may occur in poorly drained soils.

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DALLAS, TX 75202
(214) 665-7276

Name : 1B-Pool (South of Road)

Location : Bird Creek (SE 12-T27N-R7E)
Osage County, OK

Lab ID No.: : 820712
Customer Code : 1361
Sample No. : 2
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	1.47	< 5 ppm
Calcium (ppm)	4751.23	No Guidelines
Chloride (ppm)	40699	< 600 ppm
Copper (ppm)	0.10	< 0.5 ppm
Iron (ppm)	0.1	No Guidelines
Magnesium (ppm)	1365.04	No Guidelines
Manganese (ppm)	0.02	No Guidelines
Nitrate-N (ppm)	0.14	< 100 ppm
Potassium (ppm)	58	No Guidelines
Sodium (ppm)	20812.1	< 1000 ppm
Sulfate (ppm)	48.98	<1000 ppm
Zinc (ppm)	0.01	< 25 ppm
EC (µmhos/cm)	99500	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	17470.8	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	6.9	5.5-9.0
Total Dissolved Salts(TDS) (ppm)	67795.3	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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DALLAS, TX 75202
(214) 665-7276

Name : 1B-Pool (South of Road)

Location : Bird Creek (SE 12-T27N-R7E)
Osage County, OK

Lab ID No.: : 820712
Customer Code : 1361
Sample No. : 2
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	1.47	< 2.4
Calcium (ppm)	4751.23	No Guidelines
Chloride (ppm)	40699	< 250 ppm (#)
Copper (ppm)	0.10	< 1.0 ppm (#)
Iron (ppm)	0.1	< 0.3 ppm (#)
Magnesium (ppm)	1365.04	No Guidelines
Manganese (ppm)	0.02	< 0.05 ppm (#)
Nitrate-N (ppm)	0.14	< 10 ppm
Potassium (ppm)	58	No Guidelines
Sodium (ppm)	20812.1	No Guidelines
Sulfate (ppm)	48.98	< 250 ppm (#)
Zinc (ppm)	0.01	< 5.0 ppm (#)
EC (µmhos/cm)	99500	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	17470.8	No Guidelines
Hardness Class	Very Hard	< 120
pH	6.9	6.5 - 8.5 (#)
Sodium Percentage (%)	72.2	No Guidelines
Total Dissolved Solids (TDS) (ppm)	67795.3	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
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DALLAS, TX 75202
(214) 665-7276

Name : **1C-Duplicate(South of Road)**
Location : **Bird Creek (SE 12-T27N-R7E) Osage County, OK**

Lab ID No.: : **820713**
Customer Code : **1361**
Sample No. : **3**
Received : **10/6/2016**
Report Date : **10/10/2016**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	20810	Nitrate-N (ppm)	<1	pH	6.9
Calcium (ppm)	4749	Chloride (ppm)	42655	EC (µmhos/cm)	100100
Magnesium (ppm)	1432	Sulfate (ppm)	51		
Potassium (ppm)	62	Boron (ppm)	1.59		
		Bicarbonate (ppm)	64		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Salts (TDS in ppm)	69821.9	Sodium Percentage	71.8 %
Sodium Adsorption Ratio (SAR)	68.0	Hardness (ppm)	17741.4
Potassium Adsorption Ratio (PAR)	0.1	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	52.1

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.
Boron toxicity may occur in poorly drained soils.

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(214) 665-7276

Name : 1C-Duplicate(South of Road)
Location : Bird Creek (SE 12-T27N-R7E) Osage County, OK

Lab ID No.: : 820713
Customer Code : 1361
Sample No. : 3
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	1.59	< 5 ppm
Calcium (ppm)	4748.7	No Guidelines
Chloride (ppm)	42655	< 600 ppm
Copper (ppm)	0.10	< 0.5 ppm
Iron (ppm)	0.1	No Guidelines
Magnesium (ppm)	1432.35	No Guidelines
Manganese (ppm)	<DL*	No Guidelines
Nitrate-N (ppm)	0.13	< 100 ppm
Potassium (ppm)	62	No Guidelines
Sodium (ppm)	20809.6	< 1000 ppm
Sulfate (ppm)	50.51	<1000 ppm
Zinc (ppm)	0.01	< 25 ppm
EC (µmhos/cm)	100100	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	17741.4	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	6.9	5.5-9.0
Total Dissolved Salts(TDS) (ppm)	69821.9	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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Name : 1C-Duplicate(South of Road)
Location : Bird Creek (SE 12-T27N-R7E) Osage County, OK

Lab ID No.: : 820713
Customer Code : 1361
Sample No. : 3
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	1.59	< 2.4
Calcium (ppm)	4748.7	No Guidelines
Chloride (ppm)	42655	< 250 ppm (#)
Copper (ppm)	0.10	< 1.0 ppm (#)
Iron (ppm)	0.1	< 0.3 ppm (#)
Magnesium (ppm)	1432.35	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
Nitrate-N (ppm)	0.13	< 10 ppm
Potassium (ppm)	62	No Guidelines
Sodium (ppm)	20809.6	No Guidelines
Sulfate (ppm)	50.51	< 250 ppm (#)
Zinc (ppm)	0.01	< 5.0 ppm (#)
EC (µmhos/cm)	100100	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	17741.4	No Guidelines
Hardness Class	Very Hard	< 120
pH	6.9	6.5 - 8.5 (#)
Sodium Percentage (%)	71.8	No Guidelines
Total Dissolved Solids (TDS) (ppm)	69821.9	<500 ppm (#)

* DL : Detection Limit

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DALLAS, TX 75202
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Name : **2-Jireh (@ Well 18W)**

Location : **Bird Creek (SW 1-T27N-R7E)**
Osage County, OK

Lab ID No.: : **820714**
Customer Code : **1361**
Sample No. : **4**
Received : **10/6/2016**
Report Date : **10/10/2016**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	49111	Nitrate-N (ppm)	<1	pH	6.3
Calcium (ppm)	9627	Chloride (ppm)	99594	EC (µmhos/cm)	179600
Magnesium (ppm)	1770	Sulfate (ppm)	41		
Potassium (ppm)	531	Boron (ppm)	8.54		
		Bicarbonate (ppm)	104		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Salts (TDS in ppm)	160778.6	Sodium Percentage	77.3 %
Sodium Adsorption Ratio (SAR)	120.7	Hardness (ppm)	31304.2
Potassium Adsorption Ratio (PAR)	0.8	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	85.1

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.

This water is not recommended for irrigation use because of its high boron content.

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DALLAS, TX 75202
(214) 665-7276

Name : 2-Jireh (@ Well 18W)

Location : Bird Creek (SW 1-T27N-R7E)
Osage County, OK

Lab ID No.: : 820714
Customer Code : 1361
Sample No. : 4
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	8.54	< 5 ppm
Calcium (ppm)	9627.19	No Guidelines
Chloride (ppm)	99594	< 600 ppm
Copper (ppm)	0.10	< 0.5 ppm
Iron (ppm)	10.41	No Guidelines
Magnesium (ppm)	1770.4	No Guidelines
Manganese (ppm)	2.49	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	531	No Guidelines
Sodium (ppm)	49110.8	< 1000 ppm
Sulfate (ppm)	41.26	<1000 ppm
Zinc (ppm)	0.85	< 25 ppm
EC (µmhos/cm)	179600	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	31304.2	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	6.3	5.5-9.0
Total Dissolved Salts(TDS) (ppm)	160778.6	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
This water may be objectionable for some livestock because it exceeds the guideline of 5mg Boron/L.Excess boron in the diets of livestock may decrease feed consumption and cause weight loss
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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Name : 2-Jireh (@ Well 18W)

Location : Bird Creek (SW 1-T27N-R7E)
Osage County, OK

Lab ID No.: : 820714
Customer Code : 1361
Sample No. : 4
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	8.54	< 2.4
Calcium (ppm)	9627.19	No Guidelines
Chloride (ppm)	99594	< 250 ppm (#)
Copper (ppm)	0.10	< 1.0 ppm (#)
Iron (ppm)	10.41	< 0.3 ppm (#)
Magnesium (ppm)	1770.4	No Guidelines
Manganese (ppm)	2.49	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	531	No Guidelines
Sodium (ppm)	49110.8	No Guidelines
Sulfate (ppm)	41.26	< 250 ppm (#)
Zinc (ppm)	0.85	< 5.0 ppm (#)
EC (µmhos/cm)	179600	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	31304.2	No Guidelines
Hardness Class	Very Hard	< 120
pH	6.3	6.5 - 8.5 (#)
Sodium Percentage (%)	77.3	No Guidelines
Total Dissolved Solids (TDS) (ppm)	160778.6	<500 ppm (#)

* DL : Detection Limit

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DALLAS, TX 75202
(214) 665-7276

Name : **3-Grayhorse(@ Tank Battery)**
Location : **Bird Creek (NW 18-T27N-R8E) Osage County, OK**

Lab ID No.: : **820715**
Customer Code : **1361**
Sample No. : **5**
Received : **10/6/2016**
Report Date : **10/10/2016**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	45675	Nitrate-N (ppm)	<1	pH	6.5
Calcium (ppm)	8236	Chloride (ppm)	90403	EC (µmhos/cm)	170900
Magnesium (ppm)	1737	Sulfate (ppm)	10		
Potassium (ppm)	463	Boron (ppm)	8.11		
		Bicarbonate (ppm)	64		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Salts (TDS in ppm)	146587.9	Sodium Percentage	78.2 %
Sodium Adsorption Ratio (SAR)	119.4	Hardness (ppm)	27696
Potassium Adsorption Ratio (PAR)	0.7	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	52.0

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.

This water is not recommended for irrigation use because of its high boron content.

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Name : 3-Grayhorse(@ Tank Battery)
Location : Bird Creek (NW 18-T27N-R8E) Osage County, OK

Lab ID No.: : 820715
Customer Code : 1361
Sample No. : 5
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	8.11	< 5 ppm
Calcium (ppm)	8236.48	No Guidelines
Chloride (ppm)	90403	< 600 ppm
Copper (ppm)	0.10	< 0.5 ppm
Iron (ppm)	2.96	No Guidelines
Magnesium (ppm)	1736.78	No Guidelines
Manganese (ppm)	2.40	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	463	No Guidelines
Sodium (ppm)	45675	< 1000 ppm
Sulfate (ppm)	10.15	<1000 ppm
Zinc (ppm)	11.34	< 25 ppm
EC (µmhos/cm)	170900	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	27696	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	6.5	5.5-9.0
Total Dissolved Salts(TDS) (ppm)	146587.9	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
This water may be objectionable for some livestock because it exceeds the guideline of 5mg Boron/L.Excess boron in the diets of livestock may decrease feed consumption and cause weight loss
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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Name : 3-Grayhorse(@ Tank Battery)
Location : Bird Creek (NW 18-T27N-R8E) Osage County, OK

Lab ID No.: : 820715
Customer Code : 1361
Sample No. : 5
Received : 10/6/2016
Report Date : 10/10/2016

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	8.11	< 2.4
Calcium (ppm)	8236.48	No Guidelines
Chloride (ppm)	90403	< 250 ppm (#)
Copper (ppm)	0.10	< 1.0 ppm (#)
Iron (ppm)	2.96	< 0.3 ppm (#)
Magnesium (ppm)	1736.78	No Guidelines
Manganese (ppm)	2.40	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	463	No Guidelines
Sodium (ppm)	45675	No Guidelines
Sulfate (ppm)	10.15	< 250 ppm (#)
Zinc (ppm)	11.34	< 5.0 ppm (#)
EC (µmhos/cm)	170900	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	27696	No Guidelines
Hardness Class	Very Hard	< 120
pH	6.5	6.5 - 8.5 (#)
Sodium Percentage (%)	78.2	No Guidelines
Total Dissolved Solids (TDS) (ppm)	146587.9	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advise from the Oklahoma Department of Environmental Quality or local Health Department.
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Kendal Henderson
Signature

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ENVIRONMENTAL PROTECTION AGENCY
OFFICIAL
CHAIN OF CUSTODY RECORD

Customer ID: 1361

PROJ. NO.

PROJECT NAME: Bird Creek - Osage

SAMPLERS: (Signature) Kent Sanborn

Digitally signed by Kent Sanborn
DN: cn=Kent Sanborn, o=EPA, ou, email=sanborn.kent@epa.gov, c=US
Date: 2016.10.06 12:03:01 -05'00'

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Irrigation						REMARKS Lab id
1	10/05/16	11:02AM		✓	1A (Upstream)	1	✓						820711
2	10/05/16	11:18AM		✓	1B (Pool)	1	✓						820712
3	10/05/16	—		✓	1C (Replicate)	1	✓						820713
4	10/05/16	12:01PM		✓	2 (Trib TB)	1	✓						820714
5	10/05/16	12:46PM		✓	3 (Grayhorse TB)	1	✓						820715

NFE

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
			10-5-16 / 3:00pm		

Shipped by: Drop-off

Airbill Number:

Remarks: NA Custody Seals Intact?
Yes Samples Intact?
Yes Samples less than or equal 4 deg C (water)

Distribution: White Accompanies Shipment; Pink to Coordinator Field Files; Green to Report; Yellow Returns with Warrant

EPA 7500-53
(11/96)

R6 - 0801

Soil, Water & Forage Analytical Laboratory

Oklahoma State University Division of Agricultural Sciences and Natural Resources
045 Agricultural Hall
Stillwater, OK 74078
Email: soiltesting@okstate.edu
Website: www.soiltesting.okstate.edu

WATER QUALITY REPORT

CARL E. WILLS (6EN-WC)
CARL E WILLS (6EN-WC)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-13 (Field Blank)

Location : Bird Creek (DI Water)
Osage County, OK

Lab ID No.: : 847168
Customer Code : 1361
Sample No. : 13
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	0	Nitrate-N (ppm)	<1	pH	4.9
Calcium (ppm)	0	Chloride (ppm)	1	EC (µmhos/cm)	5.4
Magnesium (ppm)	0	Sulfate (ppm)	0		
Potassium (ppm)	0	Boron (ppm)	<.01		
		Bicarbonate (ppm)	3		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	4.9	Sodium Percentage	11.3 %
Sodium Adsorption Ratio (SAR)	0.0	Hardness (ppm)	1.3
Potassium Adsorption Ratio (PAR)	0	Hardness Class	Soft
Residual Carbonates (meq)	0.0	Alkalinity (ppm as CaCO3)	2.8

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

The total dissolved salt and sodium content of this water are low enough that no problem should result from its use.

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(214) 665-7276

Name : WS-13 (Field Blank)

Location : Bird Creek (DI Water)
Osage County, OK

Lab ID No.: : 847168
Customer Code : 1361
Sample No. : 13
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	< DL*	< 5 ppm
Calcium (ppm)	0.48	No Guidelines
Chloride (ppm)	0.69	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	< DL*	No Guidelines
Magnesium (ppm)	0.02	No Guidelines
Manganese (ppm)	< DL*	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	< DL*	No Guidelines
Sodium (ppm)	0.07	< 1000 ppm
Sulfate (ppm)	0.23	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	5.4	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	1.3	No Guidelines
Hardness Class	Soft	No Guidelines
pH	4.9	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	4.9	<3000 ppm

* DL : Detection Limit

This water may be objectionable for some livestock because it does not fall between the guideline for pH of 5.5 to 9.0.
If pH is lower than 5.5,a reduction in feeding and acidosis may occur in cattle.The efficiency of chlorination is diminished when pH is high.

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DALLAS, TX 75202
(214) 665-7276

Name : WS-13 (Field Blank)

Location : Bird Creek (DI Water)
Osage County, OK

Lab ID No.: : 847168
Customer Code : 1361
Sample No. : 13
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	< DL*	< 2.4
Calcium (ppm)	0.48	No Guidelines
Chloride (ppm)	0.69	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	< DL*	< 0.3 ppm (#)
Magnesium (ppm)	0.02	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	< DL*	No Guidelines
Sodium (ppm)	0.07	No Guidelines
Sulfate (ppm)	0.23	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	5.4	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	1.3	No Guidelines
Hardness Class	Soft	< 120
pH	4.9	6.5 - 8.5 (#)
Sodium Percentage (%)	11.3	No Guidelines
Total Dissolved Solids (TDS) (ppm)	4.9	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advice from the Oklahoma Department of Environmental Quality or local Health Department.
This water analysis does NOT include testing for bacteria, organic chemicals, and heavy metals. This lab is not certified by DEQ for drinking water analysis.

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1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-15 (Equipment Blank 1)

Location : Bird Creek (DI Water)
Osage County, OK

Lab ID No.: : 847170
Customer Code : 1361
Sample No. : 15
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	0	Nitrate-N (ppm)	<1	pH	6.0
Calcium (ppm)	0	Chloride (ppm)	1	EC (µmhos/cm)	5.7
Magnesium (ppm)	0	Sulfate (ppm)	0		
Potassium (ppm)	0	Boron (ppm)	0.01		
		Bicarbonate (ppm)	8		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	9.0	Sodium Percentage	16.9 %
Sodium Adsorption Ratio (SAR)	0.0	Hardness (ppm)	1.1
Potassium Adsorption Ratio (PAR)	0	Hardness Class	Soft
Residual Carbonates (meq)	0.1	Alkalinity (ppm as CaCO3)	6.3

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

The total dissolved salt and sodium content of this water are low enough that no problem should result from its use.

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DALLAS, TX 75202
(214) 665-7276

Name : WS-15 (Equipment Blank 1)
Location : Bird Creek (DI Water)
Osage County, OK

Lab ID No.: : 847170
Customer Code : 1361
Sample No. : 15
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	< DL*	< 5 ppm
Calcium (ppm)	0.42	No Guidelines
Chloride (ppm)	0.60	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	< DL*	No Guidelines
Magnesium (ppm)	0.03	No Guidelines
Manganese (ppm)	<DL*	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	< DL*	No Guidelines
Sodium (ppm)	0.11	< 1000 ppm
Sulfate (ppm)	0.14	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	5.7	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	1.1	No Guidelines
Hardness Class	Soft	No Guidelines
pH	6.0	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	9.0	<3000 ppm

* DL : Detection Limit

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Name : WS-15 (Equipment Blank 1)
Location : Bird Creek (DI Water)
Osage County, OK

Lab ID No.: : 847170
Customer Code : 1361
Sample No. : 15
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	< DL*	< 2.4
Calcium (ppm)	0.42	No Guidelines
Chloride (ppm)	0.60	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	< DL*	< 0.3 ppm (#)
Magnesium (ppm)	0.03	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	< DL*	No Guidelines
Sodium (ppm)	0.11	No Guidelines
Sulfate (ppm)	0.14	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	5.7	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	1.1	No Guidelines
Hardness Class	Soft	< 120
pH	6.0	6.5 - 8.5 (#)
Sodium Percentage (%)	16.9	No Guidelines
Total Dissolved Solids (TDS) (ppm)	9.0	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-1 (Monitoring Station 1)

Location : 36.832660, -96.496177
Osage County, OK

Lab ID No.: : 847171
Customer Code : 1361
Sample No. : 1
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	18	Nitrate-N (ppm)	<1	pH	8.3
Calcium (ppm)	54	Chloride (ppm)	4	EC (µmhos/cm)	430
Magnesium (ppm)	14	Sulfate (ppm)	30		
Potassium (ppm)	2	Boron (ppm)	0.07		
		Bicarbonate (ppm)	233		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	355.6	Sodium Percentage	17 %
Sodium Adsorption Ratio (SAR)	0.6	Hardness (ppm)	193.4
Potassium Adsorption Ratio (PAR)	0.0	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	190.6

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

The total dissolved salt and sodium content of this water are low enough that no problem should result from its use.

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1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-1 (Monitoring Station 1)

Location : 36.832660, -96.496177
Osage County, OK

Lab ID No.: : 847171
Customer Code : 1361
Sample No. : 1
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	0.07	< 5 ppm
Calcium (ppm)	53.61	No Guidelines
Chloride (ppm)	4.41	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	< DL*	No Guidelines
Magnesium (ppm)	14.50	No Guidelines
Manganese (ppm)	< DL*	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	2	No Guidelines
Sodium (ppm)	18.26	< 1000 ppm
Sulfate (ppm)	30.20	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	430	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	193.4	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	8.3	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	355.6	<3000 ppm

* DL : Detection Limit

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Name : WS-1 (Monitoring Station 1)

Location : 36.832660, -96.496177
Osage County, OK

Lab ID No.: : 847171
Customer Code : 1361
Sample No. : 1
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	0.07	< 2.4
Calcium (ppm)	53.61	No Guidelines
Chloride (ppm)	4.41	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	< DL*	< 0.3 ppm (#)
Magnesium (ppm)	14.50	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	2	No Guidelines
Sodium (ppm)	18.26	No Guidelines
Sulfate (ppm)	30.20	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	430	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	193.4	No Guidelines
Hardness Class	Very Hard	< 120
pH	8.3	6.5 - 8.5 (#)
Sodium Percentage (%)	17	No Guidelines
Total Dissolved Solids (TDS) (ppm)	355.6	<500 ppm (#)

* DL : Detection Limit

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CARL E WILLS (6EN-WC)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : **WS-2 (Monitoring Station 2)**
Location : **36.832135, -96.498664**
Osage County, OK

Lab ID No.: : **847172**
Customer Code : **1361**
Sample No. : **2**
Received : **6/30/2017**
Report Date : **7/7/2017**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	81	Nitrate-N (ppm)	<1	pH	7.9
Calcium (ppm)	46	Chloride (ppm)	118	EC (µmhos/cm)	787
Magnesium (ppm)	16	Sulfate (ppm)	33		
Potassium (ppm)	3	Boron (ppm)	0.09		
		Bicarbonate (ppm)	193		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	519.4	Sodium Percentage	49.5 %
Sodium Adsorption Ratio (SAR)	2.6	Hardness (ppm)	180.6
Potassium Adsorption Ratio (PAR)	0.1	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	158

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

This water can be used satisfactorily for most crops if care is taken to prevent accumulation of soluble salts including sodium in the soil. Good soil management and irrigation practices should be followed. This water can be used with little danger on permeable, well-drained soils.

If this water is used extensively, it is recommended that a soil sample be obtained every few years from the irrigated fields to determine the extent to which sodium or salts may be accumulating and the need for special management practices.

Kendal Henderson
Signature

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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-2 (Monitoring Station 2)
Location : 36.832135, -96.498664
Osage County, OK

Lab ID No.: : 847172
Customer Code : 1361
Sample No. : 2
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	0.09	< 5 ppm
Calcium (ppm)	46.29	No Guidelines
Chloride (ppm)	117.55	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	0.03	No Guidelines
Magnesium (ppm)	15.83	No Guidelines
Manganese (ppm)	< DL*	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	3	No Guidelines
Sodium (ppm)	81.40	< 1000 ppm
Sulfate (ppm)	32.84	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	787	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	180.6	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	7.9	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	519.4	<3000 ppm

* DL : Detection Limit

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Name : WS-2 (Monitoring Station 2)
Location : 36.832135, -96.498664
Osage County, OK

Lab ID No.: : 847172
Customer Code : 1361
Sample No. : 2
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	0.09	< 2.4
Calcium (ppm)	46.29	No Guidelines
Chloride (ppm)	117.55	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	0.03	< 0.3 ppm (#)
Magnesium (ppm)	15.83	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	3	No Guidelines
Sodium (ppm)	81.40	No Guidelines
Sulfate (ppm)	32.84	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	787	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	180.6	No Guidelines
Hardness Class	Very Hard	< 120
pH	7.9	6.5 - 8.5 (#)
Sodium Percentage (%)	49.5	No Guidelines
Total Dissolved Solids (TDS) (ppm)	519.4	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advice from the Oklahoma Department of Environmental Quality or local Health Department.
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Soil, Water & Forage Analytical Laboratory

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Email: soiltesting@okstate.edu
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WATER QUALITY REPORT

CARL E. WILLS (6EN-WC)
CARL E WILLS (6EN-WC)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-3 (Monitoring Station 3)

Location : 36.830668, -96.499461
Osage County, OK

Lab ID No.: : 847173
Customer Code : 1361
Sample No. : 3
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	525	Nitrate-N (ppm)	<1	pH	7.7
Calcium (ppm)	158	Chloride (ppm)	1029	EC (µmhos/cm)	3770
Magnesium (ppm)	31	Sulfate (ppm)	36		
Potassium (ppm)	3	Boron (ppm)	0.10		
		Bicarbonate (ppm)	280		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	2488.2	Sodium Percentage	68.6 %
Sodium Adsorption Ratio (SAR)	10.0	Hardness (ppm)	521.7
Potassium Adsorption Ratio (PAR)	0.0	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	229.8

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

This water is generally unsatisfactory for irrigation use. It may be used for irrigation only under very special conditions and on the advice of a technician trained in irrigation water use. Use of this water should be confined to occasional use as a supplemental source of water on well-drained soils. It is not recommended for use on medium and heavy textured soils

If this water is used extensively, it is recommended that a soil sample be obtained every few years from the irrigated fields to determine the extent to which sodium or salts may be accumulating and the need for special management practices.

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DALLAS, TX 75202
(214) 665-7276

Name : WS-3 (Monitoring Station 3)
Location : 36.830668, -96.499461
Osage County, OK

Lab ID No.: : 847173
Customer Code : 1361
Sample No. : 3
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	0.10	< 5 ppm
Calcium (ppm)	157.68	No Guidelines
Chloride (ppm)	1028.55	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	< DL*	No Guidelines
Magnesium (ppm)	31.18	No Guidelines
Manganese (ppm)	< DL*	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	3	No Guidelines
Sodium (ppm)	524.72	< 1000 ppm
Sulfate (ppm)	36.31	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	3770	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	521.7	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	7.7	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	2488.2	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-3 (Monitoring Station 3)
Location : 36.830668, -96.499461
Osage County, OK

Lab ID No.: : 847173
Customer Code : 1361
Sample No. : 3
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	0.10	< 2.4
Calcium (ppm)	157.68	No Guidelines
Chloride (ppm)	1028.55	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	< DL*	< 0.3 ppm (#)
Magnesium (ppm)	31.18	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	3	No Guidelines
Sodium (ppm)	524.72	No Guidelines
Sulfate (ppm)	36.31	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	3770	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	521.7	No Guidelines
Hardness Class	Very Hard	< 120
pH	7.7	6.5 - 8.5 (#)
Sodium Percentage (%)	68.6	No Guidelines
Total Dissolved Solids (TDS) (ppm)	2488.2	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advice from the Oklahoma Department of Environmental Quality or local Health Department.
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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-4 (Monitoring Station 4)

Location : 36.829906, -96.500244
Osage County, OK

Lab ID No.: : 847174
Customer Code : 1361
Sample No. : 4
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	665	Nitrate-N (ppm)	<1	pH	7.6
Calcium (ppm)	548	Chloride (ppm)	2145	EC (µmhos/cm)	6900
Magnesium (ppm)	93	Sulfate (ppm)	31		
Potassium (ppm)	4	Boron (ppm)	0.08		
		Bicarbonate (ppm)	172		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	4554	Sodium Percentage	45.3 %
Sodium Adsorption Ratio (SAR)	6.9	Hardness (ppm)	1749.5
Potassium Adsorption Ratio (PAR)	0.0	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	141.0

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.

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DALLAS, TX 75202
(214) 665-7276

Name : WS-4 (Monitoring Station 4)

Location : 36.829906, -96.500244
Osage County, OK

Lab ID No.: : 847174
Customer Code : 1361
Sample No. : 4
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	0.08	< 5 ppm
Calcium (ppm)	548.11	No Guidelines
Chloride (ppm)	2144.58	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	< DL*	No Guidelines
Magnesium (ppm)	92.83	No Guidelines
Manganese (ppm)	0.02	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	4	No Guidelines
Sodium (ppm)	665.15	< 1000 ppm
Sulfate (ppm)	31.47	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	6900	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	1749.5	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	7.6	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	4554	<3000 ppm

* DL : Detection Limit

This water is considered unacceptable for some animals because it exceeds the guidline of 3000 mg/L total dissolved salts. See L-256 for more details.
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-4 (Monitoring Station 4)

Location : 36.829906, -96.500244
Osage County, OK

Lab ID No.: : 847174
Customer Code : 1361
Sample No. : 4
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	0.08	< 2.4
Calcium (ppm)	548.11	No Guidelines
Chloride (ppm)	2144.58	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	< DL*	< 0.3 ppm (#)
Magnesium (ppm)	92.83	No Guidelines
Manganese (ppm)	0.02	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	4	No Guidelines
Sodium (ppm)	665.15	No Guidelines
Sulfate (ppm)	31.47	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	6900	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	1749.5	No Guidelines
Hardness Class	Very Hard	< 120
pH	7.6	6.5 - 8.5 (#)
Sodium Percentage (%)	45.3	No Guidelines
Total Dissolved Solids (TDS) (ppm)	4554	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-5 (Monitoring Station 6)

Location : 36.827810, -96.501613
Osage County, OK

Lab ID No.: : 847175
Customer Code : 1361
Sample No. : 5
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	14529	Nitrate-N (ppm)	<1	pH	7.2
Calcium (ppm)	2441	Chloride (ppm)	27740	EC (µmhos/cm)	69300
Magnesium (ppm)	873	Sulfate (ppm)	47		
Potassium (ppm)	38	Boron (ppm)	2.18		
		Bicarbonate (ppm)	61		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	45738	Sodium Percentage	76.5 %
Sodium Adsorption Ratio (SAR)	64.2	Hardness (ppm)	9681.9
Potassium Adsorption Ratio (PAR)	0.1	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	49.7

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.
This water is not recommended for irrigation use because of its high boron content.

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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-5 (Monitoring Station 6)

Location : 36.827810, -96.501613
Osage County, OK

Lab ID No.: : 847175
Customer Code : 1361
Sample No. : 5
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	2.18	< 5 ppm
Calcium (ppm)	2441.04	No Guidelines
Chloride (ppm)	27740.2	< 600 ppm
Copper (ppm)	0.04	< 0.5 ppm
Iron (ppm)	0.02	No Guidelines
Magnesium (ppm)	872.90	No Guidelines
Manganese (ppm)	<DL*	No Guidelines
Nitrate-N (ppm)	0.44	< 100 ppm
Potassium (ppm)	38	No Guidelines
Sodium (ppm)	14529	< 1000 ppm
Sulfate (ppm)	46.72	<1000 ppm
Zinc (ppm)	0.04	< 25 ppm
EC (µmhos/cm)	69300	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	9681.9	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	7.2	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	45738	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-5 (Monitoring Station 6)
Location : 36.827810, -96.501613
Osage County, OK

Lab ID No.: : 847175
Customer Code : 1361
Sample No. : 5
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	2.18	< 2.4
Calcium (ppm)	2441.04	No Guidelines
Chloride (ppm)	27740.2	< 250 ppm (#)
Copper (ppm)	0.04	< 1.0 ppm (#)
Iron (ppm)	0.02	< 0.3 ppm (#)
Magnesium (ppm)	872.90	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
Nitrate-N (ppm)	0.44	< 10 ppm
Potassium (ppm)	38	No Guidelines
Sodium (ppm)	14529	No Guidelines
Sulfate (ppm)	46.72	< 250 ppm (#)
Zinc (ppm)	0.04	< 5.0 ppm (#)
EC (µmhos/cm)	69300	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	9681.9	No Guidelines
Hardness Class	Very Hard	< 120
pH	7.2	6.5 - 8.5 (#)
Sodium Percentage (%)	76.5	No Guidelines
Total Dissolved Solids (TDS) (ppm)	45738	<500 ppm (#)

* DL : Detection Limit

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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : **WS-7 (Replicate 1 of WS-5)**
Location : **36.827810, -96.501613**
Osage County, OK

Lab ID No.: : **847176**
Customer Code : **1361**
Sample No. : **7**
Received : **6/30/2017**
Report Date : **7/7/2017**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	14548	Nitrate-N (ppm)	<1	pH	7.2
Calcium (ppm)	2424	Chloride (ppm)	27734	EC (µmhos/cm)	69900
Magnesium (ppm)	870	Sulfate (ppm)	47		
Potassium (ppm)	38	Boron (ppm)	2.16		
		Bicarbonate (ppm)	61		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	46134	Sodium Percentage	76.7 %
Sodium Adsorption Ratio (SAR)	64.5	Hardness (ppm)	9627.0
Potassium Adsorption Ratio (PAR)	0.1	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	50.3

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.
This water is not recommended for irrigation use because of its high boron content.

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DALLAS, TX 75202
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Name : WS-7 (Replicate 1 of WS-5)
Location : 36.827810, -96.501613
Osage County, OK

Lab ID No.: : 847176
Customer Code : 1361
Sample No. : 7
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	2.16	< 5 ppm
Calcium (ppm)	2424.43	No Guidelines
Chloride (ppm)	27733.7	< 600 ppm
Copper (ppm)	0.04	< 0.5 ppm
Iron (ppm)	0.02	No Guidelines
Magnesium (ppm)	869.61	No Guidelines
Manganese (ppm)	<DL*	No Guidelines
Nitrate-N (ppm)	0.40	< 100 ppm
Potassium (ppm)	38	No Guidelines
Sodium (ppm)	14547.7	< 1000 ppm
Sulfate (ppm)	46.66	<1000 ppm
Zinc (ppm)	0.04	< 25 ppm
EC (µmhos/cm)	69900	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	9627.0	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	7.2	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	46134	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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Name : WS-7 (Replicate 1 of WS-5)

Location : 36.827810, -96.501613
Osage County, OK

Lab ID No.: : 847176
Customer Code : 1361
Sample No. : 7
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	2.16	< 2.4
Calcium (ppm)	2424.43	No Guidelines
Chloride (ppm)	27733.7	< 250 ppm (#)
Copper (ppm)	0.04	< 1.0 ppm (#)
Iron (ppm)	0.02	< 0.3 ppm (#)
Magnesium (ppm)	869.61	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
Nitrate-N (ppm)	0.40	< 10 ppm
Potassium (ppm)	38	No Guidelines
Sodium (ppm)	14547.7	No Guidelines
Sulfate (ppm)	46.66	< 250 ppm (#)
Zinc (ppm)	0.04	< 5.0 ppm (#)
EC (µmhos/cm)	69900	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	9627.0	No Guidelines
Hardness Class	Very Hard	< 120
pH	7.2	6.5 - 8.5 (#)
Sodium Percentage (%)	76.7	No Guidelines
Total Dissolved Solids (TDS) (ppm)	46134	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
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Soil, Water & Forage Analytical Laboratory

Oklahoma State University Division of Agricultural Sciences and Natural Resources
045 Agricultural Hall
Stillwater, OK 74078
Email: soiltesting@okstate.edu
Website: www.soiltesting.okstate.edu

WATER QUALITY REPORT

CARL E. WILLS (6EN-WC)
CARL E WILLS (6EN-WC)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-6 (Monitoring Station 7)

Location : 36.825031, -96.499648
Osage County, OK

Lab ID No.: : 847177
Customer Code : 1361
Sample No. : 6
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	392	Nitrate-N (ppm)	<1	pH	8.0
Calcium (ppm)	131	Chloride (ppm)	765	EC (µmhos/cm)	2810
Magnesium (ppm)	33	Sulfate (ppm)	29		
Potassium (ppm)	3	Boron (ppm)	0.12		
		Bicarbonate (ppm)	155		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	1854.6	Sodium Percentage	64.8 %
Sodium Adsorption Ratio (SAR)	7.9	Hardness (ppm)	462.8
Potassium Adsorption Ratio (PAR)	0.0	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	127

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

This water is generally of sufficiently low quality that its use is considerably restricted. It may be used safely only on very well-drained permeable soils and on salt tolerant crops. It requires careful irrigation practices including applications of excess irrigation water to keep the soil leached of salt when rainfall is insufficient to provide leaching.

Good soil management practices must be used to maintain good physical structure in the soil and to maintain a high level of fertility. Use of this water on medium textured soils may result in problems if care is not exercised. This water is not recommended for heavy textured soils.

If this water is used extensively, it is recommended that a soil sample be obtained every few years from the irrigated fields to determine the extent to which sodium or salts may be accumulating and the need for special management practices.

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Name : WS-6 (Monitoring Station 7)

Location : 36.825031, -96.499648
Osage County, OK

Lab ID No.: : 847177
Customer Code : 1361
Sample No. : 6
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	0.12	< 5 ppm
Calcium (ppm)	130.78	No Guidelines
Chloride (ppm)	764.72	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	< DL*	No Guidelines
Magnesium (ppm)	33.18	No Guidelines
Manganese (ppm)	< DL*	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	3	No Guidelines
Sodium (ppm)	391.73	< 1000 ppm
Sulfate (ppm)	29.26	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	2810	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	462.8	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	8.0	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	1854.6	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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Name : WS-6 (Monitoring Station 7)

Location : 36.825031, -96.499648
Osage County, OK

Lab ID No.: : 847177
Customer Code : 1361
Sample No. : 6
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	0.12	< 2.4
Calcium (ppm)	130.78	No Guidelines
Chloride (ppm)	764.72	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	< DL*	< 0.3 ppm (#)
Magnesium (ppm)	33.18	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	3	No Guidelines
Sodium (ppm)	391.73	No Guidelines
Sulfate (ppm)	29.26	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	2810	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	462.8	No Guidelines
Hardness Class	Very Hard	< 120
pH	8.0	6.5 - 8.5 (#)
Sodium Percentage (%)	64.8	No Guidelines
Total Dissolved Solids (TDS) (ppm)	1854.6	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advice from the Oklahoma Department of Environmental Quality or local Health Department.
This water analysis does NOT include testing for bacteria, organic chemicals, and heavy metals. This lab is not certified by DEQ for drinking water analysis.

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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-16 (Equipment Blank 2)

Location : Bird Creek (DI Water)
Osage County, OK

Lab ID No.: : 847178
Customer Code : 1361
Sample No. : 16
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	0	Nitrate-N (ppm)	<1	pH	5.3
Calcium (ppm)	0	Chloride (ppm)	1	EC (µmhos/cm)	6.0
Magnesium (ppm)	0	Sulfate (ppm)	0		
Potassium (ppm)	0	Boron (ppm)	<.01		
		Bicarbonate (ppm)	7		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	8.8	Sodium Percentage	32.2 %
Sodium Adsorption Ratio (SAR)	0.1	Hardness (ppm)	1.3
Potassium Adsorption Ratio (PAR)	0	Hardness Class	Soft
Residual Carbonates (meq)	0.1	Alkalinity (ppm as CaCO3)	5.5

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

The total dissolved salt and sodium content of this water are low enough that no problem should result from its use.

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DALLAS, TX 75202
(214) 665-7276

Name : WS-16 (Equipment Blank 2)

Location : Bird Creek (DI Water)
Osage County, OK

Lab ID No.: : 847178
Customer Code : 1361
Sample No. : 16
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	< DL*	< 5 ppm
Calcium (ppm)	0.49	No Guidelines
Chloride (ppm)	1.20	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	< DL*	No Guidelines
Magnesium (ppm)	0.02	No Guidelines
Manganese (ppm)	< DL*	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	< DL*	No Guidelines
Sodium (ppm)	0.28	< 1000 ppm
Sulfate (ppm)	0.14	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	6.0	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	1.3	No Guidelines
Hardness Class	Soft	No Guidelines
pH	5.3	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	8.8	<3000 ppm

* DL : Detection Limit

This water may be objectionable for some livestock because it does not fall between the guideline for pH of 5.5 to 9.0.
If pH is lower than 5.5,a reduction in feeding and acidosis may occur in cattle.The efficiency of chlorination is diminished when pH is high.

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(214) 665-7276

Name : WS-16 (Equipment Blank 2)
Location : Bird Creek (DI Water)
Osage County, OK

Lab ID No.: : 847178
Customer Code : 1361
Sample No. : 16
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	< DL*	< 2.4
Calcium (ppm)	0.49	No Guidelines
Chloride (ppm)	1.20	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	< DL*	< 0.3 ppm (#)
Magnesium (ppm)	0.02	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	< DL*	No Guidelines
Sodium (ppm)	0.28	No Guidelines
Sulfate (ppm)	0.14	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	6.0	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	1.3	No Guidelines
Hardness Class	Soft	< 120
pH	5.3	6.5 - 8.5 (#)
Sodium Percentage (%)	32.2	No Guidelines
Total Dissolved Solids (TDS) (ppm)	8.8	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
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DALLAS, TX 75202
(214) 665-7276

Name : **WS-11 (East Domestic WW)**
Location : **36.828592, -96.493931**
Osage County, OK

Lab ID No.: : **847180**
Customer Code : **1361**
Sample No. : **11**
Received : **6/30/2017**
Report Date : **7/7/2017**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	229	Nitrate-N (ppm)	<1	pH	8.8
Calcium (ppm)	3	Chloride (ppm)	101	EC (µmhos/cm)	967
Magnesium (ppm)	1	Sulfate (ppm)	20		
Potassium (ppm)	1	Boron (ppm)	0.45		
		Bicarbonate (ppm)	348		
		Carbonate (ppm)	23.8		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	726.3	Sodium Percentage	98.2 %
Sodium Adsorption Ratio (SAR)	32.9	Hardness (ppm)	9.2
Potassium Adsorption Ratio (PAR)	0.1	Hardness Class	Soft
Residual Carbonates (meq)	6.3	Alkalinity (ppm as CaCO3)	324.8

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.
Residual carbonates are present in excess amounts lowering water quality to unsuitabe.
Water with too high residual carbonates may contain effective sodium in excess of that indicated by the sodium percentage of the water. The calcium and magnesium may precipitate out as lime, thus increasing the percentage of sodium.

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DALLAS, TX 75202
(214) 665-7276

Name : WS-11 (East Domestic WW)
Location : 36.828592, -96.493931
Osage County, OK

Lab ID No.: : 847180
Customer Code : 1361
Sample No. : 11
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	0.45	< 5 ppm
Calcium (ppm)	2.55	No Guidelines
Chloride (ppm)	100.54	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	< DL*	No Guidelines
Magnesium (ppm)	0.68	No Guidelines
Manganese (ppm)	< DL*	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	1	No Guidelines
Sodium (ppm)	229.39	< 1000 ppm
Sulfate (ppm)	20.48	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	967	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	9.2	No Guidelines
Hardness Class	Soft	No Guidelines
pH	8.8	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	726.3	<3000 ppm

* DL : Detection Limit

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Name : WS-11 (East Domestic WW)
Location : 36.828592, -96.493931
Osage County, OK

Lab ID No.: : 847180
Customer Code : 1361
Sample No. : 11
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	0.45	< 2.4
Calcium (ppm)	2.55	No Guidelines
Chloride (ppm)	100.54	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	< DL*	< 0.3 ppm (#)
Magnesium (ppm)	0.68	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	1	No Guidelines
Sodium (ppm)	229.39	No Guidelines
Sulfate (ppm)	20.48	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	967	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	9.2	No Guidelines
Hardness Class	Soft	< 120
pH	8.8	6.5 - 8.5 (#)
Sodium Percentage (%)	98.2	No Guidelines
Total Dissolved Solids (TDS) (ppm)	726.3	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : **WS-14(Replicate 2 of WS-11)**
Location : **36.828592, -96.493931**
Osage County, OK

Lab ID No.: : **847181**
Customer Code : **1361**
Sample No. : **14**
Received : **6/30/2017**
Report Date : **7/7/2017**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	233	Nitrate-N (ppm)	<1	pH	8.8
Calcium (ppm)	3	Chloride (ppm)	98	EC (µmhos/cm)	988
Magnesium (ppm)	1	Sulfate (ppm)	20		
Potassium (ppm)	1	Boron (ppm)	0.45		
		Bicarbonate (ppm)	345		
		Carbonate (ppm)	24.1		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	725.1	Sodium Percentage	98.2 %
Sodium Adsorption Ratio (SAR)	33.3	Hardness (ppm)	9.3
Potassium Adsorption Ratio (PAR)	0.1	Hardness Class	Soft
Residual Carbonates (meq)	6.3	Alkalinity (ppm as CaCO3)	323.1

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.
Residual carbonates are present in excess amounts lowering water quality to unsuitabe.
Water with too high residual carbonates may contain effective sodium in excess of that indicated by the sodium percentage of the water. The calcium and magnesium may precipitate out as lime, thus increasing the percentage of sodium.

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(214) 665-7276

Name : WS-14(Replicate 2 of WS-11)
Location : 36.828592, -96.493931
Osage County, OK

Lab ID No.: : 847181
Customer Code : 1361
Sample No. : 14
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	0.45	< 5 ppm
Calcium (ppm)	2.60	No Guidelines
Chloride (ppm)	97.73	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	< DL*	No Guidelines
Magnesium (ppm)	0.68	No Guidelines
Manganese (ppm)	< DL*	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	1	No Guidelines
Sodium (ppm)	233.31	< 1000 ppm
Sulfate (ppm)	20.45	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	988	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	9.3	No Guidelines
Hardness Class	Soft	No Guidelines
pH	8.8	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	725.1	<3000 ppm

* DL : Detection Limit

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Name : WS-14(Replicate 2 of WS-11)

Location : 36.828592, -96.493931
Osage County, OK

Lab ID No.: : 847181
Customer Code : 1361
Sample No. : 14
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	0.45	< 2.4
Calcium (ppm)	2.60	No Guidelines
Chloride (ppm)	97.73	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	< DL*	< 0.3 ppm (#)
Magnesium (ppm)	0.68	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	1	No Guidelines
Sodium (ppm)	233.31	No Guidelines
Sulfate (ppm)	20.45	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	988	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	9.3	No Guidelines
Hardness Class	Soft	< 120
pH	8.8	6.5 - 8.5 (#)
Sodium Percentage (%)	98.2	No Guidelines
Total Dissolved Solids (TDS) (ppm)	725.1	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
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US EPA REGION 6
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DALLAS, TX 75202
(214) 665-7276

Name : WS-12 (West Domestic WW)
Location : 36.833258, -96.504278
Osage County, OK

Lab ID No.: : 847182
Customer Code : 1361
Sample No. : 12
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	255	Nitrate-N (ppm)	<1	pH	8.0
Calcium (ppm)	21	Chloride (ppm)	26	EC (µmhos/cm)	1385
Magnesium (ppm)	23	Sulfate (ppm)	229		
Potassium (ppm)	2	Boron (ppm)	0.77		
		Bicarbonate (ppm)	590		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	1145.3	Sodium Percentage	79 %
Sodium Adsorption Ratio (SAR)	9.1	Hardness (ppm)	147.6
Potassium Adsorption Ratio (PAR)	0.0	Hardness Class	Hard
Residual Carbonates (meq)	6.7	Alkalinity (ppm as CaCO3)	483.2

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

This water is generally unsatisfactory for irrigation use. It may be used for irrigation only under very special conditions and on the advice of a technician trained in irrigation water use. Use of this water should be confined to occasional use as a supplemental source of water on well-drained soils. It is not recommended for use on medium and heavy textured soils

If this water is used extensively, it is recommended that a soil sample be obtained every few years from the irrigated fields to determine the extent to which sodium or salts may be accumulating and the need for special management practices.
Residual carbonates are present in excess amounts lowering water quality to unsuitabe.
Water with too high residual carbonates may contain effective sodium in excess of that indicated by the sodium percentage of the water. The calcium and magnesium may precipitate out as lime, thus increasing the percentage of sodium.

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Soil, Water & Forage Analytical Laboratory

Oklahoma State University Division of Agricultural Sciences and Natural Resources
045 Agricultural Hall
Stillwater, OK 74078
Email: soiltesting@okstate.edu
Website: www.soiltesting.okstate.edu

WATER QUALITY REPORT

CARL E. WILLS (6EN-WC)
CARL E WILLS (6EN-WC)
US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-12 (West Domestic WW)
Location : 36.833258, -96.504278
Osage County, OK

Lab ID No.: : 847182
Customer Code : 1361
Sample No. : 12
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	0.77	< 5 ppm
Calcium (ppm)	21.20	No Guidelines
Chloride (ppm)	25.52	< 600 ppm
Copper (ppm)	<DL*	<0.5 ppm
Iron (ppm)	< DL*	No Guidelines
Magnesium (ppm)	23.02	No Guidelines
Manganese (ppm)	< DL*	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	2	No Guidelines
Sodium (ppm)	254.63	< 1000 ppm
Sulfate (ppm)	229.37	<1000 ppm
Zinc (ppm)	< DL*	< 25 ppm
EC (µmhos/cm)	1385	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	147.6	No Guidelines
Hardness Class	Hard	No Guidelines
pH	8.0	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	1145.3	<3000 ppm

* DL : Detection Limit

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Name : WS-12 (West Domestic WW)
Location : 36.833258, -96.504278
Osage County, OK

Lab ID No.: : 847182
Customer Code : 1361
Sample No. : 12
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	0.77	< 2.4
Calcium (ppm)	21.20	No Guidelines
Chloride (ppm)	25.52	< 250 ppm (#)
Copper (ppm)	< DL*	<1.0 ppm (#)
Iron (ppm)	< DL*	< 0.3 ppm (#)
Magnesium (ppm)	23.02	No Guidelines
Manganese (ppm)	< DL*	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	2	No Guidelines
Sodium (ppm)	254.63	No Guidelines
Sulfate (ppm)	229.37	< 250 ppm (#)
Zinc (ppm)	< DL*	< 5.0 ppm (#)
EC (µmhos/cm)	1385	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	147.6	No Guidelines
Hardness Class	Hard	< 120
pH	8.0	6.5 - 8.5 (#)
Sodium Percentage (%)	79	No Guidelines
Total Dissolved Solids (TDS) (ppm)	1145.3	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advice from the Oklahoma Department of Environmental Quality or local Health Department.
This water analysis does NOT include testing for bacteria, organic chemicals, and heavy metals. This lab is not certified by DEQ for drinking water analysis.

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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : **WS-8 (Jireh Tank Battery)**

Location : **36.846536, -96.506097**
Osage County, OK

Lab ID No.: : **847183**
Customer Code : **1361**
Sample No. : **8**
Received : **6/30/2017**
Report Date : **7/7/2017**

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	49706	Nitrate-N (ppm)	<1	pH	6.3
Calcium (ppm)	10194	Chloride (ppm)	101527	EC (µmhos/cm)	189100
Magnesium (ppm)	1814	Sulfate (ppm)	38		
Potassium (ppm)	537	Boron (ppm)	8.73		
		Bicarbonate (ppm)	78		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	163893.2	Sodium Percentage	76.7 %
Sodium Adsorption Ratio (SAR)	119.2	Hardness (ppm)	32898.1
Potassium Adsorption Ratio (PAR)	0.8	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	63.6

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.
This water is not recommended for irrigation use because of its high boron content.

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US EPA REGION 6
1445 ROSS AVE SUITE 1200
DALLAS, TX 75202
(214) 665-7276

Name : WS-8 (Jireh Tank Battery)
Location : 36.846536, -96.506097
Osage County, OK

Lab ID No.: : 847183
Customer Code : 1361
Sample No. : 8
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	8.73	< 2.4
Calcium (ppm)	10193.6	No Guidelines
Chloride (ppm)	101527	< 250 ppm (#)
Copper (ppm)	0.07	< 1.0 ppm (#)
Iron (ppm)	0.56	< 0.3 ppm (#)
Magnesium (ppm)	1814.34	No Guidelines
Manganese (ppm)	2.46	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	537	No Guidelines
Sodium (ppm)	49706.1	No Guidelines
Sulfate (ppm)	37.53	< 250 ppm (#)
Zinc (ppm)	0.19	< 5.0 ppm (#)
EC (µmhos/cm)	189100	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	32898.1	No Guidelines
Hardness Class	Very Hard	< 120
pH	6.3	6.5 - 8.5 (#)
Sodium Percentage (%)	76.7	No Guidelines
Total Dissolved Solids (TDS) (ppm)	163893.2	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
If any of the above analysis exceeds EPA standards, you should seek advice from the Oklahoma Department of Environmental Quality or local Health Department.
This water analysis does NOT include testing for bacteria, organic chemicals, and heavy metals. This lab is not certified by DEQ for drinking water analysis.

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DALLAS, TX 75202
(214) 665-7276

Name : WS-8 (Jireh Tank Battery)
Location : 36.846536, -96.506097
Osage County, OK

Lab ID No.: : 847183
Customer Code : 1361
Sample No. : 8
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	8.73	< 5 ppm
Calcium (ppm)	10193.6	No Guidelines
Chloride (ppm)	101527	< 600 ppm
Copper (ppm)	0.07	< 0.5 ppm
Iron (ppm)	0.56	No Guidelines
Magnesium (ppm)	1814.34	No Guidelines
Manganese (ppm)	2.46	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	537	No Guidelines
Sodium (ppm)	49706.1	< 1000 ppm
Sulfate (ppm)	37.53	<1000 ppm
Zinc (ppm)	0.19	< 25 ppm
EC (µmhos/cm)	189100	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	32898.1	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	6.3	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	163893.2	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
This water may be objectionable for some livestock because it exceeds the guideline of 5mg Boron/L.Excess boron in the diets of livestock may decrease feed consumption and cause weight loss
This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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DALLAS, TX 75202
(214) 665-7276

Name : WS-9 (Warren American TB)
Location : 36.840077, -96.499939
Osage County, OK

Lab ID No.: : 847184
Customer Code : 1361
Sample No. : 9
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Irrigation Water

---------- Cations ----------		---------- Anions ----------		---------- Other ----------	
Sodium (ppm)	53664	Nitrate-N (ppm)	<1	pH	6.1
Calcium (ppm)	10581	Chloride (ppm)	112725	EC (µmhos/cm)	198500
Magnesium (ppm)	1847	Sulfate (ppm)	28		
Potassium (ppm)	550	Boron (ppm)	9.41		
		Bicarbonate (ppm)	73		

---------- Derived Values ----------		-------- Derived Values(cont'd) ----------	
Total Dissolved Solids (TDS in ppm)	179468.2	Sodium Percentage	77.4 %
Sodium Adsorption Ratio (SAR)	126.6	Hardness (ppm)	34000.2
Potassium Adsorption Ratio (PAR)	0.8	Hardness Class	Very Hard
		Alkalinity (ppm as CaCO3)	59.6

INTERPRETATION AND REQUIREMENTS FOR *Irrigation Water*

Water of this quality is not recommended for crop irrigation due to its high total dissolved salts and/or sodium level.
This water is not recommended for irrigation use because of its high boron content.

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Name : WS-9 (Warren American TB)
Location : 36.840077, -96.499939
Osage County, OK

Lab ID No.: : 847184
Customer Code : 1361
Sample No. : 9
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Livestock Water

Analysis	Sample Results	Livestock Water Limits
Boron (ppm)	9.41	< 5 ppm
Calcium (ppm)	10580.8	No Guidelines
Chloride (ppm)	112725	< 600 ppm
Copper (ppm)	0.08	< 0.5 ppm
Iron (ppm)	0.44	No Guidelines
Magnesium (ppm)	1847.4	No Guidelines
Manganese (ppm)	1.93	No Guidelines
Nitrate-N (ppm)	< DL*	< 100 ppm
Potassium (ppm)	550	No Guidelines
Sodium (ppm)	53664.2	< 1000 ppm
Sulfate (ppm)	28.05	<1000 ppm
Zinc (ppm)	0.13	< 25 ppm
EC (µmhos/cm)	198500	No Guidelines
ICAP_P ppm	---	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	34000.2	No Guidelines
Hardness Class	Very Hard	No Guidelines
pH	6.1	5.5-9.0
Total Dissolved Solids(TDS) (ppm)	179468.2	<3000 ppm

* DL : Detection Limit

This water may be objectionable because it is less than the guideline of 1000mg Na/L.
Serious effects including death become likely at 5000mg/L.We recommend keeping drinking water Na concentration less than 1000mg/L(chronic exposure criteria).This assumes normal feedstuff Na concentration and no other water sources;these concentrations should protect against acute lethality or chronically poor performance.Short term exposure(days-weeks) should not exceed 4000 mg Na/L
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This water may be objectionable because it exceeds the guideline of 600mg Chloride/L

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Lab ID No.: : 847184
Customer Code : 1361
Sample No. : 9
Received : 6/30/2017
Report Date : 7/7/2017

Test Results for Household Water

Analysis	Sample Results	EPA Drinking Water Limits
Boron (ppm)	9.41	< 2.4
Calcium (ppm)	10580.8	No Guidelines
Chloride (ppm)	112725	< 250 ppm (#)
Copper (ppm)	0.08	< 1.0 ppm (#)
Iron (ppm)	0.44	< 0.3 ppm (#)
Magnesium (ppm)	1847.4	No Guidelines
Manganese (ppm)	1.93	< 0.05 ppm (#)
NO3N (ppm)	< DL*	< 10 ppm
Potassium (ppm)	550	No Guidelines
Sodium (ppm)	53664.2	No Guidelines
Sulfate (ppm)	28.05	< 250 ppm (#)
Zinc (ppm)	0.13	< 5.0 ppm (#)
EC (µmhos/cm)	198500	No Guidelines
Hardness (ppm, 17.1 ppm = 1 grain/gal)	34000.2	No Guidelines
Hardness Class	Very Hard	< 120
pH	6.1	6.5 - 8.5 (#)
Sodium Percentage (%)	77.4	No Guidelines
Total Dissolved Solids (TDS) (ppm)	179468.2	<500 ppm (#)

* DL : Detection Limit

(#) Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects.
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This water analysis does NOT include testing for bacteria, organic chemicals, and heavy metals. This lab is not certified by DEQ for drinking water analysis.

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ENVIRONMENTAL PROTECTION AGENCY

OFFICIAL CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

PROJ. NO.: N/A

PROJECT NAME: BIRD CREEK - OSAGE CO., OK

SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	IRRIGATION						REMARKS Lab ID CC#13601
1	9/27/17	9:31AM		X	WS-13	1	X						817168
2	9/27/17	10:33AM		X	WS-15	1	X						170
3	9/27/17	11:25AM		X	WS-1	1	X						171
4	9/27/17	1:16pm		X	WS-2	1	X						172
5	9/27/17	2:10pm		X	WS-3	1	X						173
6	9/27/17	2:46pm		X	WS-4	1	X						174
7	9/28/17	8:35am		X	WS-5	1	X						175
8	9/28/17	—		X	WS-7 (Replicate #1)	1	X						176
10	9/28/17	10:03AM		X	WS-6	1	X						177
17	9/28/17	11:52AM		X	WS-16	1	X						178
14	9/28/17	1:15pm		X	WS-11	1	X						180
16	9/28/17	—		X	WS-14 (Replicate #2)	1	X						181
15	9/28/17	2:06pm		X	WS-12	1	X						182
11	9/28/17	2:54pm		X	WS-8	1	X						183
12	9/29/17	9:09AM		X	WS-9	1	X						184

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	6/29/17 3:57pm				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	Y/N / INITIALS
			6/29/17 3:57pm	Are all samples intact?	Y
Shipped by: N/A		Airbill Number: N/A		Were all samples ≤ 6°C?	Y

Distribution: White Accompanies Shipment; Pink to Coordinator Field Files; Green to Report; Yellow Returns with Warrant

EPA 7500-53 (11/96)

6- 05014

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 6 Laboratory
Environmental Services Branch
10625 Fallstone Road, Houston, TX 77099
Phone: (281)983-2100 Fax: (281)983-2248

Final Analytical Report

Site Name ----------	Bird Creek
Sample Collection Date(s)--	06/27/17 - 06/29/17
Contact----------	Carl Wills (6EN-WR)
Report Date----------	07/12/17
Project #----------	17CWA085
Work Order(s)----------	1706039 1706041 1706043

Analyses included in this report:

ABN 8270D Routine List	LC Anions MOD 300.1
Metals ICP 6010D	Metals ICP-MS 6020B
Metals Mercury 7470A	P/P TPH
VOA 8260C Routine List	

Report Narrative

This report has been amended for the following:

To report the salinity and conductivity results for sample 1706041-05
To correct the salinity results for samples 1706041-04 and 1706041-06
To correct the conductivity result for sample 1706041-04

Organics:

Volatiles:

2-Butanone and 4-Methyl-2-pentanone concentrations were inconsistent among vials used for analyses for samples 1706041-10 and 1706043-02. Concentrations are qualified as estimated.

Acetone is qualified as blank related in samples 1706041-02, 1706041-03, 1706043-04 due to presence of this analyte in the associated field and equipment blanks. Concentrations >10X the blanks are not qualified.

Batch B7G0104: A few targets fail in the BSs and MS/MSD. Of those failures, Acetone, Methyl

Report Narrative (cont'd)

acetate, and 4-Methyl-2-pentanone were found in the associated samples and are qualified as estimated.

TPH:

Samples 1706041-10 (WS-8) and 1706043-02 (WS-9) contained high salinity and large unresolved hydrocarbon humps. Sample 1706041-10 was analyzed with the first batch, prior to analysis of 1706043-02, and resulted in deterioration of the instrument. After maintenance, the system improved but still had a baseline rise from column bleed. The GRO and DRO in sample 1706043-02 is qualified as both blank related and high biased because the baseline rise from column bleed could not be subtracted from the results. The baseline rise caused a false positive result in the blank (not reported). Both GRO and DRO are believed present in the sample when patterns are compared against method blanks and solvent. Although blank subtraction is not allowed (unadjusted results are officially reported), blank corrected results are provided here for informational purposes. These better estimate concentrations in the samples. Corrected GRO is 10,000 ug/L (13,000 reported) and corrected DRO is 15,000 ug/L (24,000 reported). All should be considered estimated.

The surrogate 1-Chloro-octane fails slightly low in sample 1706039-03 but should not affect the data.

Sample 1706041-06 was re-extracted because no surrogates were added. Only the re-extraction results are reported.

Semi-volatiles:

The tentatively identified compound (TIC) Dichlorobenzoic acid isomer is qualified as blank related (FB) in several field samples due to presence of this compound in the associated field and equipment blank.

The TIC sulfur, mol. reported in sample 1706041-04 is likely due to sodium thiosulfate treatment given to this sample for potential chlorine (the strip test was likely a false positive but treatment is performed regardless).

Batch B7G0102: A few analytes fail in the MS/MSD. Of those failures, four are significant. The reporting limits (RLs) for 2,4-Dimethyphenol, 4-Chloroaniline, 3-Nitroaniline and 4-Nitroaniline are raised in source sample 1706041-04 due to low failures. Absence or presence at the lower RL could not be verified. The remaining failures should not affect the data.

Metals Mercury:

Mercury recoveries were below acceptance limits (75-125) in B7G0303-MS1 (53.0%) and B7G0303-MSD1 (51.8%) for Metals Mercury 7470A. Mercury concentrations in the associated samples were less than or equal to 25% of the reporting limit so, in the analyst's opinion, any potential bias on the reporting limit would not be significant enough to jeopardize the integrity of the sample results. All other QC criteria were met.

Metals ICP (Batch B7E3001):

MS1/MSD1(Source Sample 1706041-04): Calcium and sodium spike recoveries are outside

Report Narrative (cont'd)

acceptance limits; the source results are four or more times the spike added concentrations and the spike recovery cannot be reliable calculated.

Salinity & Conductivity Data:

Lab SX #	FLD STA #	Salinity	Conductivity (umhos/cm)
1706039-02	WS-13	0	1.4
1706039-03	WS-15	1	2.6
1706039-04	WS-1	1	236
1706039-05	WS-2	1	430
1706039-06	WS-3	4	2,210
1706039-07	WS-4	5	4,140
1706041-02	WS-5	46	43,700
1706041-03	WS-7	48	42,800
1706041-04	WS-17	46	42,700
1706041-05	WS-6	2	1,830
1706041-06	WS-16	0	5
1706041-07	WS-11	0	588
1706041-08	WS-14	0	618
1706041-09	WS-12	1	817
1706041-10	WS-8	160	110,600
1706043-02	WS-9	160	119,200

Salinity reported in part per thousand.

Standard procedures for quality assurance and quality control were followed in the analysis and reporting of the sample results. The results apply only to the samples tested. This final report should only be reproduced in full.

The reporting limit (sometimes referred to as a quantitation limit) is defined as the lowest concentration at which an analyte can be reliably measured and reported without qualification. Reporting limits are adjusted for sample size, dilution, and matrix interference. Concentrations below the reporting limit are reported as non-detects or <RL.

Report Approvals:

RICHARD MCMILLIN Digitally signed by RICHARD MCMILLIN DN: c=US, o=U.S. Government, ou=USEPA, ou=Staff, cn=RICHARD MCMILLIN, dnQualifier=0000008516 Date: 2017.07.12 10:26:56 -05'00'

Richard McMillin
Region 6 Laboratory Technical Manager

David W. McQuiddy Digitally signed by David W. McQuiddy Date: 2017.07.12 10:32:49 -05'00'

David W. McQuiddy
Region 6 Laboratory Branch Chief

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 6 Environmental Services Branch Laboratory

10625 Fallstone Road
Houston, Texas 77099

Sample Receipt and Disposal

Site Name: Bird Creek

Project Number: 17CWA085

Data Management Coordinator: Christy Warren

/ /

Data Management Coordinator Signature

Date

Date Transmitted: _____/_____/_____

Please have the U.S. EPA Project Manager/Officer call the Data Management Coordinator at 3-2137 for any comments or questions.

Please sign and date this form below and return it with any comments to:

Christy Warren
Data Management Coordinator
Region 6 Laboratory
6MD-HS

_____/_____/_____

Received by and Date

Comments:

The laboratory routinely disposes of samples 90 days after all analyses have been completed. If you have a need to hold these samples in custody longer than 90 days, please sign below.

_____ _____

Signature Date

Please provide a reason for holding:

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

ANALYTICAL REPORT FOR SAMPLES

Station ID	Laboratory ID	Sample Type	Date Collected	Date Received
Trip Blank #1	1706039-01	Liquid	6/27/17 9:00	06/28/17 09:40
WS-13 (Field Blank)	1706039-02	Liquid	6/27/17 9:31	06/28/17 09:40
WS-15 (Equip. Blank)	1706039-03	Liquid	6/27/17 10:33	06/28/17 09:40
WS-1	1706039-04	Liquid	6/27/17 11:25	06/28/17 09:40
WS-2	1706039-05	Liquid	6/27/17 13:16	06/28/17 09:40
WS-3	1706039-06	Liquid	6/27/17 14:10	06/28/17 09:40
WS-4	1706039-07	Liquid	6/27/17 14:46	06/28/17 09:40
Trip Blank #2	1706041-01	Liquid	6/28/17 8:11	06/29/17 09:40
WS-5	1706041-02	Liquid	6/28/17 8:35	06/29/17 09:40
WS-7 (replicate #1)	1706041-03	Liquid	6/28/17 0:00	06/29/17 09:40
WS-17	1706041-04	Liquid	6/28/17 8:35	06/29/17 09:40
WS-6	1706041-05	Liquid	6/28/17 10:03	06/29/17 09:40
WS-16 (Equip Blank #2)	1706041-06	Liquid	6/28/17 11:52	06/29/17 09:40
WS-11	1706041-07	Liquid	6/28/17 13:15	06/29/17 09:40
WS-14 (Replicate #2)	1706041-08	Liquid	6/28/17 0:00	06/29/17 09:40
WS-12	1706041-09	Liquid	6/28/17 14:06	06/29/17 09:40
WS-8	1706041-10	Liquid	6/28/17 14:54	06/29/17 09:40
Trip Blank #3	1706043-01	Liquid	6/29/17 8:14	06/30/17 09:40
WS-9	1706043-02	Liquid	6/29/17 9:09	06/30/17 09:40

Environmental Protection Agency

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QC SUMMARY REPORT

ABN 8270D Routine List

B7F2806

Liquid

Samples: 14 **ReExts: 0**

LAB NUMBER	SOURCE
B7F2806-BLK1	
B7F2806-BS1	

B7G0102

Liquid

Samples: 2 **ReExts: 0**

LAB NUMBER	SOURCE
B7G0102-BLK1	
B7G0102-BS1	
B7G0102-MS1	1706041-04
B7G0102-MSD1	1706041-04

LC Anions MOD 300.1

B7G0703

Liquid

Samples: 16 **ReExts: 0**

LAB NUMBER	SOURCE
B7G0703-BLK1	
B7G0703-BLK2	
B7G0703-BS1	
B7G0703-BS2	
B7G0703-MS1	1706039-02
B7G0703-MS2	1706041-04
B7G0703-MSD1	1706039-02
B7G0703-MSD2	1706041-04

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Metals ICP 6010D

B7F2912

Liquid

Samples: 6 **ReExts: 0**

LAB NUMBER	SOURCE
B7F2912-BLK1	
B7F2912-BS1	
B7F2912-MS1	1706039-04
B7F2912-MSD1	1706039-04

B7F3001

Liquid

Samples: 10 **ReExts: 0**

LAB NUMBER	SOURCE
B7F3001-BLK1	
B7F3001-BS1	
B7F3001-MS1	1706041-04
B7F3001-MSD1	1706041-04

Metals ICP-MS 6020B

B7F2913

Liquid

Samples: 6 **ReExts: 0**

LAB NUMBER	SOURCE
B7F2913-BLK1	
B7F2913-BS1	
B7F2913-MS1	1706039-04
B7F2913-MSD1	1706039-04

B7F3002

Liquid

Samples: 10 **ReExts: 0**

LAB NUMBER	SOURCE
B7F3002-BLK1	
B7F3002-BS1	
B7F3002-MS1	1706041-04
B7F3002-MSD1	1706041-04

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Metals Mercury 7470A

B7F3003

Liquid

Samples: 6 **ReExts: 0**

LAB NUMBER	SOURCE
B7F3003-BLK1	
B7F3003-BLK2	
B7F3003-BS1	
B7F3003-BS2	
B7F3003-BS3	
B7F3003-BS4	
B7F3003-BS5	
B7F3003-BS6	
B7F3003-BS7	
B7F3003-MS1	1706039-04
B7F3003-MSD1	1706039-04

B7G0303

Liquid

Samples: 10 **ReExts: 0**

LAB NUMBER	SOURCE
B7G0303-BLK1	
B7G0303-BLK2	
B7G0303-BS1	
B7G0303-BS2	
B7G0303-BS3	
B7G0303-BS4	
B7G0303-BS5	
B7G0303-BS6	
B7G0303-BS7	
B7G0303-MS1	1706041-04
B7G0303-MSD1	1706041-04

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P/P TPH

B7F2914

Liquid

Samples: 15 **ReExts: 0**

LAB NUMBER	SOURCE
B7F2914-BLK1	
B7F2914-BLK2	
B7F2914-BS1	
B7F2914-BS2	
B7F2914-BSD1	
B7F2914-BSD2	
B7F2914-MS1	1706041-04
B7F2914-MSD1	1706041-04

B7G0103

Liquid

Samples: 1 **ReExts: 1**

LAB NUMBER	SOURCE
B7G0103-BLK1	
B7G0103-BS1	
B7G0103-BSD1	

VOA 8260C Routine List

B7G0104

Liquid

Samples: 19 **ReExts: 0**

LAB NUMBER	SOURCE
B7G0104-BLK1	
B7G0104-BLK2	
B7G0104-BS1	
B7G0104-BS2	
B7G0104-MS1	1706041-04
B7G0104-MSD1	1706041-04

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-01 **Station ID: Trip Blank #1**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	46.8		93.7	86-117	06/29/17	06/29/17
Toluene-d8	49.7		99.4	85-113	"	"
4-Bromofluorobenzene	45.9		91.9	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-01 **Station ID: Trip Blank #1**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-01 **Station ID: Trip Blank #1**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 961ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	56.6		72.5	42-109	06/29/17	06/29/17
Phenol-d5	56.1		71.9	46-110	"	"
2-Chlorophenol-d4	59.7		76.5	47-103	"	"
1,2-Dichlorobenzene-d4	35.7		68.7	33-100	"	"
Nitrobenzene-d5	37.0		71.2	42-126	"	"
2-Fluorobiphenyl	38.8		74.6	50-104	"	"
2,4,6-Tribromophenol	76.9		98.6	59-142	"	"
Terphenyl-d14	53.3		102	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.2	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.2	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.2	"	"	"
2-Chlorophenol (95-57-8)	U		5.2	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.2	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.2	"	"	"
Benzyl alcohol (100-51-6)	U		5.2	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.2	"	"	"
2-Methylphenol (95-48-7)	U		5.2	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.2	"	"	"
Acetophenone (98-86-2)	U		5.2	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.2	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.2	"	"	"
Hexachloroethane (67-72-1)	U		5.2	"	"	"
Nitrobenzene (98-95-3)	U		5.2	"	"	"
Isophorone (78-59-1)	U		5.2	"	"	"
2-Nitrophenol (88-75-5)	U		5.2	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.2	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.2	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.2	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.2	"	"	"
Naphthalene (91-20-3)	U		2.1	"	"	"

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 961ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.2	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.2	"	"	"
Caprolactam (105-60-2)	U		5.2	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.2	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.1	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.1	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.2	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.2	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.2	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.2	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.2	"	"	"
2-Nitroaniline (88-74-4)	U		8.3	"	"	"
Dimethyl phthalate (131-11-3)	U		5.2	"	"	"
Acenaphthylene (208-96-8)	U		2.1	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.2	"	"	"
3-Nitroaniline (99-09-2)	U		8.3	"	"	"
Acenaphthene (83-32-9)	U		2.1	"	"	"
2,4-Dinitrophenol (51-28-5)	U		20.8	"	"	"
4-Nitrophenol (100-02-7)	U		13.5	"	"	"
Dibenzofuran (132-64-9)	U		5.2	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.2	"	"	"
Fluorene (86-73-7)	U		2.1	"	"	"
Diethyl phthalate (84-66-2)	U		5.2	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.2	"	"	"
4-Nitroaniline (100-01-6)	U		8.3	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		20.8	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.2	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.2	"	"	"
Hexachlorobenzene (118-74-1)	U		5.2	"	"	"
Atrazine (1912-24-9)	U		5.2	"	"	"
Pentachlorophenol (87-86-5)	U		5.2	"	"	"
Phenanthrene (85-01-8)	U		2.1	"	"	"
Anthracene (120-12-7)	U		2.1	"	"	"
Carbazole (86-74-8)	U		5.2	"	"	"

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 961ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.2	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.1	"	"	"
Pyrene (129-00-0)	U		2.1	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.2	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.2	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.2	"	"	"
Chrysene (218-01-9)	U		5.2	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.2	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.2	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.2	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.2	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.2	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.2	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.2	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.2	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 961ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed
2-(2-Butoxyethoxy)-ethyl acetate (124-17-4)	**6**		5.59	1	06/29/17	06/29/17
Dichlorobenzoic acid isomer (NA)	**19**		6.50	"	"	"

Total # of TICs: 2

The compounds listed are *tentatively* identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard. A minimum of the top 10 most significant peaks that are at least 10% in area of the nearest internal standard are reported, excluding those found in the laboratory blank.

Environmental Protection Agency

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Metals by EPA Method 6010D - ICP

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7F2912 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		100	1	06/29/17	06/30/17
Barium (7440-39-3)	U		10.0	"	"	"
Beryllium (7440-41-7)	U		5.0	"	"	"
Cadmium (7440-43-9)	U		5.0	"	"	"
Calcium (7440-70-2)	**685**		150	"	"	"
Chromium (7440-47-3)	U		10.0	"	"	"
Cobalt (7440-48-4)	U		20.0	"	"	"
Copper (7440-50-8)	U		20.0	"	"	"
Iron (7439-89-6)	**37.2**		25.0	"	"	"
Magnesium (7439-95-4)	U		150	"	"	"
Manganese (7439-96-5)	U		5.0	"	"	"
Nickel (7440-02-2)	U		20.0	"	"	"
Potassium (7440-09-7)	U		1,000	"	"	"
Silver (7440-22-4)	U		10.0	"	"	"
Sodium (7440-23-5)	U		500	"	"	"
Vanadium (7440-62-2)	U		20.0	"	"	"
Zinc (7440-66-6)	U		20.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7F2913 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		2.0	4	06/29/17	06/29/17
Arsenic (7440-38-2)	U		2.0	"	"	"
Lead (7439-92-1)	U		2.0	"	"	"
Selenium (7782-49-2)	U		4.0	"	"	"
Thallium (7440-28-0)	U		2.0	"	"	"

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7F2914 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 31.759ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	7,900		83.7	70-130	06/29/17	06/30/17
1-Chlorooctadecane	7,340		77.7	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,200	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,200	"	"	"
Oil Range Organics (NA)	U		5,200	"	"	"
TPH (NA)	U		15,600	"	"	"

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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7F3003 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	06/30/17	06/30/17

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	46.5		92.9	86-117	06/29/17	06/29/17
Toluene-d8	49.5		98.9	85-113	"	"
4-Bromofluorobenzene	45.6		91.2	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

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Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

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Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706039-02 **Station ID: WS-13 (Field Blank)**

Batch: B7G0703 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		1.00	1	1	06/28/17	06/28/17
Nitrite as NO2 (14797-65-0)	U		1.00	1	"	"	"
Fluoride (16984-48-8)	U		1.00	1	"	"	"
Bromide (24959-67-9)	U		1.00	1	"	"	"
Orthophosphate (14265-44-2)	U		1.00	1	"	"	"
Sulfate as SO4 (148-08-798)	U		1.00	1	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1013ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	57.7		77.9	42-109	06/29/17	06/29/17
Phenol-d5	58.1		78.5	46-110	"	"
2-Chlorophenol-d4	61.2		82.7	47-103	"	"
1,2-Dichlorobenzene-d4	33.8		68.6	33-100	"	"
Nitrobenzene-d5	39.0		79.0	42-126	"	"
2-Fluorobiphenyl	40.3		81.7	50-104	"	"
2,4,6-Tribromophenol	74.5		101	59-142	"	"
Terphenyl-d14	49.2		99.7	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		4.9	1	06/29/17	06/29/17
Phenol (108-95-2)	U		4.9	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		4.9	"	"	"
2-Chlorophenol (95-57-8)	U		4.9	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		4.9	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		4.9	"	"	"
Benzyl alcohol (100-51-6)	U		4.9	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		4.9	"	"	"
2-Methylphenol (95-48-7)	U		4.9	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		4.9	"	"	"
Acetophenone (98-86-2)	U		4.9	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		4.9	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		4.9	"	"	"
Hexachloroethane (67-72-1)	U		4.9	"	"	"
Nitrobenzene (98-95-3)	U		4.9	"	"	"
Isophorone (78-59-1)	U		4.9	"	"	"
2-Nitrophenol (88-75-5)	U		4.9	"	"	"
2,4-Dimethylphenol (105-67-9)	U		4.9	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		4.9	"	"	"
2,4-Dichlorophenol (120-83-2)	U		4.9	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		4.9	"	"	"
Naphthalene (91-20-3)	U		2.0	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1013ml Sample Qualifiers: A

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		4.9	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		4.9	"	"	"
Caprolactam (105-60-2)	U		4.9	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		4.9	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.0	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.0	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		4.9	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		4.9	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		4.9	"	"	"
2-Chloronaphthalene (91-58-7)	U		4.9	"	"	"
1,1'-Biphenyl (92-52-4)	U		4.9	"	"	"
2-Nitroaniline (88-74-4)	U		7.9	"	"	"
Dimethyl phthalate (131-11-3)	U		4.9	"	"	"
Acenaphthylene (208-96-8)	U		2.0	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		4.9	"	"	"
3-Nitroaniline (99-09-2)	U		7.9	"	"	"
Acenaphthene (83-32-9)	U		2.0	"	"	"
2,4-Dinitrophenol (51-28-5)	U		19.7	"	"	"
4-Nitrophenol (100-02-7)	U		12.8	"	"	"
Dibenzofuran (132-64-9)	U		4.9	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		4.9	"	"	"
Fluorene (86-73-7)	U		2.0	"	"	"
Diethyl phthalate (84-66-2)	U		4.9	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		4.9	"	"	"
4-Nitroaniline (100-01-6)	U		7.9	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		19.7	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		4.9	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		4.9	"	"	"
Hexachlorobenzene (118-74-1)	U		4.9	"	"	"
Atrazine (1912-24-9)	U		4.9	"	"	"
Pentachlorophenol (87-86-5)	U		4.9	"	"	"
Phenanthrene (85-01-8)	U		2.0	"	"	"
Anthracene (120-12-7)	U		2.0	"	"	"
Carbazole (86-74-8)	U		4.9	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1013ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		4.9	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.0	"	"	"
Pyrene (129-00-0)	U		2.0	"	"	"
Butyl benzyl phthalate (85-68-7)	U		4.9	"	"	"
Benzo (a) anthracene (56-55-3)	U		4.9	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		4.9	"	"	"
Chrysene (218-01-9)	U		4.9	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		4.9	"	"	"
Di-n-octyl phthalate (117-84-0)	U		4.9	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		4.9	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		4.9	"	"	"
Benzo (a) pyrene (50-32-8)	U		4.9	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		4.9	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		4.9	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		4.9	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1013ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed
2-(2-Butoxyethoxy)-ethyl acetate (124-17-4)	**8**		5.59	1	06/29/17	06/29/17
2-Monostearin (621-61-4)	**16**		11.54	"	"	"

Total # of TICs: 2

The compounds listed are *tentatively* identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard. A minimum of the top 10 most significant peaks that are at least 10% in area of the nearest internal standard are reported, excluding those found in the laboratory blank.

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Metals by EPA Method 6010D - ICP

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7F2912 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		100	1	06/29/17	06/30/17
Barium (7440-39-3)	U		10.0	"	"	"
Beryllium (7440-41-7)	U		5.0	"	"	"
Cadmium (7440-43-9)	U		5.0	"	"	"
Calcium (7440-70-2)	**799**		150	"	"	"
Chromium (7440-47-3)	U		10.0	"	"	"
Cobalt (7440-48-4)	U		20.0	"	"	"
Copper (7440-50-8)	**35.3**		20.0	"	"	"
Iron (7439-89-6)	**38.4**		25.0	"	"	"
Magnesium (7439-95-4)	U		150	"	"	"
Manganese (7439-96-5)	U		5.0	"	"	"
Nickel (7440-02-2)	U		20.0	"	"	"
Potassium (7440-09-7)	U		1,000	"	"	"
Silver (7440-22-4)	U		10.0	"	"	"
Sodium (7440-23-5)	U		500	"	"	"
Vanadium (7440-62-2)	U		20.0	"	"	"
Zinc (7440-66-6)	**60.9**		20.0	"	"	"

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7F2913 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		2.0	4	06/29/17	06/29/17
Arsenic (7440-38-2)	U		2.0	"	"	"
Lead (7439-92-1)	**2.9**		2.0	"	"	"
Selenium (7782-49-2)	U		4.0	"	"	"
Thallium (7440-28-0)	U		2.0	"	"	"

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7F2914 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 32.809ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	6,940		75.9	70-130	06/29/17	06/30/17
1-Chlorooctadecane	6,320		69.2 #	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,030	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,030	"	"	"
Oil Range Organics (NA)	U		5,030	"	"	"
TPH (NA)	U		15,100	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7F3003 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	06/30/17	06/30/17

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	44.3		88.5	86-117	06/29/17	06/29/17
Toluene-d8	47.3		94.6	85-113	"	"
4-Bromofluorobenzene	43.4		86.7	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

Environmental Protection Agency

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

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Region 6 Laboratory

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Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706039-03 **Station ID: WS-15 (Equip. Blank)**

Batch: B7G0703 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		1.00	1	1	06/28/17	06/28/17
Nitrite as NO2 (14797-65-0)	U		1.00	1	"	"	"
Fluoride (16984-48-8)	U		1.00	1	"	"	"
Bromide (24959-67-9)	U		1.00	1	"	"	"
Orthophosphate (14265-44-2)	U		1.00	1	"	"	"
Sulfate as SO4 (148-08-798)	U		1.00	1	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1007ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	42.7		57.4	42-109	06/29/17	06/29/17
Phenol-d5	41.9		56.3	46-110	"	"
2-Chlorophenol-d4	44.9		60.3	47-103	"	"
1,2-Dichlorobenzene-d4	28.0		56.5	33-100	"	"
Nitrobenzene-d5	28.6		57.7	42-126	"	"
2-Fluorobiphenyl	30.0		60.4	50-104	"	"
2,4,6-Tribromophenol	59.1		79.3	59-142	"	"
Terphenyl-d14	49.5		99.7	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.0	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.0	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.0	"	"	"
2-Chlorophenol (95-57-8)	U		5.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.0	"	"	"
Benzyl alcohol (100-51-6)	U		5.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.0	"	"	"
2-Methylphenol (95-48-7)	U		5.0	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.0	"	"	"
Acetophenone (98-86-2)	U		5.0	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.0	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.0	"	"	"
Hexachloroethane (67-72-1)	U		5.0	"	"	"
Nitrobenzene (98-95-3)	U		5.0	"	"	"
Isophorone (78-59-1)	U		5.0	"	"	"
2-Nitrophenol (88-75-5)	U		5.0	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.0	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.0	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"
Naphthalene (91-20-3)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1007ml Sample Qualifiers: A

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.0	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.0	"	"	"
Caprolactam (105-60-2)	U		5.0	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.0	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.0	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.0	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.0	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.0	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.0	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.0	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.0	"	"	"
2-Nitroaniline (88-74-4)	U		7.9	"	"	"
Dimethyl phthalate (131-11-3)	U		5.0	"	"	"
Acenaphthylene (208-96-8)	U		2.0	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.0	"	"	"
3-Nitroaniline (99-09-2)	U		7.9	"	"	"
Acenaphthene (83-32-9)	U		2.0	"	"	"
2,4-Dinitrophenol (51-28-5)	U		19.9	"	"	"
4-Nitrophenol (100-02-7)	U		12.9	"	"	"
Dibenzofuran (132-64-9)	U		5.0	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.0	"	"	"
Fluorene (86-73-7)	U		2.0	"	"	"
Diethyl phthalate (84-66-2)	U		5.0	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.0	"	"	"
4-Nitroaniline (100-01-6)	U		7.9	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		19.9	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.0	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.0	"	"	"
Hexachlorobenzene (118-74-1)	U		5.0	"	"	"
Atrazine (1912-24-9)	U		5.0	"	"	"
Pentachlorophenol (87-86-5)	U		5.0	"	"	"
Phenanthrene (85-01-8)	U		2.0	"	"	"
Anthracene (120-12-7)	U		2.0	"	"	"
Carbazole (86-74-8)	U		5.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1007ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.0	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.0	"	"	"
Pyrene (129-00-0)	U		2.0	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.0	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.0	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.0	"	"	"
Chrysene (218-01-9)	U		5.0	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.0	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.0	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.0	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.0	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.0	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.0	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.0	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.0	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1007ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed
Dichlorobenzoic acid isomer (NA)	**16**	FB	6.50	1	06/29/17	06/29/17

Total # of TICs: 1

The compounds listed are *tentatively* identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard. A minimum of the top 10 most significant peaks that are at least 10% in area of the nearest internal standard are reported, excluding those found in the laboratory blank.

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Metals by EPA Method 6010D - ICP

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7F2912 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		100	1	06/29/17	06/30/17
Barium (7440-39-3)	**104**		10.0	"	"	"
Beryllium (7440-41-7)	U		5.0	"	"	"
Cadmium (7440-43-9)	U		5.0	"	"	"
Calcium (7440-70-2)	**51,300**		150	"	"	"
Chromium (7440-47-3)	U		10.0	"	"	"
Cobalt (7440-48-4)	U		20.0	"	"	"
Copper (7440-50-8)	U		20.0	"	"	"
Iron (7439-89-6)	**77.6**		25.0	"	"	"
Magnesium (7439-95-4)	**13,300**		150	"	"	"
Manganese (7439-96-5)	**65.0**		5.0	"	"	"
Nickel (7440-02-2)	U		20.0	"	"	"
Potassium (7440-09-7)	**1,550**		1,000	"	"	"
Silver (7440-22-4)	U		10.0	"	"	"
Sodium (7440-23-5)	**16,400**		500	"	"	"
Vanadium (7440-62-2)	U		20.0	"	"	"
Zinc (7440-66-6)	U		20.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6020B - ICP MS

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7F2913 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		2.0	4	06/29/17	06/29/17
Arsenic (7440-38-2)	U		2.0	"	"	"
Lead (7439-92-1)	U		2.0	"	"	"
Selenium (7782-49-2)	U		4.0	"	"	"
Thallium (7440-28-0)	U		2.0	"	"	"

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Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7F2914 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 31.618ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	8,280		87.2	70-130	06/29/17	06/30/17
1-Chlorooctadecane	7,600		80.1	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,220	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,220	"	"	"
Oil Range Organics (NA)	U		5,220	"	"	"
TPH (NA)	U		15,700	"	"	"

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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7F3003 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	06/30/17	06/30/17

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	45.2		90.5	86-117	06/29/17	06/29/17
Toluene-d8	49.0		97.9	85-113	"	"
4-Bromofluorobenzene	44.8		89.5	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

Environmental Protection Agency

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

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Region 6 Laboratory

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Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706039-04 **Station ID: WS-1**

Batch: B7G0703 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		1.00	1	1	06/28/17	06/28/17
Nitrite as NO2 (14797-65-0)	U		1.00	1	"	"	"
Fluoride (16984-48-8)	U		1.00	1	"	"	"
Bromide (24959-67-9)	U		1.00	1	"	"	"
Orthophosphate (14265-44-2)	U		1.00	1	"	"	"
Sulfate as SO4 (148-08-798)	**28.5**		1.00	1	"	"	"

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Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 956ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	46.5		59.2	42-109	06/29/17	06/29/17
Phenol-d5	44.4		56.6	46-110	"	"
2-Chlorophenol-d4	49.1		62.6	47-103	"	"
1,2-Dichlorobenzene-d4	29.5		56.4	33-100	"	"
Nitrobenzene-d5	31.5		60.3	42-126	"	"
2-Fluorobiphenyl	32.5		62.2	50-104	"	"
2,4,6-Tribromophenol	62.8		80.0	59-142	"	"
Terphenyl-d14	50.5		96.6	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.2	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.2	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.2	"	"	"
2-Chlorophenol (95-57-8)	U		5.2	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.2	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.2	"	"	"
Benzyl alcohol (100-51-6)	U		5.2	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.2	"	"	"
2-Methylphenol (95-48-7)	U		5.2	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.2	"	"	"
Acetophenone (98-86-2)	U		5.2	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.2	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.2	"	"	"
Hexachloroethane (67-72-1)	U		5.2	"	"	"
Nitrobenzene (98-95-3)	U		5.2	"	"	"
Isophorone (78-59-1)	U		5.2	"	"	"
2-Nitrophenol (88-75-5)	U		5.2	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.2	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.2	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.2	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.2	"	"	"
Naphthalene (91-20-3)	U		2.1	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 956ml Sample Qualifiers: A

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.2	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.2	"	"	"
Caprolactam (105-60-2)	U		5.2	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.2	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.1	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.1	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.2	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.2	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.2	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.2	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.2	"	"	"
2-Nitroaniline (88-74-4)	U		8.4	"	"	"
Dimethyl phthalate (131-11-3)	U		5.2	"	"	"
Acenaphthylene (208-96-8)	U		2.1	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.2	"	"	"
3-Nitroaniline (99-09-2)	U		8.4	"	"	"
Acenaphthene (83-32-9)	U		2.1	"	"	"
2,4-Dinitrophenol (51-28-5)	U		20.9	"	"	"
4-Nitrophenol (100-02-7)	U		13.6	"	"	"
Dibenzofuran (132-64-9)	U		5.2	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.2	"	"	"
Fluorene (86-73-7)	U		2.1	"	"	"
Diethyl phthalate (84-66-2)	U		5.2	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.2	"	"	"
4-Nitroaniline (100-01-6)	U		8.4	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		20.9	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.2	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.2	"	"	"
Hexachlorobenzene (118-74-1)	U		5.2	"	"	"
Atrazine (1912-24-9)	U		5.2	"	"	"
Pentachlorophenol (87-86-5)	U		5.2	"	"	"
Phenanthrene (85-01-8)	U		2.1	"	"	"
Anthracene (120-12-7)	U		2.1	"	"	"
Carbazole (86-74-8)	U		5.2	"	"	"

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Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 956ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.2	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.1	"	"	"
Pyrene (129-00-0)	U		2.1	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.2	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.2	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.2	"	"	"
Chrysene (218-01-9)	U		5.2	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.2	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.2	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.2	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.2	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.2	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.2	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.2	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.2	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 956ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed
Dichlorobenzoic acid isomer (NA)	**24**	FB	6.51	1	06/29/17	06/29/17

Total # of TICs: 1

The compounds listed are *tentatively* identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard. A minimum of the top 10 most significant peaks that are at least 10% in area of the nearest internal standard are reported, excluding those found in the laboratory blank.

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Region 6 Laboratory

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Metals by EPA Method 6010D - ICP

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7F2912 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	**162**		100	1	06/29/17	06/30/17
Barium (7440-39-3)	**93.8**		10.0	"	"	"
Beryllium (7440-41-7)	U		5.0	"	"	"
Cadmium (7440-43-9)	U		5.0	"	"	"
Calcium (7440-70-2)	**42,900**		150	"	"	"
Chromium (7440-47-3)	U		10.0	"	"	"
Cobalt (7440-48-4)	U		20.0	"	"	"
Copper (7440-50-8)	U		20.0	"	"	"
Iron (7439-89-6)	**188**		25.0	"	"	"
Magnesium (7439-95-4)	**14,300**		150	"	"	"
Manganese (7439-96-5)	**60.9**		5.0	"	"	"
Nickel (7440-02-2)	U		20.0	"	"	"
Potassium (7440-09-7)	**2,360**		1,000	"	"	"
Silver (7440-22-4)	U		10.0	"	"	"
Sodium (7440-23-5)	**75,000**		500	"	"	"
Vanadium (7440-62-2)	U		20.0	"	"	"
Zinc (7440-66-6)	U		20.0	"	"	"

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7F2913 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		2.0	4	06/29/17	06/29/17
Arsenic (7440-38-2)	U		2.0	"	"	"
Lead (7439-92-1)	U		2.0	"	"	"
Selenium (7782-49-2)	U		4.0	"	"	"
Thallium (7440-28-0)	U		2.0	"	"	"

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7F2914 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 32.193ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	7,690		82.5	70-130	06/29/17	06/30/17
1-Chlorooctadecane	7,170		77.0	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,130	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,130	"	"	"
Oil Range Organics (NA)	U		5,130	"	"	"
TPH (NA)	U		15,400	"	"	"

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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7F3003 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	06/30/17	06/30/17

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	44.0		88.0	86-117	06/29/17	06/29/17
Toluene-d8	47.2		94.5	85-113	"	"
4-Bromofluorobenzene	43.0		85.9	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706039-05 **Station ID: WS-2**

Batch: B7G0703 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		1.00	1	1	06/28/17	06/28/17
Nitrite as NO2 (14797-65-0)	U		1.00	1	"	"	"
Fluoride (16984-48-8)	U		1.00	1	"	"	"
Bromide (24959-67-9)	U		1.00	1	"	"	"
Orthophosphate (14265-44-2)	U		1.00	1	"	"	"
Sulfate as SO4 (148-08-798)	**30.7**		1.00	1	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 931ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	53.0		65.7	42-109	06/29/17	06/29/17
Phenol-d5	53.9		66.9	46-110	"	"
2-Chlorophenol-d4	56.3		69.8	47-103	"	"
1,2-Dichlorobenzene-d4	34.1		63.5	33-100	"	"
Nitrobenzene-d5	35.7		66.4	42-126	"	"
2-Fluorobiphenyl	39.2		73.1	50-104	"	"
2,4,6-Tribromophenol	67.0		83.1	59-142	"	"
Terphenyl-d14	54.1		101	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.4	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.4	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.4	"	"	"
2-Chlorophenol (95-57-8)	U		5.4	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.4	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.4	"	"	"
Benzyl alcohol (100-51-6)	U		5.4	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.4	"	"	"
2-Methylphenol (95-48-7)	U		5.4	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.4	"	"	"
Acetophenone (98-86-2)	U		5.4	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.4	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.4	"	"	"
Hexachloroethane (67-72-1)	U		5.4	"	"	"
Nitrobenzene (98-95-3)	U		5.4	"	"	"
Isophorone (78-59-1)	U		5.4	"	"	"
2-Nitrophenol (88-75-5)	U		5.4	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.4	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.4	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.4	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.4	"	"	"
Naphthalene (91-20-3)	U		2.1	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 931ml Sample Qualifiers: A

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.4	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.4	"	"	"
Caprolactam (105-60-2)	U		5.4	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.4	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.1	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.1	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.4	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.4	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.4	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.4	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.4	"	"	"
2-Nitroaniline (88-74-4)	U		8.6	"	"	"
Dimethyl phthalate (131-11-3)	U		5.4	"	"	"
Acenaphthylene (208-96-8)	U		2.1	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.4	"	"	"
3-Nitroaniline (99-09-2)	U		8.6	"	"	"
Acenaphthene (83-32-9)	U		2.1	"	"	"
2,4-Dinitrophenol (51-28-5)	U		21.5	"	"	"
4-Nitrophenol (100-02-7)	U		14.0	"	"	"
Dibenzofuran (132-64-9)	U		5.4	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.4	"	"	"
Fluorene (86-73-7)	U		2.1	"	"	"
Diethyl phthalate (84-66-2)	U		5.4	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.4	"	"	"
4-Nitroaniline (100-01-6)	U		8.6	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		21.5	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.4	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.4	"	"	"
Hexachlorobenzene (118-74-1)	U		5.4	"	"	"
Atrazine (1912-24-9)	U		5.4	"	"	"
Pentachlorophenol (87-86-5)	U		5.4	"	"	"
Phenanthrene (85-01-8)	U		2.1	"	"	"
Anthracene (120-12-7)	U		2.1	"	"	"
Carbazole (86-74-8)	U		5.4	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 931ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.4	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.1	"	"	"
Pyrene (129-00-0)	U		2.1	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.4	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.4	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.4	"	"	"
Chrysene (218-01-9)	U		5.4	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.4	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.4	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.4	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.4	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.4	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.4	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.4	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.4	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 931ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

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Metals by EPA Method 6010D - ICP

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7F2912 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		100	1	06/29/17	06/30/17
Barium (7440-39-3)	**277**		10.0	"	"	"
Beryllium (7440-41-7)	U		5.0	"	"	"
Cadmium (7440-43-9)	U		5.0	"	"	"
Calcium (7440-70-2)	**149,000**		150	"	"	"
Chromium (7440-47-3)	U		10.0	"	"	"
Cobalt (7440-48-4)	U		20.0	"	"	"
Copper (7440-50-8)	U		20.0	"	"	"
Iron (7439-89-6)	**71.5**		25.0	"	"	"
Magnesium (7439-95-4)	**28,400**		150	"	"	"
Manganese (7439-96-5)	**73.4**		5.0	"	"	"
Nickel (7440-02-2)	U		20.0	"	"	"
Potassium (7440-09-7)	**2,530**		1,000	"	"	"
Silver (7440-22-4)	U		10.0	"	"	"
Sodium (7440-23-5)	**457,000**		500	"	"	"
Vanadium (7440-62-2)	U		20.0	"	"	"
Zinc (7440-66-6)	U		20.0	"	"	"

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7F2913 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		2.0	4	06/29/17	06/29/17
Arsenic (7440-38-2)	**2.4**		2.0	"	"	"
Lead (7439-92-1)	U		2.0	"	"	"
Selenium (7782-49-2)	**13.5**		4.0	"	"	"
Thallium (7440-28-0)	U		2.0	"	"	"

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7F2914 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 32.331ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	8,400		90.5	70-130	06/29/17	06/30/17
1-Chlorooctadecane	7,770		83.8	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,100	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,100	"	"	"
Oil Range Organics (NA)	U		5,100	"	"	"
TPH (NA)	U		15,300	"	"	"

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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7F3003 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	06/30/17	06/30/17

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Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	43.5		87.1	86-117	06/29/17	06/29/17
Toluene-d8	47.2		94.3	85-113	"	"
4-Bromofluorobenzene	43.4		86.8	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

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Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706039-06 **Station ID: WS-3**

Batch: B7G0703 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		1.00	1	1	06/28/17	06/28/17
Nitrite as NO2 (14797-65-0)	U		1.00	1	"	"	"
Fluoride (16984-48-8)	U		1.00	1	"	"	"
Bromide (24959-67-9)	**2.88**		1.00	1	"	"	"
Orthophosphate (14265-44-2)	U		1.00	1	"	"	"
Sulfate as SO4 (148-08-798)	**35.9**		1.00	1	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 913ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	57.6		70.1	42-109	06/29/17	06/29/17
Phenol-d5	56.8		69.1	46-110	"	"
2-Chlorophenol-d4	60.3		73.4	47-103	"	"
1,2-Dichlorobenzene-d4	35.6		65.1	33-100	"	"
Nitrobenzene-d5	37.5		68.5	42-126	"	"
2-Fluorobiphenyl	39.6		72.2	50-104	"	"
2,4,6-Tribromophenol	78.6		95.7	59-142	"	"
Terphenyl-d14	58.1		106	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.5	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.5	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.5	"	"	"
2-Chlorophenol (95-57-8)	U		5.5	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.5	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.5	"	"	"
Benzyl alcohol (100-51-6)	U		5.5	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.5	"	"	"
2-Methylphenol (95-48-7)	U		5.5	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.5	"	"	"
Acetophenone (98-86-2)	U		5.5	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.5	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.5	"	"	"
Hexachloroethane (67-72-1)	U		5.5	"	"	"
Nitrobenzene (98-95-3)	U		5.5	"	"	"
Isophorone (78-59-1)	U		5.5	"	"	"
2-Nitrophenol (88-75-5)	U		5.5	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.5	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.5	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.5	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.5	"	"	"
Naphthalene (91-20-3)	U		2.2	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 913ml Sample Qualifiers: A

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.5	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.5	"	"	"
Caprolactam (105-60-2)	U		5.5	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.5	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.2	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.2	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.5	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.5	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.5	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.5	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.5	"	"	"
2-Nitroaniline (88-74-4)	U		8.8	"	"	"
Dimethyl phthalate (131-11-3)	U		5.5	"	"	"
Acenaphthylene (208-96-8)	U		2.2	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.5	"	"	"
3-Nitroaniline (99-09-2)	U		8.8	"	"	"
Acenaphthene (83-32-9)	U		2.2	"	"	"
2,4-Dinitrophenol (51-28-5)	U		21.9	"	"	"
4-Nitrophenol (100-02-7)	U		14.2	"	"	"
Dibenzofuran (132-64-9)	U		5.5	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.5	"	"	"
Fluorene (86-73-7)	U		2.2	"	"	"
Diethyl phthalate (84-66-2)	U		5.5	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.5	"	"	"
4-Nitroaniline (100-01-6)	U		8.8	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		21.9	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.5	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.5	"	"	"
Hexachlorobenzene (118-74-1)	U		5.5	"	"	"
Atrazine (1912-24-9)	U		5.5	"	"	"
Pentachlorophenol (87-86-5)	U		5.5	"	"	"
Phenanthrene (85-01-8)	U		2.2	"	"	"
Anthracene (120-12-7)	U		2.2	"	"	"
Carbazole (86-74-8)	U		5.5	"	"	"

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Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 913ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.5	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.2	"	"	"
Pyrene (129-00-0)	U		2.2	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.5	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.5	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.5	"	"	"
Chrysene (218-01-9)	U		5.5	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.5	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.5	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.5	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.5	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.5	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.5	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.5	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.5	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7F2806 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 913ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6010D - ICP

Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7F2912 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		100	1	06/29/17	06/30/17
Barium (7440-39-3)	**792**		10.0	"	"	"
Beryllium (7440-41-7)	U		5.0	"	"	"
Cadmium (7440-43-9)	U		5.0	"	"	"
Calcium (7440-70-2)	**480,000**		150	"	"	"
Chromium (7440-47-3)	U		10.0	"	"	"
Cobalt (7440-48-4)	U		20.0	"	"	"
Copper (7440-50-8)	U		20.0	"	"	"
Iron (7439-89-6)	**33.7**		25.0	"	"	"
Magnesium (7439-95-4)	**84,000**		150	"	"	"
Manganese (7439-96-5)	**332**		5.0	"	"	"
Nickel (7440-02-2)	U		20.0	"	"	"
Potassium (7440-09-7)	**3,460**		1,000	"	"	"
Silver (7440-22-4)	U		10.0	"	"	"
Sodium (7440-23-5)	**579,000**		500	"	"	"
Vanadium (7440-62-2)	U		20.0	"	"	"
Zinc (7440-66-6)	U		20.0	"	"	"

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7F2913 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		2.0	4	06/29/17	06/29/17
Arsenic (7440-38-2)	**4.9**		2.0	"	"	"
Lead (7439-92-1)	U		2.0	"	"	"
Selenium (7782-49-2)	**29.4**		4.0	"	"	"
Thallium (7440-28-0)	U		2.0	"	"	"

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7F2914 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 31.99ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	8,460		90.2	70-130	06/29/17	06/30/17
1-Chlorooctadecane	7,800		83.2	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,160	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,160	"	"	"
Oil Range Organics (NA)	U		5,160	"	"	"
TPH (NA)	U		15,500	"	"	"

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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7F3003 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	06/30/17	06/30/17

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	45.3		90.6	86-117	06/29/17	06/29/17
Toluene-d8	48.8		97.6	85-113	"	"
4-Bromofluorobenzene	44.1		88.2	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7G0104 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

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Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706039-07 **Station ID: WS-4**

Batch: B7G0703 Date Collected: 06/27/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		1.00	1	1	06/28/17	06/28/17
Nitrite as NO2 (14797-65-0)	U		1.00	1	"	"	"
Fluoride (16984-48-8)	U		1.00	1	"	"	"
Bromide (24959-67-9)	**5.90**		1.00	1	"	"	"
Orthophosphate (14265-44-2)	U		1.00	1	"	"	"
Sulfate as SO4 (148-08-798)	**31.3**		1.00	1	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-01 **Station ID: Trip Blank #2**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	46.6		93.2	86-117	06/29/17	06/29/17
Toluene-d8	50.2		100	85-113	"	"
4-Bromofluorobenzene	45.6		91.2	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-01 **Station ID: Trip Blank #2**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-01 **Station ID: Trip Blank #2**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 921ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	54.1		66.4	42-109	06/29/17	06/29/17
Phenol-d5	60.3		74.1	46-110	"	"
2-Chlorophenol-d4	55.7		68.4	47-103	"	"
1,2-Dichlorobenzene-d4	36.9		68.0	33-100	"	"
Nitrobenzene-d5	42.7		78.6	42-126	"	"
2-Fluorobiphenyl	43.3		79.8	50-104	"	"
2,4,6-Tribromophenol	64.2		78.9	59-142	"	"
Terphenyl-d14	57.4		106	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.4	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.4	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.4	"	"	"
2-Chlorophenol (95-57-8)	U		5.4	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.4	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.4	"	"	"
Benzyl alcohol (100-51-6)	U		5.4	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.4	"	"	"
2-Methylphenol (95-48-7)	U		5.4	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.4	"	"	"
Acetophenone (98-86-2)	U		5.4	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.4	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.4	"	"	"
Hexachloroethane (67-72-1)	U		5.4	"	"	"
Nitrobenzene (98-95-3)	U		5.4	"	"	"
Isophorone (78-59-1)	U		5.4	"	"	"
2-Nitrophenol (88-75-5)	U		5.4	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.4	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.4	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.4	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.4	"	"	"
Naphthalene (91-20-3)	U		2.2	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 921ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.4	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.4	"	"	"
Caprolactam (105-60-2)	U		5.4	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.4	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.2	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.2	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.4	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.4	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.4	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.4	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.4	"	"	"
2-Nitroaniline (88-74-4)	U		8.7	"	"	"
Dimethyl phthalate (131-11-3)	U		5.4	"	"	"
Acenaphthylene (208-96-8)	U		2.2	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.4	"	"	"
3-Nitroaniline (99-09-2)	U		8.7	"	"	"
Acenaphthene (83-32-9)	U		2.2	"	"	"
2,4-Dinitrophenol (51-28-5)	U		21.7	"	"	"
4-Nitrophenol (100-02-7)	U		14.1	"	"	"
Dibenzofuran (132-64-9)	U		5.4	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.4	"	"	"
Fluorene (86-73-7)	U		2.2	"	"	"
Diethyl phthalate (84-66-2)	U		5.4	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.4	"	"	"
4-Nitroaniline (100-01-6)	U		8.7	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		21.7	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.4	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.4	"	"	"
Hexachlorobenzene (118-74-1)	U		5.4	"	"	"
Atrazine (1912-24-9)	U		5.4	"	"	"
Pentachlorophenol (87-86-5)	U		5.4	"	"	"
Phenanthrene (85-01-8)	U		2.2	"	"	"
Anthracene (120-12-7)	U		2.2	"	"	"
Carbazole (86-74-8)	U		5.4	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 921ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.4	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.2	"	"	"
Pyrene (129-00-0)	U		2.2	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.4	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.4	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.4	"	"	"
Chrysene (218-01-9)	U		5.4	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.4	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.4	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.4	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.4	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.4	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.4	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.4	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.4	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 921ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed
Unknown Iodinated Hydrocarbon (NA)	**5**		4.99	1	06/29/17	06/29/17

Total # of TICs: 1

The compounds listed are *tentatively* identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard. A minimum of the top 10 most significant peaks that are at least 10% in area of the nearest internal standard are reported, excluding those found in the laboratory blank.

Environmental Protection Agency

Region 6 Laboratory

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7F2914 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 32.413ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	7,970		86.1	70-130	06/29/17	06/30/17
1-Chlorooctadecane	7,420		80.1	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,090	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,090	"	"	"
Oil Range Organics (NA)	U		5,090	"	"	"
TPH (NA)	U		15,300	"	"	"

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Metals by EPA Method 6010D - ICP

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7F3001 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		400	4	06/30/17	07/05/17
Barium (7440-39-3)	**6,040**		40.0	"	"	"
Beryllium (7440-41-7)	U		20.0	"	"	"
Cadmium (7440-43-9)	U		20.0	"	"	"
Calcium (7440-70-2)	**1.70E6**		600	"	"	"
Chromium (7440-47-3)	U		40.0	"	"	"
Cobalt (7440-48-4)	U		80.0	"	"	"
Copper (7440-50-8)	U		80.0	"	"	"
Iron (7439-89-6)	**693**		100	"	"	"
Magnesium (7439-95-4)	**686,000**		600	"	"	"
Manganese (7439-96-5)	**427**		20.0	"	"	"
Nickel (7440-02-2)	U		80.0	"	"	"
Potassium (7440-09-7)	**32,300**		4,000	"	"	"
Silver (7440-22-4)	U		40.0	"	"	"
Sodium (7440-23-5)	**1.24E7**		10,000	20	"	"
Vanadium (7440-62-2)	U		80.0	4	"	"
Zinc (7440-66-6)	U		80.0	"	"	"

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7F3002 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		10.0	20	06/30/17	06/30/17
Arsenic (7440-38-2)	**85.8**		10.0	"	"	"
Lead (7439-92-1)	U		10.0	"	"	"
Selenium (7782-49-2)	**302**		20.0	"	"	"
Thallium (7440-28-0)	U		10.0	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	47.6		95.2	86-117	06/29/17	06/29/17
Toluene-d8	50.6		101	85-113	"	"
4-Bromofluorobenzene	46.4		92.8	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	**13.6**	**FB, J**	10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7G0303 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	07/03/17	07/03/17

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Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706041-02 **Station ID: WS-5**

Batch: B7G0703 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		10.0	1	10	06/29/17	06/29/17
Nitrite as NO2 (14797-65-0)	U		10.0	1	"	"	"
Fluoride (16984-48-8)	U		10.0	1	"	"	"
Bromide (24959-67-9)	**90.2**		10.0	1	"	"	"
Orthophosphate (14265-44-2)	U		10.0	1	"	"	"
Sulfate as SO4 (148-08-798)	**39.0**		10.0	1	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 904ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	54.0		65.1	42-109	06/29/17	06/29/17
Phenol-d5	54.9		66.2	46-110	"	"
2-Chlorophenol-d4	53.4		64.3	47-103	"	"
1,2-Dichlorobenzene-d4	38.3		69.3	33-100	"	"
Nitrobenzene-d5	39.8		72.0	42-126	"	"
2-Fluorobiphenyl	40.8		73.7	50-104	"	"
2,4,6-Tribromophenol	60.8		73.3	59-142	"	"
Terphenyl-d14	58.4		106	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.5	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.5	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.5	"	"	"
2-Chlorophenol (95-57-8)	U		5.5	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.5	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.5	"	"	"
Benzyl alcohol (100-51-6)	U		5.5	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.5	"	"	"
2-Methylphenol (95-48-7)	U		5.5	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.5	"	"	"
Acetophenone (98-86-2)	U		5.5	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.5	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.5	"	"	"
Hexachloroethane (67-72-1)	U		5.5	"	"	"
Nitrobenzene (98-95-3)	U		5.5	"	"	"
Isophorone (78-59-1)	U		5.5	"	"	"
2-Nitrophenol (88-75-5)	U		5.5	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.5	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.5	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.5	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.5	"	"	"
Naphthalene (91-20-3)	U		2.2	"	"	"

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 904ml Sample Qualifiers: A

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.5	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.5	"	"	"
Caprolactam (105-60-2)	U		5.5	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.5	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.2	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.2	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.5	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.5	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.5	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.5	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.5	"	"	"
2-Nitroaniline (88-74-4)	U		8.8	"	"	"
Dimethyl phthalate (131-11-3)	U		5.5	"	"	"
Acenaphthylene (208-96-8)	U		2.2	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.5	"	"	"
3-Nitroaniline (99-09-2)	U		8.8	"	"	"
Acenaphthene (83-32-9)	U		2.2	"	"	"
2,4-Dinitrophenol (51-28-5)	U		22.1	"	"	"
4-Nitrophenol (100-02-7)	U		14.4	"	"	"
Dibenzofuran (132-64-9)	U		5.5	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.5	"	"	"
Fluorene (86-73-7)	U		2.2	"	"	"
Diethyl phthalate (84-66-2)	U		5.5	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.5	"	"	"
4-Nitroaniline (100-01-6)	U		8.8	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		22.1	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.5	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.5	"	"	"
Hexachlorobenzene (118-74-1)	U		5.5	"	"	"
Atrazine (1912-24-9)	U		5.5	"	"	"
Pentachlorophenol (87-86-5)	U		5.5	"	"	"
Phenanthrene (85-01-8)	U		2.2	"	"	"
Anthracene (120-12-7)	U		2.2	"	"	"
Carbazole (86-74-8)	U		5.5	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 904ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.5	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.2	"	"	"
Pyrene (129-00-0)	U		2.2	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.5	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.5	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.5	"	"	"
Chrysene (218-01-9)	U		5.5	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.5	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.5	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.5	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.5	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.5	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.5	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.5	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.5	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 904ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7F2914 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 32.932ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	7,320		80.4	70-130	06/29/17	06/30/17
1-Chlorooctadecane	6,780		74.4	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,010	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,010	"	"	"
Oil Range Organics (NA)	U		5,010	"	"	"
TPH (NA)	U		15,000	"	"	"

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Metals by EPA Method 6010D - ICP

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7F3001 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		1,000	10	06/30/17	07/05/17
Barium (7440-39-3)	**6,870**		100	"	"	"
Beryllium (7440-41-7)	U		50.0	"	"	"
Cadmium (7440-43-9)	U		50.0	"	"	"
Calcium (7440-70-2)	**1.98E6**		1,500	"	"	"
Chromium (7440-47-3)	U		100	"	"	"
Cobalt (7440-48-4)	U		200	"	"	"
Copper (7440-50-8)	U		200	"	"	"
Iron (7439-89-6)	**833**		250	"	"	"
Magnesium (7439-95-4)	**775,000**		1,500	"	"	"
Manganese (7439-96-5)	**487**		50.0	"	"	"
Nickel (7440-02-2)	U		200	"	"	"
Potassium (7440-09-7)	**33,000**		10,000	"	"	"
Silver (7440-22-4)	U		100	"	"	"
Sodium (7440-23-5)	**1.34E7**		20,000	40	"	"
Vanadium (7440-62-2)	U		200	10	"	"
Zinc (7440-66-6)	U		200	"	"	"

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7F3002 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		20.0	40	06/30/17	07/03/17
Arsenic (7440-38-2)	**93.6**		20.0	"	"	"
Lead (7439-92-1)	U		20.0	"	"	"
Selenium (7782-49-2)	**342**		40.0	"	"	"
Thallium (7440-28-0)	U		20.0	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	50.2		100	86-117	06/30/17	06/30/17
Toluene-d8	54.7		109	85-113	"	"
4-Bromofluorobenzene	50.2		100	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/30/17	06/30/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	**11.3**	**FB, J**	10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/30/17	06/30/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7G0303 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	07/03/17	07/03/17

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Region 6 Laboratory

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Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706041-03 **Station ID: WS-7 (replicate #1)**

Batch: B7G0703 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		10.0	1	10	06/29/17	06/29/17
Nitrite as NO2 (14797-65-0)	U		10.0	1	"	"	"
Fluoride (16984-48-8)	U		10.0	1	"	"	"
Bromide (24959-67-9)	**89.8**		10.0	1	"	"	"
Orthophosphate (14265-44-2)	U		10.0	1	"	"	"
Sulfate as SO4 (148-08-798)	**39.9**		10.0	1	"	"	"

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7F2914 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 32.781ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	7,960		87.0	70-130	06/29/17	06/29/17
1-Chlorooctadecane	7,330		80.1	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,030	1	06/29/17	06/29/17
Diesel Range Organics (068334-30-5)	U		5,030	"	"	"
Oil Range Organics (NA)	U		5,030	"	"	"
TPH (NA)	U		15,100	"	"	"

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Metals by EPA Method 6010D - ICP

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7F3001 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		1,000	10	06/30/17	07/05/17
Barium (7440-39-3)	**6,840**		100	"	"	"
Beryllium (7440-41-7)	U		50.0	"	"	"
Cadmium (7440-43-9)	U		50.0	"	"	"
Calcium (7440-70-2)	**1.99E6**		1,500	"	"	"
Chromium (7440-47-3)	U		100	"	"	"
Cobalt (7440-48-4)	U		200	"	"	"
Copper (7440-50-8)	U		200	"	"	"
Iron (7439-89-6)	**860**		250	"	"	"
Magnesium (7439-95-4)	**777,000**		1,500	"	"	"
Manganese (7439-96-5)	**450**		50.0	"	"	"
Nickel (7440-02-2)	U		200	"	"	"
Potassium (7440-09-7)	**33,100**		10,000	"	"	"
Silver (7440-22-4)	U		100	"	"	"
Sodium (7440-23-5)	**1.26E7**		20,000	40	"	"
Vanadium (7440-62-2)	U		200	10	"	"
Zinc (7440-66-6)	U		200	"	"	"

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7F3002 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		5.0	10	06/30/17	06/30/17
Arsenic (7440-38-2)	**83.5**		5.0	"	"	"
Lead (7439-92-1)	U		5.0	"	"	"
Selenium (7782-49-2)	**253**		10.0	"	"	"
Thallium (7440-28-0)	U		5.0	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7G0102 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 939ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	45.5		57.0	42-109	07/01/17	07/01/17
Phenol-d5	46.4		58.1	46-110	"	"
2-Chlorophenol-d4	46.8		58.6	47-103	"	"
1,2-Dichlorobenzene-d4	32.0		60.0	33-100	"	"
Nitrobenzene-d5	34.1		64.0	42-126	"	"
2-Fluorobiphenyl	37.0		69.5	50-104	"	"
2,4,6-Tribromophenol	53.6		67.1	59-142	"	"
Terphenyl-d14	57.2		107	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.3	1	07/01/17	07/01/17
Phenol (108-95-2)	U		5.3	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.3	"	"	"
2-Chlorophenol (95-57-8)	U		5.3	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.3	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.3	"	"	"
Benzyl alcohol (100-51-6)	U		5.3	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.3	"	"	"
2-Methylphenol (95-48-7)	U		5.3	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.3	"	"	"
Acetophenone (98-86-2)	U		5.3	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.3	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.3	"	"	"
Hexachloroethane (67-72-1)	U		5.3	"	"	"
Nitrobenzene (98-95-3)	U		5.3	"	"	"
Isophorone (78-59-1)	U		5.3	"	"	"
2-Nitrophenol (88-75-5)	U		5.3	"	"	"
2,4-Dimethylphenol (105-67-9)	U	RL	16.0	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.3	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.3	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.3	"	"	"
Naphthalene (91-20-3)	U		2.1	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7G0102 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 939ml Sample Qualifiers: A

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U	RL	16.0	1	07/01/17	07/01/17
Hexachlorobutadiene (87-68-3)	U		5.3	"	"	"
Caprolactam (105-60-2)	U		5.3	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.3	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.1	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.1	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.3	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.3	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.3	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.3	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.3	"	"	"
2-Nitroaniline (88-74-4)	U		8.5	"	"	"
Dimethyl phthalate (131-11-3)	U		5.3	"	"	"
Acenaphthylene (208-96-8)	U		2.1	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.3	"	"	"
3-Nitroaniline (99-09-2)	U	RL	25.6	"	"	"
Acenaphthene (83-32-9)	U		2.1	"	"	"
2,4-Dinitrophenol (51-28-5)	U		21.3	"	"	"
4-Nitrophenol (100-02-7)	U		13.8	"	"	"
Dibenzofuran (132-64-9)	U		5.3	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.3	"	"	"
Fluorene (86-73-7)	U		2.1	"	"	"
Diethyl phthalate (84-66-2)	U		5.3	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.3	"	"	"
4-Nitroaniline (100-01-6)	U	RL	25.6	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		21.3	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.3	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.3	"	"	"
Hexachlorobenzene (118-74-1)	U		5.3	"	"	"
Atrazine (1912-24-9)	U		5.3	"	"	"
Pentachlorophenol (87-86-5)	U		5.3	"	"	"
Phenanthrene (85-01-8)	U		2.1	"	"	"
Anthracene (120-12-7)	U		2.1	"	"	"
Carbazole (86-74-8)	U		5.3	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7G0102 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 939ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.3	1	07/01/17	07/01/17
Fluoranthene (206-44-0)	U		2.1	"	"	"
Pyrene (129-00-0)	U		2.1	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.3	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.3	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.3	"	"	"
Chrysene (218-01-9)	U		5.3	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.3	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.3	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.3	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.3	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.3	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.3	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.3	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.3	"	"	"
Sulfur (7704-34-9)	**4.5**			"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7G0102 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 939ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed
Sulfur, mol. (10544-50-0)	**4**		9.33	1	07/01/17	07/01/17

Total # of TICs: 1

The compounds listed are *tentatively* identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard. A minimum of the top 10 most significant peaks that are at least 10% in area of the nearest internal standard are reported, excluding those found in the laboratory blank.

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Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	48.3		96.6	86-117	06/30/17	06/30/17
Toluene-d8	51.4		103	85-113	"	"
4-Bromofluorobenzene	46.9		93.8	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/30/17	06/30/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	**12.7**	**FB, J**	10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/30/17	06/30/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

Environmental Protection Agency

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7G0303 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	07/03/17	07/03/17

Environmental Protection Agency

Region 6 Laboratory

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Phone:(281)983-2100 Fax:(281)983-2248

Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706041-04 **Station ID: WS-17**

Batch: B7G0703 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		10.0	1	10	06/29/17	06/29/17
Nitrite as NO2 (14797-65-0)	U		10.0	1	"	"	"
Fluoride (16984-48-8)	U		10.0	1	"	"	"
Bromide (24959-67-9)	**82.7**		10.0	1	"	"	"
Orthophosphate (14265-44-2)	U		10.0	1	"	"	"
Sulfate as SO4 (148-08-798)	**36.3**		10.0	1	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 926ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	59.8		73.9	42-109	06/29/17	06/29/17
Phenol-d5	57.1		70.5	46-110	"	"
2-Chlorophenol-d4	61.4		75.9	47-103	"	"
1,2-Dichlorobenzene-d4	36.1		66.9	33-100	"	"
Nitrobenzene-d5	38.3		71.0	42-126	"	"
2-Fluorobiphenyl	38.2		70.8	50-104	"	"
2,4,6-Tribromophenol	75.3		92.9	59-142	"	"
Terphenyl-d14	55.4		103	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.4	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.4	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.4	"	"	"
2-Chlorophenol (95-57-8)	U		5.4	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.4	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.4	"	"	"
Benzyl alcohol (100-51-6)	U		5.4	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.4	"	"	"
2-Methylphenol (95-48-7)	U		5.4	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.4	"	"	"
Acetophenone (98-86-2)	U		5.4	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.4	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.4	"	"	"
Hexachloroethane (67-72-1)	U		5.4	"	"	"
Nitrobenzene (98-95-3)	U		5.4	"	"	"
Isophorone (78-59-1)	U		5.4	"	"	"
2-Nitrophenol (88-75-5)	U		5.4	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.4	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.4	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.4	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.4	"	"	"
Naphthalene (91-20-3)	U		2.2	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 926ml Sample Qualifiers: A

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.4	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.4	"	"	"
Caprolactam (105-60-2)	U		5.4	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.4	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.2	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.2	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.4	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.4	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.4	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.4	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.4	"	"	"
2-Nitroaniline (88-74-4)	U		8.6	"	"	"
Dimethyl phthalate (131-11-3)	U		5.4	"	"	"
Acenaphthylene (208-96-8)	U		2.2	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.4	"	"	"
3-Nitroaniline (99-09-2)	U		8.6	"	"	"
Acenaphthene (83-32-9)	U		2.2	"	"	"
2,4-Dinitrophenol (51-28-5)	U		21.6	"	"	"
4-Nitrophenol (100-02-7)	U		14.0	"	"	"
Dibenzofuran (132-64-9)	U		5.4	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.4	"	"	"
Fluorene (86-73-7)	U		2.2	"	"	"
Diethyl phthalate (84-66-2)	U		5.4	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.4	"	"	"
4-Nitroaniline (100-01-6)	U		8.6	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		21.6	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.4	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.4	"	"	"
Hexachlorobenzene (118-74-1)	U		5.4	"	"	"
Atrazine (1912-24-9)	U		5.4	"	"	"
Pentachlorophenol (87-86-5)	U		5.4	"	"	"
Phenanthrene (85-01-8)	U		2.2	"	"	"
Anthracene (120-12-7)	U		2.2	"	"	"
Carbazole (86-74-8)	U		5.4	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 926ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.4	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.2	"	"	"
Pyrene (129-00-0)	U		2.2	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.4	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.4	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.4	"	"	"
Chrysene (218-01-9)	U		5.4	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.4	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.4	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.4	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.4	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.4	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.4	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.4	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.4	"	"	"

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 926ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7F2914 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 32.21ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	8,160		87.6	70-130	06/29/17	06/30/17
1-Chlorooctadecane	7,610		81.7	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,120	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,120	"	"	"
Oil Range Organics (NA)	U		5,120	"	"	"
TPH (NA)	U		15,400	"	"	"

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Metals by EPA Method 6010D - ICP

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7F3001 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		100	1	06/30/17	07/05/17
Barium (7440-39-3)	**198**		10.0	"	"	"
Beryllium (7440-41-7)	U		5.0	"	"	"
Cadmium (7440-43-9)	U		5.0	"	"	"
Calcium (7440-70-2)	**113,000**		150	"	"	"
Chromium (7440-47-3)	U		10.0	"	"	"
Cobalt (7440-48-4)	U		20.0	"	"	"
Copper (7440-50-8)	U		20.0	"	"	"
Iron (7439-89-6)	**68.2**		25.0	"	"	"
Magnesium (7439-95-4)	**29,100**		150	"	"	"
Manganese (7439-96-5)	**23.1**		5.0	"	"	"
Nickel (7440-02-2)	U		20.0	"	"	"
Potassium (7440-09-7)	**2,460**		1,000	"	"	"
Silver (7440-22-4)	U		10.0	"	"	"
Sodium (7440-23-5)	**317,000**		500	"	"	"
Vanadium (7440-62-2)	U		20.0	"	"	"
Zinc (7440-66-6)	U		20.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7F3002 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		5.0	10	06/30/17	06/30/17
Arsenic (7440-38-2)	U		5.0	"	"	"
Lead (7439-92-1)	U		5.0	"	"	"
Selenium (7782-49-2)	U		10.0	"	"	"
Thallium (7440-28-0)	U		5.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	43.6		87.2	86-117	06/29/17	06/29/17
Toluene-d8	46.9		93.8	85-113	"	"
4-Bromofluorobenzene	42.8		85.6	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7G0303 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	07/03/17	07/03/17

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Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706041-05 **Station ID: WS-6**

Batch: B7G0703 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		1.00	1	1	06/29/17	06/29/17
Nitrite as NO2 (14797-65-0)	U		1.00	1	"	"	"
Fluoride (16984-48-8)	U		1.00	1	"	"	"
Bromide (24959-67-9)	**2.26**		1.00	1	"	"	"
Orthophosphate (14265-44-2)	U		1.00	1	"	"	"
Sulfate as SO4 (148-08-798)	**28.8**		1.00	1	"	"	"

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Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-06 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 918ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	58.7		71.8	42-109	06/29/17	06/29/17
Phenol-d5	60.3		73.7	46-110	"	"
2-Chlorophenol-d4	63.4		77.6	47-103	"	"
1,2-Dichlorobenzene-d4	36.0		66.1	33-100	"	"
Nitrobenzene-d5	40.5		74.4	42-126	"	"
2-Fluorobiphenyl	43.6		80.0	50-104	"	"
2,4,6-Tribromophenol	78.9		96.6	59-142	"	"
Terphenyl-d14	54.9		101	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.4	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.4	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.4	"	"	"
2-Chlorophenol (95-57-8)	U		5.4	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.4	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.4	"	"	"
Benzyl alcohol (100-51-6)	U		5.4	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.4	"	"	"
2-Methylphenol (95-48-7)	U		5.4	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.4	"	"	"
Acetophenone (98-86-2)	U		5.4	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.4	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.4	"	"	"
Hexachloroethane (67-72-1)	U		5.4	"	"	"
Nitrobenzene (98-95-3)	U		5.4	"	"	"
Isophorone (78-59-1)	U		5.4	"	"	"
2-Nitrophenol (88-75-5)	U		5.4	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.4	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.4	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.4	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.4	"	"	"
Naphthalene (91-20-3)	U		2.2	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-06 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 918ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.4	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.4	"	"	"
Caprolactam (105-60-2)	U		5.4	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.4	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.2	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.2	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.4	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.4	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.4	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.4	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.4	"	"	"
2-Nitroaniline (88-74-4)	U		8.7	"	"	"
Dimethyl phthalate (131-11-3)	U		5.4	"	"	"
Acenaphthylene (208-96-8)	U		2.2	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.4	"	"	"
3-Nitroaniline (99-09-2)	U		8.7	"	"	"
Acenaphthene (83-32-9)	U		2.2	"	"	"
2,4-Dinitrophenol (51-28-5)	U		21.8	"	"	"
4-Nitrophenol (100-02-7)	U		14.2	"	"	"
Dibenzofuran (132-64-9)	U		5.4	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.4	"	"	"
Fluorene (86-73-7)	U		2.2	"	"	"
Diethyl phthalate (84-66-2)	U		5.4	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.4	"	"	"
4-Nitroaniline (100-01-6)	U		8.7	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		21.8	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.4	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.4	"	"	"
Hexachlorobenzene (118-74-1)	U		5.4	"	"	"
Atrazine (1912-24-9)	U		5.4	"	"	"
Pentachlorophenol (87-86-5)	U		5.4	"	"	"
Phenanthrene (85-01-8)	U		2.2	"	"	"
Anthracene (120-12-7)	U		2.2	"	"	"
Carbazole (86-74-8)	U		5.4	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-06 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 918ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.4	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.2	"	"	"
Pyrene (129-00-0)	U		2.2	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.4	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.4	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.4	"	"	"
Chrysene (218-01-9)	U		5.4	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	**7.5**		5.4	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.4	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.4	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.4	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.4	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.4	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.4	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.4	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-06 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 918ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed
2-(2-Butoxyethoxy)-ethyl acetate (124-17-4)	**7**		5.59	1	06/29/17	06/29/17
Diethyltoluamide (134-62-3)	**10**		6.85	"	"	"

Total # of TICs: 2

The compounds listed are *tentatively* identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard. A minimum of the top 10 most significant peaks that are at least 10% in area of the nearest internal standard are reported, excluding those found in the laboratory blank.

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Metals by EPA Method 6010D - ICP

Lab ID: 1706041-06 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7F3001 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		100	1	06/30/17	07/05/17
Barium (7440-39-3)	U		10.0	"	"	"
Beryllium (7440-41-7)	U		5.0	"	"	"
Cadmium (7440-43-9)	U		5.0	"	"	"
Calcium (7440-70-2)	**304**		150	"	"	"
Chromium (7440-47-3)	U		10.0	"	"	"
Cobalt (7440-48-4)	U		20.0	"	"	"
Copper (7440-50-8)	U		20.0	"	"	"
Iron (7439-89-6)	U		25.0	"	"	"
Magnesium (7439-95-4)	U		150	"	"	"
Manganese (7439-96-5)	U		5.0	"	"	"
Nickel (7440-02-2)	U		20.0	"	"	"
Potassium (7440-09-7)	U		1,000	"	"	"
Silver (7440-22-4)	U		10.0	"	"	"
Sodium (7440-23-5)	U		500	"	"	"
Vanadium (7440-62-2)	U		20.0	"	"	"
Zinc (7440-66-6)	U		20.0	"	"	"

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706041-06 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7F3002 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		5.0	10	06/30/17	06/30/17
Arsenic (7440-38-2)	U		5.0	"	"	"
Lead (7439-92-1)	U		5.0	"	"	"
Selenium (7782-49-2)	U		10.0	"	"	"
Thallium (7440-28-0)	U		5.0	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-06 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	43.8		87.6	86-117	06/29/17	06/29/17
Toluene-d8	45.6		91.1	85-113	"	"
4-Bromofluorobenzene	41.7		83.4	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-06 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-06 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706041-06 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7G0303 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	07/03/17	07/03/17

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706041-06 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7G0703 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		1.00	1	1	06/29/17	06/29/17
Nitrite as NO2 (14797-65-0)	U		1.00	1	"	"	"
Fluoride (16984-48-8)	U		1.00	1	"	"	"
Bromide (24959-67-9)	U		1.00	1	"	"	"
Orthophosphate (14265-44-2)	U		1.00	1	"	"	"
Sulfate as SO4 (148-08-798)	U		1.00	1	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706041-06RE1 **Station ID: WS-16 (Equip Blank #2)**

Batch: B7G0103 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 32.168ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	6,780		72.7	70-130	07/01/17	07/06/17
1-Chlorooctadecane	7,050		75.6	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		4,660	1	07/01/17	07/06/17
Diesel Range Organics (068334-30-5)	U		4,660	"	"	"
Oil Range Organics (NA)	U		4,660	"	"	"
TPH (NA)	U		14,000	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 943ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	67.1		84.4	42-109	06/29/17	06/29/17
Phenol-d5	37.7		47.4	46-110	"	"
2-Chlorophenol-d4	69.5		87.4	47-103	"	"
1,2-Dichlorobenzene-d4	42.0		79.2	33-100	"	"
Nitrobenzene-d5	44.5		83.9	42-126	"	"
2-Fluorobiphenyl	45.4		85.6	50-104	"	"
2,4,6-Tribromophenol	80.4		101	59-142	"	"
Terphenyl-d14	52.3		98.6	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.3	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.3	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.3	"	"	"
2-Chlorophenol (95-57-8)	U		5.3	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.3	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.3	"	"	"
Benzyl alcohol (100-51-6)	U		5.3	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.3	"	"	"
2-Methylphenol (95-48-7)	U		5.3	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.3	"	"	"
Acetophenone (98-86-2)	U		5.3	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.3	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.3	"	"	"
Hexachloroethane (67-72-1)	U		5.3	"	"	"
Nitrobenzene (98-95-3)	U		5.3	"	"	"
Isophorone (78-59-1)	U		5.3	"	"	"
2-Nitrophenol (88-75-5)	U		5.3	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.3	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.3	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.3	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.3	"	"	"
Naphthalene (91-20-3)	U		2.1	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 943ml Sample Qualifiers: A

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.3	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.3	"	"	"
Caprolactam (105-60-2)	U		5.3	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.3	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.1	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.1	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.3	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.3	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.3	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.3	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.3	"	"	"
2-Nitroaniline (88-74-4)	U		8.5	"	"	"
Dimethyl phthalate (131-11-3)	U		5.3	"	"	"
Acenaphthylene (208-96-8)	U		2.1	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.3	"	"	"
3-Nitroaniline (99-09-2)	U		8.5	"	"	"
Acenaphthene (83-32-9)	U		2.1	"	"	"
2,4-Dinitrophenol (51-28-5)	U		21.2	"	"	"
4-Nitrophenol (100-02-7)	U		13.8	"	"	"
Dibenzofuran (132-64-9)	U		5.3	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.3	"	"	"
Fluorene (86-73-7)	U		2.1	"	"	"
Diethyl phthalate (84-66-2)	U		5.3	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.3	"	"	"
4-Nitroaniline (100-01-6)	U		8.5	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		21.2	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.3	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.3	"	"	"
Hexachlorobenzene (118-74-1)	U		5.3	"	"	"
Atrazine (1912-24-9)	U		5.3	"	"	"
Pentachlorophenol (87-86-5)	U		5.3	"	"	"
Phenanthrene (85-01-8)	U		2.1	"	"	"
Anthracene (120-12-7)	U		2.1	"	"	"
Carbazole (86-74-8)	U		5.3	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 943ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.3	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.1	"	"	"
Pyrene (129-00-0)	U		2.1	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.3	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.3	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.3	"	"	"
Chrysene (218-01-9)	U		5.3	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.3	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.3	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.3	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.3	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.3	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.3	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.3	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.3	"	"	"

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 943ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7F2914 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 32.335ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	8,420		90.8	70-130	06/29/17	06/30/17
1-Chlorooctadecane	7,750		83.5	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,100	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,100	"	"	"
Oil Range Organics (NA)	U		5,100	"	"	"
TPH (NA)	U		15,300	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6010D - ICP

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7F3001 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		100	1	06/30/17	07/05/17
Barium (7440-39-3)	**132**		10.0	"	"	"
Beryllium (7440-41-7)	U		5.0	"	"	"
Cadmium (7440-43-9)	U		5.0	"	"	"
Calcium (7440-70-2)	**1,200**		150	"	"	"
Chromium (7440-47-3)	U		10.0	"	"	"
Cobalt (7440-48-4)	U		20.0	"	"	"
Copper (7440-50-8)	U		20.0	"	"	"
Iron (7439-89-6)	U		25.0	"	"	"
Magnesium (7439-95-4)	**382**		150	"	"	"
Manganese (7439-96-5)	U		5.0	"	"	"
Nickel (7440-02-2)	U		20.0	"	"	"
Potassium (7440-09-7)	U		1,000	"	"	"
Silver (7440-22-4)	U		10.0	"	"	"
Sodium (7440-23-5)	**196,000**		500	"	"	"
Vanadium (7440-62-2)	U		20.0	"	"	"
Zinc (7440-66-6)	U		20.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6020B - ICP MS

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7F3002 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		5.0	10	06/30/17	06/30/17
Arsenic (7440-38-2)	U		5.0	"	"	"
Lead (7439-92-1)	U		5.0	"	"	"
Selenium (7782-49-2)	U		10.0	"	"	"
Thallium (7440-28-0)	U		5.0	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	49.5		99.1	86-117	06/29/17	06/29/17
Toluene-d8	53.7		107	85-113	"	"
4-Bromofluorobenzene	49.2		98.5	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7G0303 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	07/03/17	07/03/17

Environmental Protection Agency

Region 6 Laboratory

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Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706041-07 **Station ID: WS-11**

Batch: B7G0703 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		1.00	1	1	06/29/17	06/29/17
Nitrite as NO2 (14797-65-0)	U		1.00	1	"	"	"
Fluoride (16984-48-8)	U		1.00	1	"	"	"
Bromide (24959-67-9)	U		1.00	1	"	"	"
Orthophosphate (14265-44-2)	U		1.00	1	"	"	"
Sulfate as SO4 (148-08-798)	**19.5**		1.00	1	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 929ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	61.4		76.1	42-109	06/29/17	06/29/17
Phenol-d5	60.6		75.1	46-110	"	"
2-Chlorophenol-d4	63.7		78.9	47-103	"	"
1,2-Dichlorobenzene-d4	36.1		67.0	33-100	"	"
Nitrobenzene-d5	40.1		74.5	42-126	"	"
2-Fluorobiphenyl	40.5		75.3	50-104	"	"
2,4,6-Tribromophenol	78.5		97.2	59-142	"	"
Terphenyl-d14	56.9		106	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.4	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.4	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.4	"	"	"
2-Chlorophenol (95-57-8)	U		5.4	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.4	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.4	"	"	"
Benzyl alcohol (100-51-6)	U		5.4	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.4	"	"	"
2-Methylphenol (95-48-7)	U		5.4	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.4	"	"	"
Acetophenone (98-86-2)	U		5.4	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.4	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.4	"	"	"
Hexachloroethane (67-72-1)	U		5.4	"	"	"
Nitrobenzene (98-95-3)	U		5.4	"	"	"
Isophorone (78-59-1)	U		5.4	"	"	"
2-Nitrophenol (88-75-5)	U		5.4	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.4	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.4	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.4	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.4	"	"	"
Naphthalene (91-20-3)	U		2.2	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 929ml Sample Qualifiers: A

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.4	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.4	"	"	"
Caprolactam (105-60-2)	U		5.4	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.4	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.2	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.2	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.4	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.4	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.4	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.4	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.4	"	"	"
2-Nitroaniline (88-74-4)	U		8.6	"	"	"
Dimethyl phthalate (131-11-3)	U		5.4	"	"	"
Acenaphthylene (208-96-8)	U		2.2	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.4	"	"	"
3-Nitroaniline (99-09-2)	U		8.6	"	"	"
Acenaphthene (83-32-9)	U		2.2	"	"	"
2,4-Dinitrophenol (51-28-5)	U		21.5	"	"	"
4-Nitrophenol (100-02-7)	U		14.0	"	"	"
Dibenzofuran (132-64-9)	U		5.4	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.4	"	"	"
Fluorene (86-73-7)	U		2.2	"	"	"
Diethyl phthalate (84-66-2)	U		5.4	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.4	"	"	"
4-Nitroaniline (100-01-6)	U		8.6	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		21.5	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.4	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.4	"	"	"
Hexachlorobenzene (118-74-1)	U		5.4	"	"	"
Atrazine (1912-24-9)	U		5.4	"	"	"
Pentachlorophenol (87-86-5)	U		5.4	"	"	"
Phenanthrene (85-01-8)	U		2.2	"	"	"
Anthracene (120-12-7)	U		2.2	"	"	"
Carbazole (86-74-8)	U		5.4	"	"	"

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 929ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.4	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.2	"	"	"
Pyrene (129-00-0)	U		2.2	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.4	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.4	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.4	"	"	"
Chrysene (218-01-9)	U		5.4	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.4	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.4	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.4	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.4	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.4	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.4	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.4	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.4	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 929ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7F2914 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 32.584ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	7,810		84.9	70-130	06/29/17	06/30/17
1-Chlorooctadecane	7,230		78.5	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,060	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,060	"	"	"
Oil Range Organics (NA)	U		5,060	"	"	"
TPH (NA)	U		15,200	"	"	"

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Metals by EPA Method 6010D - ICP

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7F3001 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		100	1	06/30/17	07/05/17
Barium (7440-39-3)	**128**		10.0	"	"	"
Beryllium (7440-41-7)	U		5.0	"	"	"
Cadmium (7440-43-9)	U		5.0	"	"	"
Calcium (7440-70-2)	**1,170**		150	"	"	"
Chromium (7440-47-3)	U		10.0	"	"	"
Cobalt (7440-48-4)	U		20.0	"	"	"
Copper (7440-50-8)	U		20.0	"	"	"
Iron (7439-89-6)	U		25.0	"	"	"
Magnesium (7439-95-4)	**378**		150	"	"	"
Manganese (7439-96-5)	U		5.0	"	"	"
Nickel (7440-02-2)	U		20.0	"	"	"
Potassium (7440-09-7)	U		1,000	"	"	"
Silver (7440-22-4)	U		10.0	"	"	"
Sodium (7440-23-5)	**193,000**		500	"	"	"
Vanadium (7440-62-2)	U		20.0	"	"	"
Zinc (7440-66-6)	U		20.0	"	"	"

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7F3002 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		5.0	10	06/30/17	06/30/17
Arsenic (7440-38-2)	U		5.0	"	"	"
Lead (7439-92-1)	U		5.0	"	"	"
Selenium (7782-49-2)	U		10.0	"	"	"
Thallium (7440-28-0)	U		5.0	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	47.3		94.6	86-117	06/30/17	06/30/17
Toluene-d8	50.1		100	85-113	"	"
4-Bromofluorobenzene	46.4		92.8	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/30/17	06/30/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

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Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/30/17	06/30/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7G0303 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	07/03/17	07/03/17

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Region 6 Laboratory

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Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706041-08 **Station ID: WS-14 (Replicate #2)**

Batch: B7G0703 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		1.00	1	1	06/29/17	06/29/17
Nitrite as NO2 (14797-65-0)	U		1.00	1	"	"	"
Fluoride (16984-48-8)	U		1.00	1	"	"	"
Bromide (24959-67-9)	U		1.00	1	"	"	"
Orthophosphate (14265-44-2)	U		1.00	1	"	"	"
Sulfate as SO4 (148-08-798)	**19.1**		1.00	1	"	"	"

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 930ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	59.2		73.4	42-109	06/29/17	06/29/17
Phenol-d5	58.1		72.0	46-110	"	"
2-Chlorophenol-d4	61.4		76.1	47-103	"	"
1,2-Dichlorobenzene-d4	36.7		68.3	33-100	"	"
Nitrobenzene-d5	38.3		71.3	42-126	"	"
2-Fluorobiphenyl	38.9		72.4	50-104	"	"
2,4,6-Tribromophenol	78.5		97.3	59-142	"	"
Terphenyl-d14	55.0		102	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.4	1	06/29/17	06/29/17
Phenol (108-95-2)	U		5.4	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.4	"	"	"
2-Chlorophenol (95-57-8)	U		5.4	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.4	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.4	"	"	"
Benzyl alcohol (100-51-6)	U		5.4	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.4	"	"	"
2-Methylphenol (95-48-7)	U		5.4	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.4	"	"	"
Acetophenone (98-86-2)	U		5.4	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	U		5.4	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.4	"	"	"
Hexachloroethane (67-72-1)	U		5.4	"	"	"
Nitrobenzene (98-95-3)	U		5.4	"	"	"
Isophorone (78-59-1)	U		5.4	"	"	"
2-Nitrophenol (88-75-5)	U		5.4	"	"	"
2,4-Dimethylphenol (105-67-9)	U		5.4	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.4	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.4	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.4	"	"	"
Naphthalene (91-20-3)	U		2.2	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 930ml Sample Qualifiers: A

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
4-Chloroaniline (106-47-8)	U		5.4	1	06/29/17	06/29/17
Hexachlorobutadiene (87-68-3)	U		5.4	"	"	"
Caprolactam (105-60-2)	U		5.4	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.4	"	"	"
2-Methylnaphthalene (91-57-6)	U		2.2	"	"	"
1-Methylnaphthalene (90-12-0)	U		2.2	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.4	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.4	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.4	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.4	"	"	"
1,1'-Biphenyl (92-52-4)	U		5.4	"	"	"
2-Nitroaniline (88-74-4)	U		8.6	"	"	"
Dimethyl phthalate (131-11-3)	U		5.4	"	"	"
Acenaphthylene (208-96-8)	U		2.2	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.4	"	"	"
3-Nitroaniline (99-09-2)	U		8.6	"	"	"
Acenaphthene (83-32-9)	U		2.2	"	"	"
2,4-Dinitrophenol (51-28-5)	U		21.5	"	"	"
4-Nitrophenol (100-02-7)	U		14.0	"	"	"
Dibenzofuran (132-64-9)	U		5.4	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.4	"	"	"
Fluorene (86-73-7)	U		2.2	"	"	"
Diethyl phthalate (84-66-2)	U		5.4	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.4	"	"	"
4-Nitroaniline (100-01-6)	U		8.6	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		21.5	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.4	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.4	"	"	"
Hexachlorobenzene (118-74-1)	U		5.4	"	"	"
Atrazine (1912-24-9)	U		5.4	"	"	"
Pentachlorophenol (87-86-5)	U		5.4	"	"	"
Phenanthrene (85-01-8)	U		2.2	"	"	"
Anthracene (120-12-7)	U		2.2	"	"	"
Carbazole (86-74-8)	U		5.4	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 930ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Di-n-butyl phthalate (84-74-2)	U		5.4	1	06/29/17	06/29/17
Fluoranthene (206-44-0)	U		2.2	"	"	"
Pyrene (129-00-0)	U		2.2	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.4	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.4	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.4	"	"	"
Chrysene (218-01-9)	U		5.4	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.4	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.4	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.4	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.4	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.4	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.4	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.4	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.4	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 930ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7F2914 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 31.512ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	8,220		86.3	70-130	06/29/17	06/30/17
1-Chlorooctadecane	7,670		80.5	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	U		5,240	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	U		5,240	"	"	"
Oil Range Organics (NA)	U		5,240	"	"	"
TPH (NA)	U		15,700	"	"	"

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Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6010D - ICP

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7F3001 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		100	1	06/30/17	07/05/17
Barium (7440-39-3)	U		10.0	"	"	"
Beryllium (7440-41-7)	U		5.0	"	"	"
Cadmium (7440-43-9)	U		5.0	"	"	"
Calcium (7440-70-2)	**51,500**		150	"	"	"
Chromium (7440-47-3)	U		10.0	"	"	"
Cobalt (7440-48-4)	U		20.0	"	"	"
Copper (7440-50-8)	U		20.0	"	"	"
Iron (7439-89-6)	U		25.0	"	"	"
Magnesium (7439-95-4)	**22,800**		150	"	"	"
Manganese (7439-96-5)	U		5.0	"	"	"
Nickel (7440-02-2)	U		20.0	"	"	"
Potassium (7440-09-7)	**1,710**		1,000	"	"	"
Silver (7440-22-4)	U		10.0	"	"	"
Sodium (7440-23-5)	**217,000**		500	"	"	"
Vanadium (7440-62-2)	U		20.0	"	"	"
Zinc (7440-66-6)	U		20.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7F3002 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		5.0	10	06/30/17	06/30/17
Arsenic (7440-38-2)	U		5.0	"	"	"
Lead (7439-92-1)	U		5.0	"	"	"
Selenium (7782-49-2)	U		10.0	"	"	"
Thallium (7440-28-0)	U		5.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	49.7		99.4	86-117	06/29/17	06/29/17
Toluene-d8	51.6		103	85-113	"	"
4-Bromofluorobenzene	47.2		94.3	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/29/17	06/29/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	U		10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	U		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/29/17	06/29/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

Region 6 Laboratory

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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7G0303 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	07/03/17	07/03/17

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Phone:(281)983-2100 Fax:(281)983-2248

Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706041-09 **Station ID: WS-12**

Batch: B7G0703 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		10.0	1	10	06/29/17	06/29/17
Nitrite as NO2 (14797-65-0)	U		10.0	1	"	"	"
Fluoride (16984-48-8)	U		10.0	1	"	"	"
Bromide (24959-67-9)	U		10.0	1	"	"	"
Orthophosphate (14265-44-2)	U		10.0	1	"	"	"
Sulfate as SO4 (148-08-798)	**226**		10.0	1	"	"	"

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 500ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	103		68.8	42-109	06/29/17	06/29/17
Phenol-d5	106		70.9	46-110	"	"
2-Chlorophenol-d4	111		73.9	47-103	"	"
1,2-Dichlorobenzene-d4	69.0		69.0	33-100	"	"
Nitrobenzene-d5	85.1		85.1	42-126	"	"
2-Fluorobiphenyl	93.5		93.5	50-104	"	"
2,4,6-Tribromophenol	157		104	59-142	"	"
Terphenyl-d14	101		101	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		10.0	1	06/29/17	06/29/17
Phenol (108-95-2)	**10.5**		10.0	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		10.0	"	"	"
2-Chlorophenol (95-57-8)	U		10.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		10.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		10.0	"	"	"
Benzyl alcohol (100-51-6)	U		10.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		10.0	"	"	"
2-Methylphenol (95-48-7)	**28.5**		10.0	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		10.0	"	"	"
Acetophenone (98-86-2)	U		10.0	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	**16.7**		10.0	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		10.0	"	"	"
Hexachloroethane (67-72-1)	U		10.0	"	"	"
Nitrobenzene (98-95-3)	U		10.0	"	"	"
Isophorone (78-59-1)	U		10.0	"	"	"
2-Nitrophenol (88-75-5)	U		10.0	"	"	"
2,4-Dimethylphenol (105-67-9)	**44.8**		10.0	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		10.0	"	"	"
2,4-Dichlorophenol (120-83-2)	U		10.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		10.0	"	"	"
Naphthalene (91-20-3)	**48.5**		4.0	"	"	"
4-Chloroaniline (106-47-8)	U		10.0	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 500ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Hexachlorobutadiene (87-68-3)	U		10.0	1	06/29/17	06/29/17
Caprolactam (105-60-2)	U		10.0	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		10.0	"	"	"
2-Methylnaphthalene (91-57-6)	**111**		4.0	"	"	"
1-Methylnaphthalene (90-12-0)	**75.6**		4.0	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		10.0	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		10.0	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		10.0	"	"	"
2-Chloronaphthalene (91-58-7)	U		10.0	"	"	"
1,1'-Biphenyl (92-52-4)	**16.7**		10.0	"	"	"
2-Nitroaniline (88-74-4)	U		16.0	"	"	"
Dimethyl phthalate (131-11-3)	U		10.0	"	"	"
Acenaphthylene (208-96-8)	U		4.0	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		10.0	"	"	"
3-Nitroaniline (99-09-2)	U		16.0	"	"	"
Acenaphthene (83-32-9)	U		4.0	"	"	"
2,4-Dinitrophenol (51-28-5)	U		40.0	"	"	"
4-Nitrophenol (100-02-7)	U		26.0	"	"	"
Dibenzofuran (132-64-9)	U		10.0	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		10.0	"	"	"
Fluorene (86-73-7)	**8.1**		4.0	"	"	"
Diethyl phthalate (84-66-2)	U		10.0	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		10.0	"	"	"
4-Nitroaniline (100-01-6)	U		16.0	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		40.0	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		10.0	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		10.0	"	"	"
Hexachlorobenzene (118-74-1)	U		10.0	"	"	"
Atrazine (1912-24-9)	U		10.0	"	"	"
Pentachlorophenol (87-86-5)	U		10.0	"	"	"
Phenanthrene (85-01-8)	**18.4**		4.0	"	"	"
Anthracene (120-12-7)	U		4.0	"	"	"
Carbazole (86-74-8)	U		10.0	"	"	"
Di-n-butyl phthalate (84-74-2)	U		10.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 500ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Fluoranthene (206-44-0)	U		4.0	1	06/29/17	06/29/17
Pyrene (129-00-0)	U		4.0	"	"	"
Butyl benzyl phthalate (85-68-7)	U		10.0	"	"	"
Benzo (a) anthracene (56-55-3)	U		10.0	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		10.0	"	"	"
Chrysene (218-01-9)	U		10.0	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		10.0	"	"	"
Di-n-octyl phthalate (117-84-0)	U		10.0	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		10.0	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		10.0	"	"	"
Benzo (a) pyrene (50-32-8)	U		10.0	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		10.0	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		10.0	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		10.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7F2806 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 500ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed
Dodecane (112-40-3)	**240**		4.64	1	06/29/17	06/29/17
Dimethylundecane isomer (NA)	**88**		4.70	"	"	"
Unknown Hydrocarbon, Cyclic (NA)	**81**		4.93	"	"	"
C14 Branched Hydrocarbon (01) (NA)	**150**		5.08	"	"	"
Tridecane (629-50-5)	**330**		5.27	"	"	"
C14 Branched Hydrocarbon (02) (NA)	**70**		5.35	"	"	"
Trimethyldodecane isomer (NA)	**86**		5.71	"	"	"
Tetradecane (629-59-4)	**240**		5.86	"	"	"
Dimethylnaphthalene Isomer (02) (NA)	**88**		6.00	"	"	"
Dimethylnaphthalene Isomer (01) (NA)	**120**		6.08	"	"	"
Unknown Branched Hydrocarbon (NA)	**200**		6.19	"	"	"
Pentadecane (629-62-9)	**200**		6.42	"	"	"
Trimethylnaphthalene Isomer (01) (NA)	**66**		6.66	"	"	"
Trimethylnaphthalene Isomer (02) (NA)	**85**		6.70	"	"	"
C17 Branched Hydrocarbon (NA)	**61**		6.75	"	"	"
Hexadecane (544-76-3)	**180**		6.96	"	"	"
C18 Branched Hydrocarbon (NA)	**90**		7.18	"	"	"
Heptadecane (629-78-7)	**290**		7.46	"	"	"
Octadecane (593-45-3)	**170**		7.94	"	"	"
C20 Branched Hydrocarbon (NA)	**75**		7.97	"	"	"
Nonadecane (629-92-5)	**140**		8.40	"	"	"
C15H12 isomer (NA)	**63**		8.57	"	"	"
Eicosane (112-95-8)	**120**		8.83	"	"	"
Dimethylphenanthrene Isomer (NA)	**63**		9.14	"	"	"
Heneicosane (629-94-7)	**120**		9.25	"	"	"
Docosane (629-97-0)	**120**		9.64	"	"	"
Tricosane (638-67-5)	**97**		10.02	"	"	"
Tetracosane (646-31-1)	**82**		10.39	"	"	"
Pentacosane (629-99-2)	**75**		10.74	"	"	"
Hexacosane (630-01-3)	**73**		11.09	"	"	"

Total # of TICs: 30

The compounds listed are *tentatively* identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard. A minimum of the top 10 most significant peaks that are at least 10% in area of the nearest internal standard are reported, excluding those found in the laboratory blank.

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7F2914 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 35.57ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	7,550		89.5	70-130	06/29/17	06/30/17
1-Chlorooctadecane	7,440		88.3	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	**15,800**		4,640	1	06/29/17	06/30/17
Diesel Range Organics (068334-30-5)	**71,700**		4,640	"	"	"
Oil Range Organics (NA)	**21,100**		4,640	"	"	"
TPH (NA)	**109,000**		13,900	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6010D - ICP

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7F3001 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		2,000	20	06/30/17	07/05/17
Barium (7440-39-3)	**34,800**		200	"	"	"
Beryllium (7440-41-7)	U		100	"	"	"
Cadmium (7440-43-9)	U		100	"	"	"
Calcium (7440-70-2)	**7.89E6**		3,000	"	"	"
Chromium (7440-47-3)	U		200	"	"	"
Cobalt (7440-48-4)	U		400	"	"	"
Copper (7440-50-8)	U		400	"	"	"
Iron (7439-89-6)	**17,400**		500	"	"	"
Magnesium (7439-95-4)	**1.56E6**		3,000	"	"	"
Manganese (7439-96-5)	**2,330**		100	"	"	"
Nickel (7440-02-2)	U		400	"	"	"
Potassium (7440-09-7)	**427,000**		20,000	"	"	"
Silver (7440-22-4)	U		200	"	"	"
Sodium (7440-23-5)	**4.58E7**		50,000	100	"	"
Vanadium (7440-62-2)	U		400	20	"	"
Zinc (7440-66-6)	U		400	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7F3002 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		25.0	50	06/30/17	07/03/17
Arsenic (7440-38-2)	**286**		25.0	"	"	"
Lead (7439-92-1)	U		25.0	"	"	"
Selenium (7782-49-2)	**969**		50.0	"	"	"
Thallium (7440-28-0)	U		25.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	44.7		89.5	86-117	06/30/17	06/30/17
Toluene-d8	47.4		94.7	85-113	"	"
4-Bromofluorobenzene	46.7		93.4	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/30/17	06/30/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	**1,210**	**J**	200	20	"	06/30/17
Methylene chloride (75-09-2)	U		2.0	1	"	06/30/17
Methyl acetate (79-20-9)	**2,330**	**J**	40.0	20	"	06/30/17
trans-1,2-Dichloroethene (156-60-5)	U		2.0	1	"	06/30/17
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	**162**	**J**	5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	**46.9**		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	**531**		40.0	20	"	06/30/17
Trichloroethene (79-01-6)	U		2.0	1	"	06/30/17
Methylcyclohexane (108-87-2)	**57.8**		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	1	06/30/17	06/30/17
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	**22.1**	**J**	5.0	"	"	"
Toluene (108-88-3)	**265**		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	**26.8**		2.0	"	"	"
meta-/para-Xylene (na)	**156**		4.0	"	"	"
ortho-Xylene (95-47-6)	**80.3**		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	**5.4**		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7G0104 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed
Unknown (01) (NA)	**73**		1.04	1	06/30/17	06/30/17
TIC: Butane (106-97-8)	**67**		1.20	"	"	"
2-Methylbutane (78-78-4)	**18**		1.46	"	"	"
Pentane (109-66-0)	**63**		1.60	"	"	"
Unknown alcohol (NA)	**34**		2.36	"	"	"
TIC: Hexane (110-54-3)	**51**		2.63	"	"	"
TIC: Methylcyclopentane (96-37-7)	**66**		3.23	"	"	"
TIC: Heptane (142-82-5)	**27**		4.94	"	"	"
C8H16 isomer (NA)	**21**		6.69	"	"	"
TIC: Octane (111-65-9)	**22**		7.02	"	"	"
Nonane (111-84-2)	**31**		8.63	"	"	"
C9H12 isomer (01) (NA)	**56**		9.85	"	"	"
C9H12 isomer (02) (NA)	**28**		9.94	"	"	"
Decane (124-18-5)	**39**		9.98	"	"	"
C9H12 isomer (03) (NA)	**120**		10.30	"	"	"
C9H12 isomer (04) (NA)	**57**		10.71	"	"	"
Undecane (1120-21-4)	**54**		11.18	"	"	"
C10H14 isomer (01) (NA)	**19**		11.82	"	"	"
C10H14 isomer (NA)	**32**		12.23	"	"	"
Dodecane (112-40-3)	**60**		12.26	"	"	"

Total # of TICs: 20

The compounds listed are *tentatively* identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard. A minimum of the top 10 most significant peaks that are at least 10% in area of the nearest internal standard are reported, excluding those found in the laboratory blank.

Environmental Protection Agency

Region 6 Laboratory

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Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7G0303 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	07/03/17	07/03/17

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706041-10 **Station ID: WS-8**

Batch: B7G0703 Date Collected: 06/28/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed
Nitrate as NO3 (14797-55-8)	U		10.0	1	10	06/29/17	06/29/17
Nitrite as NO2 (14797-65-0)	U		10.0	1	"	"	"
Fluoride (16984-48-8)	U		10.0	1	"	"	"
Bromide (24959-67-9)	**295**		10.0	1	"	"	"
Orthophosphate (14265-44-2)	U		10.0	1	"	"	"
Sulfate as SO4 (148-08-798)	**27.4**		10.0	1	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706043-01 **Station ID: Trip Blank #3**

Batch: B7G0104 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	47.2		94.3	86-117	06/30/17	06/30/17
Toluene-d8	51.2		102	85-113	"	"
4-Bromofluorobenzene	47.2		94.3	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/30/17	06/30/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	**12.7**	**J**	10.0	"	"	"
Methylene chloride (75-09-2)	U		2.0	"	"	"
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	**5.5**		5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	U		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	"
Benzene (71-43-2)	U		2.0	"	"	"
Trichloroethene (79-01-6)	U		2.0	"	"	"
Methylcyclohexane (108-87-2)	U		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706043-01 **Station ID: Trip Blank #3**

Batch: B7G0104 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/30/17	06/30/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	U		5.0	"	"	"
Toluene (108-88-3)	U		2.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	"	"	"
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	U		2.0	"	"	"
meta-/para-Xylene (na)	U		4.0	"	"	"
ortho-Xylene (95-47-6)	U		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	U		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706043-01 **Station ID: Trip Blank #3**

Batch: B7G0104 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed

No TICs present in this sample.

Environmental Protection Agency

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Metals by EPA Method 6010D - ICP

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7F3001 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Aluminum (7429-90-5)	U		2,000	20	06/30/17	07/05/17
Barium (7440-39-3)	**30,700**		200	"	"	"
Beryllium (7440-41-7)	U		100	"	"	"
Cadmium (7440-43-9)	U		100	"	"	"
Calcium (7440-70-2)	**8.09E6**		3,000	"	"	"
Chromium (7440-47-3)	U		200	"	"	"
Cobalt (7440-48-4)	U		400	"	"	"
Copper (7440-50-8)	U		400	"	"	"
Iron (7439-89-6)	**21,900**		500	"	"	"
Magnesium (7439-95-4)	**1.60E6**		3,000	"	"	"
Manganese (7439-96-5)	**1,850**		100	"	"	"
Nickel (7440-02-2)	U		400	"	"	"
Potassium (7440-09-7)	**442,000**		20,000	"	"	"
Silver (7440-22-4)	U		200	"	"	"
Sodium (7440-23-5)	**4.74E7**		50,000	100	"	"
Vanadium (7440-62-2)	U		400	20	"	"
Zinc (7440-66-6)	U		400	"	"	"

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Metals by EPA Method 6020B - ICP MS

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7F3002 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 50ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Antimony (7440-36-0)	U		25.0	50	06/30/17	07/03/17
Arsenic (7440-38-2)	**311**		25.0	"	"	"
Lead (7439-92-1)	U		25.0	"	"	"
Selenium (7782-49-2)	**1,000**		50.0	"	"	"
Thallium (7440-28-0)	U		25.0	"	"	"

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7G0102 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 917ml Sample Qualifiers: **A**

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
2-Fluorophenol	53.9		65.9	42-109	07/01/17	07/01/17
Phenol-d5	54.2		66.3	46-110	"	"
2-Chlorophenol-d4	58.2		71.2	47-103	"	"
1,2-Dichlorobenzene-d4	39.6		72.7	33-100	"	"
Nitrobenzene-d5	43.1		79.0	42-126	"	"
2-Fluorobiphenyl	48.7		89.4	50-104	"	"
2,4,6-Tribromophenol	88.4		108	59-142	"	"
Terphenyl-d14	63.0		116	61-125	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Benzaldehyde (100-52-7)	U		5.5	1	07/01/17	07/01/17
Phenol (108-95-2)	**6.8**		5.5	"	"	"
Bis(2-chloroethyl)ether (111-44-4)	U		5.5	"	"	"
2-Chlorophenol (95-57-8)	U		5.5	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		5.5	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		5.5	"	"	"
Benzyl alcohol (100-51-6)	U		5.5	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		5.5	"	"	"
2-Methylphenol (95-48-7)	**17.8**		5.5	"	"	"
Bis(2-chloro-1-methylethyl)ether (108-60-1)	U		5.5	"	"	"
Acetophenone (98-86-2)	U		5.5	"	"	"
3 &/or 4-Methylphenol (108-39-4/106-44-5)	**17.2**		5.5	"	"	"
N-Nitrosodi-n-propylamine (621-64-7)	U		5.5	"	"	"
Hexachloroethane (67-72-1)	U		5.5	"	"	"
Nitrobenzene (98-95-3)	U		5.5	"	"	"
Isophorone (78-59-1)	U		5.5	"	"	"
2-Nitrophenol (88-75-5)	U		5.5	"	"	"
2,4-Dimethylphenol (105-67-9)	**37.9**		5.5	"	"	"
Bis(2-chloroethoxy)methane (111-91-1)	U		5.5	"	"	"
2,4-Dichlorophenol (120-83-2)	U		5.5	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.5	"	"	"
Naphthalene (91-20-3)	**26.9**		2.2	"	"	"
4-Chloroaniline (106-47-8)	U		5.5	"	"	"

Environmental Protection Agency

Region 6 Laboratory

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7G0102 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 917ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Hexachlorobutadiene (87-68-3)	U		5.5	1	07/01/17	07/01/17
Caprolactam (105-60-2)	U		5.5	"	"	"
4-Chloro-3-methylphenol (59-50-7)	U		5.5	"	"	"
2-Methylnaphthalene (91-57-6)	**40.6**		2.2	"	"	"
1-Methylnaphthalene (90-12-0)	**28.1**		2.2	"	"	"
Hexachlorocyclopentadiene (77-47-4)	U		5.5	"	"	"
2,4,6-Trichlorophenol (88-06-2)	U		5.5	"	"	"
2,4,5-Trichlorophenol (95-95-4)	U		5.5	"	"	"
2-Chloronaphthalene (91-58-7)	U		5.5	"	"	"
1,1'-Biphenyl (92-52-4)	**5.6**		5.5	"	"	"
2-Nitroaniline (88-74-4)	U		8.7	"	"	"
Dimethyl phthalate (131-11-3)	U		5.5	"	"	"
Acenaphthylene (208-96-8)	U		2.2	"	"	"
2,6-Dinitrotoluene (606-20-2)	U		5.5	"	"	"
3-Nitroaniline (99-09-2)	U		8.7	"	"	"
Acenaphthene (83-32-9)	U		2.2	"	"	"
2,4-Dinitrophenol (51-28-5)	U		21.8	"	"	"
4-Nitrophenol (100-02-7)	U		14.2	"	"	"
Dibenzofuran (132-64-9)	U		5.5	"	"	"
2,4-Dinitrotoluene (121-14-2)	U		5.5	"	"	"
Fluorene (86-73-7)	**2.5**		2.2	"	"	"
Diethyl phthalate (84-66-2)	U		5.5	"	"	"
4-Chlorophenyl phenyl ether (7005-72-3)	U		5.5	"	"	"
4-Nitroaniline (100-01-6)	U		8.7	"	"	"
4,6-Dinitro-2-methylphenol (534-52-1)	U		21.8	"	"	"
N-Nitrosodiphenylamine/Diphenylamine (86-30-6/122-39-4)	U		5.5	"	"	"
4-Bromophenyl phenyl ether (101-55-3)	U		5.5	"	"	"
Hexachlorobenzene (118-74-1)	U		5.5	"	"	"
Atrazine (1912-24-9)	U		5.5	"	"	"
Pentachlorophenol (87-86-5)	U		5.5	"	"	"
Phenanthrene (85-01-8)	**6.1**		2.2	"	"	"
Anthracene (120-12-7)	U		2.2	"	"	"
Carbazole (86-74-8)	U		5.5	"	"	"
Di-n-butyl phthalate (84-74-2)	U		5.5	"	"	"

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7G0102 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 917ml Sample Qualifiers: **A**

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Fluoranthene (206-44-0)	U		2.2	1	07/01/17	07/01/17
Pyrene (129-00-0)	U		2.2	"	"	"
Butyl benzyl phthalate (85-68-7)	U		5.5	"	"	"
Benzo (a) anthracene (56-55-3)	U		5.5	"	"	"
3,3´-Dichlorobenzidine (91-94-1)	U		5.5	"	"	"
Chrysene (218-01-9)	U		5.5	"	"	"
Bis(2-ethylhexyl)phthalate (117-81-7)	U		5.5	"	"	"
Di-n-octyl phthalate (117-84-0)	U		5.5	"	"	"
Benzo (b) fluoranthene (205-99-2)	U		5.5	"	"	"
Benzo (k) fluoranthene (207-08-9)	U		5.5	"	"	"
Benzo (a) pyrene (50-32-8)	U		5.5	"	"	"
Indeno (1,2,3-cd) pyrene (193-39-5)	U		5.5	"	"	"
Dibenz (a,h) anthracene (53-70-3)	U		5.5	"	"	"
Benzo (g,h,i) perylene (191-24-2)	U		5.5	"	"	"

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Semivolatiles by EPA Method 8270D - GC/MS

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7G0102 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 917ml Sample Qualifiers: **A**

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed
Dimethylphenol isomer (NA)	**23**		4.58	1	07/01/17	07/01/17
Dodecane (112-40-3)	**100**		4.62	"	"	"
Dimethylundecane isomer (NA)	**31**		4.70	"	"	"
C14 Branched Hydrocarbon (NA)	**45**		5.07	"	"	"
Tridecane (629-50-5)	**94**		5.26	"	"	"
Trimethyldodecane isomer (NA)	**25**		5.70	"	"	"
Tetradecane (629-59-4)	**72**		5.85	"	"	"
Dimethylnaphthalene Isomer (01) (NA)	**31**		5.99	"	"	"
Dimethylnaphthalene Isomer (02) (NA)	**37**		6.07	"	"	"
Dimethylnaphthalene Isomer (03) (NA)	**18**		6.10	"	"	"
Unknown Branched Hydrocarbon (NA)	**60**		6.19	"	"	"
Pentadecane (629-62-9)	**120**		6.41	"	"	"
Trimethylnaphthalene Isomer (01) (NA)	**24**		6.65	"	"	"
Trimethylnaphthalene Isomer (02) (NA)	**27**		6.69	"	"	"
Unknown Hydrocarbon, Cyclic (NA)	**22**		6.74	"	"	"
Hexadecane (544-76-3)	**56**		6.95	"	"	"
C18 Branched Hydrocarbon (NA)	**30**		7.18	"	"	"
Heptadecane (629-78-7)	**81**		7.45	"	"	"
Octadecane (593-45-3)	**45**		7.93	"	"	"
C20 Branched Hydrocarbon (NA)	**23**		7.96	"	"	"
Nonadecane (629-92-5)	**39**		8.38	"	"	"
C15H12 Isomer (01) (NA)	**17**		8.56	"	"	"
C15H12 Isomer (02) (NA)	**20**		8.65	"	"	"
Eicosane (112-95-8)	**35**		8.82	"	"	"
Heneicosane (629-94-7)	**33**		9.24	"	"	"
Docosane (629-97-0)	**37**		9.63	"	"	"
Tricosane (638-67-5)	**30**		10.01	"	"	"
Tetracosane (646-31-1)	**25**		10.38	"	"	"
Pentacosane (629-99-2)	**22**		10.73	"	"	"
Hexacosane (630-01-3)	**22**		11.08	"	"	"

Total # of TICs: 30

The compounds listed are *tentatively* identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard. A minimum of the top 10 most significant peaks that are at least 10% in area of the nearest internal standard are reported, excluding those found in the laboratory blank.

Environmental Protection Agency

Region 6 Laboratory

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TPH by Texas Method 1005 (GC-FID)

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7G0103 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 35.633ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1-Chlorooctane	9,280		110	70-130	07/01/17	07/06/17
1-Chlorooctadecane	9,930		118	70-130	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Gasoline Range Organics (8006-61-9)	**13,300**	**B, K**	4,210	1	07/01/17	07/06/17
Diesel Range Organics (068334-30-5)	**24,200**	**K, B**	4,210	"	"	"
Oil Range Organics (NA)	U		4,210	"	"	"
TPH (NA)	**37,500**	**B, K**	12,600	"	"	"

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Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7G0104 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Surrogates

Analyte	Result µg/L	Analyte Qualifiers	%Recovery	%Recovery Limits	Prepared	Analyzed
1,2-Dichloroethane-d4	44.4		88.9	86-117	06/30/17	06/30/17
Toluene-d8	49.2		98.3	85-113	"	"
4-Bromofluorobenzene	47.4		94.8	73-115	"	"

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Dichlorodifluoromethane (75-71-8)	U		5.0	1	06/30/17	06/30/17
Chloromethane (74-87-3)	U		5.0	"	"	"
Vinyl chloride (75-01-4)	U		2.0	"	"	"
Bromomethane (74-83-9)	U		5.0	"	"	"
Chloroethane (75-00-3)	U		2.0	"	"	"
Trichlorofluoromethane (75-69-4)	U		2.0	"	"	"
1,1-Dichloroethene (75-35-4)	U		2.0	"	"	"
Carbon disulfide (75-15-0)	U		2.0	"	"	"
1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	U		2.0	"	"	"
Acetone (67-64-1)	**1,790**	**J**	200	20	"	06/30/17
Methylene chloride (75-09-2)	U		2.0	1	"	06/30/17
Methyl acetate (79-20-9)	U		2.0	"	"	"
trans-1,2-Dichloroethene (156-60-5)	U		2.0	"	"	"
cis-1,2-Dichloroethene (156-59-2)	U		2.0	"	"	"
Methyl tert-butyl ether (1634-04-4)	U		2.0	"	"	"
1,1-Dichloroethane (75-34-3)	U		2.0	"	"	"
2-Butanone (78-93-3)	**123**	**J**	5.0	"	"	"
Chloroform (67-66-3)	U		2.0	"	"	"
1,2-Dichloroethane (107-06-2)	U		2.0	"	"	"
1,1,1-Trichloroethane (71-55-6)	U		2.0	"	"	"
Cyclohexane (110-82-7)	**144**		2.0	"	"	"
Carbon tetrachloride (56-23-5)	U		2.0	"	"	06/30/17
Benzene (71-43-2)	**1,390**		40.0	20	"	06/30/17
Trichloroethene (79-01-6)	U		2.0	1	"	"
Methylcyclohexane (108-87-2)	**96.4**		2.0	"	"	"
1,2-Dichloropropane (78-87-5)	U		2.0	"	"	"
Bromodichloromethane (75-27-4)	U		2.0	"	"	"

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7G0104 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Targets (Continued)

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
cis-1,3-Dichloropropene (10061-01-5)	U		2.0	1	06/30/17	06/30/17
trans-1,3-Dichloropropene (10061-02-6)	U		2.0	"	"	"
1,1,2-Trichloroethane (79-00-5)	U		2.0	"	"	"
Dibromochloromethane (124-48-1)	U		2.0	"	"	"
Bromoform (75-25-2)	U		2.0	"	"	"
4-Methyl-2-pentanone (108-10-1)	**287**	**J**	100	20	"	06/30/17
Toluene (108-88-3)	**655**		40.0	"	"	"
Tetrachloroethene (127-18-4)	U		2.0	1	"	06/30/17
2-Hexanone (591-78-6)	U		5.0	"	"	"
1,2-Dibromoethane (106-93-4)	U		2.0	"	"	"
Chlorobenzene (108-90-7)	U		2.0	"	"	"
Ethylbenzene (100-41-4)	**59.4**		2.0	"	"	"
meta-/para-Xylene (na)	**362**		4.0	"	"	"
ortho-Xylene (95-47-6)	**181**		2.0	"	"	"
Styrene (100-42-5)	U		2.0	"	"	"
Isopropylbenzene (98-82-8)	**9.2**		2.0	"	"	"
1,1,2,2-Tetrachloroethane (79-34-5)	U		2.0	"	"	"
1,3-Dichlorobenzene (541-73-1)	U		2.0	"	"	"
1,4-Dichlorobenzene (106-46-7)	U		2.0	"	"	"
1,2-Dichlorobenzene (95-50-1)	U		2.0	"	"	"
1,2-Dibromo-3-chloropropane (96-12-8)	U		5.0	"	"	"
1,2,4-Trichlorobenzene (120-82-1)	U		5.0	"	"	"

This sample was received at pH 2.
Vinyl Chloride and Styrene may be biased low.

Environmental Protection Agency

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Volatiles by EPA Method 8260C - GC/MS

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7G0104 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 5ml Sample Qualifiers:

Tentatively Identified Compounds

Compound (CAS)	Result µg/L	Analyte Qualifiers	Retention Time	Dilution	Prepared	Analyzed
Unknown (01) (NA)	**280**		1.04	1	06/30/17	06/30/17
TIC: Isobutane (75-28-5)	**100**		1.13	"	"	"
TIC: Butane (106-97-8)	**300**		1.20	"	"	"
2-Methylbutane (78-78-4)	**100**		1.46	"	"	"
Pentane (109-66-0)	**160**		1.60	"	"	"
Unknown alcohol (NA)	**31**		2.36	"	"	"
Unknown (02) (NA)	**23**		2.39	"	"	"
TIC: Hexane (110-54-3)	**76**		2.63	"	"	"
TIC: Methylcyclopentane (96-37-7)	**180**		3.23	"	"	"
TIC: Ethyl acetate (141-78-6)	**26**		3.58	"	"	"
TIC: Heptane (142-82-5)	**30**		4.94	"	"	"
TIC: Octane (111-65-9)	**26**		7.02	"	"	"
Nonane (111-84-2)	**23**		8.63	"	"	"
C9H12 isomer (01) (NA)	**69**		9.85	"	"	"
C9H12 isomer (02) (NA)	**33**		9.94	"	"	"
C9H12 isomer (03) (NA)	**22**		10.12	"	"	"
C9H12 isomer (04) (NA)	**150**		10.30	"	"	"
C9H12 isomer (05) (NA)	**69**		10.71	"	"	"
Undecane (1120-21-4)	**22**		11.17	"	"	"
C10H14 isomer (NA)	**25**		12.23	"	"	"

Total # of TICs: 20

The compounds listed are *tentatively* identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard. A minimum of the top 10 most significant peaks that are at least 10% in area of the nearest internal standard are reported, excluding those found in the laboratory blank.

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Metals by EPA Method 7470A/7471B - CVAAS

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7G0303 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 25ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result µg/L	Analyte Qualifiers	Reporting Limit	Dilution	Prepared	Analyzed
Mercury (7439-97-6)	U		0.200	1	07/03/17	07/03/17

Environmental Protection Agency

Region 6 Laboratory

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Phone:(281)983-2100 Fax:(281)983-2248

Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD

Lab ID: 1706043-02 **Station ID: WS-9**

Batch: B7G0703 Date Collected: 06/29/17
Sample Type: Liquid Sample Vol: 1ml; Final Vol: 1ml Sample Qualifiers:

Targets

Analyte (CAS Number)	Result mg/L	Analyte Qualifiers	Reporting Limit	Prep Dil	Anal Dil	Prepared	Analyzed	
Nitrate as NO3 (14797-55-8)	U		10.0	1	10	06/29/17	06/29/17	
Nitrite as NO2 (14797-65-0)	U		10.0	1	"	"	"	
Fluoride (16984-48-8)	U		10.0	1	"	"	"	
Bromide (24959-67-9)	**298**		10.0	1	"	"	"	
Orthophosphate (14265-44-2)	U		10.0	1	"	"	"	
Sulfate as SO4 (148-08-798)	**18.7**		10.0	1	"	"	"	jm

Environmental Protection Agency

Region 6 Laboratory

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Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

Blank (B7G0104-BLK1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1,2-Dichloroethane-d4	46.2		50.0	92.5	86-117
Toluene-d8	49.2		50.0	98.5	85-113
4-Bromofluorobenzene	45.2		50.0	90.5	73-115

Blank (B7G0104-BLK1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Dichlorodifluoromethane	U		5.0
Chloromethane	U		5.0
Vinyl chloride	U		2.0
Bromomethane	U		5.0
Chloroethane	U		2.0
Trichlorofluoromethane	U		2.0
1,1-Dichloroethene	U		2.0
Carbon disulfide	U		2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	U		2.0
Acetone	U		10.0
Methylene chloride	U		2.0
Methyl acetate	U		2.0
trans-1,2-Dichloroethene	U		2.0
cis-1,2-Dichloroethene	U		2.0
Methyl tert-butyl ether	U		2.0
1,1-Dichloroethane	U		2.0
2-Butanone	U		5.0
Chloroform	U		2.0
1,2-Dichloroethane	U		2.0
1,1,1-Trichloroethane	U		2.0
Cyclohexane	U		2.0
Carbon tetrachloride	U		2.0
Benzene	U		2.0

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

Blank (B7G0104-BLK1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Trichloroethene	U		2.0
Methylcyclohexane	U		2.0
1,2-Dichloropropane	U		2.0
Bromodichloromethane	U		2.0
cis-1,3-Dichloropropene	U		2.0
trans-1,3-Dichloropropene	U		2.0
1,1,2-Trichloroethane	U		2.0
Dibromochloromethane	U		2.0
Bromoform	U		2.0
4-Methyl-2-pentanone	U		5.0
Toluene	U		2.0
Tetrachloroethene	U		2.0
2-Hexanone	U		5.0
1,2-Dibromoethane	U		2.0
Chlorobenzene	U		2.0
Ethylbenzene	U		2.0
meta-/para-Xylene	U		4.0
ortho-Xylene	U		2.0
Styrene	U		2.0
Isopropylbenzene	U		2.0
1,1,2,2-Tetrachloroethane	U		2.0
1,3-Dichlorobenzene	U		2.0
1,4-Dichlorobenzene	U		2.0
1,2-Dichlorobenzene	U		2.0
1,2-Dibromo-3-chloropropane	U		5.0
1,2,4-Trichlorobenzene	U		5.0

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

Blank (B7G0104-BLK2)

Prepared: 6/30/2017 Analyzed: 6/30/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1,2-Dichloroethane-d4	48.1		50.0	96.1	86-117
Toluene-d8	52.1		50.0	104	85-113
4-Bromofluorobenzene	47.6		50.0	95.3	73-115

Blank (B7G0104-BLK2)

Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Dichlorodifluoromethane	U		5.0
Chloromethane	U		5.0
Vinyl chloride	U		2.0
Bromomethane	U		5.0
Chloroethane	U		2.0
Trichlorofluoromethane	U		2.0
1,1-Dichloroethene	U		2.0
Carbon disulfide	U		2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	U		2.0
Acetone	U		10.0
Methylene chloride	U		2.0
Methyl acetate	U		2.0
trans-1,2-Dichloroethene	U		2.0
cis-1,2-Dichloroethene	U		2.0
Methyl tert-butyl ether	U		2.0
1,1-Dichloroethane	U		2.0
2-Butanone	U		5.0
Chloroform	U		2.0
1,2-Dichloroethane	U		2.0
1,1,1-Trichloroethane	U		2.0
Cyclohexane	U		2.0
Carbon tetrachloride	U		2.0
Benzene	U		2.0

Environmental Protection Agency

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Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

Blank (B7G0104-BLK2)

Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Trichloroethene	U		2.0
Methylcyclohexane	U		2.0
1,2-Dichloropropane	U		2.0
Bromodichloromethane	U		2.0
cis-1,3-Dichloropropene	U		2.0
trans-1,3-Dichloropropene	U		2.0
1,1,2-Trichloroethane	U		2.0
Dibromochloromethane	U		2.0
Bromoform	U		2.0
4-Methyl-2-pentanone	U		5.0
Toluene	U		2.0
Tetrachloroethene	U		2.0
2-Hexanone	U		5.0
1,2-Dibromoethane	U		2.0
Chlorobenzene	U		2.0
Ethylbenzene	U		2.0
meta-/para-Xylene	U		4.0
ortho-Xylene	U		2.0
Styrene	U		2.0
Isopropylbenzene	U		2.0
1,1,2,2-Tetrachloroethane	U		2.0
1,3-Dichlorobenzene	U		2.0
1,4-Dichlorobenzene	U		2.0
1,2-Dichlorobenzene	U		2.0
1,2-Dibromo-3-chloropropane	U		5.0
1,2,4-Trichlorobenzene	U		5.0

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

LCS (B7G0104-BS1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC		%REC Limits
1,2-Dichloroethane-d4	58.6		50.0	117		86-117
Toluene-d8	59.7		50.0	119	#	85-113
4-Bromofluorobenzene	56.1		50.0	112		73-115

LCS (B7G0104-BS1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC		%REC Limits
Dichlorodifluoromethane	62.7		5.0	50.0	125		69-132
Chloromethane	60.6		5.0	50.0	121		73-130
Vinyl chloride	59.9		2.0	50.0	120		76-130
Bromomethane	31.6		5.0	50.0	63.1	#	75-129
Chloroethane	41.6		2.0	50.0	83.3		75-121
Trichlorofluoromethane	65.3		2.0	50.0	131	#	79-130
1,1-Dichloroethene	55.3		2.0	50.0	111		76-127
Carbon disulfide	51.3		2.0	50.0	103		74-122
1,1,2-Trichloro-1,2,2-trifluoroethane	59.0		2.0	50.0	118		79-126
Acetone	86.9		10.0	50.0	174	#	44-140
Methylene chloride	55.7		2.0	50.0	111		79-122
Methyl acetate	75.0		2.0	50.0	150	#	78-118
trans-1,2-Dichloroethene	55.2		2.0	50.0	110		78-123
cis-1,2-Dichloroethene	54.3		2.0	50.0	109		80-120
Methyl tert-butyl ether	51.4		2.0	50.0	103		78-124
1,1-Dichloroethane	56.2		2.0	50.0	112		80-122
2-Butanone	56.7		5.0	50.0	113		71-127
Chloroform	53.7		2.0	50.0	107		81-121
1,2-Dichloroethane	54.8		2.0	50.0	110		80-121
1,1,1-Trichloroethane	54.5		2.0	50.0	109		80-120
Cyclohexane	52.0		2.0	50.0	104		77-120
Carbon tetrachloride	54.7		2.0	50.0	109		78-121
Benzene	54.1		2.0	50.0	108		81-119

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

LCS (B7G0104-BS1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC		%REC Limits
Trichloroethene	58.0		2.0	50.0	116		80-120
Methylcyclohexane	54.5		2.0	50.0	109		79-122
1,2-Dichloropropane	57.1		2.0	50.0	114		81-121
Bromodichloromethane	54.6		2.0	50.0	109		80-121
cis-1,3-Dichloropropene	52.5		2.0	50.0	105		79-119
trans-1,3-Dichloropropene	48.1		2.0	50.0	96.2		78-119
1,1,2-Trichloroethane	54.3		2.0	50.0	109		80-120
Dibromochloromethane	54.1		2.0	50.0	108		80-118
Bromoform	54.7		2.0	50.0	109		79-119
4-Methyl-2-pentanone	69.3		5.0	50.0	139	#	77-121
Toluene	55.2		2.0	50.0	110		81-118
Tetrachloroethene	56.2		2.0	50.0	112		80-120
2-Hexanone	49.4		5.0	50.0	98.8		77-122
1,2-Dibromoethane	55.5		2.0	50.0	111		81-118
Chlorobenzene	55.1		2.0	50.0	110		81-118
Ethylbenzene	54.7		2.0	50.0	109		80-118
meta-/para-Xylene	113		4.0	100	113		81-117
ortho-Xylene	56.4		2.0	50.0	113		81-118
Styrene	56.1		2.0	50.0	112		79-118
Isopropylbenzene	54.7		2.0	50.0	109		74-124
1,1,2,2-Tetrachloroethane	55.2		2.0	50.0	110		79-119
1,3-Dichlorobenzene	54.6		2.0	50.0	109		81-118
1,4-Dichlorobenzene	55.8		2.0	50.0	112		80-117
1,2-Dichlorobenzene	55.8		2.0	50.0	112		79-119
1,2-Dibromo-3-chloropropane	53.9		5.0	50.0	108		77-123
1,2,4-Trichlorobenzene	54.4		5.0	50.0	109		78-128

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

LCS (B7G0104-BS2)

Prepared: 6/30/2017 Analyzed: 6/30/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1,2-Dichloroethane-d4	47.1		50.0	94.2	86-117
Toluene-d8	52.3		50.0	105	85-113
4-Bromofluorobenzene	48.9		50.0	97.7	73-115

LCS (B7G0104-BS2)

Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Dichlorodifluoromethane	57.0		5.0	50.0	114	69-132
Chloromethane	54.4		5.0	50.0	109	73-130
Vinyl chloride	54.6		2.0	50.0	109	76-130
Bromomethane	29.8		5.0	50.0	59.7 #	75-129
Chloroethane	34.2		2.0	50.0	68.3 #	75-121
Trichlorofluoromethane	62.2		2.0	50.0	124	79-130
1,1-Dichloroethene	51.7		2.0	50.0	103	76-127
Carbon disulfide	47.3		2.0	50.0	94.6	74-122
1,1,2-Trichloro-1,2,2-trifluoroethane	54.9		2.0	50.0	110	79-126
Acetone	79.1		10.0	50.0	158 #	44-140
Methylene chloride	51.7		2.0	50.0	103	79-122
Methyl acetate	68.9		2.0	50.0	138 #	78-118
trans-1,2-Dichloroethene	49.4		2.0	50.0	98.8	78-123
cis-1,2-Dichloroethene	48.3		2.0	50.0	96.7	80-120
Methyl tert-butyl ether	45.9		2.0	50.0	91.9	78-124
1,1-Dichloroethane	52.2		2.0	50.0	104	80-122
2-Butanone	49.8		5.0	50.0	99.6	71-127
Chloroform	49.7		2.0	50.0	99.5	81-121
1,2-Dichloroethane	50.2		2.0	50.0	100	80-121
1,1,1-Trichloroethane	52.7		2.0	50.0	105	80-120
Cyclohexane	51.0		2.0	50.0	102	77-120
Carbon tetrachloride	53.0		2.0	50.0	106	78-121
Benzene	52.0		2.0	50.0	104	81-119

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

LCS (B7G0104-BS2)

Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC		%REC Limits
Trichloroethene	56.1		2.0	50.0	112		80-120
Methylcyclohexane	51.8		2.0	50.0	104		79-122
1,2-Dichloropropane	54.0		2.0	50.0	108		81-121
Bromodichloromethane	52.0		2.0	50.0	104		80-121
cis-1,3-Dichloropropene	49.3		2.0	50.0	98.7		79-119
trans-1,3-Dichloropropene	45.2		2.0	50.0	90.3		78-119
1,1,2-Trichloroethane	51.2		2.0	50.0	102		80-120
Dibromochloromethane	51.4		2.0	50.0	103		80-118
Bromoform	51.2		2.0	50.0	102		79-119
4-Methyl-2-pentanone	66.4		5.0	50.0	133	#	77-121
Toluene	53.5		2.0	50.0	107		81-118
Tetrachloroethene	55.5		2.0	50.0	111		80-120
2-Hexanone	47.2		5.0	50.0	94.4		77-122
1,2-Dibromoethane	53.8		2.0	50.0	108		81-118
Chlorobenzene	54.4		2.0	50.0	109		81-118
Ethylbenzene	53.3		2.0	50.0	107		80-118
meta-/para-Xylene	111		4.0	100	111		81-117
ortho-Xylene	55.0		2.0	50.0	110		81-118
Styrene	54.4		2.0	50.0	109		79-118
Isopropylbenzene	53.4		2.0	50.0	107		74-124
1,1,2,2-Tetrachloroethane	52.5		2.0	50.0	105		79-119
1,3-Dichlorobenzene	53.4		2.0	50.0	107		81-118
1,4-Dichlorobenzene	54.6		2.0	50.0	109		80-117
1,2-Dichlorobenzene	54.4		2.0	50.0	109		79-119
1,2-Dibromo-3-chloropropane	50.9		5.0	50.0	102		77-123
1,2,4-Trichlorobenzene	53.3		5.0	50.0	107		78-128

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

Matrix Spike (B7G0104-MS1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 6/30/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1,2-Dichloroethane-d4	46.5		50.0	93.0	86-117
Toluene-d8	50.7		50.0	101	85-113
4-Bromofluorobenzene	47.5		50.0	95.0	73-115

Matrix Spike (B7G0104-MS1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits
Dichlorodifluoromethane	58.7		5.0	50.0		117	64-127
Chloromethane	56.2		5.0	50.0		112	68-125
Vinyl chloride	55.6		2.0	50.0		111	75-123
Bromomethane	33.0		5.0	50.0	0.4	65.1	46-142
Chloroethane	39.7		2.0	50.0		79.4	60-145
Trichlorofluoromethane	63.0		2.0	50.0		126	73-132
1,1-Dichloroethene	53.2		2.0	50.0		106	72-134
Carbon disulfide	48.8		2.0	50.0		97.7	74-128
1,1,2-Trichloro-1,2,2-trifluoroethane	57.0		2.0	50.0		114	72-130
Acetone	97.5		10.0	50.0	12.7	170 #	35-142
Methylene chloride	53.0		2.0	50.0		106	74-127
Methyl acetate	84.2		2.0	50.0		168 #	64-134
trans-1,2-Dichloroethene	52.4		2.0	50.0		105	74-130
cis-1,2-Dichloroethene	50.7		2.0	50.0		101	75-127
Methyl tert-butyl ether	53.9		2.0	50.0		108	72-130
1,1-Dichloroethane	53.2		2.0	50.0		106	70-133
2-Butanone	61.8		5.0	50.0		124	51-139
Chloroform	50.0		2.0	50.0		99.9	75-125
1,2-Dichloroethane	52.1		2.0	50.0		104	73-126
1,1,1-Trichloroethane	53.1		2.0	50.0		106	79-117
Cyclohexane	51.1		2.0	50.0		102	72-129
Carbon tetrachloride	54.8		2.0	50.0		110	74-123
Benzene	53.2		2.0	50.0		106	79-122

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

Matrix Spike (B7G0104-MS1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC		%REC Limits
Trichloroethene	57.7		2.0	50.0		115		79-126
Methylcyclohexane	52.7		2.0	50.0		105		76-123
1,2-Dichloropropane	55.3		2.0	50.0		111		77-125
Bromodichloromethane	53.2		2.0	50.0		106		80-115
cis-1,3-Dichloropropene	51.9		2.0	50.0		104		79-119
trans-1,3-Dichloropropene	47.5		2.0	50.0		95.0		77-118
1,1,2-Trichloroethane	55.9		2.0	50.0		112		79-122
Dibromochloromethane	54.1		2.0	50.0		108		78-123
Bromoform	56.9		2.0	50.0		114		76-127
4-Methyl-2-pentanone	92.6		5.0	50.0		185	#	84-126
Toluene	55.2		2.0	50.0		110		81-122
Tetrachloroethene	57.1		2.0	50.0		114		80-115
2-Hexanone	69.6		5.0	50.0		139		49-149
1,2-Dibromoethane	59.7		2.0	50.0		119	#	80-116
Chlorobenzene	55.1		2.0	50.0		110		82-121
Ethylbenzene	54.7		2.0	50.0		109		78-123
meta-/para-Xylene	112		4.0	100		112		79-123
ortho-Xylene	56.6		2.0	50.0		113		80-124
Styrene	40.9		2.0	50.0		81.8	#	82-121
Isopropylbenzene	54.2		2.0	50.0		108		80-117
1,1,2,2-Tetrachloroethane	62.0		2.0	50.0		124		77-127
1,3-Dichlorobenzene	54.3		2.0	50.0		109		80-114
1,4-Dichlorobenzene	55.7		2.0	50.0		111		79-116
1,2-Dichlorobenzene	56.0		2.0	50.0		112		77-118
1,2-Dibromo-3-chloropropane	63.8		5.0	50.0		128	#	76-116
1,2,4-Trichlorobenzene	54.9		5.0	50.0		110		70-118

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

Matrix Spike Dup (B7G0104-MSD1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 6/30/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1,2-Dichloroethane-d4	46.0		50.0	92.0	86-117
Toluene-d8	50.3		50.0	101	85-113
4-Bromofluorobenzene	47.0		50.0	94.0	73-115

Matrix Spike Dup (B7G0104-MSD1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Dichlorodifluoromethane	56.4		5.0	50.0		113	64-127	4.00	21
Chloromethane	54.2		5.0	50.0		108	68-125	3.64	15
Vinyl chloride	53.8		2.0	50.0		108	75-123	3.35	16
Bromomethane	35.7		5.0	50.0	0.4	70.6	46-142	7.93	17
Chloroethane	38.3		2.0	50.0		76.6	60-145	3.62	18
Trichlorofluoromethane	62.4		2.0	50.0		125	73-132	0.97	12
1,1-Dichloroethene	51.6		2.0	50.0		103	72-134	3.09	21
Carbon disulfide	47.6		2.0	50.0		95.2	74-128	2.57	16
1,1,2-Trichloro-1,2,2-trifluoroethane	55.9		2.0	50.0		112	72-130	1.97	19
Acetone	94.9		10.0	50.0	12.7	164 #	35-142	2.79	17
Methylene chloride	51.3		2.0	50.0		103	74-127	3.39	13
Methyl acetate	82.8		2.0	50.0		166 #	64-134	1.63	13
trans-1,2-Dichloroethene	50.6		2.0	50.0		101	74-130	3.53	14
cis-1,2-Dichloroethene	50.3		2.0	50.0		101	75-127	0.81	15
Methyl tert-butyl ether	52.6		2.0	50.0		105	72-130	2.54	12
1,1-Dichloroethane	51.3		2.0	50.0		103	70-133	3.68	14
2-Butanone	62.1		5.0	50.0		124	51-139	0.50	21
Chloroform	49.7		2.0	50.0		99.5	75-125	0.44	13
1,2-Dichloroethane	51.6		2.0	50.0		103	73-126	1.08	13
1,1,1-Trichloroethane	53.6		2.0	50.0		107	79-117	1.05	13
Cyclohexane	50.8		2.0	50.0		102	72-129	0.57	13
Carbon tetrachloride	54.6		2.0	50.0		109	74-123	0.33	14
Benzene	53.8		2.0	50.0		108	79-122	1.03	16

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Volatiles by EPA Method 8260C - GC/MS - Quality Control

Batch: B7G0104 **Sample Type: Liquid**

Matrix Spike Dup (B7G0104-MSD1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit
Trichloroethene	57.2		2.0	50.0		114		79-126	0.77	14
Methylcyclohexane	52.2		2.0	50.0		104		76-123	0.99	20
1,2-Dichloropropane	54.4		2.0	50.0		109		77-125	1.59	14
Bromodichloromethane	54.6		2.0	50.0		109		80-115	2.76	14
cis-1,3-Dichloropropene	53.4		2.0	50.0		107		79-119	2.72	14
trans-1,3-Dichloropropene	48.6		2.0	50.0		97.2		77-118	2.29	15
1,1,2-Trichloroethane	56.6		2.0	50.0		113		79-122	1.16	14
Dibromochloromethane	54.6		2.0	50.0		109		78-123	0.94	14
Bromoform	58.0		2.0	50.0		116		76-127	1.78	14
4-Methyl-2-pentanone	97.8		5.0	50.0		196	#	84-126	5.42	15
Toluene	54.3		2.0	50.0		109		81-122	1.57	13
Tetrachloroethene	56.2		2.0	50.0		112		80-115	1.68	12
2-Hexanone	72.8		5.0	50.0		146		49-149	4.50	21
1,2-Dibromoethane	59.7		2.0	50.0		119	#	80-116	0.03	14
Chlorobenzene	55.2		2.0	50.0		110		82-121	0.15	10
Ethylbenzene	54.1		2.0	50.0		108		78-123	1.05	15
meta-/para-Xylene	112		4.0	100		112		79-123	0.29	19
ortho-Xylene	55.8		2.0	50.0		112		80-124	1.42	18
Styrene	40.0		2.0	50.0		80.0	#	82-121	2.25	12
Isopropylbenzene	54.0		2.0	50.0		108		80-117	0.31	11
1,1,2,2-Tetrachloroethane	63.3		2.0	50.0		127		77-127	2.06	14
1,3-Dichlorobenzene	54.3		2.0	50.0		109		80-114	0.07	13
1,4-Dichlorobenzene	55.3		2.0	50.0		111		79-116	0.68	11
1,2-Dichlorobenzene	56.0		2.0	50.0		112		77-118	0.04	12
1,2-Dibromo-3-chloropropane	66.1		5.0	50.0		132	#	76-116	3.54	16
1,2,4-Trichlorobenzene	55.0		5.0	50.0		110		70-118	0.11	21

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7F2806 **Sample Type: Liquid**

Blank (B7F2806-BLK1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
2-Fluorophenol	65.6		75.0	87.4	42-109
Phenol-d5	58.5		75.0	78.0	46-110
2-Chlorophenol-d4	64.0		75.0	85.3	47-103
1,2-Dichlorobenzene-d4	35.2		50.0	70.5	33-100
Nitrobenzene-d5	39.5		50.0	79.0	42-126
2-Fluorobiphenyl	38.9		50.0	77.7	50-104
2,4,6-Tribromophenol	73.6		75.0	98.1	59-142
Terphenyl-d14	51.9		50.0	104	61-125

Blank (B7F2806-BLK1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Benzaldehyde	U		5.0
Phenol	U		5.0
Bis(2-chloroethyl)ether	U		5.0
2-Chlorophenol	U		5.0
1,3-Dichlorobenzene	U		5.0
1,4-Dichlorobenzene	U		5.0
Benzyl alcohol	U		5.0
1,2-Dichlorobenzene	U		5.0
2-Methylphenol	U		5.0
Bis(2-chloro-1-methylethyl)ether	U		5.0
Acetophenone	U		5.0
3 &/or 4-Methylphenol	U		5.0
N-Nitrosodi-n-propylamine	U		5.0
Hexachloroethane	U		5.0
Nitrobenzene	U		5.0
Isophorone	U		5.0
2-Nitrophenol	U		5.0
2,4-Dimethylphenol	U		5.0

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7F2806 **Sample Type: Liquid**

Blank (B7F2806-BLK1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Bis(2-chloroethoxy)methane	U		5.0
2,4-Dichlorophenol	U		5.0
1,2,4-Trichlorobenzene	U		5.0
Naphthalene	U		2.0
4-Chloroaniline	U		5.0
Hexachlorobutadiene	U		5.0
Caprolactam	U		5.0
4-Chloro-3-methylphenol	U		5.0
2-Methylnaphthalene	U		2.0
1-Methylnaphthalene	U		2.0
Hexachlorocyclopentadiene	U		5.0
2,4,6-Trichlorophenol	U		5.0
2,4,5-Trichlorophenol	U		5.0
2-Chloronaphthalene	U		5.0
1,1'-Biphenyl	U		5.0
2-Nitroaniline	U		8.0
Dimethyl phthalate	U		5.0
Acenaphthylene	U		2.0
2,6-Dinitrotoluene	U		5.0
3-Nitroaniline	U		8.0
Acenaphthene	U		2.0
2,4-Dinitrophenol	U		20.0
4-Nitrophenol	U		13.0
Dibenzofuran	U		5.0
2,4-Dinitrotoluene	U		5.0
Fluorene	U		2.0
Diethyl phthalate	U		5.0
4-Chlorophenyl phenyl ether	U		5.0
4-Nitroaniline	U		8.0
4,6-Dinitro-2-methylphenol	U		20.0
N-Nitrosodiphenylamine/Diphenylamine	U		5.0
4-Bromophenyl phenyl ether	U		5.0

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7F2806 **Sample Type: Liquid**

Blank (B7F2806-BLK1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Hexachlorobenzene	U		5.0
Atrazine	U		5.0
Pentachlorophenol	U		5.0
Phenanthrene	U		2.0
Anthracene	U		2.0
Carbazole	U		5.0
Di-n-butyl phthalate	U		5.0
Fluoranthene	U		2.0
Pyrene	U		2.0
Butyl benzyl phthalate	U		5.0
Benzo (a) anthracene	U		5.0
3,3´-Dichlorobenzidine	U		5.0
Chrysene	U		5.0
Bis(2-ethylhexyl)phthalate	U		5.0
Di-n-octyl phthalate	U		5.0
Benzo (b) fluoranthene	U		5.0
Benzo (k) fluoranthene	U		5.0
Benzo (a) pyrene	U		5.0
Indeno (1,2,3-cd) pyrene	U		5.0
Dibenz (a,h) anthracene	U		5.0
Benzo (g,h,i) perylene	U		5.0

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7F2806 **Sample Type: Liquid**

LCS (B7F2806-BS1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
2-Fluorophenol	69.9		75.0	93.2	42-109
Phenol-d5	64.0		75.0	85.3	46-110
2-Chlorophenol-d4	68.5		75.0	91.4	47-103
1,2-Dichlorobenzene-d4	41.6		50.0	83.1	33-100
Nitrobenzene-d5	43.2		50.0	86.4	42-126
2-Fluorobiphenyl	45.2		50.0	90.4	50-104
2,4,6-Tribromophenol	74.0		75.0	98.6	59-142
Terphenyl-d14	49.1		50.0	98.2	61-125

LCS (B7F2806-BS1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Benzaldehyde	22.0		5.0	25.0	88.0	57-123
Phenol	21.2		5.0	25.0	84.8	60-116
Bis(2-chloroethyl)ether	21.6		5.0	25.0	86.5	74-112
2-Chlorophenol	22.5		5.0	25.0	90.1	64-116
1,3-Dichlorobenzene	19.4		5.0	25.0	77.7	32-100
1,4-Dichlorobenzene	19.8		5.0	25.0	79.2	35-100
Benzyl alcohol	22.4		5.0	25.0	89.4	63-125
1,2-Dichlorobenzene	20.4		5.0	25.0	81.4	46-100
2-Methylphenol	21.4		5.0	25.0	85.4	66-124
Bis(2-chloro-1-methylethyl)ether	18.7		5.0	25.0	74.6	63-122
Acetophenone	22.9		5.0	25.0	91.7	74-119
3 &/or 4-Methylphenol	21.9		5.0	25.0	87.7	66-125
N-Nitrosodi-n-propylamine	20.5		5.0	25.0	82.0	65-118
Hexachloroethane	18.4		5.0	25.0	73.7	16-103
Nitrobenzene	21.8		5.0	25.0	87.4	76-114
Isophorone	21.7		5.0	25.0	86.7	76-116
2-Nitrophenol	24.1		5.0	25.0	96.3	77-121
2,4-Dimethylphenol	19.0		5.0	25.0	76.0	57-115

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7F2806 **Sample Type: Liquid**

LCS (B7F2806-BS1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Bis(2-chloroethoxy)methane	22.2		5.0	25.0	88.7	75-114
2,4-Dichlorophenol	24.0		5.0	25.0	96.1	80-113
1,2,4-Trichlorobenzene	22.7		5.0	25.0	90.9	42-103
Naphthalene	22.5		2.0	25.0	90.0	70-106
4-Chloroaniline	19.1		5.0	25.0	76.2	51-118
Hexachlorobutadiene	22.5		5.0	25.0	90.2	25-115
Caprolactam	23.0		5.0	25.0	92.1	53-130
4-Chloro-3-methylphenol	22.9		5.0	25.0	91.4	63-117
2-Methylnaphthalene	22.9		2.0	25.0	91.5	67-110
1-Methylnaphthalene	23.3		2.0	25.0	93.2	70-130
Hexachlorocyclopentadiene	18.3		5.0	25.0	73.1	37-127
2,4,6-Trichlorophenol	24.4		5.0	25.0	97.8	77-115
2,4,5-Trichlorophenol	24.4		5.0	25.0	97.5	78-116
2-Chloronaphthalene	23.4		5.0	25.0	93.8	70-110
1,1'-Biphenyl	23.9		5.0	25.0	95.6	63-118
2-Nitroaniline	23.8		8.0	25.0	95.1	74-125
Dimethyl phthalate	23.4		5.0	25.0	93.7	79-111
Acenaphthylene	23.2		2.0	25.0	92.9	73-115
2,6-Dinitrotoluene	23.9		5.0	25.0	95.4	77-122
3-Nitroaniline	23.6		8.0	25.0	94.4	61-139
Acenaphthene	23.1		2.0	25.0	92.4	63-112
2,4-Dinitrophenol	17.1		20.0	25.0	68.4	40-151
4-Nitrophenol	20.9		13.0	25.0	83.6	49-137
Dibenzofuran	23.8		5.0	25.0	95.1	74-112
2,4-Dinitrotoluene	24.5		5.0	25.0	98.0	59-120
Fluorene	24.1		2.0	25.0	96.3	74-114
Diethyl phthalate	24.0		5.0	25.0	96.1	79-115
4-Chlorophenyl phenyl ether	24.6		5.0	25.0	98.5	71-115
4-Nitroaniline	24.3		8.0	25.0	97.2	61-149
4,6-Dinitro-2-methylphenol	18.5		20.0	25.0	74.2	46-148
N-Nitrosodiphenylamine/Diphenylamine	23.8		5.0	25.0	95.2	76-117
4-Bromophenyl phenyl ether	24.2		5.0	25.0	97.0	77-114

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7F2806 **Sample Type: Liquid**

LCS (B7F2806-BS1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Hexachlorobenzene	24.2		5.0	25.0	96.9	76-114
Atrazine	25.2		5.0	25.0	101	78-125
Pentachlorophenol	23.2		5.0	25.0	92.7	46-133
Phenanthrene	23.4		2.0	25.0	93.8	76-115
Anthracene	23.5		2.0	25.0	93.9	77-117
Carbazole	23.4		5.0	25.0	93.7	73-128
Di-n-butyl phthalate	25.2		5.0	25.0	101	82-126
Fluoranthene	24.3		2.0	25.0	97.1	75-122
Pyrene	25.3		2.0	25.0	101	59-131
Butyl benzyl phthalate	25.6		5.0	25.0	102	86-127
Benzo (a) anthracene	22.6		5.0	25.0	90.5	83-117
3,3´-Dichlorobenzidine	21.8		5.0	25.0	87.1	38-146
Chrysene	23.8		5.0	25.0	95.0	80-115
Bis(2-ethylhexyl)phthalate	25.2		5.0	25.0	101	83-135
Di-n-octyl phthalate	24.8		5.0	25.0	99.2	72-138
Benzo (b) fluoranthene	24.5		5.0	25.0	98.0	73-127
Benzo (k) fluoranthene	24.7		5.0	25.0	98.8	73-128
Benzo (a) pyrene	24.6		5.0	25.0	98.4	75-127
Indeno (1,2,3-cd) pyrene	26.4		5.0	25.0	106	66-147
Dibenz (a,h) anthracene	26.4		5.0	25.0	105	68-144
Benzo (g,h,i) perylene	26.1		5.0	25.0	104	63-148

Blank (B7G0102-BLK1)

Prepared: 7/1/2017 Analyzed: 7/1/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
2-Fluorophenol	53.4		75.0	71.3	42-109
Phenol-d5	52.8		75.0	70.3	46-110
2-Chlorophenol-d4	56.1		75.0	74.8	47-103
1,2-Dichlorobenzene-d4	29.7		50.0	59.4	33-100
Nitrobenzene-d5	35.1		50.0	70.2	42-126

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

Blank (B7G0102-BLK1)

Prepared: 7/1/2017 Analyzed: 7/1/2017

Surrogates (Continued)

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
2-Fluorobiphenyl	34.4		50.0	68.8	50-104
2,4,6-Tribromophenol	73.7		75.0	98.3	59-142
Terphenyl-d14	56.0		50.0	112	61-125

Blank (B7G0102-BLK1)

Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Benzaldehyde	U		5.0
Phenol	U		5.0
Bis(2-chloroethyl)ether	U		5.0
2-Chlorophenol	U		5.0
1,3-Dichlorobenzene	U		5.0
1,4-Dichlorobenzene	U		5.0
Benzyl alcohol	U		5.0
1,2-Dichlorobenzene	U		5.0
2-Methylphenol	U		5.0
Bis(2-chloro-1-methylethyl)ether	U		5.0
Acetophenone	U		5.0
3 &/or 4-Methylphenol	U		5.0
N-Nitrosodi-n-propylamine	U		5.0
Hexachloroethane	U		5.0
Nitrobenzene	U		5.0
Isophorone	U		5.0
2-Nitrophenol	U		5.0
2,4-Dimethylphenol	U		5.0
Bis(2-chloroethoxy)methane	U		5.0
2,4-Dichlorophenol	U		5.0
1,2,4-Trichlorobenzene	U		5.0
Naphthalene	U		2.0
4-Chloroaniline	U		5.0

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

Blank (B7G0102-BLK1)

Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Hexachlorobutadiene	U		5.0
Caprolactam	U		5.0
4-Chloro-3-methylphenol	U		5.0
2-Methylnaphthalene	U		2.0
1-Methylnaphthalene	U		2.0
Hexachlorocyclopentadiene	U		5.0
2,4,6-Trichlorophenol	U		5.0
2,4,5-Trichlorophenol	U		5.0
2-Chloronaphthalene	U		5.0
1,1'-Biphenyl	U		5.0
2-Nitroaniline	U		8.0
Dimethyl phthalate	U		5.0
Acenaphthylene	U		2.0
2,6-Dinitrotoluene	U		5.0
3-Nitroaniline	U		8.0
Acenaphthene	U		2.0
2,4-Dinitrophenol	U		20.0
4-Nitrophenol	U		13.0
Dibenzofuran	U		5.0
2,4-Dinitrotoluene	U		5.0
Fluorene	U		2.0
Diethyl phthalate	U		5.0
4-Chlorophenyl phenyl ether	U		5.0
4-Nitroaniline	U		8.0
4,6-Dinitro-2-methylphenol	U		20.0
N-Nitrosodiphenylamine/Diphenylamine	U		5.0
4-Bromophenyl phenyl ether	U		5.0
Hexachlorobenzene	U		5.0
Atrazine	U		5.0
Pentachlorophenol	U		5.0
Phenanthrene	U		2.0
Anthracene	U		2.0

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

Blank (B7G0102-BLK1)

Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Carbazole	U		5.0
Di-n-butyl phthalate	U		5.0
Fluoranthene	U		2.0
Pyrene	U		2.0
Butyl benzyl phthalate	U		5.0
Benzo (a) anthracene	U		5.0
3,3´-Dichlorobenzidine	U		5.0
Chrysene	U		5.0
Bis(2-ethylhexyl)phthalate	U		5.0
Di-n-octyl phthalate	U		5.0
Benzo (b) fluoranthene	U		5.0
Benzo (k) fluoranthene	U		5.0
Benzo (a) pyrene	U		5.0
Indeno (1,2,3-cd) pyrene	U		5.0
Dibenz (a,h) anthracene	U		5.0
Benzo (g,h,i) perylene	U		5.0

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Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

LCS (B7G0102-BS1)

Prepared: 7/1/2017 Analyzed: 7/1/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
2-Fluorophenol	65.8		75.0	87.7	42-109
Phenol-d5	63.9		75.0	85.2	46-110
2-Chlorophenol-d4	69.1		75.0	92.2	47-103
1,2-Dichlorobenzene-d4	41.3		50.0	82.6	33-100
Nitrobenzene-d5	43.8		50.0	87.5	42-126
2-Fluorobiphenyl	46.4		50.0	92.8	50-104
2,4,6-Tribromophenol	76.5		75.0	102	59-142
Terphenyl-d14	55.0		50.0	110	61-125

LCS (B7G0102-BS1)

Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Benzaldehyde	20.0		5.0	25.0	80.2	57-123
Phenol	21.4		5.0	25.0	85.6	60-116
Bis(2-chloroethyl)ether	22.0		5.0	25.0	87.9	74-112
2-Chlorophenol	23.3		5.0	25.0	93.2	64-116
1,3-Dichlorobenzene	20.6		5.0	25.0	82.5	32-100
1,4-Dichlorobenzene	21.0		5.0	25.0	84.2	35-100
Benzyl alcohol	22.5		5.0	25.0	90.0	63-125
1,2-Dichlorobenzene	21.6		5.0	25.0	86.4	46-100
2-Methylphenol	22.2		5.0	25.0	89.0	66-124
Bis(2-chloro-1-methylethyl)ether	19.1		5.0	25.0	76.4	63-122
Acetophenone	23.6		5.0	25.0	94.2	74-119
3 &/or 4-Methylphenol	22.2		5.0	25.0	88.8	66-125
N-Nitrosodi-n-propylamine	21.0		5.0	25.0	84.1	65-118
Hexachloroethane	19.4		5.0	25.0	77.6	16-103
Nitrobenzene	22.5		5.0	25.0	89.9	76-114
Isophorone	22.0		5.0	25.0	88.0	76-116
2-Nitrophenol	24.9		5.0	25.0	99.5	77-121
2,4-Dimethylphenol	20.4		5.0	25.0	81.8	57-115

Environmental Protection Agency

Region 6 Laboratory

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Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

LCS (B7G0102-BS1)

Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Bis(2-chloroethoxy)methane	22.5		5.0	25.0	90.0	75-114
2,4-Dichlorophenol	24.5		5.0	25.0	98.1	80-113
1,2,4-Trichlorobenzene	23.7		5.0	25.0	94.9	42-103
Naphthalene	23.5		2.0	25.0	94.2	70-106
4-Chloroaniline	19.2		5.0	25.0	76.7	51-118
Hexachlorobutadiene	23.4		5.0	25.0	93.8	25-115
Caprolactam	23.1		5.0	25.0	92.4	53-130
4-Chloro-3-methylphenol	22.8		5.0	25.0	91.3	63-117
2-Methylnaphthalene	23.7		2.0	25.0	94.9	67-110
1-Methylnaphthalene	24.1		2.0	25.0	96.5	70-130
Hexachlorocyclopentadiene	19.7		5.0	25.0	78.9	37-127
2,4,6-Trichlorophenol	24.8		5.0	25.0	99.0	77-115
2,4,5-Trichlorophenol	25.2		5.0	25.0	101	78-116
2-Chloronaphthalene	24.3		5.0	25.0	97.2	70-110
1,1'-Biphenyl	24.7		5.0	25.0	98.7	63-118
2-Nitroaniline	23.9		8.0	25.0	95.8	74-125
Dimethyl phthalate	23.8		5.0	25.0	95.2	79-111
Acenaphthylene	24.2		2.0	25.0	96.7	73-115
2,6-Dinitrotoluene	24.4		5.0	25.0	97.6	77-122
3-Nitroaniline	23.3		8.0	25.0	93.2	61-139
Acenaphthene	23.9		2.0	25.0	95.6	63-112
2,4-Dinitrophenol	15.5		20.0	25.0	62.1	40-151
4-Nitrophenol	19.4		13.0	25.0	77.8	49-137
Dibenzofuran	24.3		5.0	25.0	97.0	74-112
2,4-Dinitrotoluene	24.8		5.0	25.0	99.2	59-120
Fluorene	24.2		2.0	25.0	96.8	74-114
Diethyl phthalate	24.4		5.0	25.0	97.4	79-115
4-Chlorophenyl phenyl ether	25.0		5.0	25.0	100	71-115
4-Nitroaniline	23.3		8.0	25.0	93.3	61-149
4,6-Dinitro-2-methylphenol	17.0		20.0	25.0	68.2	46-148
N-Nitrosodiphenylamine/Diphenylamine	25.2		5.0	25.0	101	76-117
4-Bromophenyl phenyl ether	25.4		5.0	25.0	101	77-114

Environmental Protection Agency

Region 6 Laboratory

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Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

LCS (B7G0102-BS1)

Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Hexachlorobenzene	25.6		5.0	25.0	103	76-114
Atrazine	26.6		5.0	25.0	106	78-125
Pentachlorophenol	24.0		5.0	25.0	95.9	46-133
Phenanthrene	24.3		2.0	25.0	97.0	76-115
Anthracene	24.6		2.0	25.0	98.3	77-117
Carbazole	23.9		5.0	25.0	95.6	73-128
Di-n-butyl phthalate	25.8		5.0	25.0	103	82-126
Fluoranthene	24.6		2.0	25.0	98.2	75-122
Pyrene	28.7		2.0	25.0	115	59-131
Butyl benzyl phthalate	28.8		5.0	25.0	115	86-127
Benzo (a) anthracene	25.2		5.0	25.0	101	83-117
3,3´-Dichlorobenzidine	22.3		5.0	25.0	89.3	38-146
Chrysene	24.8		5.0	25.0	99.0	80-115
Bis(2-ethylhexyl)phthalate	28.0		5.0	25.0	112	83-135
Di-n-octyl phthalate	25.9		5.0	25.0	104	72-138
Benzo (b) fluoranthene	25.5		5.0	25.0	102	73-127
Benzo (k) fluoranthene	27.3		5.0	25.0	109	73-128
Benzo (a) pyrene	25.5		5.0	25.0	102	75-127
Indeno (1,2,3-cd) pyrene	23.4		5.0	25.0	93.8	66-147
Dibenz (a,h) anthracene	23.7		5.0	25.0	95.0	68-144
Benzo (g,h,i) perylene	23.1		5.0	25.0	92.4	63-148

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Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

Matrix Spike (B7G0102-MS1)

Source: 1706041-04 Prepared: 7/1/2017 Analyzed: 7/1/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
2-Fluorophenol	64.7		81.1	79.8	42-109
Phenol-d5	63.7		81.1	78.6	46-110
2-Chlorophenol-d4	60.6		81.1	74.7	47-103
1,2-Dichlorobenzene-d4	48.8		54.1	90.3	33-100
Nitrobenzene-d5	45.9		54.1	85.0	42-126
2-Fluorobiphenyl	49.4		54.1	91.3	50-104
2,4,6-Tribromophenol	70.8		81.1	87.3	59-142
Terphenyl-d14	57.9		54.1	107	61-125

Matrix Spike (B7G0102-MS1)

Source: 1706041-04 Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits
Benzaldehyde	23.2		5.4	27.0		86.0	53-136
Phenol	18.7		5.4	27.0		69.3	41-114
Bis(2-chloroethyl)ether	23.4		5.4	27.0		86.8	62-125
2-Chlorophenol	27.8		5.4	27.0		103	46-114
1,3-Dichlorobenzene	24.7		5.4	27.0		91.4	36-100
1,4-Dichlorobenzene	25.0		5.4	27.0		92.5	34-100
Benzyl alcohol	23.2		5.4	27.0		86.0	67-119
1,2-Dichlorobenzene	25.1		5.4	27.0		92.9	48-100
2-Methylphenol	17.0		5.4	27.0		62.8	60-131
Bis(2-chloro-1-methylethyl)ether	20.6		5.4	27.0		76.2	51-138
Acetophenone	24.8		5.4	27.0		91.7	63-134
3 &/or 4-Methylphenol	15.5		5.4	27.0		57.4	57-136
N-Nitrosodi-n-propylamine	21.9		5.4	27.0		81.0	50-116
Hexachloroethane	24.4		5.4	27.0		90.4	24-100
Nitrobenzene	33.5		5.4	27.0		124	68-126
Isophorone	23.2		5.4	27.0		85.8	67-125
2-Nitrophenol	26.9		5.4	27.0		99.4	62-137
2,4-Dimethylphenol	10.3		5.4	27.0		38.2 #	48-136

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

Matrix Spike (B7G0102-MS1)

Source: 1706041-04 Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC		%REC Limits
Bis(2-chloroethoxy)methane	23.9		5.4	27.0		88.3		66-126
2,4-Dichlorophenol	25.4		5.4	27.0		93.8		69-125
1,2,4-Trichlorobenzene	26.6		5.4	27.0		98.6		38-106
Naphthalene	25.6		2.2	27.0		94.7		65-115
4-Chloroaniline	8.4		5.4	27.0		31.0	#	54-122
Hexachlorobutadiene	27.4		5.4	27.0		101		29-112
Caprolactam	24.1		5.4	27.0		89.3		56-124
4-Chloro-3-methylphenol	23.2		5.4	27.0		86.0		44-137
2-Methylnaphthalene	25.6		2.2	27.0		94.8		64-117
1-Methylnaphthalene	26.0		2.2	27.0		96.1		70-130
Hexachlorocyclopentadiene	18.5		5.4	27.0		68.6		32-122
2,4,6-Trichlorophenol	25.4		5.4	27.0		94.2		65-128
2,4,5-Trichlorophenol	27.1		5.4	27.0		100		68-127
2-Chloronaphthalene	26.2		5.4	27.0		97.0		62-122
1,1'-Biphenyl	26.9		5.4	27.0		99.5		60-129
2-Nitroaniline	15.8		8.6	27.0		58.3	#	65-126
Dimethyl phthalate	25.5		5.4	27.0		94.4		71-122
Acenaphthylene	24.3		2.2	27.0		90.0		70-121
2,6-Dinitrotoluene	26.4		5.4	27.0		97.6		68-128
3-Nitroaniline	8.7		8.6	27.0		32.2	#	57-136
Acenaphthene	25.4		2.2	27.0		93.9		41-131
2,4-Dinitrophenol	21.8		21.6	27.0		80.6		42-152
4-Nitrophenol	22.4		14.1	27.0		82.8		39-152
Dibenzofuran	26.0		5.4	27.0		96.0		67-123
2,4-Dinitrotoluene	26.8		5.4	27.0		99.3		57-123
Fluorene	26.2		2.2	27.0		97.1		65-129
Diethyl phthalate	26.4		5.4	27.0	0.4	96.3		72-124
4-Chlorophenyl phenyl ether	26.7		5.4	27.0		99.0		63-130
4-Nitroaniline	8.8		8.6	27.0		32.4	#	64-137
4,6-Dinitro-2-methylphenol	20.8		21.6	27.0		77.0		46-146
N-Nitrosodiphenylamine/Diphenylamine	25.5		5.4	27.0		94.4		66-125
4-Bromophenyl phenyl ether	27.5		5.4	27.0		102		64-123

Environmental Protection Agency

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Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

Matrix Spike (B7G0102-MS1)

Source: 1706041-04 Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits
Hexachlorobenzene	27.6		5.4	27.0		102	67-121
Atrazine	26.5		5.4	27.0		98.0	74-127
Pentachlorophenol	27.6		5.4	27.0		102	55-146
Phenanthrene	26.3		2.2	27.0		97.4	69-121
Anthracene	26.0		2.2	27.0		96.3	68-122
Carbazole	24.7		5.4	27.0		91.4	71-124
Di-n-butyl phthalate	27.9		5.4	27.0	0.3	102	75-136
Fluoranthene	26.6		2.2	27.0		98.6	74-123
Pyrene	30.8		2.2	27.0		114	54-133
Butyl benzyl phthalate	32.6		5.4	27.0	1.4	115	77-132
Benzo (a) anthracene	27.0		5.4	27.0		99.8	76-125
3,3´-Dichlorobenzidine	14.7		5.4	27.0		54.5	40-139
Chrysene	26.9		5.4	27.0		99.6	76-125
Bis(2-ethylhexyl)phthalate	29.9		5.4	27.0	3.9	96.4	79-138
Di-n-octyl phthalate	27.8		5.4	27.0		103	64-134
Benzo (b) fluoranthene	27.7		5.4	27.0		103	70-130
Benzo (k) fluoranthene	28.8		5.4	27.0		107	68-136
Benzo (a) pyrene	27.2		5.4	27.0		101	75-125
Indeno (1,2,3-cd) pyrene	25.7		5.4	27.0		95.2	65-143
Dibenz (a,h) anthracene	26.6		5.4	27.0		98.6	61-145
Benzo (g,h,i) perylene	24.8		5.4	27.0		91.7	67-142

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Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

Matrix Spike Dup (B7G0102-MSD1)

Source: 1706041-04 Prepared: 7/1/2017 Analyzed: 7/1/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
2-Fluorophenol	62.0		80.0	77.5	42-109
Phenol-d5	60.5		80.0	75.7	46-110
2-Chlorophenol-d4	61.0		80.0	76.3	47-103
1,2-Dichlorobenzene-d4	49.0		53.3	91.8	33-100
Nitrobenzene-d5	45.0		53.3	84.4	42-126
2-Fluorobiphenyl	48.8		53.3	91.5	50-104
2,4,6-Tribromophenol	70.2		80.0	87.8	59-142
Terphenyl-d14	60.1		53.3	113	61-125

Matrix Spike Dup (B7G0102-MSD1)

Source: 1706041-04 Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Benzaldehyde	22.9		5.3	26.7		85.8	53-136	1.68	30
Phenol	16.6		5.3	26.7		62.4	41-114	11.9	32
Bis(2-chloroethyl)ether	22.6		5.3	26.7		84.9	62-125	3.54	30
2-Chlorophenol	26.5		5.3	26.7		99.4	46-114	4.91	27
1,3-Dichlorobenzene	24.2		5.3	26.7		90.9	36-100	1.97	30
1,4-Dichlorobenzene	24.5		5.3	26.7		91.8	34-100	2.09	32
Benzyl alcohol	21.9		5.3	26.7		82.1	67-119	5.96	30
1,2-Dichlorobenzene	24.4		5.3	26.7		91.5	48-100	2.96	30
2-Methylphenol	16.4		5.3	26.7		61.7	60-131	3.13	30
Bis(2-chloro-1-methylethyl)ether	19.9		5.3	26.7		74.8	51-138	3.14	30
Acetophenone	24.0		5.3	26.7		90.0	63-134	3.24	30
3 &/or 4-Methylphenol	15.0		5.3	26.7		56.1 #	57-136	3.65	30
N-Nitrosodi-n-propylamine	21.3		5.3	26.7		79.9	50-116	2.79	29
Hexachloroethane	23.8		5.3	26.7		89.4	24-100	2.60	30
Nitrobenzene	29.2		5.3	26.7		110	68-126	13.6	30
Isophorone	22.2		5.3	26.7		83.4	67-125	4.23	30
2-Nitrophenol	25.8		5.3	26.7		96.9	62-137	3.88	30
2,4-Dimethylphenol	13.0		5.3	26.7		49.0	48-136	23.4	30

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

Matrix Spike Dup (B7G0102-MSD1)

Source: 1706041-04 Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit
Bis(2-chloroethoxy)methane	22.7		5.3	26.7		85.2		66-126	4.94	30
2,4-Dichlorophenol	24.5		5.3	26.7		92.0		69-125	3.33	30
1,2,4-Trichlorobenzene	25.7		5.3	26.7		96.5		38-106	3.53	26
Naphthalene	24.9		2.1	26.7		93.6		65-115	2.59	30
4-Chloroaniline	10.1		5.3	26.7		38.0	#	54-122	18.7	30
Hexachlorobutadiene	26.3		5.3	26.7		98.8		29-112	3.83	30
Caprolactam	20.3		5.3	26.7		76.0		56-124	17.4	30
4-Chloro-3-methylphenol	22.7		5.3	26.7		85.3		44-137	2.19	30
2-Methylnaphthalene	24.7		2.1	26.7		92.6		64-117	3.66	30
1-Methylnaphthalene	25.0		2.1	26.7		93.6		70-130	3.97	30
Hexachlorocyclopentadiene	16.6		5.3	26.7		62.4		32-122	10.8	30
2,4,6-Trichlorophenol	24.8		5.3	26.7		93.1		65-128	2.55	30
2,4,5-Trichlorophenol	26.9		5.3	26.7		101		68-127	0.72	30
2-Chloronaphthalene	25.4		5.3	26.7		95.1		62-122	3.31	30
1,1'-Biphenyl	26.0		5.3	26.7		97.6		60-129	3.34	30
2-Nitroaniline	16.7		8.5	26.7		62.6	#	65-126	5.82	30
Dimethyl phthalate	24.7		5.3	26.7		92.5		71-122	3.41	30
Acenaphthylene	23.1		2.1	26.7		86.8		70-121	5.01	30
2,6-Dinitrotoluene	25.9		5.3	26.7		97.2		68-128	1.85	30
3-Nitroaniline	10.1		8.5	26.7		38.0	#	57-136	15.2	30
Acenaphthene	24.6		2.1	26.7		92.2		41-131	3.16	33
2,4-Dinitrophenol	20.0		21.3	26.7		75.0		42-152	8.60	30
4-Nitrophenol	21.1		13.9	26.7		79.3		39-152	5.74	34
Dibenzofuran	25.1		5.3	26.7		94.1		67-123	3.46	30
2,4-Dinitrotoluene	25.9		5.3	26.7		97.4		57-123	3.39	16
Fluorene	25.3		2.1	26.7		95.1		65-129	3.48	30
Diethyl phthalate	25.5		5.3	26.7	0.4	94.2		72-124	3.55	30
4-Chlorophenyl phenyl ether	25.9		5.3	26.7		97.2		63-130	3.15	30
4-Nitroaniline	9.7		8.5	26.7		36.4	#	64-137	10.1	30
4,6-Dinitro-2-methylphenol	19.4		21.3	26.7		72.9		46-146	6.89	30
N-Nitrosodiphenylamine/Diphenylamine	24.5		5.3	26.7		91.8		66-125	4.23	30
4-Bromophenyl phenyl ether	26.7		5.3	26.7		100		64-123	2.98	30

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Semivolatiles by EPA Method 8270D - GC/MS - Quality Control

Batch: B7G0102 **Sample Type: Liquid**

Matrix Spike Dup (B7G0102-MSD1)

Source: 1706041-04 Prepared: 7/1/2017 Analyzed: 7/1/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Hexachlorobenzene	26.9		5.3	26.7		101	67-121	2.54	30
Atrazine	26.1		5.3	26.7		97.8	74-127	1.68	30
Pentachlorophenol	26.5		5.3	26.7		99.6	55-146	4.01	21
Phenanthrene	25.5		2.1	26.7		95.8	69-121	2.97	30
Anthracene	25.1		2.1	26.7		94.2	68-122	3.62	30
Carbazole	23.9		5.3	26.7		89.6	71-124	3.38	30
Di-n-butyl phthalate	27.3		5.3	26.7	0.3	101	75-136	2.25	30
Fluoranthene	25.8		2.1	26.7		96.8	74-123	3.20	30
Pyrene	30.9		2.1	26.7		116	54-133	0.17	21
Butyl benzyl phthalate	32.7		5.3	26.7	1.4	117	77-132	0.28	30
Benzo (a) anthracene	26.2		5.3	26.7		98.4	76-125	2.81	30
3,3´-Dichlorobenzidine	14.4		5.3	26.7		54.1	40-139	2.21	30
Chrysene	26.1		5.3	26.7		97.8	76-125	3.14	30
Bis(2-ethylhexyl)phthalate	29.5		5.3	26.7	3.9	96.2	79-138	1.40	30
Di-n-octyl phthalate	27.1		5.3	26.7		102	64-134	2.45	30
Benzo (b) fluoranthene	27.6		5.3	26.7		104	70-130	0.31	30
Benzo (k) fluoranthene	29.4		5.3	26.7		110	68-136	1.89	30
Benzo (a) pyrene	26.6		5.3	26.7		99.8	75-125	2.27	30
Indeno (1,2,3-cd) pyrene	24.6		5.3	26.7		92.3	65-143	4.47	30
Dibenz (a,h) anthracene	24.9		5.3	26.7		93.2	61-145	6.94	30
Benzo (g,h,i) perylene	23.9		5.3	26.7		89.6	67-142	3.73	30

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

TPH by Texas Method 1005 (GC-FID) - Quality Control

Batch: B7F2914 **Sample Type: Liquid**

Blank (B7F2914-BLK1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1-Chlorooctane	9,460		10,000	94.6	70-130
1-Chlorooctadecane	8,840		10,000	88.4	70-130

Blank (B7F2914-BLK1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Gasoline Range Organics	U		5,500
Diesel Range Organics	U		5,500
Oil Range Organics	U		5,500
TPH	U		16,500

Blank (B7F2914-BLK2)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1-Chlorooctane	8,970		10,000	89.7	70-130
1-Chlorooctadecane	8,350		10,000	83.5	70-130

Blank (B7F2914-BLK2)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Gasoline Range Organics	U		5,500
Diesel Range Organics	U		5,500
Oil Range Organics	U		5,500

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

TPH by Texas Method 1005 (GC-FID) - Quality Control

Batch: B7F2914 **Sample Type: Liquid**

Blank (B7F2914-BLK2)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
TPH	U		16,500

LCS (B7F2914-BS1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1-Chlorooctane	11,200		10,000	112	70-130
1-Chlorooctadecane	11,300		10,000	113	70-130

LCS (B7F2914-BS1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Gasoline Range Organics	166,000		6,500	200,000	82.8	75-125
Diesel Range Organics	192,000		6,500	200,000	95.8	75-125

LCS (B7F2914-BS2)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1-Chlorooctane	10,300		10,000	103	70-130
1-Chlorooctadecane	11,500		10,000	115	70-130

LCS (B7F2914-BS2)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

TPH by Texas Method 1005 (GC-FID) - Quality Control

Batch: B7F2914 **Sample Type: Liquid**

LCS (B7F2914-BS2)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Gasoline Range Organics	163,000		6,500	200,000	81.5	75-125
Diesel Range Organics	194,000		6,500	200,000	97.2	75-125

LCS Dup (B7F2914-BSD1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1-Chlorooctane	10,900		10,000	109	70-130
1-Chlorooctadecane	11,100		10,000	111	70-130

LCS Dup (B7F2914-BSD1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Gasoline Range Organics	159,000		6,500	200,000	79.7	75-125	3.81	20
Diesel Range Organics	195,000		6,500	200,000	97.4	75-125	1.59	20

LCS Dup (B7F2914-BSD2)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1-Chlorooctane	10,500		10,000	105	70-130
1-Chlorooctadecane	11,600		10,000	116	70-130

LCS Dup (B7F2914-BSD2)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

TPH by Texas Method 1005 (GC-FID) - Quality Control

Batch: B7F2914 **Sample Type: Liquid**

LCS Dup (B7F2914-BSD2)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Gasoline Range Organics	166,000		6,500	200,000	83.0	75-125	1.88	20
Diesel Range Organics	194,000		6,500	200,000	97.2	75-125	0.04	20

Matrix Spike (B7F2914-MS1)

Source: 1706041-04 Prepared: 6/29/2017 Analyzed: 6/29/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1-Chlorooctane	8,700		8,930	97.4	70-130
1-Chlorooctadecane	9,460		8,930	106	70-130

Matrix Spike (B7F2914-MS1)

Source: 1706041-04 Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits
Gasoline Range Organics	150,000		5,810	179,000		83.9	75-125
Diesel Range Organics	161,000		5,810	179,000		90.2	75-125

Matrix Spike Dup (B7F2914-MSD1)

Source: 1706041-04 Prepared: 6/29/2017 Analyzed: 6/30/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1-Chlorooctane	9,140		9,030	101	70-130
1-Chlorooctadecane	9,520		9,030	105	70-130

Matrix Spike Dup (B7F2914-MSD1)

Source: 1706041-04 Prepared: 6/29/2017 Analyzed: 6/30/2017

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

TPH by Texas Method 1005 (GC-FID) - Quality Control

Batch: B7F2914 **Sample Type: Liquid**

Matrix Spike Dup (B7F2914-MSD1)

Source: 1706041-04 Prepared: 6/29/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Gasoline Range Organics	153,000		5,870	181,000		84.6	75-125	1.96	20
Diesel Range Organics	166,000		5,870	181,000		92.0	75-125	3.06	20

Blank (B7G0103-BLK1)

Prepared: 7/1/2017 Analyzed: 7/6/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1-Chlorooctane	10,700		10,000	107	70-130
1-Chlorooctadecane	11,500		10,000	115	70-130

Blank (B7G0103-BLK1)

Prepared: 7/1/2017 Analyzed: 7/6/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Gasoline Range Organics	U		5,000
Diesel Range Organics	U		5,000
Oil Range Organics	U		5,000
TPH	U		15,000

LCS (B7G0103-BS1)

Prepared: 7/1/2017 Analyzed: 7/6/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1-Chlorooctane	8,880		10,000	88.8	70-130
1-Chlorooctadecane	9,580		10,000	95.8	70-130

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

TPH by Texas Method 1005 (GC-FID) - Quality Control

Batch: B7G0103 **Sample Type: Liquid**

LCS (B7G0103-BS1)

Prepared: 7/1/2017 Analyzed: 7/6/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Gasoline Range Organics	31,300		5,000	33,300	93.9	75-125
Diesel Range Organics	32,100		5,000	33,300	96.3	75-125

LCS Dup (B7G0103-BSD1)

Prepared: 7/1/2017 Analyzed: 7/6/2017

Surrogates

ANALYTE	Result µg/L	Analyte Qualifier	Spike Level	%REC	%REC Limits
1-Chlorooctane	10,700		10,000	107	70-130
1-Chlorooctadecane	12,200		10,000	122	70-130

LCS Dup (B7G0103-BSD1)

Prepared: 7/1/2017 Analyzed: 7/6/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Gasoline Range Organics	37,600		5,000	33,300	113	75-125	18.2	20
Diesel Range Organics	38,000		5,000	33,300	114	75-125	16.9	20

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD - Quality Control

Batch: B7G0703 **Sample Type: Liquid**

Blank (B7G0703-BLK1)

Prepared: 6/28/2017 Analyzed: 6/28/2017

Targets

ANALYTE	Result mg/L	Analyte Qualifiers	Reporting Limit
Nitrate as NO3	U		1.00
Nitrite as NO2	U		1.00
Fluoride	U		1.00
Bromide	U		1.00
Orthophosphate	U		1.00
Sulfate as SO4	U		1.00

Blank (B7G0703-BLK2)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result mg/L	Analyte Qualifiers	Reporting Limit
Nitrate as NO3	U		1.00
Nitrite as NO2	U		1.00
Fluoride	U		1.00
Bromide	U		1.00
Orthophosphate	U		1.00
Sulfate as SO4	U		1.00

LCS (B7G0703-BS1)

Prepared: 6/28/2017 Analyzed: 6/28/2017

Targets

ANALYTE	Result µl	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Nitrate as NO3	11.3			10.0	113	75-125
Nitrite as NO2	9.66			10.0	96.6	75-125
Fluoride	10.1			10.0	101	75-125
Bromide	10.2			10.0	102	75-125
Orthophosphate	10.2			10.0	102	75-125

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD - Quality Control

Batch: B7G0703 **Sample Type: Liquid**

LCS (B7G0703-BS1)

Prepared: 6/28/2017 Analyzed: 6/28/2017

Targets (Continued)

ANALYTE	Result µl	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Sulfate as SO4	10.3			10.0	103	75-125

LCS (B7G0703-BS2)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µl	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Nitrate as NO3	11.2			10.0	112	75-125
Nitrite as NO2	10.2			10.0	102	75-125
Fluoride	10.2			10.0	102	75-125
Bromide	10.3			10.0	103	75-125
Orthophosphate	10.3			10.0	103	75-125
Sulfate as SO4	10.4			10.0	104	75-125

Matrix Spike (B7G0703-MS1)

Source: 1706039-02 Prepared: 6/28/2017 Analyzed: 6/28/2017

Targets

ANALYTE	Result µl	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits
Nitrate as NO3	5.48			5.00	0.590	97.9	75-125
Nitrite as NO2	5.11			5.00		102	75-125
Fluoride	5.37			5.00		107	75-125
Bromide	4.72			5.00		94.4	75-125
Orthophosphate	4.83			5.00		96.6	75-125
Sulfate as SO4	4.48			5.00		89.7	75-125

Matrix Spike (B7G0703-MS2)

Source: 1706041-04 Prepared: 6/29/2017 Analyzed: 7/10/2017

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Anions by Modified EPA Method 300.1 - WK51894-IC/UV/CD - Quality Control

Batch: B7G0703 **Sample Type: Liquid**

Matrix Spike (B7G0703-MS2)

Source: 1706041-04 Prepared: 6/29/2017 Analyzed: 7/10/2017

Targets

ANALYTE	Result µl	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits
Nitrate as NO3	5.00			5.00	0.064	98.6	75-125
Nitrite as NO2	5.32			5.00		106	75-125
Fluoride	5.09			5.00		102	75-125
Bromide	13.4			5.00	8.27	103	75-125
Orthophosphate	4.65			5.00		93.0	75-125
Sulfate as SO4	9.10			5.00	3.63	109	75-125

Matrix Spike Dup (B7G0703-MSD1)

Source: 1706039-02 Prepared: 6/28/2017 Analyzed: 6/28/2017

Targets

ANALYTE	Result µl	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Nitrate as NO3	5.54			5.00	0.590	98.9	75-125	1.04	20
Nitrite as NO2	4.41			5.00		88.3	75-125	14.6	20
Fluoride	5.38			5.00		108	75-125	0.20	20
Bromide	4.89			5.00		97.8	75-125	3.52	20
Orthophosphate	4.73			5.00		94.6	75-125	2.13	20
Sulfate as SO4	4.43			5.00		88.6	75-125	1.17	20

Matrix Spike Dup (B7G0703-MSD2)

Source: 1706041-04 Prepared: 6/29/2017 Analyzed: 7/10/2017

Targets

ANALYTE	Result µl	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Nitrate as NO3	4.89			5.00	0.064	96.5	75-125	2.19	20
Nitrite as NO2	5.42			5.00		108	75-125	1.69	20
Fluoride	5.09			5.00		102	75-125	0.02	20
Bromide	13.8			5.00	8.27	111	75-125	7.31	20
Orthophosphate	4.63			5.00		92.5	75-125	0.52	20
Sulfate as SO4	9.08			5.00	3.63	109	75-125	0.27	20

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6010D - ICP - Quality Control

Batch: B7F2912 **Sample Type: Liquid**

Blank (B7F2912-BLK1)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Aluminum	U		100
Barium	U		10.0
Beryllium	U		5.0
Cadmium	U		5.0
Calcium	U		150
Chromium	U		10.0
Cobalt	U		20.0
Copper	U		20.0
Iron	U		25.0
Magnesium	U		150
Manganese	U		5.0
Nickel	U		20.0
Potassium	U		1,000
Silver	U		10.0
Sodium	U		500
Vanadium	U		20.0
Zinc	U		20.0

LCS (B7F2912-BS1)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Aluminum	934		100	1,000	93.4	75-125
Barium	1,850		10.0	2,000	92.6	75-125
Beryllium	47.4		5.0	50.1	94.6	75-125
Cadmium	45.4		5.0	50.0	90.8	75-125
Calcium	94,300		150	100,000	94.3	75-125
Chromium	377		10.0	400	94.1	75-125
Cobalt	178		20.0	200	88.8	75-125
Copper	375		20.0	400	93.7	75-125
Iron	933		25.0	1,000	93.3	75-125

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6010D - ICP - Quality Control

Batch: B7F2912 **Sample Type: Liquid**

LCS (B7F2912-BS1)

Prepared: 6/29/2017 Analyzed: 6/30/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Magnesium	96,700		150	100,000	96.7	75-125
Manganese	370		5.0	400	92.5	75-125
Nickel	352		20.0	400	87.9	75-125
Potassium	95,500		1,000	100,000	95.5	75-125
Silver	45.0		10.0	50.0	90.1	75-125
Sodium	93,100		500	100,000	93.1	75-125
Vanadium	393		20.0	400	98.4	75-125
Zinc	906		20.0	1,000	90.6	75-125

Matrix Spike (B7F2912-MS1)

Source: 1706039-04 Prepared: 6/29/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits
Aluminum	1,020		100	1,000	61.8	95.7	75-125
Barium	1,920		10.0	2,000	104	90.7	75-125
Beryllium	46.7		5.0	50.1	0.07	93.0	75-125
Cadmium	44.0		5.0	50.0	0.05	88.0	75-125
Calcium	141,000		150	100,000	51,300	89.8	75-125
Chromium	374		10.0	400	1.3	93.0	75-125
Cobalt	174		20.0	200		86.9	75-125
Copper	373		20.0	400		93.1	75-125
Iron	999		25.0	1,000	77.6	92.1	75-125
Magnesium	108,000		150	100,000	13,300	94.8	75-125
Manganese	424		5.0	400	65.0	89.7	75-125
Nickel	343		20.0	400	0.4	85.6	75-125
Potassium	96,400		1,000	100,000	1,550	94.9	75-125
Silver	45.1		10.0	50.0	1.5	87.1	75-125
Sodium	108,000		500	100,000	16,400	91.5	75-125
Vanadium	386		20.0	400	0.7	96.4	75-125
Zinc	884		20.0	1,000		88.4	75-125

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6010D - ICP - Quality Control

Batch: B7F2912 **Sample Type: Liquid**

Matrix Spike Dup (B7F2912-MSD1)

Source: 1706039-04 Prepared: 6/29/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Aluminum	1,040		100	1,000	61.8	97.8	75-125	2.07	20
Barium	1,930		10.0	2,000	104	91.4	75-125	0.75	20
Beryllium	47.1		5.0	50.1	0.07	94.0	75-125	1.03	20
Cadmium	44.4		5.0	50.0	0.05	88.8	75-125	0.89	20
Calcium	142,000		150	100,000	51,300	90.6	75-125	0.55	20
Chromium	376		10.0	400	1.3	93.7	75-125	0.70	20
Cobalt	174		20.0	200		87.2	75-125	0.28	20
Copper	375		20.0	400		93.8	75-125	0.73	20
Iron	1,010		25.0	1,000	77.6	93.2	75-125	1.10	20
Magnesium	109,000		150	100,000	13,300	95.8	75-125	0.94	20
Manganese	427		5.0	400	65.0	90.6	75-125	0.85	20
Nickel	348		20.0	400	0.4	86.8	75-125	1.42	20
Potassium	97,300		1,000	100,000	1,550	95.7	75-125	0.90	20
Silver	45.3		10.0	50.0	1.5	87.6	75-125	0.54	20
Sodium	109,000		500	100,000	16,400	92.5	75-125	0.86	20
Vanadium	390		20.0	400	0.7	97.5	75-125	1.07	20
Zinc	891		20.0	1,000		89.1	75-125	0.76	20

Blank (B7F3001-BLK1)

Prepared: 6/30/2017 Analyzed: 7/5/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Aluminum	U		100
Barium	U		10.0
Beryllium	U		5.0
Cadmium	U		5.0
Calcium	U		150
Chromium	U		10.0
Cobalt	U		20.0
Copper	U		20.0
Iron	U		25.0
Magnesium	U		150

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6010D - ICP - Quality Control

Batch: B7F3001 **Sample Type: Liquid**

Blank (B7F3001-BLK1)

Prepared: 6/30/2017 Analyzed: 7/5/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Manganese	U		5.0
Nickel	U		20.0
Potassium	U		1,000
Silver	U		10.0
Sodium	U		500
Vanadium	U		20.0
Zinc	U		20.0

LCS (B7F3001-BS1)

Prepared: 6/30/2017 Analyzed: 7/5/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Aluminum	1,790		100	2,000	89.6	75-125
Barium	3,480		10.0	4,000	86.9	75-125
Beryllium	88.0		5.0	100	87.8	75-125
Cadmium	85.7		5.0	100	85.7	75-125
Calcium	178,000		150	200,000	89.0	75-125
Chromium	713		10.0	801	89.0	75-125
Cobalt	331		20.0	400	82.8	75-125
Copper	710		20.0	801	88.7	75-125
Iron	1,750		25.0	2,000	87.3	75-125
Magnesium	186,000		150	200,000	93.1	75-125
Manganese	693		5.0	800	86.6	75-125
Nickel	655		20.0	801	81.7	75-125
Potassium	194,000		1,000	200,000	97.1	75-125
Silver	85.8		10.0	100	85.8	75-125
Sodium	182,000		500	200,000	90.8	75-125
Vanadium	741		20.0	800	92.7	75-125
Zinc	1,670		20.0	2,000	83.4	75-125

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6010D - ICP - Quality Control

Batch: B7F3001 **Sample Type: Liquid**

Matrix Spike (B7F3001-MS1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 7/5/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC		%REC Limits
Aluminum	1,750		1,000	2,000		87.4		75-125
Barium	10,700		100	4,000	6,840	97.1		75-125
Beryllium	86.7		50.0	100	0.6	86.0		75-125
Cadmium	78.8		50.0	100		78.8		75-125
Calcium	2.32E6		6,000	200,000	1.99E6	166	#	75-125
Chromium	722		100	801	11.2	88.8		75-125
Cobalt	326		200	400		81.6		75-125
Copper	846		200	801	73.2	96.6		75-125
Iron	2,610		250	2,000	860	87.4		75-125
Magnesium	1.02E6		1,500	200,000	777,000	120		75-125
Manganese	1,180		50.0	800	450	91.7		75-125
Nickel	668		200	801		83.4		75-125
Potassium	248,000		10,000	200,000	33,100	108		75-125
Silver	100		100	100	15.7	84.4		75-125
Sodium	1.29E7		20,000	200,000	1.26E7	120		75-125
Vanadium	760		200	800	7.1	94.2		75-125
Zinc	1,710		200	2,000		85.3		75-125

Matrix Spike Dup (B7F3001-MSD1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 7/5/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit
Aluminum	1,710		1,000	2,000		85.7		75-125	2.01	20
Barium	10,700		100	4,000	6,840	97.6		75-125	0.16	20
Beryllium	87.2		50.0	100	0.6	86.4		75-125	0.54	20
Cadmium	77.2		50.0	100		77.2		75-125	2.02	20
Calcium	2.28E6		6,000	200,000	1.99E6	146	#	75-125	1.74	20
Chromium	704		100	801	11.2	86.5		75-125	2.51	20
Cobalt	329		200	400		82.2		75-125	0.82	20
Copper	856		200	801	73.2	97.8		75-125	1.15	20
Iron	2,600		250	2,000	860	87.1		75-125	0.21	20
Magnesium	1.01E6		1,500	200,000	777,000	117		75-125	0.42	20

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6010D - ICP - Quality Control

Batch: B7F3001 **Sample Type: Liquid**

Matrix Spike Dup (B7F3001-MSD1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 7/5/2017

Targets (Continued)

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit
Manganese	1,180		50.0	800	450	91.7		75-125	0.04	20
Nickel	653		200	801		81.5		75-125	2.40	20
Potassium	250,000		10,000	200,000	33,100	108		75-125	0.56	20
Silver	108		100	100	15.7	92.2		75-125	7.43	20
Sodium	1.26E7		20,000	200,000	1.26E7	NR	#	75-125	2.52	20
Vanadium	765		200	800	7.1	94.8		75-125	0.61	20
Zinc	1,700		200	2,000		85.1		75-125	0.20	20

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 7470A/7471B - CVAAS - Quality Control

Batch: B7F3003 **Sample Type: Liquid**

Blank (B7F3003-BLK1)

Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Mercury	U		0.200

LCS (B7F3003-BS1)

Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Mercury	1.94		0.200	2.00	96.8	85-115

Matrix Spike (B7F3003-MS1)

Source: 1706039-04 Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits
Mercury	2.14		0.200	2.00	0.011	106	75-125

Matrix Spike Dup (B7F3003-MSD1)

Source: 1706039-04 Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Mercury	2.04		0.200	2.00	0.011	102	75-125	4.64	20

Blank (B7G0303-BLK1)

Prepared: 7/3/2017 Analyzed: 7/3/2017

Targets

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 7470A/7471B - CVAAS - Quality Control

Batch: B7G0303 **Sample Type: Liquid**

Blank (B7G0303-BLK1)

Prepared: 7/3/2017 Analyzed: 7/3/2017

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Mercury	U		0.200

LCS (B7G0303-BS1)

Prepared: 7/3/2017 Analyzed: 7/3/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Mercury	1.99		0.200	2.00	99.3	85-115

Matrix Spike (B7G0303-MS1)

Source: 1706041-04 Prepared: 7/3/2017 Analyzed: 7/3/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits
Mercury	1.11		0.200	2.00	0.050	53.0 #	75-125

Matrix Spike Dup (B7G0303-MSD1)

Source: 1706041-04 Prepared: 7/3/2017 Analyzed: 7/3/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Mercury	1.09		0.200	2.00	0.050	51.8 #	75-125	2.00	20

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6020B - ICP MS - Quality Control

Batch: B7F2913 **Sample Type: Liquid**

Blank (B7F2913-BLK1)

Prepared: 6/29/2017 Analyzed: 7/3/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Antimony	U		2.0
Arsenic	U		2.0
Lead	U		2.0
Selenium	U		4.0
Thallium	U		2.0

LCS (B7F2913-BS1)

Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Antimony	211		2.0	200	106	85-115
Arsenic	209		2.0	200	105	85-115
Lead	210		2.0	200	105	85-115
Selenium	209		4.0	200	105	85-115
Thallium	211		2.0	200	106	85-115

Matrix Spike (B7F2913-MS1)

Source: 1706039-04 Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits
Antimony	212		2.0	200	0.1	106	70-130
Arsenic	209		2.0	200		104	70-130
Lead	207		2.0	200	0.9	103	70-130
Selenium	207		4.0	200		103	70-130
Thallium	213		2.0	200	0.3	106	70-130

Matrix Spike Dup (B7F2913-MSD1)

Source: 1706039-04 Prepared: 6/29/2017 Analyzed: 6/29/2017

Environmental Protection Agency

Region 6 Laboratory

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Metals by EPA Method 6020B - ICP MS - Quality Control

Batch: B7F2913 **Sample Type: Liquid**

Matrix Spike Dup (B7F2913-MSD1)

Source: 1706039-04 Prepared: 6/29/2017 Analyzed: 6/29/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Antimony	213		2.0	200	0.1	106	70-130	0.35	20
Arsenic	211		2.0	200		105	70-130	0.85	20
Lead	209		2.0	200	0.9	104	70-130	0.64	20
Selenium	208		4.0	200		104	70-130	0.35	20
Thallium	215		2.0	200	0.3	107	70-130	0.90	20

Blank (B7F3002-BLK1)

Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit
Antimony	U		5.0
Arsenic	U		5.0
Lead	U		5.0
Selenium	U		10.0
Thallium	U		5.0

LCS (B7F3002-BS1)

Prepared: 6/30/2017 Analyzed: 6/30/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	%REC	%REC Limits
Antimony	432		5.0	400	108	85-115
Arsenic	427		5.0	400	107	85-115
Lead	415		5.0	400	104	85-115
Selenium	445		10.0	400	111	85-115
Thallium	413		5.0	400	103	85-115

Matrix Spike (B7F3002-MS1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 7/3/2017

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Metals by EPA Method 6020B - ICP MS - Quality Control

Batch: B7F3002 **Sample Type: Liquid**

Matrix Spike (B7F3002-MS1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 7/3/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits
Antimony	411		10.0	400	0.5	103	70-130
Arsenic	515		10.0	400	83.5	108	70-130
Lead	425		10.0	400	1.7	106	70-130
Selenium	738		20.0	400	253	121	70-130
Thallium	404		10.0	400	1.3	101	70-130

Matrix Spike Dup (B7F3002-MSD1)

Source: 1706041-04 Prepared: 6/30/2017 Analyzed: 7/3/2017

Targets

ANALYTE	Result µg/L	Analyte Qualifiers	Reporting Limit	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Antimony	418		10.0	400	0.5	104	70-130	1.56	20
Arsenic	527		10.0	400	83.5	111	70-130	2.38	20
Lead	431		10.0	400	1.7	107	70-130	1.37	20
Selenium	758		20.0	400	253	126	70-130	2.70	20
Thallium	416		10.0	400	1.3	104	70-130	3.08	20

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

SURROGATE SUMMARY REPORT

VOA 8260C Routine List

Liquid

LAB NUMBER	1,2-DCE-d4	TOL-d8	4-BFB
1706039-01	93.7	99.4	91.9
1706039-02	92.9	98.9	91.2
1706039-03	88.5	94.6	86.7
1706039-04	90.5	97.9	89.5
1706039-05	88.0	94.5	85.9
1706039-06	87.1	94.3	86.8
1706039-07	90.6	97.6	88.2
1706041-01	93.2	100	91.2
1706041-02	95.2	101	92.8
1706041-03	100	109	100
1706041-04	96.6	103	93.8
1706041-05	87.2	93.8	85.6
1706041-06	87.6	91.1	83.4
1706041-07	99.1	107	98.5
1706041-08	94.6	100	92.8
1706041-09	99.4	103	94.3
1706041-10	89.5	94.7	93.4
1706043-01	94.3	102	94.3
1706043-02	88.9	98.3	94.8
B7G0104-BLK1	92.5	98.5	90.5
B7G0104-BLK2	96.1	104	95.3
B7G0104-BS1	117	119 #	112
B7G0104-BS2	94.2	105	97.7
B7G0104-MS1	93.0	101	95.0
B7G0104-MSD1	92.0	101	94.0

			QC LIMITS
1,2-DCE-d4	=	1,2-Dichloroethane-d4	86 - 117
TOL-d8	=	Toluene-d8	85 - 113
4-BFB	=	4-Bromofluorobenzene	73 - 115

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
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SURROGATE SUMMARY REPORT

ABN 8270D Routine List

Liquid

LAB NUMBER	2-FP	PH-d5	2-CP-d4	1,2-DCB-d4	NB-d5	2-FBP	2,4,6-TBP	TP-d14
1706039-02	72.5	71.9	76.5	68.7	71.2	74.6	98.6	102
1706039-03	77.9	78.5	82.7	68.6	79.0	81.7	101	99.7
1706039-04	57.4	56.3	60.3	56.5	57.7	60.4	79.3	99.7
1706039-05	59.2	56.6	62.6	56.4	60.3	62.2	80.0	96.6
1706039-06	65.7	66.9	69.8	63.5	66.4	73.1	83.1	101
1706039-07	70.1	69.1	73.4	65.1	68.5	72.2	95.7	106
1706041-02	66.4	74.1	68.4	68.0	78.6	79.8	78.9	106
1706041-03	65.1	66.2	64.3	69.3	72.0	73.7	73.3	106
1706041-04	57.0	58.1	58.6	60.0	64.0	69.5	67.1	107
1706041-05	73.9	70.5	75.9	66.9	71.0	70.8	92.9	103
1706041-06	71.8	73.7	77.6	66.1	74.4	80.0	96.6	101
1706041-07	84.4	47.4	87.4	79.2	83.9	85.6	101	98.6
1706041-08	76.1	75.1	78.9	67.0	74.5	75.3	97.2	106
1706041-09	73.4	72.0	76.1	68.3	71.3	72.4	97.3	102
1706041-10	68.8	70.9	73.9	69.0	85.1	93.5	104	101
1706043-02	65.9	66.3	71.2	72.7	79.0	89.4	108	116
B7F2806-BLK1	87.4	78.0	85.3	70.5	79.0	77.7	98.1	104
B7F2806-BS1	93.2	85.3	91.4	83.1	86.4	90.4	98.6	98.2
B7G0102-BLK1	71.3	70.3	74.8	59.4	70.2	68.8	98.3	112
B7G0102-BS1	87.7	85.2	92.2	82.6	87.5	92.8	102	110
B7G0102-MS1	79.8	78.6	74.7	90.3	85.0	91.3	87.3	107
B7G0102-MSD1	77.5	75.7	76.3	91.8	84.4	91.5	87.8	113

			QC LIMITS
2-FP	=	2-Fluorophenol	42 - 109
PH-d5	=	Phenol-d5	46 - 110
2-CP-d4	=	2-Chlorophenol-d4	47 - 103
1,2-DCB-d4	=	1,2-Dichlorobenzene-d4	33 - 100
NB-d5	=	Nitrobenzene-d5	42 - 126
2-FBP	=	2-Fluorobiphenyl	50 - 104
2,4,6-TBP	=	2,4,6-Tribromophenol	59 - 142
TP-d14	=	Terphenyl-d14	61 - 125

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

SURROGATE SUMMARY REPORT

P/P TPH

Liquid

LAB NUMBER	1-CO	1-COD
1706039-02	83.7	77.7
1706039-03	75.9	69.2 #
1706039-04	87.2	80.1
1706039-05	82.5	77.0
1706039-06	90.5	83.8
1706039-07	90.2	83.2
1706041-02	86.1	80.1
1706041-03	80.4	74.4
1706041-04	87.0	80.1
1706041-05	87.6	81.7
1706041-06RE1	72.7	75.6
1706041-07	90.8	83.5
1706041-08	84.9	78.5
1706041-09	86.3	80.5
1706041-10	89.5	88.3
1706043-02	110	118
B7F2914-BLK1	94.6	88.4
B7F2914-BLK2	89.7	83.5
B7F2914-BS1	112	113
B7F2914-BS2	103	115
B7F2914-BSD1	109	111
B7F2914-BSD2	105	116
B7F2914-MS1	97.4	106
B7F2914-MSD1	101	105
B7G0103-BLK1	107	115
B7G0103-BS1	88.8	95.8
B7G0103-BSD1	107	122

			QC LIMITS
1-CO	=	1-Chlorooctane	70 - 130
1-COD	=	1-Chlorooctadecane	70 - 130

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

Notes and Definitions

T	The compounds listed are tentatively identified by the best match with the NIST or Wiley mass spectral data base or by manual interpretation. The concentrations are estimated based on a Response Factor of 1.0 to the nearest internal standard.
RL	The reporting limit for this analyte was raised because absence or presence at the routine or lower value could not be verified.
K	The identification of the analyte is acceptable; the reported value may be biased high. The actual value is expected to be less than the reported value.
J	The identification of the analyte is acceptable; the reported value is an estimate.
FB	Field Blank Related - The concentration found in the sample was less than 10X the concentration found in the associated field, trip, or equipment blank. Presence in the sample is therefore suspect.
B	Blank Related - The concentration found in the sample was less than 10X the concentration found in the associated extraction, digestion and/or analysis blank. Presence in the sample is therefore suspect.
A	This sample was extracted at a single acid pH.
HTS	Sample was prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.
ABN	Acid Base Neutrals (Semivolatile Compounds)
AES	Atomic Emission Spectrometer
BS	Blank Spike
CVAA	Cold Vapor Atomic Absorption
DCB	Decachlorobiphenyl
ECD	Electron Capture Detector
GC	Gas Chromatograph
ICP	Inductively Coupled Plasma
ISTD	Internal Standard
LCS	Laboratory Control Sample
MS	Mass Spectrometer
MS/MSD	Matrix Spike/Matrix Spike Duplicate

Environmental Protection Agency

Region 6 Laboratory

10625 Fallstone Road, Houston, TX 77099
Phone:(281)983-2100 Fax:(281)983-2248

NA	Not Applicable
NPD	Nitrogen Phosphorous Detector
NR	Not Reported
PCB	Polychlorinatedbiphenyl
RL	Reporting Limit
RT	Retention Time
RPD	Relative Percent Difference
TCLP	Toxicity Characteristic Leaching Procedure
TCMX	Tetrachloro-meta-xylene
U	Undetected
VOA	Volatile Organic Analysis

Initial pressure in air analyses is the pressure at which the canister was received in psia (pounds *per* square inch absolute pressure).

The pH reported for Volatile liquid samples was tested using a 0-14 pH indicator strip for the purpose of verifying chemical preservation.

The statistical software used for the reporting of toxicity data is ToxCalc 5.0.32, Environmental Toxicity Data Analysis System 1994-2007 Tidepool Scientific Software.

ENVIRONMENTAL PROTECTION AGENCY

OFFICIAL CHAIN OF CUSTODY RECORD

PROJ. NO.: N/A

PROJECT NAME: BIRD CREEK - OSAGE CO., OK

SAMPLERS: (Signature) Jeanne Eckhart

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA*	ABN	TPH*	TOTAL METALS**	ANIONS	EXPERIMENTAL (E&P)	REMARKS
N/A	6/27/17	9:00 am		X	TRIP BLANK #1	2	2						* - HCl preservative added
1	6/27/17	9:31 am		X	WS-13 (Field Blank)	11	2	2	2	1	2	2	** - HNO_3 preservative added
2	6/27/17	10:33 am		X	WS-15 (Equip. Blank)	11	2	2	2	1	2	2	
3	6/27/17	11:25 am		X	WS-1	11	2	2	2	1	2	2	
4	6/27/17	1:16 pm		X	WS-2	11	2	2	2	1	2	2	
5	6/27/17	2:10 pm		X	WS-3	11	2	2	2	1	2	2	
6	6/27/17	2:46 pm		X	WS-4	11	2	2	2	1	2	2	

NFE

Under Custody Seals

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	6/27/17 3:35 pm				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	6/28/17 ~~8:44~~ 9:40				
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Shipped by: via UPS - 3 ICE CHESTS

Airbill Number: 1Z A46 R22 01 9451 2577

	Y/N	INITIALS
Are all samples intact?	/	
Were all samples ≤6°C?	/	
Were all custody seals intact?	/	

ISPI Temps
Cooler #1 - 5.0
Cooler #2 - 1.0
Cooler #3 - 3.0

Distribution: White Accompanies Shipment; Pink to Coordinator Field Files; Green to Report; Yellow Returns with Warrant

9455 0391
9431 5985

6- 05012

EPA 7500-53 (11/96)

ENVIRONMENTAL PROTECTION AGENCY

OFFICIAL CHAIN OF CUSTODY RECORD

PROJ. NO.: N/A

PROJECT NAME: BIRD CREEK - OSAGE CO., OK

SAMPLERS: (Signature) [signature] JE / [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOAs*	ABN	TPH*	TOTAL METALS**	ANIONS	Experimental
N/A	6/28/2017	8:11 AM		X	TRIP BLANK #2	2	X 2					
7	6/28/17	8:35 AM		X	WS-5	11	2	2	2	1	2	2
8	6/28/17	—		X	WS-7 (Replicate #1)	11	2	2	2	1	2	2
9	6/28/17	8:35 AM		X	WS-17 (QA/QC H-lab-QMP)	24	6	6	6	2	4	
10	6/28/17	10:03 AM		X	WS-6	11	2	2	2	1	2	2
17	6/28/17	11:52 AM		X	WS-16 (EQUIP. BLANK #2)	11	2	2	2	1	2	2
14	6/28/17	1:15 PM		X	WS-11	11	2	2	2	1	2	2
16	6/28/17	—		X	WS-14 (Replicate #2)	11	2	2	2	1	2	2
15	6/28/17	2:06 PM		X	WS-12	11	2	2	2	1	2	2
11	6/28/17	2:54 PM		X	WS-8	11	2	2	2	1	2	2

REMARKS
*HCl preserve added
**HNO3 Preserve added

UNDER CUSTODY SEALS

NFE

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	6/28/17 3:59 PM				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature) [signature]	Date / Time 6/29/17 15:55 ~~6/28/17~~ 9:40		

Shipped by: Via UPS - 4 ICE CHESTS

Airbill Number: 1ZA46R2201 9201 2207

Remarks: Are all samples intact? Y/N / INITIALS
Were all samples ≤6°? / [initials]
Were all custody seals intact? / [initials]

Distribution: White Accompanies Shipment; Pink to Coordinator Field Files; Green to Report; Yellow Returns with Warrant

EPA 7500-53 (11/96)

Cooler 1 - Temp ~~Blank~~ = 4.0 SP/Temp 90937418
Cooler 2 - Temp ~~Blank~~ = 1.0 Cooler 4 - ~~Temp Blank~~ 94602021
Cooler 3 SP/Temp ~~Blank~~ = 3.0 (SP/Temps) 90922031

6- 05013

ENVIRONMENTAL PROTECTION AGENCY

OFFICIAL CHAIN OF CUSTODY RECORD

PROJ. NO.: N/A

PROJECT NAME: BIRD CREEK - OSAGE CO., OK

SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA*	ABN	TPH*	TOTAL METALS**	ANIONS	EXPERIMENTAL	REMARKS
N/A	6/29/17	8:14 am		X	TRIP BLANK #3	2	2						*HCl preserve added
12	6/29/17	9:09 AM		X	WARREN TB	11	2	2	2	1	2	2	**HNO3 preserve added
N/A	6/29/17	9:22 AM		X	WARREN EXP #1	2						2	CORROSION INHIBITOR
N/A	6/29/17	9:36 AM		X	WARREN EXP #2	2						2	EMULSIFER
N/A	6/29/17	9:45 AM		X	WARREN EXP #3	2						2	IRON SULFIDE STABILIZER
N/A	6/29/17	11:04 AM		X	JIREH EXP #1	2						2	SURFACTANT
N/A	6/29/17	11:15 AM		X	JIREH EXP #2	2						2	CHELATING AGENT
N/A	6/29/17	11:24 AM		X	JIREH EXP #3	2						2	CORROSION INHIBITOR
N/A	6/29/17	11:33 AM		X	JIREH EXP #4	2						2	SCALE INHIBITOR
N/A	6/29/17	12:32 PM		X	JIREH EXP #5	2						2	CORROSION INHIBITOR

Under Custody Seals

NFE

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	6/29/2017 3:23 PM				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
			6/30/17 9:40	Are all samples intact? (Y/N) Y / Initials	
Shipped by: Via UPS - 1 ice chest		Airbill Number: 1Z A46 R22 01 9205 3440		Were all samples ≤ 6°C? Y /	
				Were all custody seals intact? Y /	

Distribution: White Accompanies Shipment; Pink to Coordinator Field Files; Green to Report; Yellow Returns with Warrant

SPL Temp = 2°C

EPA 7500-53 (11/06)

6 - 07734

Multiply values by 1

Bird Creek Location	FieldID	SAMPLE DATE	insp_NO	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	Fe (mg/l)	Ba (mg/l)	Carb (ppm)	Bi-carb (ppm)	Sulfates (mg/l)	Cl (mg/l)	NITRATE-N (MG/L)	NITRITE-N (mg/l)	AMMONIUM-N (MG/L)	P-total (mg/l)	TDS	PH	SG	Sr (mg/l)	F (mg/l)	alkalinity	CO2	N2O	Cu (mg/l)	PPA (mg/l CaCO3)	MOA (mg/l CaCO3)	B (mg/l)
1A (North of Rd) SE 12-T27N-T7E	1A(North of Culvert)	05-Oct-16		47	7	17	8	1.26			56	35	87					300	7.5				46						0.02
1B (South of Rd) SE 12-T27N-R7E	1B(South of Culvert)	05-Oct-16		4751	1365	20812	58	0.1			61	49	40699					67795	6.9				50			0.1			1.47
1C (South of Rd) SE 12-T27NR-7E	1C(Duplicate of 1B)	05-Oct-16		4749	1432	20810	62	0.1			64	51	42655					69822	6.9				52			0.1			1.59
2 Jireh @ 18W SW 1-T27N-R7E	2(Jireh TB)	05-Oct-16		9627	1770	49111	531	10.41			104	41	99594					160779	6.3				85			0.1			8.54
3 G.horse @ TB NW18-T27N-R8E	3(Grayhorse TB)	05-Oct-16		8236	1737	45675	463	2.96			64	10	90403					146588	6.5				52			0.1			8.11

Bird Creek

Location	FieldID	SAMPLE DATE	TKN	SiO2 (mg/L)	Al (mg/l)	Co (mg/l)	Pb (mg/l)	Mn (mg/l)	Zn (mg/l)	Temp (C)	Temp (F)
1A (North of Rd) SE 12-T27N-T7E	1A(North of Culvert)	**05-Oct-16**						0.01			
1B (South of Rd) SE 12-T27N-R7E	1B(South of Culvert)	**05-Oct-16**						0.02	0.01		
1C (South of Rd) SE 12-T27NR-7E	1C(Duplicate of 1B)	**05-Oct-16**							0.01		
2 Jireh @ 18W SW 1-T27N-R7E	2(Jireh TB)	**05-Oct-16**						2.49	0.85		
3 G.horse @ TB NW18-T27N-R8E	3(Grayhorse TB)	**05-Oct-16**						2.4	11.34		

mg/l																		as CaCO3		
Sample_Name	**Ca**	**Mg**	**Na**	**K**	**Fe**	**Ba**	**CO3**	**HCO3**	**SO4**	**Cl**	**NO3-N**	**NO2-N**	**NH4-N**	**P**	**Cations**	**Anions**	**Si**	**alkalinity**	**meq**	**pH**
1A (North of Rd)SE 12-T27N-T7E: 1A(North of Culvert)	47	7	17	8	1.26	0	0.00	56	35	87	0.00	0.00	0.00	0.00	79.0	178.0	10.0	46	0.912	7.50
1B (South of Rd)SE 12-T27N-R7E: 1B(South of Culvert)	4751	1365	20812	58	0.1	0	0.00	61	49	40699	0.00	0.00	0.00	0.00	26986.0	40809.0	10.0	50	1	6.90
1C (South of Rd)SE 12-T27NR-7E: 1C(Duplicate of 1B)	4749	1432	20810	62	0.1	0	0.00	64	51	42655	0.00	0.00	0.00	0.00	27053.0	42770.0	10.0	52	1.042	6.90
2 Jireh @ 18WSW 1-T27N-R7E: 2(Jireh TB)	9627	1770	49111	531	10.41	0	0.00	104	41	99594	0.00	0.00	0.00	0.00	61039.0	99739.0	10.0	85	1.702	6.30
3 G.horse @ TBNW18-T27N-R8E: 3(Grayhorse TB)	8236	1737	45675	463	2.96	0	0.00	64	10	90403	0.00	0.00	0.00	0.00	56111.0	90477.0	10.0	52	1.04	6.50
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0				

:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0

:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
maximum	9627	1770	49111	531			0	104	51	99594	0	0	0	0		

mg/l	OH		est		actual											
Sample_Name	**mg/l**	**HCO3**	**CO3**	**est TDS**	**TDS**	**Strontium**	**Fluoride**	**B (mg/l)**	**TKN**	**SiO2**	**Al**	**Co**	**Pb**	**Mn**	**Zn**
1A (North of Rd)SE 12-T27N-T7E: 1A(North of Culvert)	0.010	55.6	27.4	294	300	0	0	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00
1B (South of Rd)SE 12-T27N-R7E: 1B(South of Culvert)	0.003	61.0	30.0	67,835	67,795	0	0	1.47	0.00	0.00	0.00	0.00	0.00	0.02	0.01
1C (South of Rd)SE 12-T27NR-7E: 1C(Duplicate of 1B)	0.003	63.6	31.3	69,864	69,822	0	0	1.59	0.00	0.00	0.00	0.00	0.00	0.00	0.01
2 Jireh @ 18WSW 1-T27N-R7E: 2(Jireh TB)	0.001	103.9	51.1	160,839	160,779	0	0	8.54	0.00	0.00	0.00	0.00	0.00	2.49	0.85
3 G.horse @ TBNW18-T27N-R8E: 3(Grayhorse TB)	0.001	63.5	31.2	146,629	146,588	0	0	8.11	0.00	0.00	0.00	0.00	0.00	2.40	11.34
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:					0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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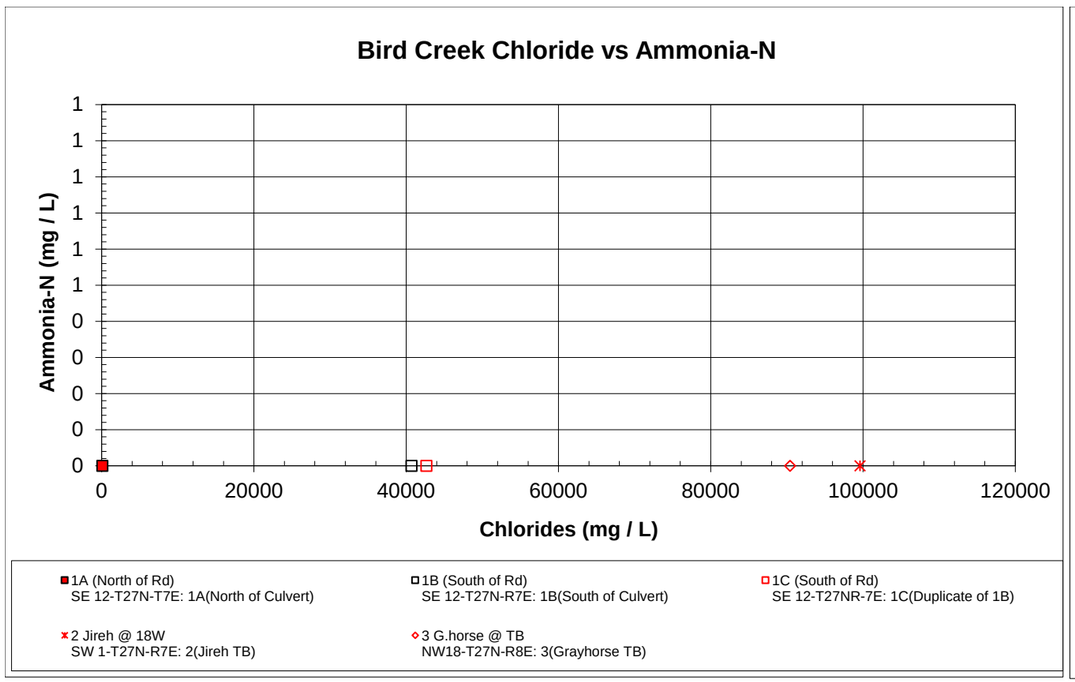
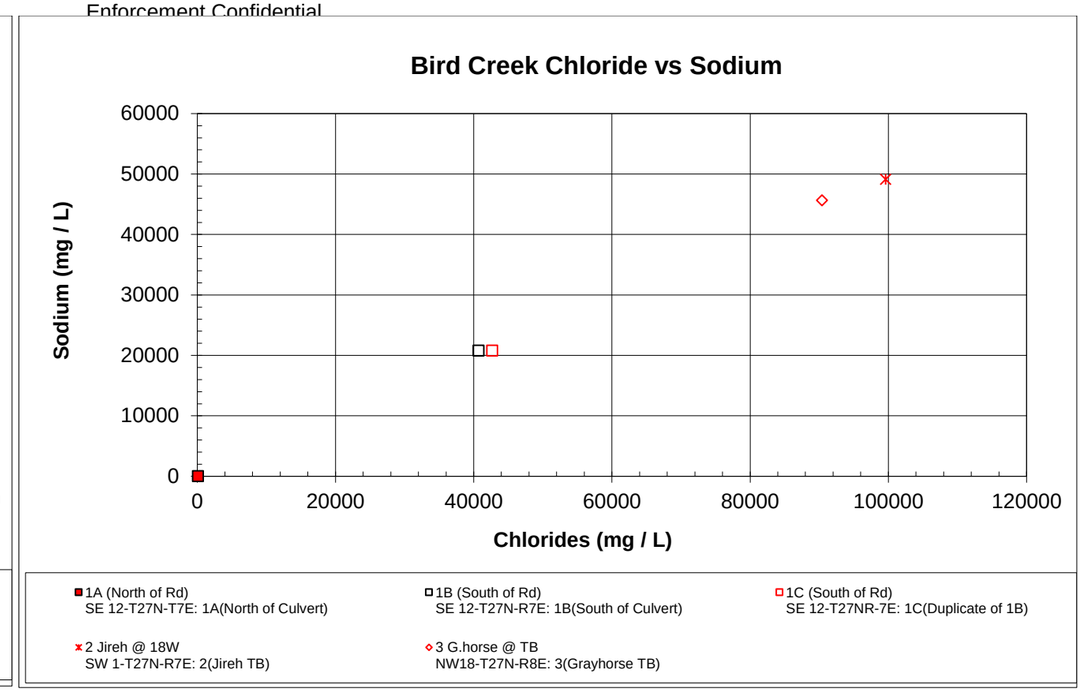
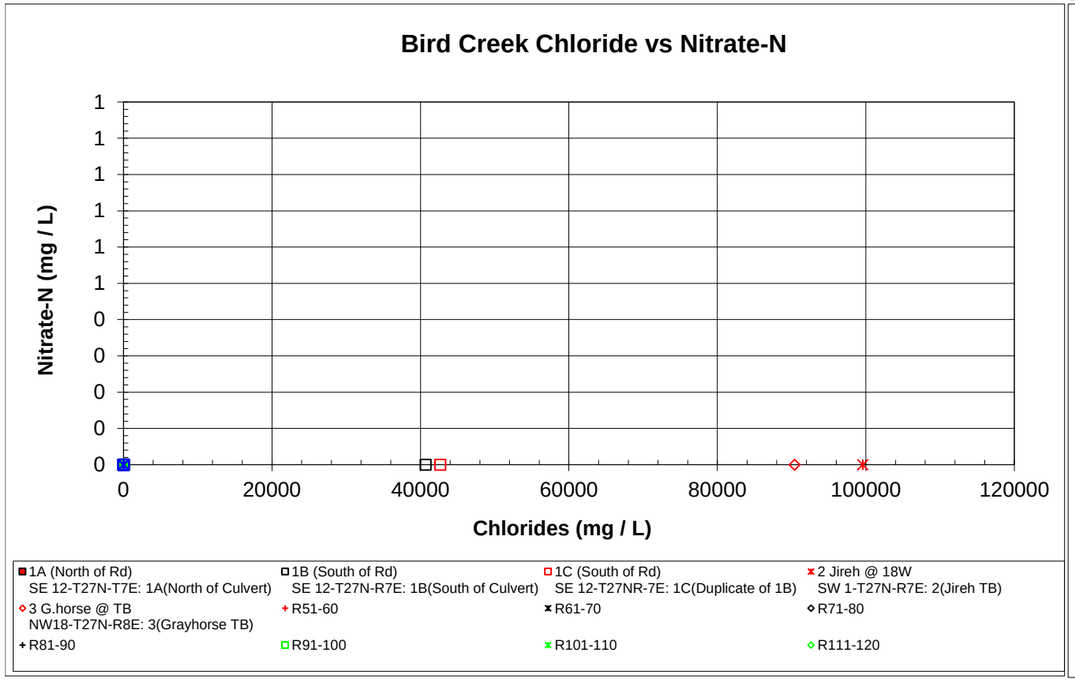
maximum

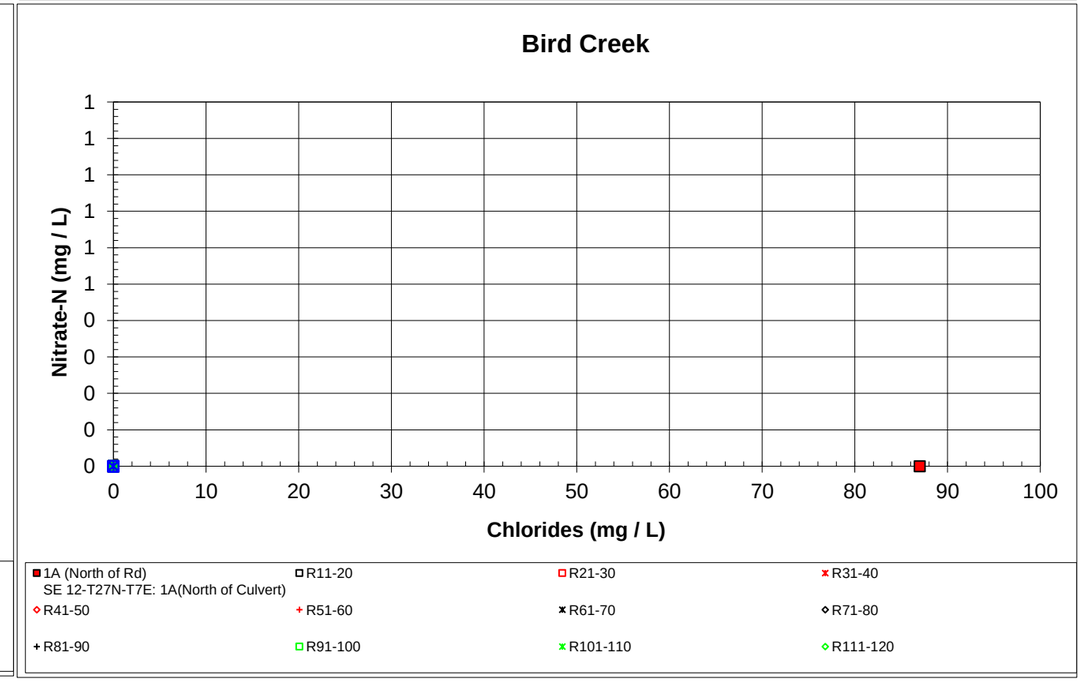
Ground Water Center
EPA R6 WQ-SG
Enforcement Confidential





Bird Creek
k Chloride
n Ammonia-N Bird Creek
d Sodium Bird Creek
l Nitrate-N Bird Creek





Ground Water Center
EPA R6 WQ-SG
Enforcement Confidential

Chloride vs Ammonia-N
Chloride vs Sodium
Chloride vs Nitrate-N

mequiv/l

	Ca	Mg	Na	K	Fe	Ba	CO3	HCO3	SO4	Cl	Cations	Anions	Error	check	NH4-N	Sr	NO3-N	NO2-N	Fluoride	B	TKN-N	Cation+NH4	Anion+N
1A (North of Rd)SE 12-T27N-T7E: 1A(North of Culvert)	2.35	0.58	0.74	0.20	0.05	0.00	0.00	0.92	0.73	2.45	3.91	4.10	-2.37%	y	0.00	0.00	0.00	0.00	0.00	0.01	0.00	3.91	4.10
1B (South of Rd)SE 12-T27N-R7E: 1B(South of Culvert)	237.08	112.32	905.27	1.48	0.00	0.00	0.00	1.00	1.02	1147.97	1256.16	1149.99	4.41%	y	0.00	0.00	0.00	0.00	0.00	0.41	0.00	1256.16	1149.99
1C (South of Rd)SE 12-T27NR-7E: 1C(Duplicate of 1B)	236.98	117.84	905.19	1.59	0.00	0.00	0.00	1.05	1.06	1203.14	1261.59	1205.25	2.28%	y	0.00	0.00	0.00	0.00	0.00	0.44	0.00	1261.59	1205.25
2 Jireh @ 18WSW 1-T27N-R7E: 2(Jireh TB)	480.39	145.65	2136.21	13.58	0.37	0.00	0.00	1.70	0.85	2809.18	2776.20	2811.74	-0.64%	y	0.00	0.00	0.00	0.00	0.00	2.37	0.00	2776.20	2811.74
3 G.horse @ TBNW18-T27N-R8E: 3(Grayhorse TB)	410.98	142.93	1986.75	11.84	0.11	0.00	0.00	1.05	0.21	2549.94	2552.61	2551.20	0.03%	y	0.00	0.00	0.00	0.00	0.00	2.25	0.00	2552.61	2551.20
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00		
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00		
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00		
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:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
max	480.39	145.65	2136.21	13.58			0.00	1.70	1.06	2809.18	0.00	0.00	0.00	0.00	0.00	2.37	

Brine Balance

Error	check	Cation+B,NH4	Error	check	K+2Ca+2Mg+H+Na	SO4+2CO3+Cl+OH	[H+] *1000 meq	pH	[OH-] *1000 meq	SiO2	Al	Co	Pb	Mn	Zn
-2.37%	n	3.92	2.30%	n	6.786716905	3.18	3.16228E-05	7.50	0.000316228	0.00	0.00	0.00	0.00	0.00	0.00
4.41%	n	1256.57	-4.43%	n	1605.552486	1148.99	0.000125893	6.90	7.94328E-05	0.00	0.00	0.00	0.00	0.00	0.00
2.28%	n	1262.03	-2.30%	n	1616.394734	1204.20	0.000125893	6.90	7.94328E-05	0.00	0.00	0.00	0.00	0.00	0.00
-0.64%	n	2778.57	0.59%	n	3401.868702	2810.04	0.000501187	6.30	1.99526E-05	0.00	0.00	0.00	0.00	0.09	0.03
0.03%	n	2554.86	-0.07%	n	3106.418379	2550.15	0.000316228	6.50	3.16228E-05	0.00	0.00	0.00	0.00	0.09	0.35
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
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										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
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										0.00	0.00	0.00	0.00	0.00	0.00
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										0.00	0.00	0.00	0.00	0.00	0.00
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										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
										0.00	0.00	0.00	0.00	0.00	0.00
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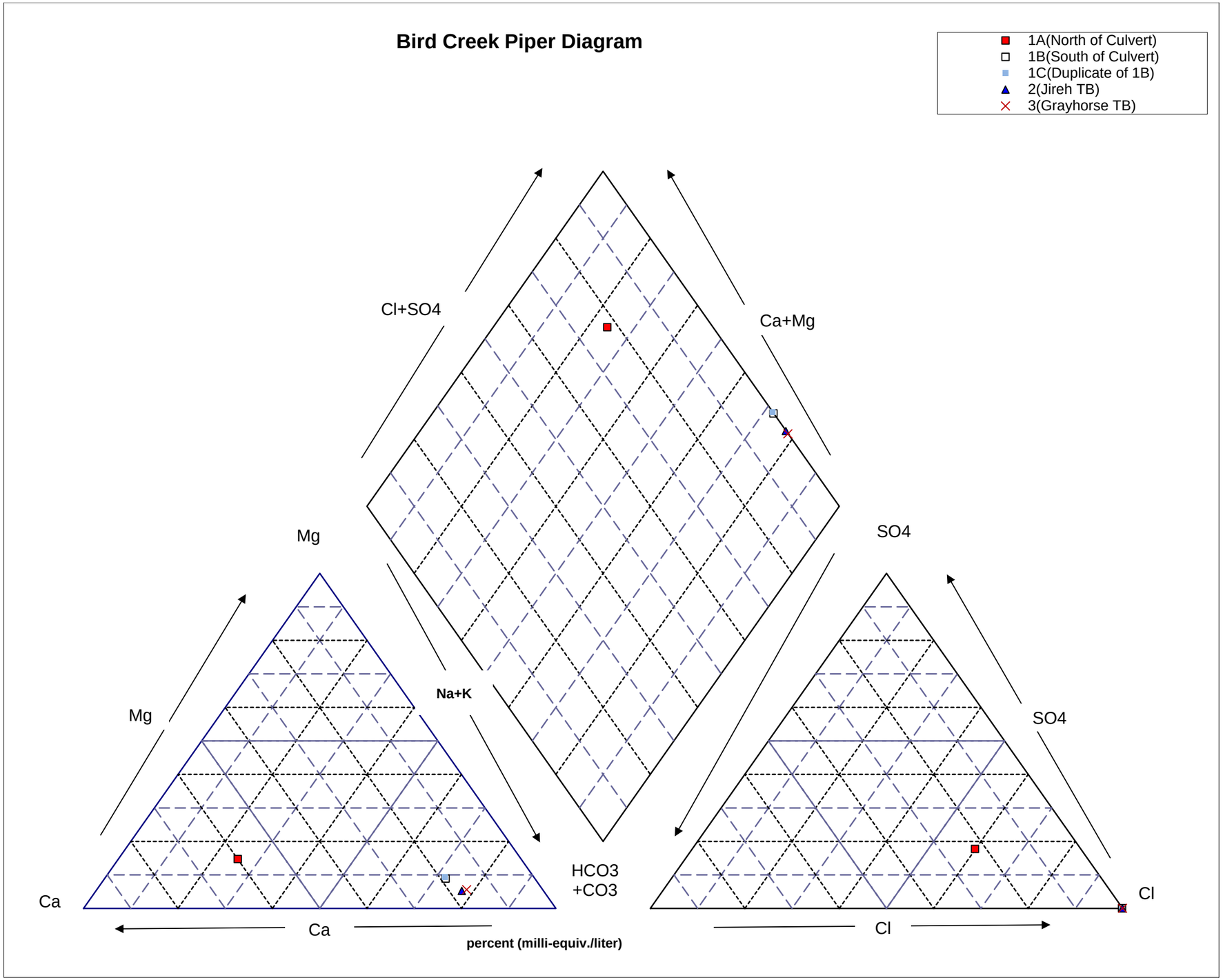
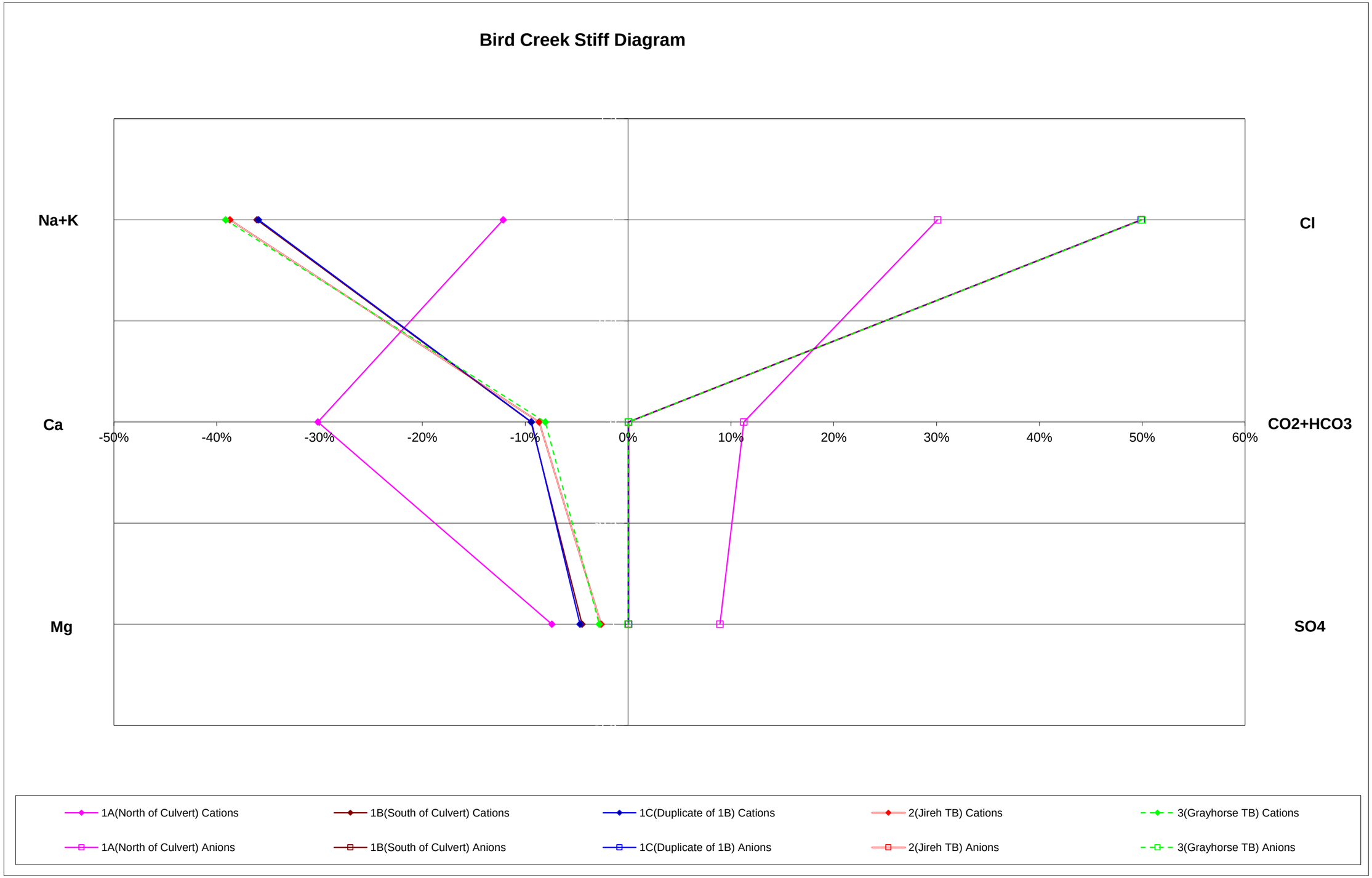
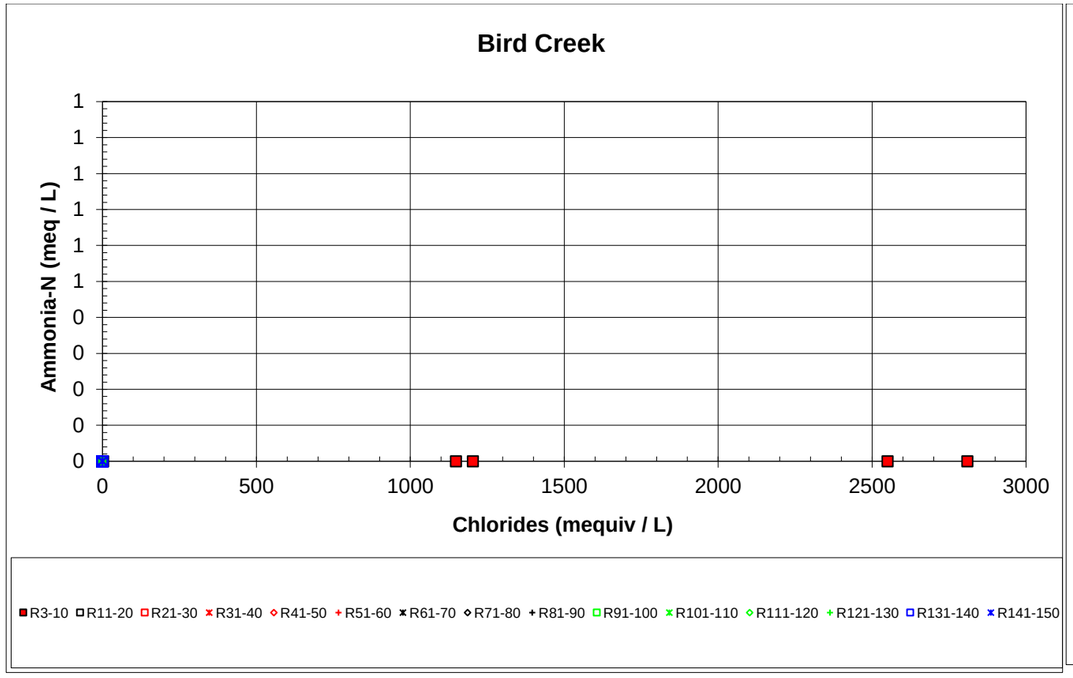
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

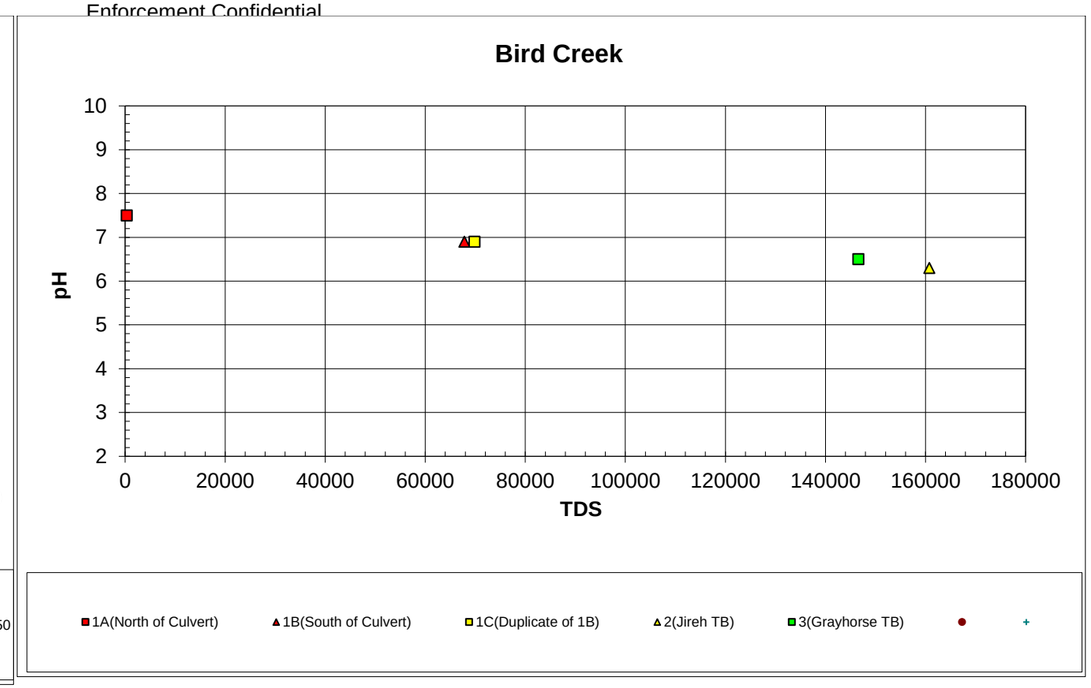


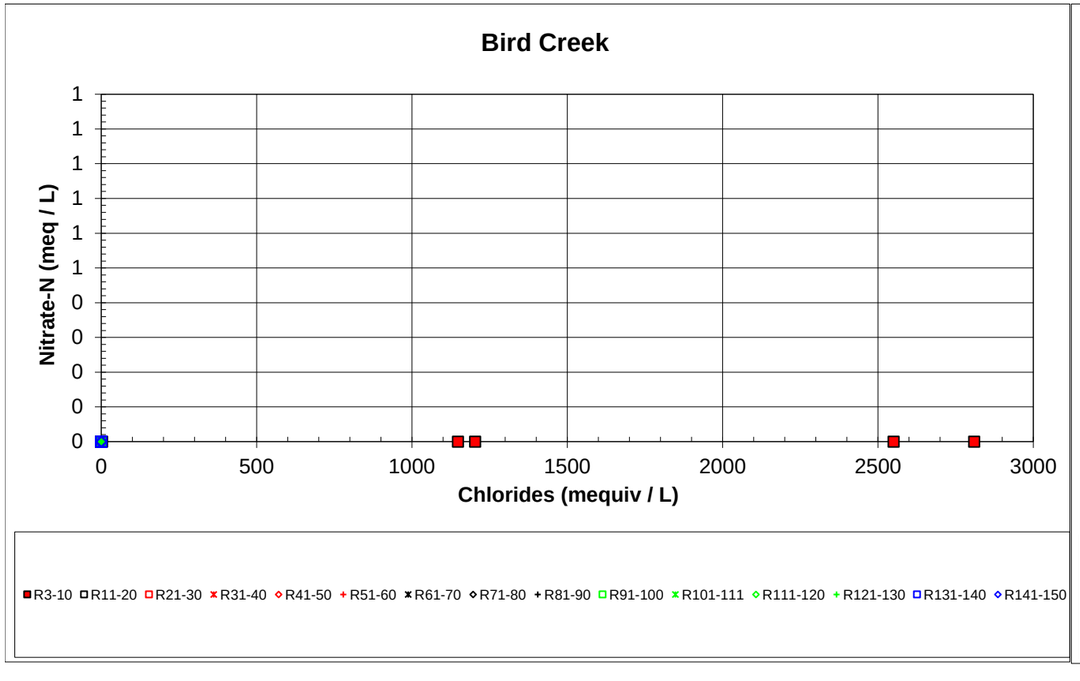
Bird Creek
Piper Diagram
Stiff Diagram

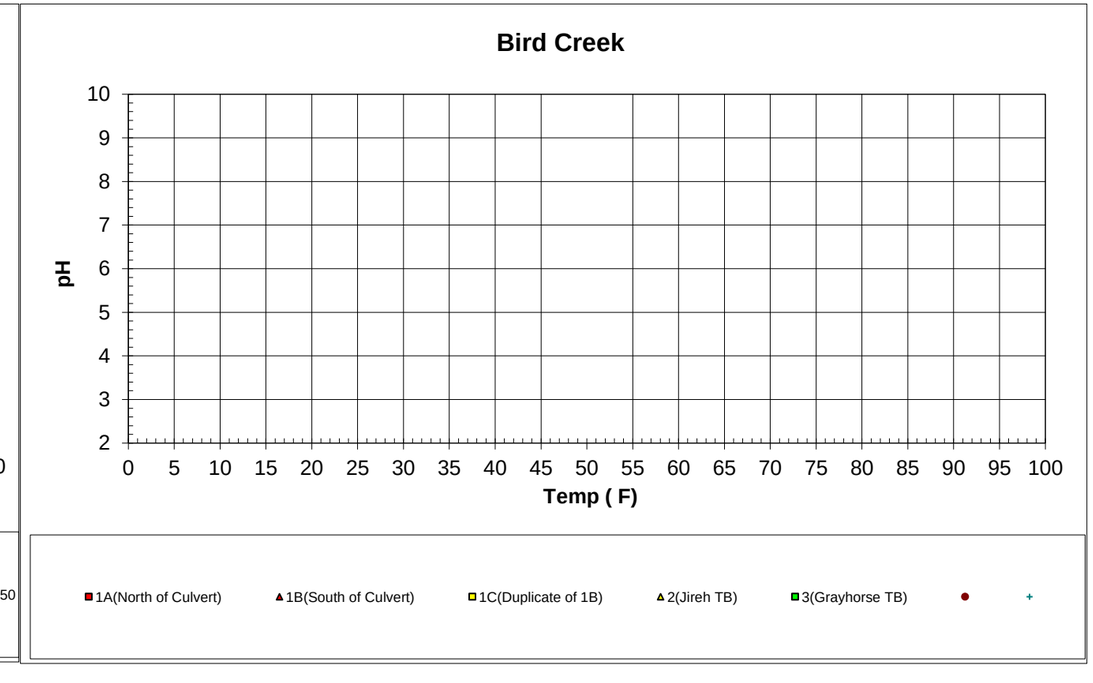

Bird Creek Stiff Diagram
Na+K
Ca
Mg
Cl
CO2+HCO3
SO4
-50%
-40%
-30%
-20%
-10%
0%
10%
20%
30%
40%
50%
60%
1A(North of Culvert) Cations
1B(South of Culvert) Cations
1C(Duplicate of 1B) Cations
2(Jireh TB) Cations
3(Grayhorse TB) Cations
1A(North of Culvert) Anions
1B(South of Culvert) Anions
1C(Duplicate of 1B) Anions
2(Jireh TB) Anions
3(Grayhorse TB) Anions

Ground Water Center
EPA R6 WQ-SG
Enforcement Confidential









	1A (North c	1B (South c	1C (South	2 Jireh @ 1	3 G.horse c	:	:	:	:	:	:	:	:	:	:
Na+K	-12.14%	-36.09%	-35.94%	-38.72%	-39.15%										
Ca	-30.16%	-9.44%	-9.39%	-8.65%	-8.05%										
Mg	-7.41%	-4.47%	-4.67%	-2.62%	-2.80%										
Cl-	30.10%	49.91%	49.91%	49.96%	49.98%										
HCO3-	11.26%	0.04%	0.04%	0.03%	0.02%										
SO4-	8.94%	0.04%	0.04%	0.02%	0.00%										

short name	1A(North o	1B(South c	1C(Duplica	2(Jireh TB)	3(Grayhorse TB)											
Cations	1A(North o	1B(South c	1C(Duplica	2(Jireh TB)	3(Grayhors	: Cations	: Cations	: Cations	: Cations	: Cations	: Cations	: Cations	: Cations	: Cations	: Cations	: Cations
Na+K			1													
Ca			0													
Mg			-1													
Anions	1A(North o	1B(South c	1C(Duplica	2(Jireh TB)	3(Grayhors	: Anions	: Anions	: Anions	: Anions	: Anions	: Anions	: Anions	: Anions	: Anions	: Anions	: Anions
Cl-			1													
HCO3-			0													
SO4-			-1													

fraction	Left Plot			Upper Plot: Cations & Anions = 200%				Right Plot		
	Ca	Mg	Na+K	Na+K	Ca+Mg	SO4+Cl	CO3+HCO3	CO3+HCO3	Cl	SO4
1A (North of Rd)SE 12-T27N-T7E:	0.600	0.147	0.241	0.241	0.747	0.776	0.224	0.224	0.598	0.178
1B (South of Rd)SE 12-T27N-R7E:	0.189	0.089	0.722	0.722	0.278	0.999	0.001	0.001	0.998	0.001
1C (South of Rd)SE 12-T27NR-7E:	0.188	0.093	0.719	0.719	0.281	0.999	0.001	0.001	0.998	0.001
2 Jireh @ 18WSW 1-T27N-R7E: 2	0.173	0.052	0.774	0.774	0.226	0.999	0.001	0.001	0.999	0.000
3 G.horse @ TBNW18-T27N-R8E:	0.161	0.056	0.783	0.783	0.217	1.000	0.000	0.000	1.000	0.000

	Left Plot			Upper Plot: Cations & Anions = 200%				Right Plot		
	Ca	Mg	Na,K,NH4	Na,K,NH4	Ca+Mg	SO4,Cl,NO3	CO3+HCO3	CO3+HCO3	Cl	SO4+NO3-N
1A (North of Rd)SE 12-T27N-T7E:	0.600	0.147	0.241	0.241	0.747	0.776	0.224	0.224	0.598	0.178
1B (South of Rd)SE 12-T27N-R7E:	0.189	0.089	0.722	0.722	0.278	0.999	0.001	0.001	0.998	0.001
1C (South of Rd)SE 12-T27NR-7E:	0.188	0.093	0.719	0.719	0.281	0.999	0.001	0.001	0.998	0.001
2 Jireh @ 18WSW 1-T27N-R7E: 2	0.173	0.052	0.774	0.774	0.226	0.999	0.001	0.001	0.999	0.000
3 G.horse @ TBNW18-T27N-R8E:	0.161	0.056	0.783	0.783	0.217	1.000	0.000	0.000	1.000	0.000

x,y

	(1-Ca)	Left Plot		Right Plot		Center Plot		(1-Ca)	alt Left Plot		alt Right Plot		alt Center Plot		short name
1A (North of Rd)SE 12-T27N-T7E: 1A(North of C	0.400	0.427	0.228	1.987	0.254	1.209	1.602	0.400	0.427	0.228	1.987	0.254	1.209	1.602	1A(North of Culvert)
1B (South of Rd)SE 12-T27N-R7E: 1B(South of	0.811	0.867	0.177	2.299	0.101	1.560	1.379	0.811	0.867	0.177	2.299	0.101	1.560	1.379	1B(South of Culvert)
1C (South of Rd)SE 12-T27NR-7E: 1C(Duplicate	0.812	0.865	0.181	2.299	0.101	1.559	1.382	0.812	0.865	0.181	2.299	0.101	1.559	1.382	1C(Duplicate of 1B)
2 Jireh @ 18WSW 1-T27N-R7E: 2(Jireh TB)	0.827	0.901	0.145	2.299	0.100	1.587	1.334	0.827	0.901	0.145	2.299	0.100	1.587	1.334	2(Jireh TB)
3 G.horse @ TBNW18-T27N-R8E: 3(Grayhorse	0.839	0.911	0.148	2.300	0.100	1.591	1.327	0.839	0.911	0.148	2.300	0.100	1.591	1.327	3(Grayhorse TB)

	Aluminium	Ammonium	Boron	Barium	Berylium	Calcium	Cesium	Copper	Copper	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Nickel	Potassium	Rubidium	Silver	Sodium
Cations	**Al**	**NH4**	**B**	**Ba**	**Be**	**Ca**	**Cs**	**Cu(1)**	**Cu(2)**	**Cu(3)**	**Fe**	**Pb**	**Li**	**Mg**	**Mn**	**Hg**	**Ni**	**K**	**Rb**	**Ag**	**Na**
MW	26.9815	18.0383	10.81	137.34	9.012	40.08	132.91	63.546	63.546	63.546	55.847	207.2	6.941	24.305	54.938	200.59	58.71	39.0983	85.47	107.868	22.98977
v	3	1	3	2	2	2	1	1	2	3	2	2	1	2	2	2	2	1	1	1	1
mg/mequiv	8.9938	18.0383	3.60333333	68.67	4.506	20.04	132.91	63.546	31.773	21.182	27.9235	103.6	6.941	12.1525	27.469	100.3	29.355	39.0983	85.47	107.868	22.98977

	Acetate	Arsenate	Bromide	Carbonate	Chloride	Chromate	Cyanide	Dichromate	Fluoride	Hydroxide	Iodide	Nitrate	Oxalate	Permanganate	Phosphate	Silicate	Sulfate	Sulfide	Sulfite	Thiocyanate	Thiosulfate
Anions	**CH3CO2**	**AsO4**	**Br**	**CO3**	**Cl**	**CrO4**	**CN**	**Cr2O7**	**F**	**OH**	**I**	**NO3**	**C2O4**	**MnO4**	**PO4**	**SiO3**	**SO4**	**S**	**SO3**	**SCN**	**S2O3**
MW	59.0445	138.9192	79.909	60.0092	35.453	115.9936	26.0177	215.9878	18.9984	33.0679	126.9044	62.0049	88.0196	118.9356	94.9716	76.084	96.0576	32.06	80.0582	58.0777	112.1182
v	-1	-3	-1	-2	-1	-2	-1	-2	-1	-1	-1	-1	-2	-1	-3	-2	-2	-2	-2	-1	-2
mg/mequiv	59.0445	46.3064	79.909	30.0046	35.453	57.9968	26.0177	107.9939	18.9984	33.0679	126.9044	62.0049	44.0098	118.9356	31.6572	38.042	48.0288	16.03	40.0291	58.0777	56.0591

	CaCO3	**CO2**						Bicarbonate													
MW	100.0892	44.0098		cos(60)	sin(60)	tan(60)		**HCO3**	**H2S**						**HPO4**	**SiO2**					
v	2			0.5	0.866025	1.732051		61.0171	34.0758						95.9726	60.084					
mg/mequiv	50.0446							-1	2	sign?					-2	1					
								61.0171	17.0379						47.9863	60.084					
	C	**H**	**N**	**O**	**S**	**Si**	**As**	**Cr**	**Co**												
MW	12.011	1.0079	14.0067	15.9994	32.06	28.0855	74.9216	51.996	58.933												
									+3												
									19.6443												
	NO3-N	**NO2-N**	**NH4-N**			**NO2**															
MW						46.0055															
v						1															
mg/mequiv		use N value				46.0055															
MCL mg/l	10				45																
	0.713944				0.725749																

Hardness

cations	Ca	Mg	Sr	Fe	Mn
	20.04	12.1525	43.81	27.9235	27.469
assoc anions	**HCO3**	SO4	Cl	NO3	SiO3
	61.0171	48.0288	35.453	62.0049	38.04185

Total Alkalinity	**CO3**	**HCO3**	**OH**			**pH**
	30.0046	61.0171	33.0679	pH >9.0	**MOA**	4.5
	PPA > MOA/2		PPA > MOA/2		**PPA**	8.3
	PPA = MOA					
	PPA < MOA/2	PPA < MOA/2				
		PPA = 0				
			PPA = MOA	pH >9.0		
		pH < 8.3				

	Strontium	Tin	Zinc
Cations	**Sr**	**Sn**	**Zn**
MW	87.62	118.69	65.37
v	2	2	2
mg/mequiv	43.81	59.345	32.685

Anions
MW
v
mg/mequiv

MW
v
mg/mequiv

MW

MW
v
mg/mequiv

MCL mg/l

Hardness
cations

assoc anions

Total Alkalinity

fraction								0	Left Plot	0	0	Right Plot	0	
	0	**%Ca**	**%Mg**	**%Na+K**	**%CO3+HCO3**	**%Cl**	**%SO4**	**Ca**	**Mg**	**Na+K**	**CO3+HCO**	**Cl**	**SO4**	**sum**
1A (North of Rd)SE 12-T27N-T7E: 1A(North of Culvert)		-30.16%	-7.41%	-12.14%	11.26%	30.10%	8.94%	0.599744	0.147298	0.241419	0.223823	0.598458	0.177719	1.988461
1B (South of Rd)SE 12-T27N-R7E: 1B(South of Culvert)		-9.44%	-4.47%	-36.09%	0.04%	49.91%	0.04%	0.188731	0.089418	0.721849	0.000869	0.998244	0.000887	1.999997
1C (South of Rd)SE 12-T27NR-7E: 1C(Duplicate of 1B)		-9.39%	-4.67%	-35.94%	0.04%	49.91%	0.04%	0.18784	0.093403	0.718755	0.00087	0.998249	0.000881	1.999997
2 Jireh @ 18WSW 1-T27N-R7E: 2(Jireh TB)		-8.65%	-2.62%	-38.72%	0.03%	49.96%	0.02%	0.173038	0.052463	0.774364	0.000606	0.99909	0.000304	1.999866
3 G.horse @ TBNW18-T27N-R8E: 3(Grayhorse TB)		-8.05%	-2.80%	-39.15%	0.02%	49.98%	0.00%	0.161003	0.055995	0.782961	0.000411	0.999507	8.16E-05	1.999958
:														0
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Bird Creek, Osage County, OK Multiply values by 1

Location	FieldID	SAMPLE DATE	insp_NO	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	Fe (mg/l)	Ba (mg/l)	Carb (ppm)	Bi-carb (ppm)	Sulfates (mg/l)	Cl (mg/l)	NITRATE-N (MG/L)	NITRITE-N (mg/l)	AMMONIUM-N (MG/L)	P-total (mg/l)	TDS	PH	SG	Sr (mg/l)	F (mg/l)	alkalinity	CO2	N2O	Cu (mg/l)	PPA (mg/l CaCO3)	MOA (mg/l CaCO3)	B (mg/l)
WS-1 (Monitoring Station 1) 36.832660, -96.496177	MS-1	**27-Jun-17**		54	14	18	2	0	0.104	**0**	**233**	30	4					355.6	8.3				**191**						0.07
WS-2 (Monitoring Station 2) 36.832135, -96.498664	MS-2	**27-Jun-17**		46	16	81	3	0.03	0.0938	**0**	**193**	33	118					519.4	7.9				**158**						0.09
WS-3 (Monitoring Station 3) 36.830668, -96.499461	MS-3	**27-Jun-17**		158	31	525	3	0	0.277	**0**	**280**	36	1029					2488.2	7.7				**230**						0.1
WS-4 (Monitoring Station 4) 36.829906, -96.500244	MS-4	**27-Jun-17**		548	93	665	4	0	0.792	**0**	**172**	31	2145					4554	7.6				**141**						0.08
WS-5 (Monitoring Station 6) 36.827810, -96.501613	MS-6	**28-Jun-17**		2441	873	14529	38	0.02	6.04	**0**	**61**	47	27740					45738	7.2				**50**			**0.04**			2.18
WS-7 (Replicate 1 of WS-5) 36.827810, -96.501613	MS-6 replicate	**28-Jun-17**		2424	870	14548	38	0.02	6.87	**0**	**61**	47	27734					46134	7.2				**50**			**0.04**			2.16
WS-6 (Monitoring Station 7) 36.825031, -96.499648	MS-7	**28-Jun-17**		131	33	392	3	0	0.198	**0**	**155**	29	765					1854.6	8				**127**						0.12
WS-11 (East Domestic WW) 36.828592, -96.493931	WW-East	**28-Jun-17**		3	1	229	1	0	0.132	**23.8**	**348**	20	101					726.3	8.8				**325**						0.45
WS-14 (Replicate 2 of WS-11) 36.828592, -96.493931	WW-East replicate	**28-Jun-17**		3	1	233	1	0	0.128	**24.1**	**345**	20	98					725.1	8.8				**323**						0.45
WS-12 (West Domestic WW) 36.833258, -96.504278	WW-West	**28-Jun-17**		21	23	255	2	0	0	**0**	**590**	229	26					1145.3	8				**483**						0.77
WS-8 (Jireh TB) 36.846536, -96.506097	Jireh TB	**28-Jun-17**		10194	1814	49706	537	0.56	34.8	**0**	**78**	38	101527					163893	6.3				**64**			**0.07**			8.73

WS-9 (Warren American TB) 36.840077, -96.499939	Warren TB	**29-Jun-17**		10581	1847	53664	550	0.44	30.7	**0**	**73**	28	112725				179468	6.1			**60**	**0.08**	9.41
3 G.horse @ TB NW18-T27N-R8E	Grayhorse 10/5/16 TB	**05-Oct-16**		8236	1737	45675	463	2.96			**64**	10	90403				146588	6.5			**52**	**0.1**	8.11

Bird Creek, Osage County, OK

Location	FieldID	SAMPLE DATE	TKN	SiO2 (mg/L)	Al (mg/l)	Co (mg/l)	Pb (mg/l)	Mn (mg/l)	Zn (mg/l)	Temp (C)	Temp (F)
WS-1 (Monitoring Station 1) 36.832660, -96.496177	MS-1	**27-Jun-17**						0	0		
WS-2 (Monitoring Station 2) 36.832135, -96.498664	MS-2	**27-Jun-17**						0	0		
WS-3 (Monitoring Station 3) 36.830668, -96.499461	MS-3	**27-Jun-17**						0	0		
WS-4 (Monitoring Station 4) 36.829906, -96.500244	MS-4	**27-Jun-17**						0.02	0		
WS-5 (Monitoring Station 6) 36.827810, -96.501613	MS-6	**28-Jun-17**						0	0.04		
WS-7 (Replicate 1 of WS-5) 36.827810, -96.501613	MS-6 replicate	**28-Jun-17**						0	0.04		
WS-6 (Monitoring Station 7) 36.825031, -96.499648	MS-7	**28-Jun-17**						0	0		
WS-11 (East Domestic WW) 36.828592, -96.493931	WW-East	**28-Jun-17**						0	0		
WS-14 (Replicate 2 of WS-11) 36.828592, -96.493931	WW-East replicate	**28-Jun-17**						0	0		
WS-12 (West Domestic WW) 36.833258, -96.504278	WW-West	**28-Jun-17**						0	0		
WS-8 (Jireh TB) 36.846536, -96.506097	Jireh TB	**28-Jun-17**						2.46	0.19		

WS-9 (Warren American TB) 36.840077, -96.499939	Warren TB	**29-Jun-17**				1.93	0.13
3 G.horse @ TB NW18-T27N-R8E	Grayhorse 10/5/16 TB	**05-Oct-16**				2.4	11.34

mg/l																		as CaCO3	
Sample_Name	Ca	Mg	Na	K	Fe	Ba	CO3	HCO3	SO4	Cl	NO3-N	NO2-N	NH4-N	P	Cations	Anions	Si	alkalinity	meq
WS-1 (Monitoring Station 1)36.832660,-96.496177: MS-1	54	14	18	2	0	0.104	0.00	233	30	4	0.00	0.00	0.00	0.00	88.0	267.0	10.0	191	3.812
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2	46	16	81	3	0.03	0.0938	0.00	193	33	118	0.00	0.00	0.00	0.00	146.0	344.0	10.0	158	3.16
WS-3 (Monitoring Station 3)36.830668,-96.499461: MS-3	158	31	525	3	0	0.277	0.00	280	36	1029	0.00	0.00	0.00	0.00	717.0	1345.0	10.0	230	4.596
WS-4 (Monitoring Station 4)36.829906,-96.500244: MS-4	548	93	665	4	0	0.792	0.00	172	31	2145	0.00	0.00	0.00	0.00	1310.0	2348.0	10.0	141	2.82
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6	2441	873	14529	38	0.02	6.04	0.00	61	47	27740	0.00	0.00	0.00	0.00	17881.0	27848.0	10.0	50	0.994
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate	2424	870	14548	38	0.02	6.87	0.00	61	47	27734	0.00	0.00	0.00	0.00	17880.0	27842.0	10.0	50	1.006
WS-6 (Monitoring Station 7)36.825031,-96.499648: MS-7	131	33	392	3	0	0.198	0.00	155	29	765	0.00	0.00	0.00	0.00	559.0	949.0	10.0	127	2.54
WS-11 (East Domestic WW)36.828592,-96.493931: WW-East	3	1	229	1	0	0.132	23.80	348	20	101	0.00	0.00	0.00	0.00	234.0	492.8	10.0	325	6.496
WS-14 (Replicate 2 of WS-11)36.828592, -96.493931: WW-East replicate	3	1	233	1	0	0.128	24.10	345	20	98	0.00	0.00	0.00	0.00	238.0	487.1	10.0	323	6.462
WS-12 (West Domestic WW)36.833258,-96.504278: WW-West	21	23	255	2	0	0	0.00	590	229	26	0.00	0.00	0.00	0.00	301.0	845.0	10.0	483	9.664
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB	10194	1814	49706	537	0.56	34.8	0.00	78	38	101527	0.00	0.00	0.00	0.00	62251.0	101643.0	10.0	64	1.272
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB	10581	1847	53664	550	0.44	30.7	0.00	73	28	112725	0.00	0.00	0.00	0.00	66642.0	112826.0	10.0	60	1.192
3 G.horse @ TBNW18-T27N-R8E: Grayhorse 10/5/16 TB	8236	1737	45675	463	2.96	0	0.00	64	10	90403	0.00	0.00	0.00	0.00	56111.0	90477.0	10.0	52	1.04
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			

:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
maximum	10581	1847	53664	550			24.1	590	229	112725	0	0	0	0		

mg/l		OH		est		actual							
Sample_Name	**pH**	**mg/l**	**HCO3**	**CO3**	**est TDS**	**TDS**	**Strontium**	**Fluoride**	**B (mg/l)**	**TKN**	**SiO2**	**Al**	**Co**
WS-1 (Monitoring Station 1)36.832660,-96.496177: MS-1	8.30	0.066	232.5	114.3	479	356	0	0	0.07	0.00	0.00	0.00	0.00
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2	7.90	0.026	192.8	94.8	595	519	0	0	0.09	0.00	0.00	0.00	0.00
WS-3 (Monitoring Station 3)36.830668,-96.499461: MS-3	7.70	0.017	280.4	137.9	2,210	2,488	0	0	0.10	0.00	0.00	0.00	0.00
WS-4 (Monitoring Station 4)36.829906,-96.500244: MS-4	7.60	0.013	172.1	84.6	3,753	4,554	0	0	0.08	0.00	0.00	0.00	0.00
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6	7.20	0.005	60.7	29.8	45,769	45,738	0	0	2.18	0.00	0.00	0.00	0.00
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate	7.20	0.005	61.4	30.2	45,762	46,134	0	0	2.16	0.00	0.00	0.00	0.00
WS-6 (Monitoring Station 7)36.825031,-96.499648: MS-7	8.00	0.033	155.0	76.2	1,594	1,855	0	0	0.12	0.00	0.00	0.00	0.00
WS-11 (East Domestic WW)36.828592,-96.493931: WW-East	8.80	0.209	396.0	194.7	932	726	0	0	0.12	0.00	0.00	0.00	0.00
WS-14 (Replicate 2 of WS-11)36.828592, -96.493931: WW-East replicate	8.80	0.209	393.9	193.7	929	725	0	0	0.45	0.00	0.00	0.00	0.00
WS-12 (West Domestic WW)36.833258,-96.504278: WW-West	8.00	0.033	589.7	290.0	1,446	1,145	0	0	0.77	0.00	0.00	0.00	0.00
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB	6.30	0.001	77.6	38.2	163,942	163,893	0	0	8.73	0.00	0.00	0.00	0.00
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB	6.10	0.000	72.7	35.8	179,514	179,468	0	0	9.41	0.00	0.00	0.00	0.00
3 G.horse @ TBNW18-T27N-R8E: Grayhorse 10/5/16 TB	6.50	0.001	63.5	31.2	146,629	146,588	0	0	8.11	0.00	0.00	0.00	0.00
:						0	0	0	0.00	0.00	0.00	0.00	0.00
:						0	0	0	0.00	0.00	0.00	0.00	0.00
:						0	0	0	0.00	0.00	0.00	0.00	0.00
:							0	0	0.00	0.00	0.00	0.00	0.00
:							0	0	0.00	0.00	0.00	0.00	0.00
:							0	0	0.00	0.00	0.00	0.00	0.00
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:							0	0	0.00	0.00	0.00	0.00	0.00
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:							0	0	0.00	0.00	0.00	0.00	0.00
:							0	0	0.00	0.00	0.00	0.00	0.00
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:							0	0	0.00	0.00	0.00	0.00	0.00
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:							0	0	0.00	0.00	0.00	0.00	0.00
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:							0	0	0.00	0.00	0.00	0.00	0.00
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:							0	0	0.00	0.00	0.00	0.00	0.00
:							0	0	0.00	0.00	0.00	0.00	0.00
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:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
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:	0	0	0.00	0.00	0.00	0.00	0.00
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:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
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:	0	0	0.00	0.00	0.00	0.00	0.00
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:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
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:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
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maximum

mg/l

Sample_Name	Pb	Mn	Zn
WS-1 (Monitoring Station 1)36.832660,-96.496177: MS-1	0.00	0.00	0.00
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2	0.00	0.00	0.00
WS-3 (Monitoring Station 3)36.830668,-96.499461: MS-3	0.00	0.00	0.00
WS-4 (Monitoring Station 4)36.829906,-96.500244: MS-4	0.00	0.02	0.00
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6	0.00	0.00	0.04
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate	0.00	0.00	0.04
WS-6 (Monitoring Station 7)36.825031,-96.499648: MS-7	0.00	0.00	0.00
WS-11 (East Domestic WW)36.828592,-96.493931: WW-East	0.00	0.00	0.00
WS-14 (Replicate 2 of WS-11)36.828592, -96.493931: WW-East replicate	0.00	0.00	0.00
WS-12 (West Domestic WW)36.833258,-96.504278: WW-West	0.00	0.00	0.00
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB	0.00	2.46	0.19
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB	0.00	1.93	0.13
3 G.horse @ TBNW18-T27N-R8E: Grayhorse 10/5/16 TB	0.00	2.40	11.34
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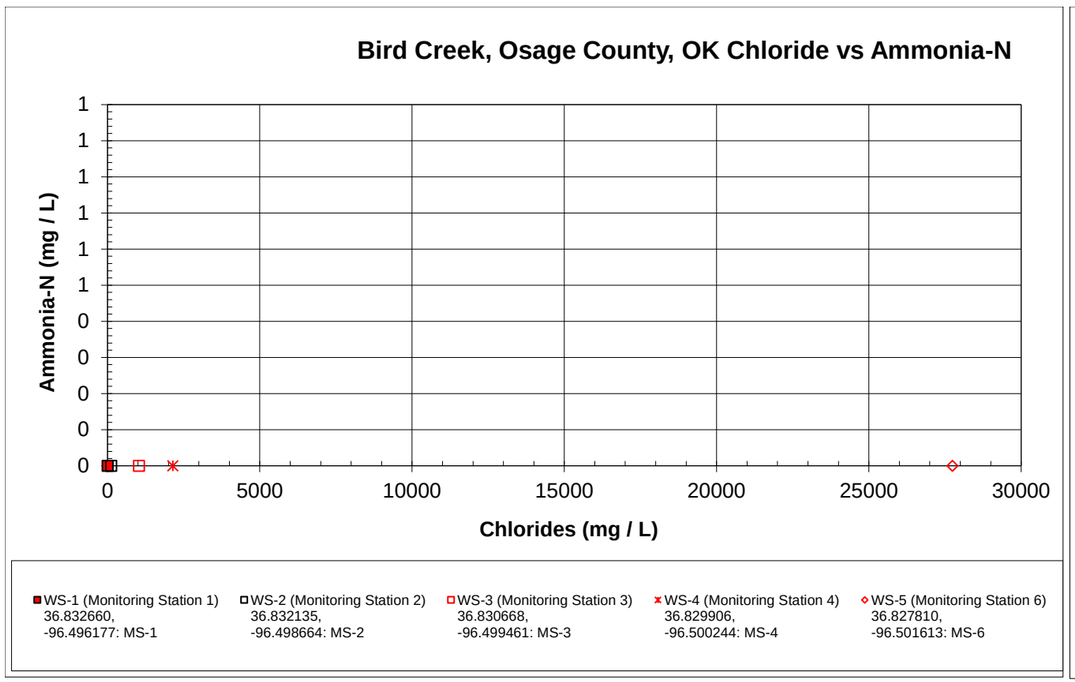
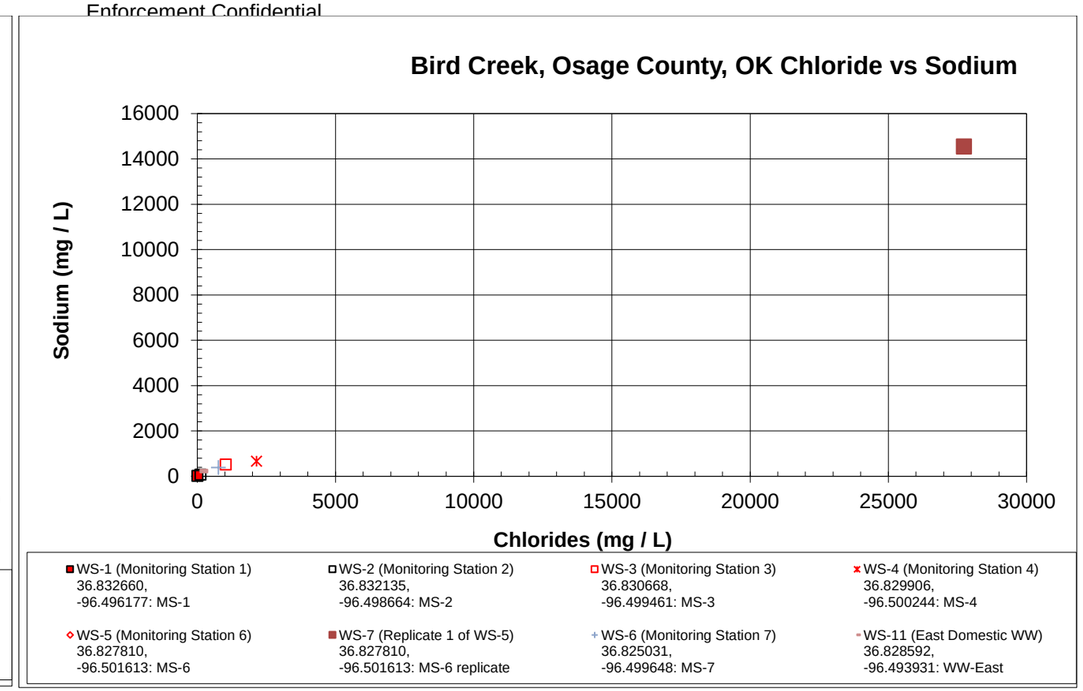
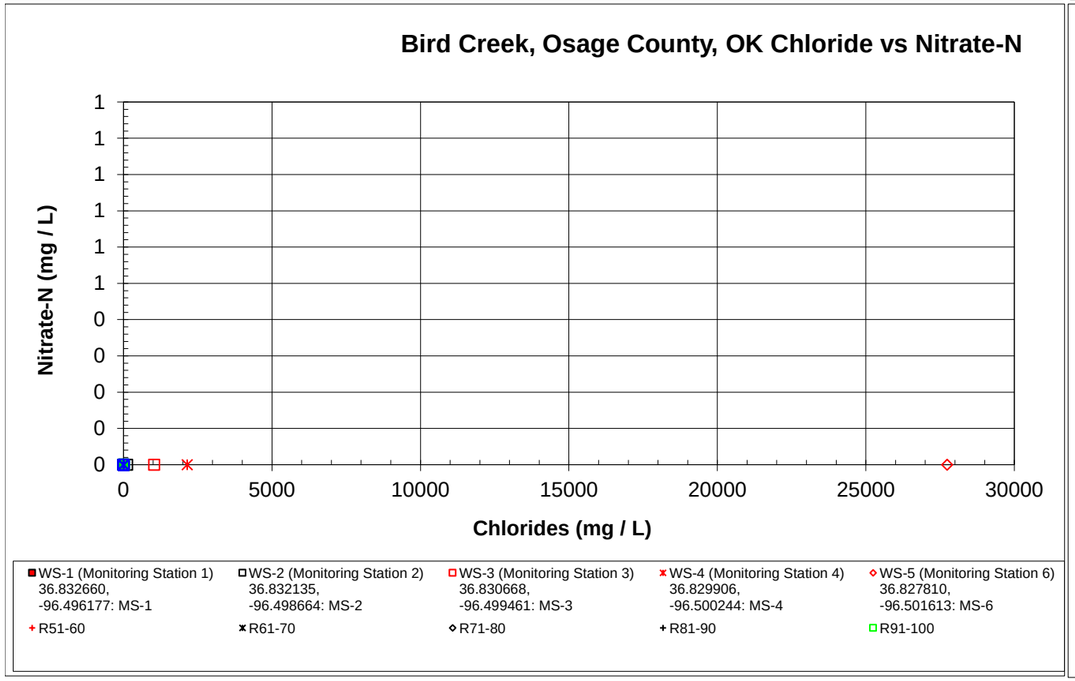
maximum

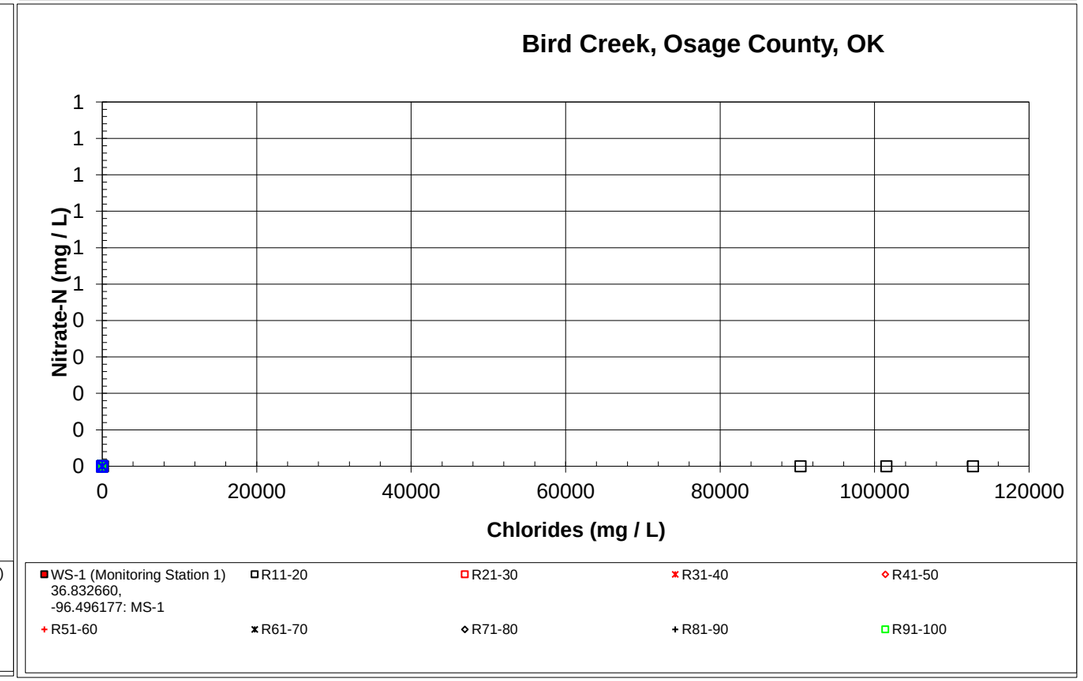
Ground Water Center
EPA R6 WQ-SG
Enforcement Confidential





Bird Creek, Osage Cou
k Chloride
n Ammonia-N Bird Creek,
d Sodium Bird Creek,
l Nitrate-N Bird Creek,





Ground Water Center
EPA R6 WQ-SG
Enforcement Confidential

unty, OK

Osage County, OK Chloride vs Ammonia-N
Osage County, OK Chloride vs Sodium
Osage County, OK Chloride vs Nitrate-N

mequiv/l

	Ca	Mg	Na	K	Fe	Ba	CO3	HCO3	SO4	Cl	Cations	Anions	Error	check	NH4-N	Sr	NO3-N	NO2-N	Fluoride	B	TKN-N
WS-1 (Monitoring Station 1)36.832660,-96.496177: MS-1	2.69	1.15	0.78	0.05	0.00	0.00	0.00	3.82	0.62	0.11	4.68	4.56	1.35%	y	0.00	0.00	0.00	0.00	0.00	0.02	0.00
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2	2.30	1.32	3.52	0.08	0.00	0.00	0.00	3.16	0.69	3.33	7.21	7.18	0.24%	y	0.00	0.00	0.00	0.00	0.00	0.02	0.00
WS-3 (Monitoring Station 3)36.830668,-96.499461: MS-3	7.88	2.55	22.84	0.08	0.00	0.00	0.00	4.59	0.75	29.02	33.35	34.36	-1.50%	y	0.00	0.00	0.00	0.00	0.00	0.03	0.00
WS-4 (Monitoring Station 4)36.829906,-96.500244: MS-4	27.35	7.65	28.93	0.10	0.00	0.01	0.00	2.82	0.65	60.50	64.03	63.97	0.05%	y	0.00	0.00	0.00	0.00	0.00	0.02	0.00
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6	121.81	71.84	631.98	0.97	0.00	0.09	0.00	1.00	0.98	782.44	826.59	784.42	2.62%	y	0.00	0.00	0.00	0.00	0.00	0.60	0.00
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate	120.96	71.59	632.80	0.97	0.00	0.10	0.00	1.00	0.98	782.28	826.32	784.25	2.61%	y	0.00	0.00	0.00	0.00	0.00	0.60	0.00
WS-6 (Monitoring Station 7)36.825031,-96.499648: MS-7	6.54	2.72	17.05	0.08	0.00	0.00	0.00	2.54	0.60	21.58	26.38	24.72	3.25%	y	0.00	0.00	0.00	0.00	0.00		0.00
WS-11 (East Domestic WW)36.828592,-96.493931: WW-East	0.15	0.08	9.96	0.03	0.00	0.00	0.79	5.70	0.42	2.85	10.22	9.76	2.29%	y	0.00	0.00	0.00	0.00	0.00	0.03	0.00
WS-14 (Replicate 2 of WS-11)36.828592, -96.493931: WW-East replicate	0.15	0.08	10.13	0.03	0.00	0.00	0.80	5.65	0.42	2.76	10.39	9.64	3.77%	y	0.00	0.00	0.00	0.00	0.00	0.12	0.00
WS-12 (West Domestic WW)36.833258,-96.504278: WW-West	1.05	1.89	11.09	0.05	0.00	0.00	0.00	9.67	4.77	0.73	14.08	15.17	-3.72%	y	0.00	0.00	0.00	0.00	0.00	0.21	0.00
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB	508.68	149.27	2162.09	13.73	0.02	0.51	0.00	1.28	0.79	2863.71	2833.80	2865.78	-0.56%	y	0.00	0.00	0.00	0.00	0.00	2.42	0.00
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB	527.99	151.99	2334.26	14.07	0.02	0.45	0.00	1.20	0.58	3179.56	3028.32	3181.34	-2.46%	y	0.00	0.00	0.00	0.00	0.00	2.61	0.00
3 G.horse @ TBNW18-T27N-R8E: Grayhorse 10/5/16 TB	410.98	142.93	1986.75	11.84	0.11	0.00	0.00	1.05	0.21	2549.94	2552.61	2551.20	0.03%	y	0.00	0.00	0.00	0.00	0.00	2.25	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00
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max	527.99	151.99	2334.26	14.07			0.80	9.67	4.77	3179.56	0.00	0.00	0.00	0.00	0.00	2.61	

mequiv/l

	Cation+NH4	Anion+N	Error	check	Cation+B,NH4	Error	check	Brine Balance K+2Ca+2Mg+H+Na	SO4+2CO3+Cl+OH	[H+] *1000 meq	pH	[OH-] *1000 meq
WS-1 (Monitoring Station 1)36.832660,-96.496177: MS-1	4.68	4.56	1.35%	n	4.70	-1.56%	n	8.527384281	0.74	5.01187E-06	8.30	0.001995262
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2	7.21	7.18	0.24%	n	7.24	-0.41%	n	10.82405732	4.02	1.25893E-05	7.90	0.000794328
WS-3 (Monitoring Station 3)36.830668,-96.499461: MS-3	33.35	34.36	-1.50%	n	33.38	1.46%	n	43.78326777	29.77	1.99526E-05	7.70	0.000501187
WS-4 (Monitoring Station 4)36.829906,-96.500244: MS-4	64.03	63.97	0.05%	n	64.05	-0.06%	n	99.02432692	61.15	2.51189E-05	7.60	0.000398107
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6	826.59	784.42	2.62%	n	827.20	-2.65%	n	1020.235569	783.42	6.30957E-05	7.20	0.000158489
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate	826.32	784.25	2.61%	n	826.92	-2.65%	n	1018.871691	783.25	6.30957E-05	7.20	0.000158489
WS-6 (Monitoring Station 7)36.825031,-96.499648: MS-7	26.38	24.72	3.25%	n	26.38	-3.25%	n	35.63262553	22.18	0.00001	8.00	0.001
WS-11 (East Domestic WW)36.828592,-96.493931: WW-East	10.22	9.76	2.29%	n	10.25	-2.45%	n	10.45050514	3.27	1.58489E-06	8.80	0.006309573
WS-14 (Replicate 2 of WS-11)36.828592, -96.493931: WW-East replicate	10.39	9.64	3.77%	n	10.52	-4.36%	n	10.62449558	3.18	1.58489E-06	8.80	0.006309573
WS-12 (West Domestic WW)36.833258,-96.504278: WW-West	14.08	15.17	-3.72%	n	14.30	2.96%	n	17.02408088	5.50	0.00001	8.00	0.001
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB	2833.80	2865.78	-0.56%	n	2836.22	0.52%	n	3491.731373	2864.50	0.000501187	6.30	1.99526E-05
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB	3028.32	3181.34	-2.46%	n	3030.93	2.42%	n	3708.281136	3180.14	0.000794328	6.10	1.25893E-05
3 G.horse @ TBNW18-T27N-R8E: Grayhorse 10/5/16 TB	2552.61	2551.20	0.03%	n	2554.86	-0.07%	n	3106.418379	2550.15	0.000316228	6.50	3.16228E-05

max

mequiv/l

	SiO2	Al	Co	Pb	Mn	Zn
WS-1 (Monitoring Station 1)36.832660,-96.496177: MS-1	0.00	0.00	0.00	0.00	0.00	0.00
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2	0.00	0.00	0.00	0.00	0.00	0.00
WS-3 (Monitoring Station 3)36.830668,-96.499461: MS-3	0.00	0.00	0.00	0.00	0.00	0.00
WS-4 (Monitoring Station 4)36.829906,-96.500244: MS-4	0.00	0.00	0.00	0.00	0.00	0.00
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6	0.00	0.00	0.00	0.00	0.00	0.00
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate	0.00	0.00	0.00	0.00	0.00	0.00
WS-6 (Monitoring Station 7)36.825031,-96.499648: MS-7	0.00	0.00	0.00	0.00	0.00	0.00
WS-11 (East Domestic WW)36.828592,-96.493931: WW-East	0.00	0.00	0.00	0.00	0.00	0.00
WS-14 (Replicate 2 of WS-11)36.828592, -96.493931: WW-East replicate	0.00	0.00	0.00	0.00	0.00	0.00
WS-12 (West Domestic WW)36.833258,-96.504278: WW-West	0.00	0.00	0.00	0.00	0.00	0.00
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB	0.00	0.00	0.00	0.00	0.09	0.01
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB	0.00	0.00	0.00	0.00	0.07	0.00
3 G.horse @ TBNW18-T27N-R8E: Grayhorse 10/5/16 TB	0.00	0.00	0.00	0.00	0.09	0.35
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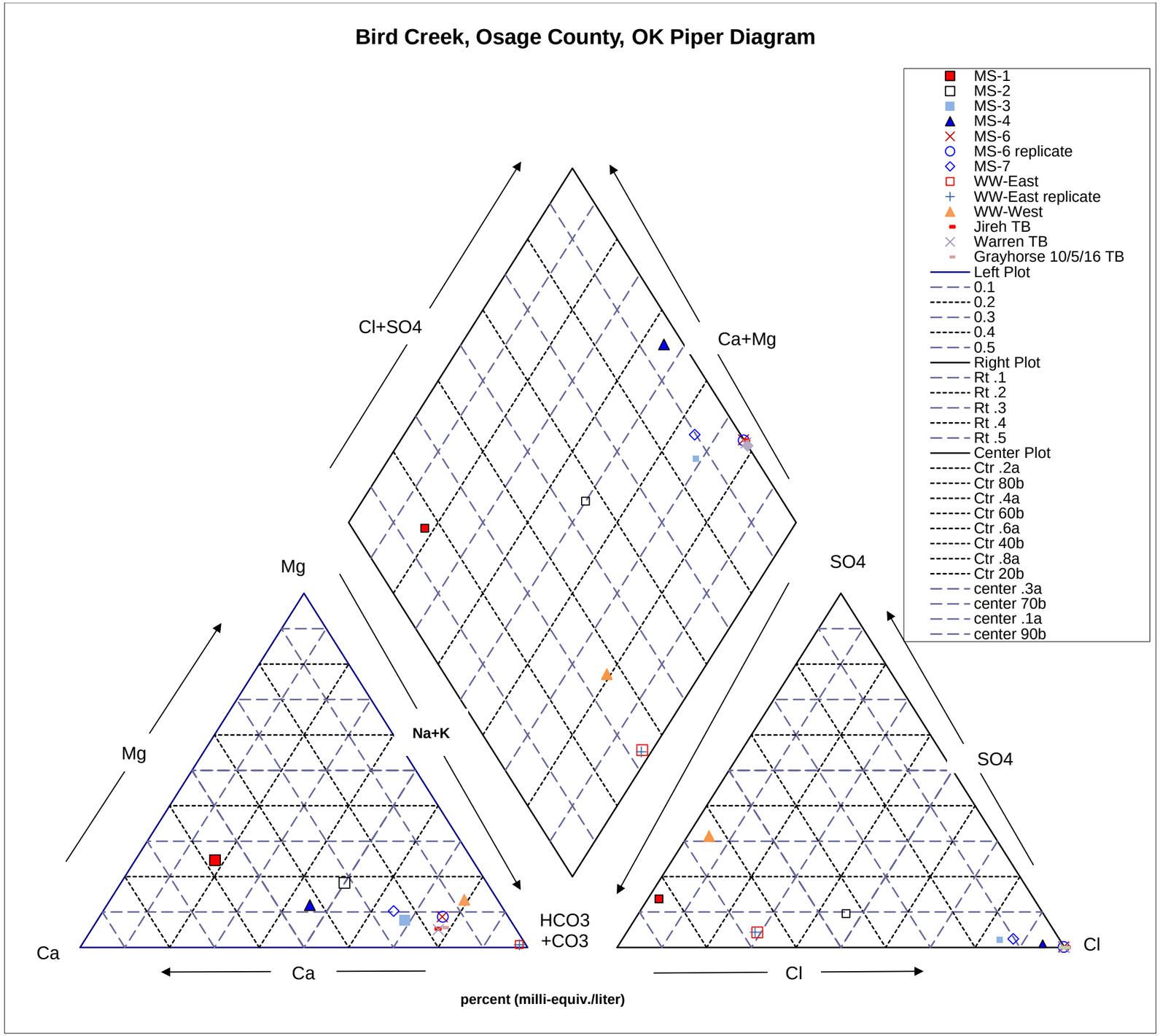
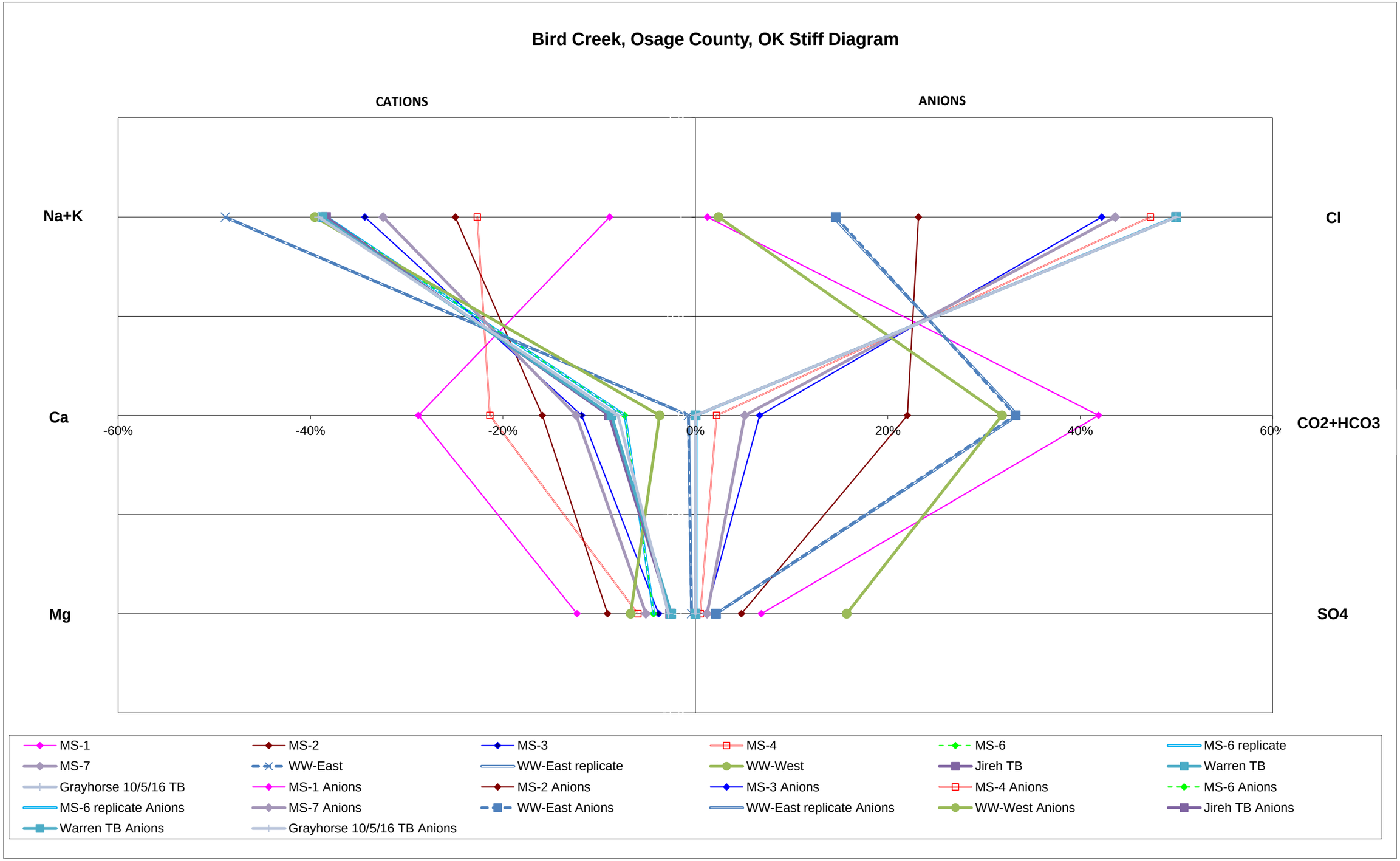
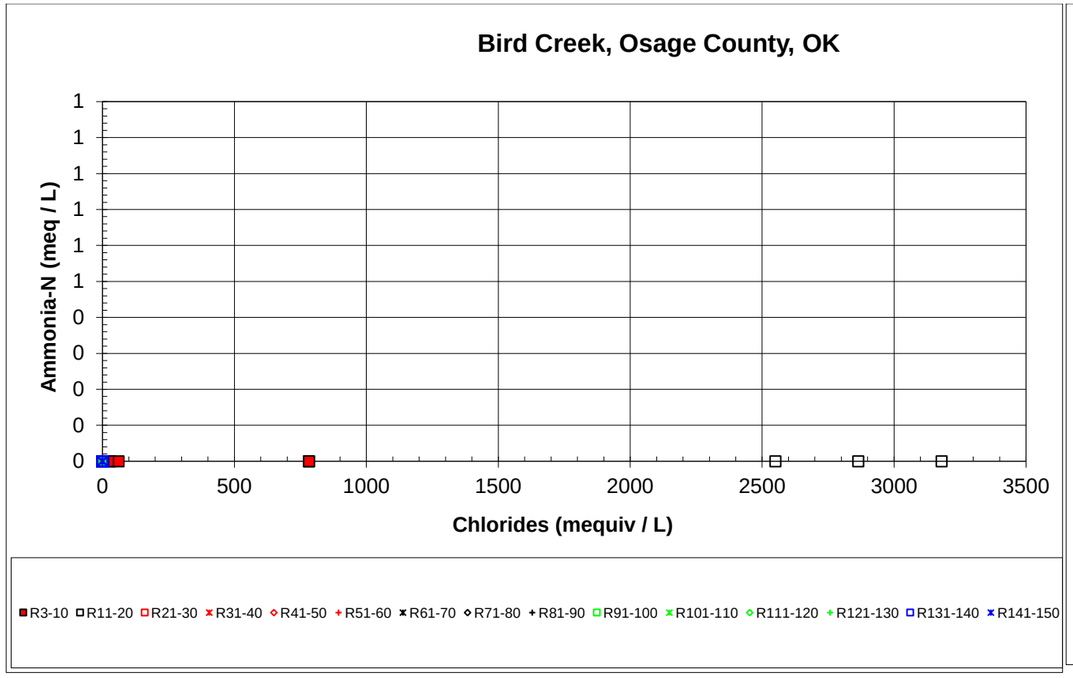


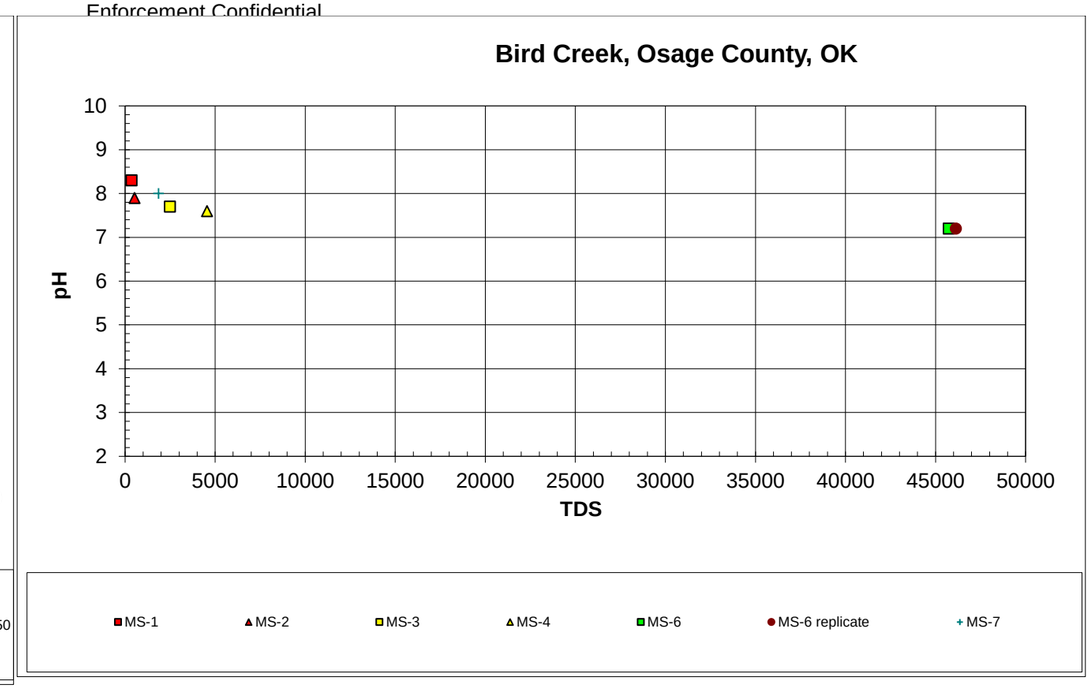
Bird Creek, Osage C
Piper Diagram
Stiff Diagram

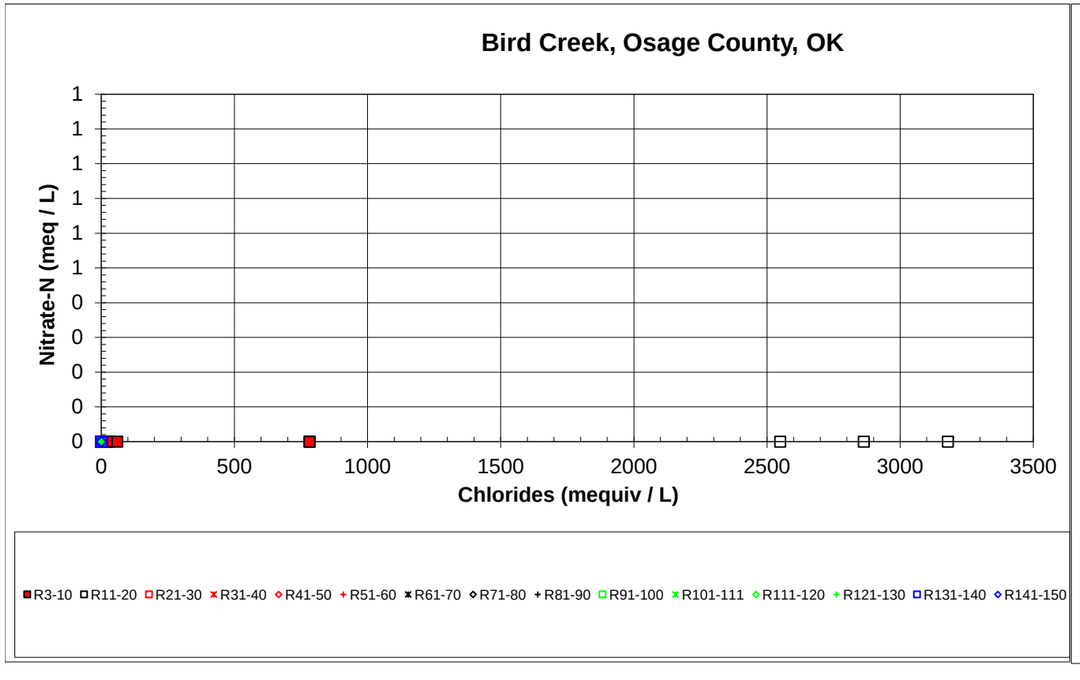

Bird Creek, Osage County, OK Stiff Diagram
CATIONS
ANIONS
Na+K
Ca
Mg
Cl
CO2+HCO3
SO4
-60%
-40%
-20%
0%
20%
40%
60%
MS-1
MS-2
MS-3
MS-4
MS-6
MS-6 replicate
MS-7
WW-East
WW-East replicate
WW-West
Jireh TB
Warren TB
Grayhorse 10/5/16 TB
MS-1 Anions
MS-2 Anions
MS-3 Anions
MS-4 Anions
MS-6 Anions
MS-6 replicate Anions
MS-7 Anions
WW-East Anions
WW-East replicate Anions
WW-West Anions
Jireh TB Anions
Warren TB Anions
Grayhorse 10/5/16 TB Anions

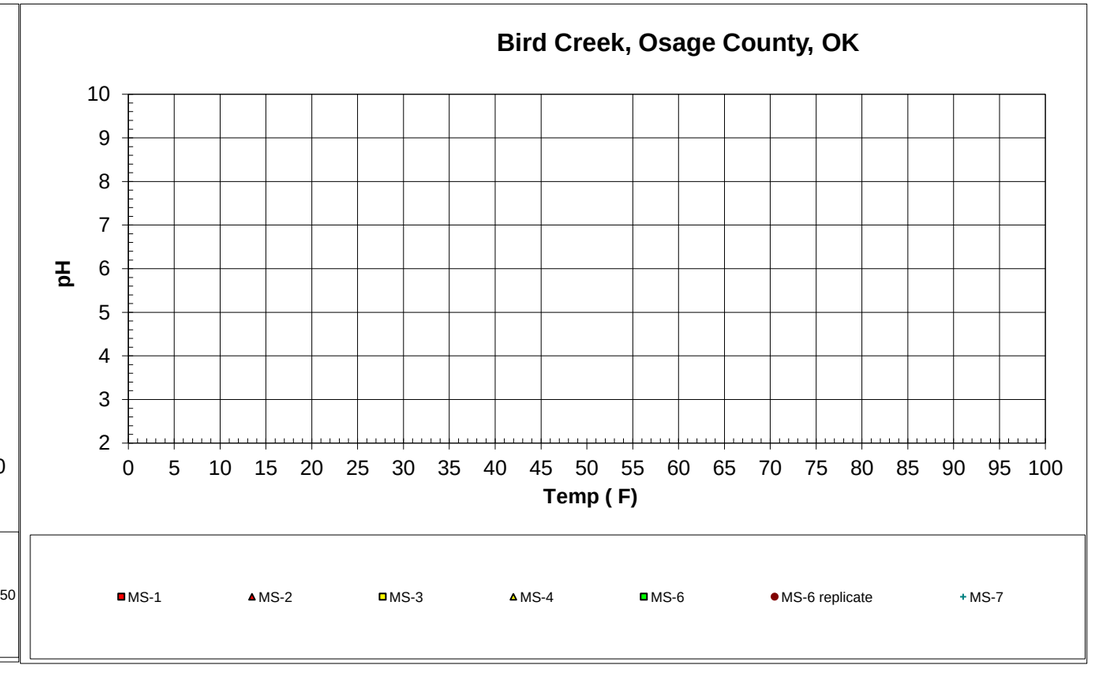
ounty, OK
Bird Creek, Osage County, OK Piper Diagram
Bird Creek, Osage County, OK Stiff Diagram

Ground Water Center
EPA R6 WQ-SG
Enforcement Confidential









	WS-1 (Mor	WS-2 (Mor	WS-3 (Mor	WS-4 (Mor	WS-5 (Mor	WS-7 (Replica	WS-6 (Mor	WS-11 (Ea	WS-14 (Replicate 2 of W	WS-12 (Wes	WS-8 (Jireh	WS-9 (Warren Americ	3 G.horse	:	:	:
Na+K	-8.91%	-24.96%	-34.35%	-22.67%	-38.29%	-38.35%	-32.46%	-48.86%	-48.88%	-39.56%	-38.39%	-38.77%	-39.15%			
Ca	-28.78%	-15.91%	-11.82%	-21.35%	-7.37%	-7.32%	-12.39%	-0.73%	-0.72%	-3.72%	-8.98%	-8.72%	-8.05%			
Mg	-12.31%	-9.13%	-3.82%	-5.98%	-4.35%	-4.33%	-5.15%	-0.40%	-0.40%	-6.72%	-2.63%	-2.51%	-2.80%			
Cl-	1.24%	23.18%	42.23%	47.29%	49.87%	49.87%	43.64%	14.59%	14.34%	2.42%	49.96%	49.97%	49.98%			
HCO3-	41.91%	22.03%	6.68%	2.20%	0.06%	0.06%	5.14%	33.28%	33.50%	31.87%	0.02%	0.02%	0.02%			
SO4-	6.85%	4.79%	1.09%	0.50%	0.06%	0.06%	1.22%	2.13%	2.16%	15.71%	0.01%	0.01%	0.00%			

short name	MS-1	MS-2	MS-3	MS-4	MS-6	MS-6 replicate	MS-7	WW-East	WW-East replicate	WW-West	Jireh TB	Warren TB	Grayhorse	0	0	0
Cations	MS-1 Catic	MS-2 Catic	MS-3 Catic	MS-4 Catic	MS-6 Catic	MS-6 replicate	MS-7 Catic	WW-East (	WW-East replicate Catior	WW-West Ca	Jireh TB Cati	Warren TB Cations	Grayhorse	0 Cations	0 Cations	0 Cations
Na+K			1													
Ca			0													
Mg			-1													
Anions	MS-1 Anior	MS-2 Anior	MS-3 Anior	MS-4 Anior	MS-6 Anior	MS-6 replicate	MS-7 Anior	WW-East /	WW-East replicate Anion	WW-West Ai	Jireh TB Anic	Warren TB Anions	Grayhorse	0 Anions	0 Anions	0 Anions
Cl-			1													
HCO3-			0													
SO4-			-1													

fraction	Left Plot			Upper Plot: Cations & Anions = 200%				Right Plot		
	Ca	Mg	Na+K	Na+K	Ca+Mg	SO4+Cl	CO3+HCO3	CO3+HCO3	Cl	SO4
WS-1 (Monitoring Station 1)36.832	0.576	0.246	0.178	0.178	0.822	0.162	0.838	0.838	0.025	0.137
WS-2 (Monitoring Station 2)36.832	0.318	0.183	0.499	0.499	0.501	0.559	0.441	0.441	0.464	0.096
WS-3 (Monitoring Station 3)36.830	0.236	0.076	0.687	0.687	0.313	0.866	0.134	0.134	0.845	0.022
WS-4 (Monitoring Station 4)36.829	0.427	0.120	0.453	0.453	0.547	0.956	0.044	0.044	0.946	0.010
WS-5 (Monitoring Station 6)36.827	0.147	0.087	0.766	0.766	0.234	0.999	0.001	0.001	0.997	0.001
WS-7 (Replicate 1 of WS-5)36.827	0.146	0.087	0.767	0.767	0.233	0.999	0.001	0.001	0.997	0.001
WS-6 (Monitoring Station 7)36.825	0.248	0.103	0.649	0.649	0.351	0.897	0.103	0.103	0.873	0.024
WS-11 (East Domestic WW)36.82	0.015	0.008	0.977	0.977	0.023	0.334	0.666	0.666	0.292	0.043
WS-14 (Replicate 2 of WS-11)36.8	0.014	0.008	0.978	0.978	0.022	0.330	0.670	0.670	0.287	0.043
WS-12 (West Domestic WW)36.83	0.074	0.134	0.791	0.791	0.209	0.363	0.637	0.637	0.048	0.314
WS-8 (Jireh TB)36.846536,-96.506	0.180	0.053	0.768	0.768	0.232	1.000	0.000	0.000	0.999	0.000
WS-9 (Warren American TB)36.84	0.174	0.050	0.775	0.775	0.225	1.000	0.000	0.000	0.999	0.000
3 G.horse @ TBNW18-T27N-R8E:	0.161	0.056	0.783	0.783	0.217	1.000	0.000	0.000	1.000	0.000

	Left Plot			Upper Plot: Cations & Anions = 200%				Right Plot		
	Ca	Mg	Na,K,NH4	Na,K,NH4	Ca+Mg	SO4,Cl,NO3	CO3+HCO3	CO3+HCO3	Cl	SO4+NO3-N
WS-1 (Monitoring Station 1)36.832	0.576	0.246	0.178	0.178	0.822	0.162	0.838	0.838	0.025	0.137
WS-2 (Monitoring Station 2)36.832	0.318	0.183	0.499	0.499	0.501	0.559	0.441	0.441	0.464	0.096
WS-3 (Monitoring Station 3)36.830	0.236	0.076	0.687	0.687	0.313	0.866	0.134	0.134	0.845	0.022
WS-4 (Monitoring Station 4)36.829	0.427	0.120	0.453	0.453	0.547	0.956	0.044	0.044	0.946	0.010
WS-5 (Monitoring Station 6)36.827	0.147	0.087	0.766	0.766	0.234	0.999	0.001	0.001	0.997	0.001
WS-7 (Replicate 1 of WS-5)36.827	0.146	0.087	0.767	0.767	0.233	0.999	0.001	0.001	0.997	0.001
WS-6 (Monitoring Station 7)36.825	0.248	0.103	0.649	0.649	0.351	0.897	0.103	0.103	0.873	0.024
WS-11 (East Domestic WW)36.82	0.015	0.008	0.977	0.977	0.023	0.334	0.666	0.666	0.292	0.043
WS-14 (Replicate 2 of WS-11)36.8	0.014	0.008	0.978	0.978	0.022	0.330	0.670	0.670	0.287	0.043
WS-12 (West Domestic WW)36.83	0.074	0.134	0.791	0.791	0.209	0.363	0.637	0.637	0.048	0.314
WS-8 (Jireh TB)36.846536,-96.506	0.180	0.053	0.768	0.768	0.232	1.000	0.000	0.000	0.999	0.000
WS-9 (Warren American TB)36.84	0.174	0.050	0.775	0.775	0.225	1.000	0.000	0.000	0.999	0.000
3 G.horse @ TBNW18-T27N-R8E:	0.161	0.056	0.783	0.783	0.217	1.000	0.000	0.000	1.000	0.000

x,y	(1-Ca)	Left Plot		Right Plot		Center Plot		(1-Ca)	alt Left Plot		alt Right Plot		alt Center Plot		short name
WS-1 (Monitoring Station 1)36.832660,-96.496177: MS-1	0.424	0.401	0.313	1.393	0.219	0.870	1.125	0.424	0.401	0.313	1.393	0.219	0.870	1.125	MS-1
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2	0.682	0.691	0.258	1.812	0.183	1.229	1.191	0.682	0.691	0.258	1.812	0.183	1.229	1.191	MS-2
WS-3 (Monitoring Station 3)36.830668,-96.499461: MS-3	0.764	0.825	0.166	2.156	0.119	1.477	1.295	0.764	0.825	0.166	2.156	0.119	1.477	1.295	MS-3
WS-4 (Monitoring Station 4)36.829906,-96.500244: MS-4	0.573	0.613	0.204	2.251	0.109	1.405	1.574	0.573	0.613	0.204	2.251	0.109	1.405	1.574	MS-4
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6	0.853	0.909	0.175	2.298	0.101	1.582	1.341	0.853	0.909	0.175	2.298	0.101	1.582	1.341	MS-6
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate	0.854	0.910	0.175	2.298	0.101	1.583	1.340	0.854	0.910	0.175	2.298	0.101	1.583	1.340	MS-6 replic
WS-6 (Monitoring Station 7)36.825031,-96.499648: MS-7	0.752	0.801	0.189	2.185	0.121	1.473	1.354	0.752	0.801	0.189	2.185	0.121	1.473	1.354	MS-7
WS-11 (East Domestic WW)36.828592,-96.493931: WW-East	0.985	1.081	0.107	1.613	0.137	1.356	0.583	0.985	1.081	0.107	1.613	0.137	1.356	0.583	WW-East
WS-14 (Replicate 2 of WS-11)36.828592, -96.493931: WW-East replicate	0.986	1.082	0.107	1.608	0.137	1.354	0.578	0.986	1.082	0.107	1.608	0.137	1.354	0.578	WW-East r
WS-12 (West Domestic WW)36.833258,-96.504278: WW-West	0.926	0.958	0.216	1.505	0.372	1.277	0.768	0.926	0.958	0.216	1.505	0.372	1.277	0.768	WW-West
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB	0.820	0.894	0.146	2.299	0.100	1.584	1.340	0.820	0.894	0.146	2.299	0.100	1.584	1.340	Jireh TB
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB	0.826	0.901	0.143	2.300	0.100	1.588	1.333	0.826	0.901	0.143	2.300	0.100	1.588	1.333	Warren TB
3 G.horse @ TBNW18-T27N-R8E: Grayhorse 10/5/16 TB	0.839							0.839	0.911	0.148	2.300	0.100	1.591	1.327	Grayhorse

:ate

eplicate

10/5/16 TB

	Aluminium	Ammonium	Boron	Barium	Berylium	Calcium	Cesium	Copper	Copper	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Nickel	Potassium	Rubidium	Silver	Sodium
Cations	**Al**	**NH4**	**B**	**Ba**	**Be**	**Ca**	**Cs**	**Cu(1)**	**Cu(2)**	**Cu(3)**	**Fe**	**Pb**	**Li**	**Mg**	**Mn**	**Hg**	**Ni**	**K**	**Rb**	**Ag**	**Na**
MW	26.9815	18.0383	10.81	137.34	9.012	40.08	132.91	63.546	63.546	63.546	55.847	207.2	6.941	24.305	54.938	200.59	58.71	39.0983	85.47	107.868	22.98977
v	3	1	3	2	2	2	1	1	2	3	2	2	1	2	2	2	2	1	1	1	1
mg/mequiv	8.9938	18.0383	3.60333333	68.67	4.506	20.04	132.91	63.546	31.773	21.182	27.9235	103.6	6.941	12.1525	27.469	100.3	29.355	39.0983	85.47	107.868	22.98977

	Acetate	Arsenate	Bromide	Carbonate	Chloride	Chromate	Cyanide	Dichromate	Fluoride	Hydroxide	Iodide	Nitrate	Oxalate	Permanganate	Phosphate	Silicate	Sulfate	Sulfide	Sulfite	Thiocyanate	Thiosulfate
Anions	**CH3CO2**	**AsO4**	**Br**	**CO3**	**Cl**	**CrO4**	**CN**	**Cr2O7**	**F**	**OH**	**I**	**NO3**	**C2O4**	**MnO4**	**PO4**	**SiO3**	**SO4**	**S**	**SO3**	**SCN**	**S2O3**
MW	59.0445	138.9192	79.909	60.0092	35.453	115.9936	26.0177	215.9878	18.9984	33.0679	126.9044	62.0049	88.0196	118.9356	94.9716	76.084	96.0576	32.06	80.0582	58.0777	112.1182
v	-1	-3	-1	-2	-1	-2	-1	-2	-1	-1	-1	-1	-2	-1	-3	-2	-2	-2	-2	-1	-2
mg/mequiv	59.0445	46.3064	79.909	30.0046	35.453	57.9968	26.0177	107.9939	18.9984	33.0679	126.9044	62.0049	44.0098	118.9356	31.6572	38.042	48.0288	16.03	40.0291	58.0777	56.0591

	CaCO3	**CO2**						Bicarbonate													
MW	100.0892	44.0098		cos(60)	sin(60)	tan(60)		**HCO3**	**H2S**						**HPO4**	**SiO2**					
v	2			0.5	0.866025	1.732051		61.0171	34.0758						95.9726	60.084					
mg/mequiv	50.0446							-1	2	sign?					-2	1					
								61.0171	17.0379						47.9863	60.084					
	C	**H**	**N**	**O**	**S**	**Si**	**As**	**Cr**	**Co**												
MW	12.011	1.0079	14.0067	15.9994	32.06	28.0855	74.9216	51.996	58.933												
									+3												
									19.6443												
	NO3-N	**NO2-N**	**NH4-N**			**NO2**															
MW						46.0055															
v						1															
mg/mequiv		use N value				46.0055															
MCL mg/l	10				45																
	0.713944				0.725749																

Hardness

cations	Ca	Mg	Sr	Fe	Mn
	20.04	12.1525	43.81	27.9235	27.469
assoc anions	**HCO3**	SO4	Cl	NO3	SiO3
	61.0171	48.0288	35.453	62.0049	38.04185

Total Alkalinity	**CO3**	**HCO3**	**OH**			**pH**
	30.0046	61.0171	33.0679	pH >9.0	**MOA**	4.5
	PPA > MOA/2		PPA > MOA/2		**PPA**	8.3
	PPA = MOA					
	PPA < MOA/2	PPA < MOA/2				
		PPA = 0				
			PPA = MOA	pH >9.0		
		pH < 8.3				

	Strontium	Tin	Zinc
Cations	**Sr**	**Sn**	**Zn**
MW	87.62	118.69	65.37
v	2	2	2
mg/mequiv	43.81	59.345	32.685

Anions
MW
v
mg/mequiv

MW
v
mg/mequiv

MW

MW
v
mg/mequiv

MCL mg/l

Hardness
cations

assoc anions

Total Alkalinity

fraction								0 Left Plot		0		0 Right Plot		0
	0	**%Ca**	**%Mg**	**%Na+K**	**%CO3+HCO3**	**%Cl**	**%SO4**	**Ca**	**Mg**	**Na+K**	**CO3+HCO**	**Cl**	**SO4**	**sum**
WS-1 (Monitoring Station 1)36.832660,-96.496177: MS-1		-28.78%	-12.31%	-8.91%	41.91%	1.24%	6.85%	0.57568	0.24612	0.1782	0.838138	0.024764	0.137098	2
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2		-15.91%	-9.13%	-24.96%	22.03%	23.18%	4.79%	0.318227	0.182529	0.499095	0.440629	0.463656	0.095715	1.999851
WS-3 (Monitoring Station 3)36.830668,-96.499461: MS-3		-11.82%	-3.82%	-34.35%	6.68%	42.23%	1.09%	0.236422	0.076494	0.687084	0.133542	0.844645	0.021813	2
WS-4 (Monitoring Station 4)36.829906,-96.500244: MS-4		-21.35%	-5.98%	-22.67%	2.20%	47.29%	0.50%	0.427095	0.119525	0.45338	0.044068	0.945842	0.01009	2
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6		-7.37%	-4.35%	-38.29%	0.06%	49.87%	0.06%	0.14736	0.086907	0.765732	0.001274	0.997478	0.001248	1.999999
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate		-7.32%	-4.33%	-38.35%	0.06%	49.87%	0.06%	0.146381	0.086637	0.766981	0.001275	0.997477	0.001248	1.999999
WS-6 (Monitoring Station 7)36.825031,-96.499648: MS-7		-12.39%	-5.15%	-32.46%	5.14%	43.64%	1.22%	0.247797	0.102937	0.649267	0.102754	0.872822	0.024424	2
WS-11 (East Domestic WW)36.828592,-96.493931: WW-East		-0.73%	-0.40%	-48.86%	33.28%	14.59%	2.13%	0.01465	0.008053	0.977297	0.665506	0.291836	0.042658	2
WS-14 (Replicate 2 of WS-11)36.828592, -96.493931: WW-East replicate		-0.72%	-0.40%	-48.88%	33.50%	14.34%	2.16%	0.014405	0.007918	0.977677	0.66999	0.286805	0.043206	2
WS-12 (West Domestic WW)36.833258,-96.504278: WW-West		-3.72%	-6.72%	-39.56%	31.87%	2.42%	15.71%	0.074406	0.134385	0.791209	0.637372	0.048341	0.314287	2
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB		-8.98%	-2.63%	-38.39%	0.02%	49.96%	0.01%	0.179506	0.052675	0.767813	0.000446	0.999278	0.000276	1.999993
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB		-8.72%	-2.51%	-38.77%	0.02%	49.97%	0.01%	0.174352	0.050188	0.775455	0.000376	0.999441	0.000183	1.999995
3 G.horse @ TBNW18-T27N-R8E: Grayhorse 10/5/16 TB		-8.05%	-2.80%	-39.15%	0.02%	49.98%	0.00%	0.161003	0.055995	0.782961	0.000411	0.999507	8.16E-05	1.999958
:														0
:														0
:														0

Bird Creek, Osage County, OK Multiply values by 1

Location	FieldID	SAMPLE DATE	insp_NO	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	Fe (mg/l)	Ba (mg/l)	Carb (ppm)	Bi-carb (ppm)	Sulfates (mg/l)	Cl (mg/l)	NITRATE-N (MG/L)	NITRITE-N (mg/l)	AMMONIUM-N (MG/L)	P-total (mg/l)	TDS	PH	SG	Sr (mg/l)	F (mg/l)	alkalinity	CO2	N2O	Cu (mg/l)	PPA (mg/l CaCO3)	MOA (mg/l CaCO3)	B (mg/l)
2 Jireh @ 18W SW 1-T27N-R7E	Jireh TB 10/5/16	**05-Oct-16**		9627	1770	49111	531	10.41			**104**	41	99594					160779	6.3				**85**			**0.1**			8.54
3 G.horse @ TB NW18-T27N-R8E	Grayhorse TB 10/5/16	**05-Oct-16**		8236	1737	45675	463	2.96			**64**	10	90403					146588	6.5				**52**			**0.1**			8.11
WS-8 (Jireh TB) 36.846536, -96.506097	Jireh TB 6/28/17	**28-Jun-17**		10194	1814	49706	537	0.56	34.8	**0**	**78**	38	101527					163893	6.3				**64**			**0.07**			8.73
WS-9 (Warren American TB) 36.840077, -96.499939	Warren TB 6/29/17	**29-Jun-17**		10581	1847	53664	550	0.44	30.7	**0**	**73**	28	112725					179468	6.1				**60**			**0.08**			9.41
1B (South of Rd) SE 12-T27N-R7E	~MS-2 10/5/16	**05-Oct-16**		4751	1365	20812	58	0.1			**61**	49	40699					67795	6.9				**50**			**0.1**			1.47
1C (South of Rd) SE 12-T27NR-7E	~MS-2 replicate 10/5/16	**05-Oct-16**		4749	1432	20810	62	0.1			**64**	51	42655					69822	6.9				**52**			**0.1**			1.59
WS-2 (Monitoring Station 2) 36.832135, -96.498664	MS-2 6/27/17	**27-Jun-17**		46	16	81	3	0.03	0.0938	**0**	**193**	33	118					519.4	7.9				**158**						0.09
WS-5 (Monitoring Station 6) 36.827810, -96.501613	MS-6 6/28/17	**28-Jun-17**		2441	873	14529	38	0.02	6.04	**0**	**61**	47	27740					45738	7.2				**50**			**0.04**			2.18
WS-7 (Replicate 1 of WS-5) 36.827810, -96.501613	MS-6 replicate 6/28/17	**28-Jun-17**		2424	870	14548	38	0.02	6.87	**0**	**61**	47	27734					46134	7.2				**50**			**0.04**			2.16

Bird Creek, Osage County, OK

Location	FieldID	SAMPLE DATE	TKN	SiO2 (mg/L)	Al (mg/l)	Co (mg/l)	Pb (mg/l)	Mn (mg/l)	Zn (mg/l)	Temp (C)	Temp (F)
2 Jireh @ 18W SW 1-T27N-R7E	Jireh TB 10/5/16	**05-Oct-16**						2.49	0.85		
3 G.horse @ TB NW18-T27N-R8E	Grayhorse TB 10/5/16	**05-Oct-16**						2.4	11.34		
WS-8 (Jireh TB) 36.846536, -96.506097	Jireh TB 6/28/17	**28-Jun-17**						2.46	0.19		
WS-9 (Warren American TB) 36.840077, -96.499939	Warren TB 6/29/17	**29-Jun-17**						1.93	0.13		
1B (South of Rd) SE 12-T27N-R7E	~MS-2 10/5/16	**05-Oct-16**						0.02	0.01		
1C (South of Rd) SE 12-T27NR-7E	~MS-2 replicate 10/5/16	**05-Oct-16**							0.01		
WS-2 (Monitoring Station 2) 36.832135, -96.498664	MS-2 6/27/17	**27-Jun-17**						0	0		
WS-5 (Monitoring Station 6) 36.827810, -96.501613	MS-6 6/28/17	**28-Jun-17**						0	0.04		
WS-7 (Replicate 1 of WS-5) 36.827810, -96.501613	MS-6 replicate 6/28/17	**28-Jun-17**						0	0.04		

mg/l																		as CaCO3	
Sample_Name	Ca	Mg	Na	K	Fe	Ba	CO3	HCO3	SO4	Cl	NO3-N	NO2-N	NH4-N	P	Cations	Anions	Si	alkalinity	meq
2 Jireh @ 18WSW 1-T27N-R7E: Jireh TB 10/5/16	9627	1770	49111	531	10.41	0	0.00	104	41	99594	0.00	0.00	0.00	0.00	61039.0	99739.0	10.0	85	1.702
3 G.horse @ TBNW18-T27N-R8E: Grayhorse TB 10/5/16	8236	1737	45675	463	2.96	0	0.00	64	10	90403	0.00	0.00	0.00	0.00	56111.0	90477.0	10.0	52	1.04
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB 6/28/17	10194	1814	49706	537	0.56	34.8	0.00	78	38	101527	0.00	0.00	0.00	0.00	62251.0	101643.0	10.0	64	1.272
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB 6/29/17	10581	1847	53664	550	0.44	30.7	0.00	73	28	112725	0.00	0.00	0.00	0.00	66642.0	112826.0	10.0	60	1.192
1B (South of Rd)SE 12-T27N-R7E: ~MS-2 10/5/16	4751	1365	20812	58	0.1	0	0.00	61	49	40699	0.00	0.00	0.00	0.00	26986.0	40809.0	10.0	50	1
1C (South of Rd)SE 12-T27NR-7E: ~MS-2 replicate 10/5/16	4749	1432	20810	62	0.1	0	0.00	64	51	42655	0.00	0.00	0.00	0.00	27053.0	42770.0	10.0	52	1.042
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2 6/27/17	46	16	81	3	0.03	0.0938	0.00	193	33	118	0.00	0.00	0.00	0.00	146.0	344.0	10.0	158	3.16
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6 6/28/17	2441	873	14529	38	0.02	6.04	0.00	61	47	27740	0.00	0.00	0.00	0.00	17881.0	27848.0	10.0	50	0.994
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate 6/28/17	2424	870	14548	38	0.02	6.87	0.00	61	47	27734	0.00	0.00	0.00	0.00	17880.0	27842.0	10.0	50	1.006
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0			

:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
:	0	0	0	0	0	0	0.00	0	0	0	0.00	0.00	0.00	0.00	0.0	0.0
maximum	10581	1847	53664	550			0	193	51	112725	0	0	0	0		

mg/l		OH		est		actual							
Sample_Name	**pH**	**mg/l**	**HCO3**	**CO3**	**est TDS**	**TDS**	**Strontium**	**Fluoride**	**B (mg/l)**	**TKN**	**SiO2**	**Al**	**Co**
2 Jireh @ 18WSW 1-T27N-R7E: Jireh TB 10/5/16	6.30	0.001	103.9	51.1	160,839	160,779	0	0	8.54	0.00	0.00	0.00	0.00
3 G.horse @ TBNW18-T27N-R8E: Grayhorse TB 10/5/16	6.50	0.001	63.5	31.2	146,629	146,588	0	0	8.11	0.00	0.00	0.00	0.00
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB 6/28/17	6.30	0.001	77.6	38.2	163,942	163,893	0	0	8.73	0.00	0.00	0.00	0.00
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB 6/29/17	6.10	0.000	72.7	35.8	179,514	179,468	0	0	9.41	0.00	0.00	0.00	0.00
1B (South of Rd)SE 12-T27N-R7E: ~MS-2 10/5/16	6.90	0.003	61.0	30.0	67,835	67,795	0	0	1.47	0.00	0.00	0.00	0.00
1C (South of Rd)SE 12-T27NR-7E: ~MS-2 replicate 10/5/16	6.90	0.003	63.6	31.3	69,864	69,822	0	0	1.59	0.00	0.00	0.00	0.00
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2 6/27/17	7.90	0.026	192.8	94.8	595	519	0	0	0.09	0.00	0.00	0.00	0.00
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6 6/28/17	7.20	0.005	60.7	29.8	45,769	45,738	0	0	0.09	0.00	0.00	0.00	0.00
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate 6/28/17	7.20	0.005	61.4	30.2	45,762	46,134	0	0	2.16	0.00	0.00	0.00	0.00
:						0	0	0	0.00	0.00	0.00	0.00	0.00
:						0	0	0	0.00	0.00	0.00	0.00	0.00
:						0	0	0	0.00	0.00	0.00	0.00	0.00
:						0	0	0	0.00	0.00	0.00	0.00	0.00
:						0	0	0	0.00	0.00	0.00	0.00	0.00
:						0	0	0	0.00	0.00	0.00	0.00	0.00
:						0	0	0	0.00	0.00	0.00	0.00	0.00
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:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00
:	0	0	0.00	0.00	0.00	0.00	0.00

maximum

mg/l

Sample_Name	Pb	Mn	Zn
2 Jireh @ 18WSW 1-T27N-R7E: Jireh TB 10/5/16	0.00	2.49	0.85
3 G.horse @ TBNW18-T27N-R8E: Grayhorse TB 10/5/16	0.00	2.40	11.34
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB 6/28/17	0.00	2.46	0.19
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB 6/29/17	0.00	1.93	0.13
1B (South of Rd)SE 12-T27N-R7E: ~MS-2 10/5/16	0.00	0.02	0.01
1C (South of Rd)SE 12-T27NR-7E: ~MS-2 replicate 10/5/16	0.00	0.00	0.01
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2 6/27/17	0.00	0.00	0.00
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6 6/28/17	0.00	0.00	0.04
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate 6/28/17	0.00	0.00	0.04
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:	0.00	0.00	0.00
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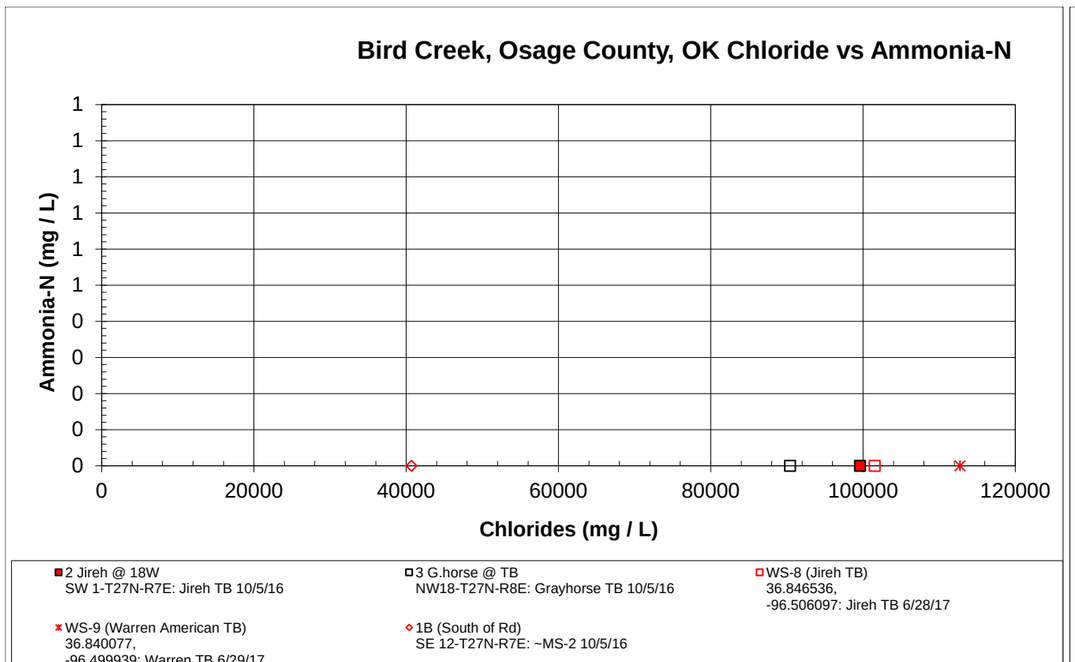
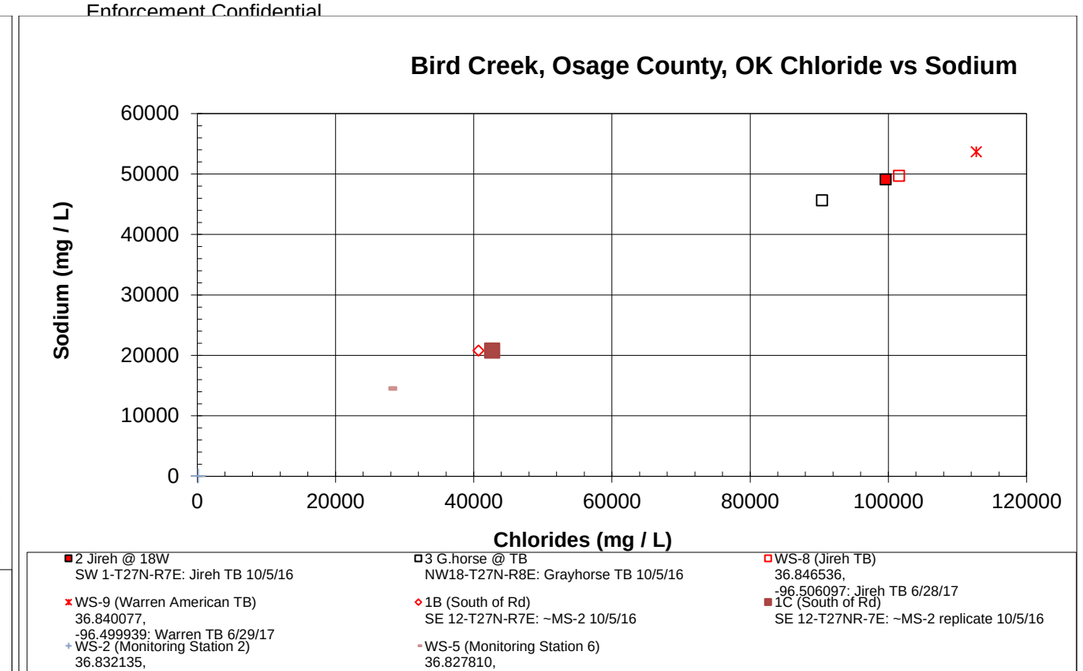
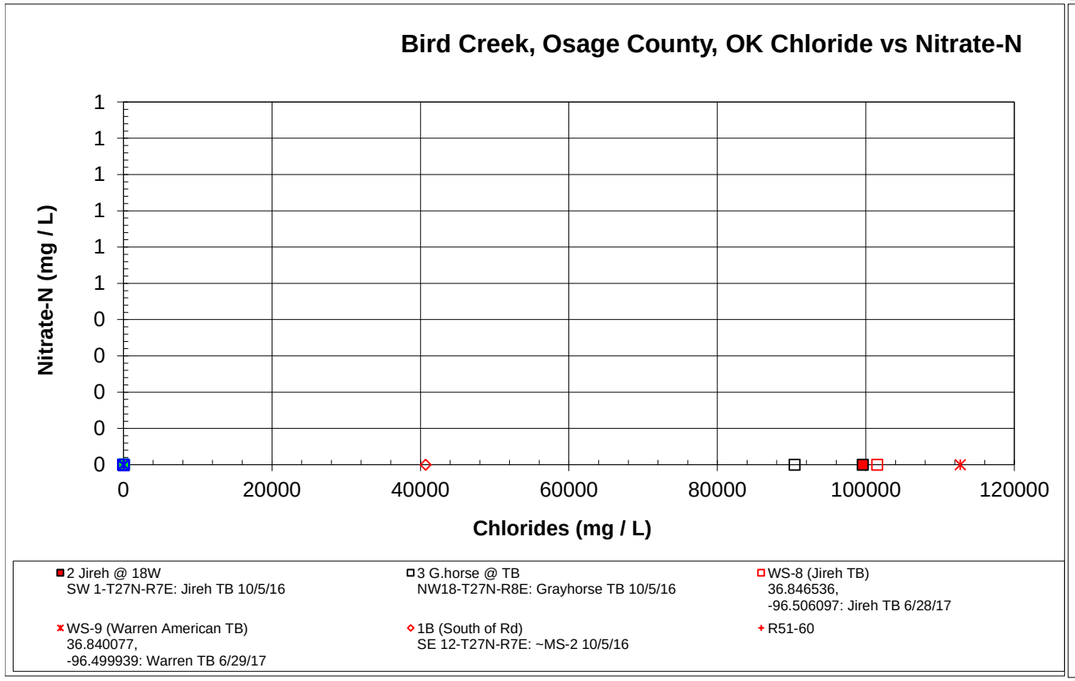
maximum			

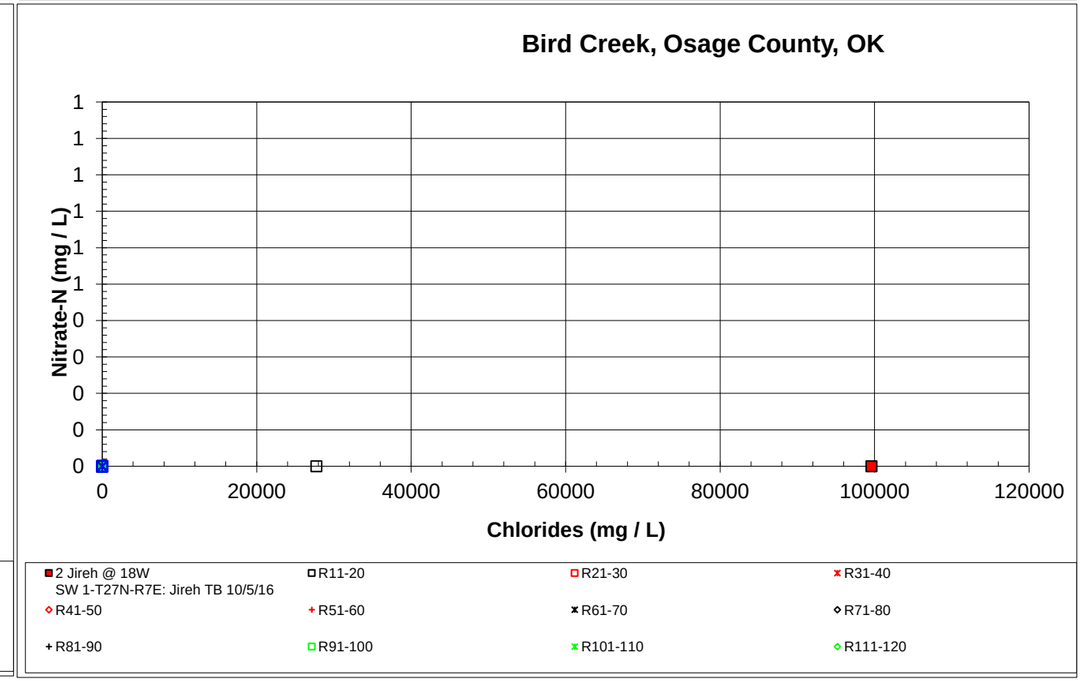
Ground Water Center
EPA R6 WQ-SG
Enforcement Confidential





Bird Creek, Osage Cou
k Chloride
n Ammonia-N Bird Creek,
d Sodium Bird Creek,
l Nitrate-N Bird Creek,





Ground Water Center
EPA R6 WQ-SG
Enforcement Confidential

unty, OK

Osage County, OK Chloride vs Ammonia-N
Osage County, OK Chloride vs Sodium
Osage County, OK Chloride vs Nitrate-N

mequiv/l

	Ca	Mg	Na	K	Fe	Ba	CO3	HCO3	SO4	Cl	Cations	Anions	Error	check	NH4-N	Sr	NO3-N	NO2-N	Fluoride	B	TKN-N
2 Jireh @ 18WSW 1-T27N-R7E: Jireh TB 10/5/16	480.39	145.65	2136.21	13.58	0.37	0.00	0.00	1.70	0.85	2809.18	2776.20	2811.74	-0.64%	y	0.00	0.00	0.00	0.00	0.00	2.37	0.00
3 G.horse @ TBNW18-T27N-R8E: Grayhorse TB 10/5/16	410.98	142.93	1986.75	11.84	0.11	0.00	0.00	1.05	0.21	2549.94	2552.61	2551.20	0.03%	y	0.00	0.00	0.00	0.00	0.00	2.25	0.00
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB 6/28/17	508.68	149.27	2162.09	13.73	0.02	0.51	0.00	1.28	0.79	2863.71	2833.80	2865.78	-0.56%	y	0.00	0.00	0.00	0.00	0.00	2.42	0.00
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB 6/29/17	527.99	151.99	2334.26	14.07	0.02	0.45	0.00	1.20	0.58	3179.56	3028.32	3181.34	-2.46%	y	0.00	0.00	0.00	0.00	0.00	2.61	0.00
1B (South of Rd)SE 12-T27N-R7E: ~MS-2 10/5/16	237.08	112.32	905.27	1.48	0.00	0.00	0.00	1.00	1.02	1147.97	1256.16	1149.99	4.41%	y	0.00	0.00	0.00	0.00	0.00	0.41	0.00
1C (South of Rd)SE 12-T27NR-7E: ~MS-2 replicate 10/5/16	236.98	117.84	905.19	1.59	0.00	0.00	0.00	1.05	1.06	1203.14	1261.59	1205.25	2.28%	y	0.00	0.00	0.00	0.00	0.00	0.44	0.00
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2 6/27/17	2.30	1.32	3.52	0.08	0.00	0.00	0.00	3.16	0.69	3.33	7.21	7.18	0.24%	y	0.00	0.00	0.00	0.00	0.00		0.00
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6 6/28/17	121.81	71.84	631.98	0.97	0.00	0.09	0.00	1.00	0.98	782.44	826.59	784.42	2.62%	y	0.00	0.00	0.00	0.00	0.00	0.02	0.00
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate 6/28/17	120.96	71.59	632.80	0.97	0.00	0.10	0.00	1.00	0.98	782.28	826.32	784.25	2.61%	y	0.00	0.00	0.00	0.00	0.00	0.60	0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00
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:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00
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:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00
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:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00
:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00	0.00	0.00	0.00	0.00		0.00

:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
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:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
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:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
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:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
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:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
:		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
max	527.99	151.99	2334.26	14.07			0.00	3.16	1.06	3179.56	0.00	0.00	0.00	0.00	0.00	2.61		

Brine Balance

Cation+NH4	Anion+N	Error	check	Cation+B,NH4	Error	check	K+2Ca+2Mg+H+Na	SO4+2CO3+Cl+OH	[H+] *1000 meq	pH	[OH-] *1000 meq	SiO2	Al	Co	Pb	Mn
2776.20	2811.74	-0.64%	n	2778.57	0.59%	n	3401.868702	2810.04	0.000501187	6.30	1.99526E-05	0.00	0.00	0.00	0.00	0.09
2552.61	2551.20	0.03%	n	2554.86	-0.07%	n	3106.418379	2550.15	0.000316228	6.50	3.16228E-05	0.00	0.00	0.00	0.00	0.09
2833.80	2865.78	-0.56%	n	2836.22	0.52%	n	3491.731373	2864.50	0.000501187	6.30	1.99526E-05	0.00	0.00	0.00	0.00	0.09
3028.32	3181.34	-2.46%	n	3030.93	2.42%	n	3708.281136	3180.14	0.000794328	6.10	1.25893E-05	0.00	0.00	0.00	0.00	0.07
1256.16	1149.99	4.41%	n	1256.57	-4.43%	n	1605.552486	1148.99	0.000125893	6.90	7.94328E-05	0.00	0.00	0.00	0.00	0.00
1261.59	1205.25	2.28%	n	1262.03	-2.30%	n	1616.394734	1204.20	0.000125893	6.90	7.94328E-05	0.00	0.00	0.00	0.00	0.00
7.21	7.18	0.24%	n	7.21	-0.24%	n	10.82405732	4.02	1.25893E-05	7.90	0.000794328	0.00	0.00	0.00	0.00	0.00
826.59	784.42	2.62%	n	826.62	-2.62%	n	1020.235569	783.42	6.30957E-05	7.20	0.000158489	0.00	0.00	0.00	0.00	0.00
826.32	784.25	2.61%	n	826.92	-2.65%	n	1018.871691	783.25	6.30957E-05	7.20	0.000158489	0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
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												0.00	0.00	0.00	0.00	0.00
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												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
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												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
												0.00	0.00	0.00	0.00	0.00
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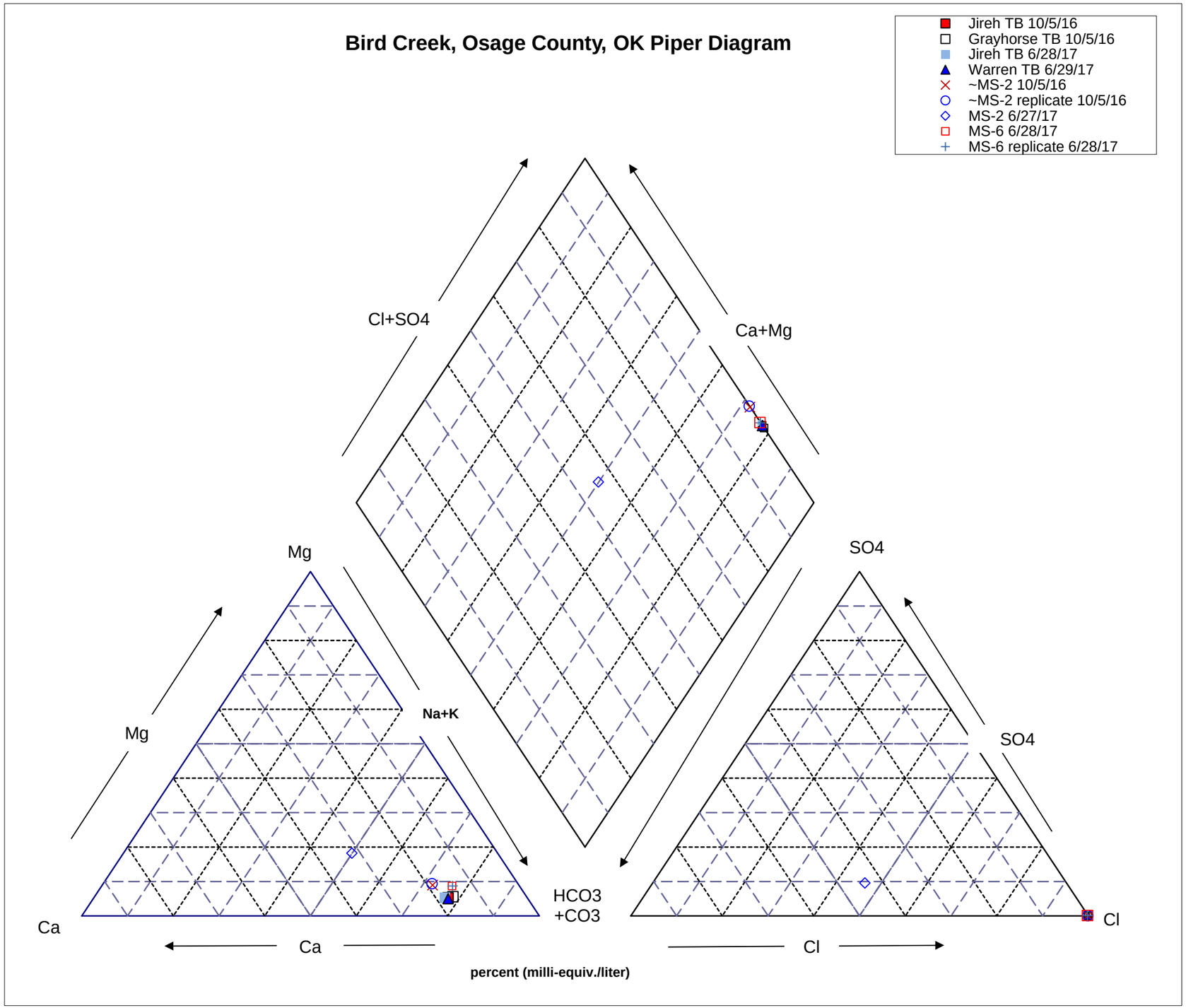
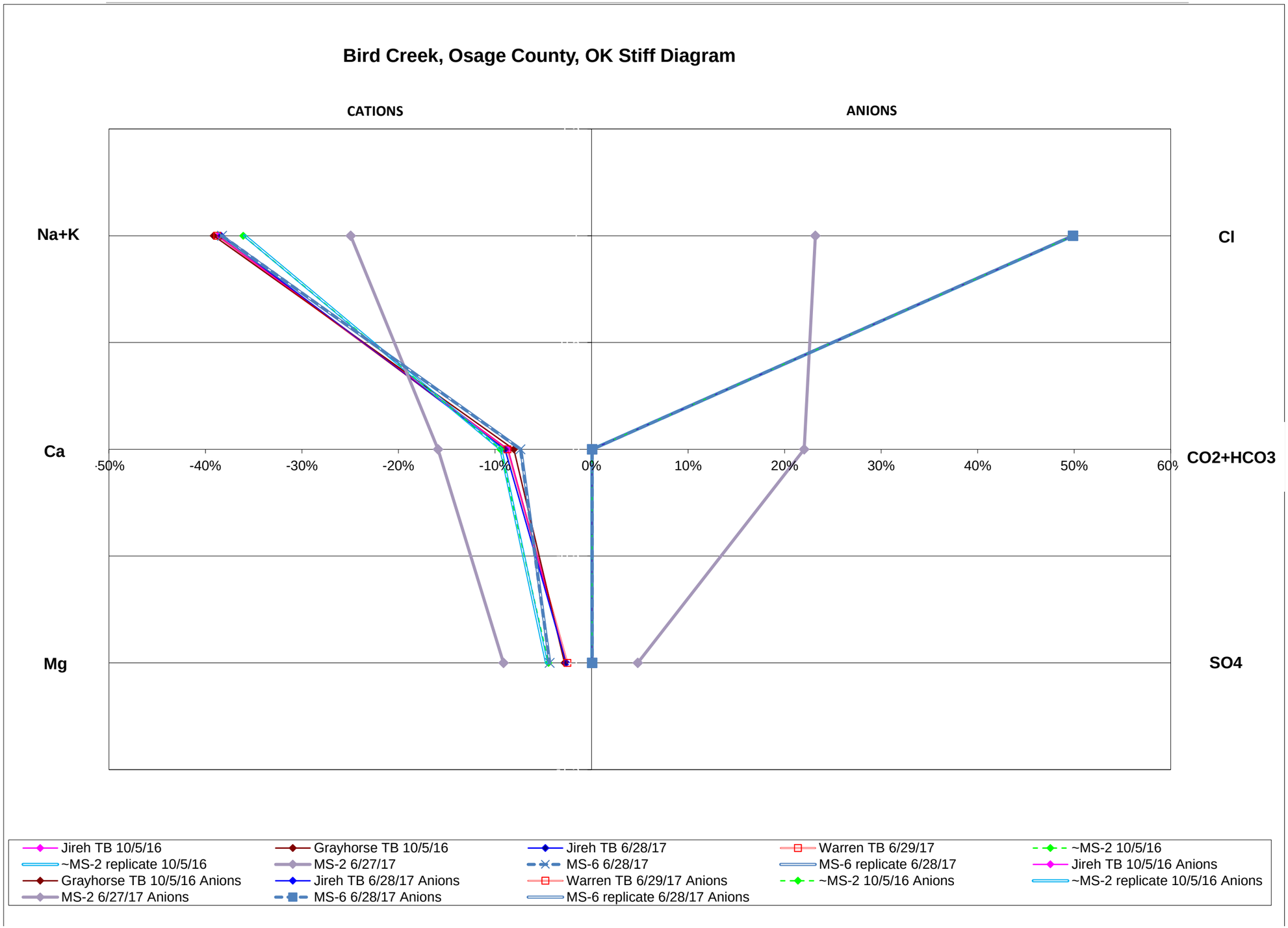
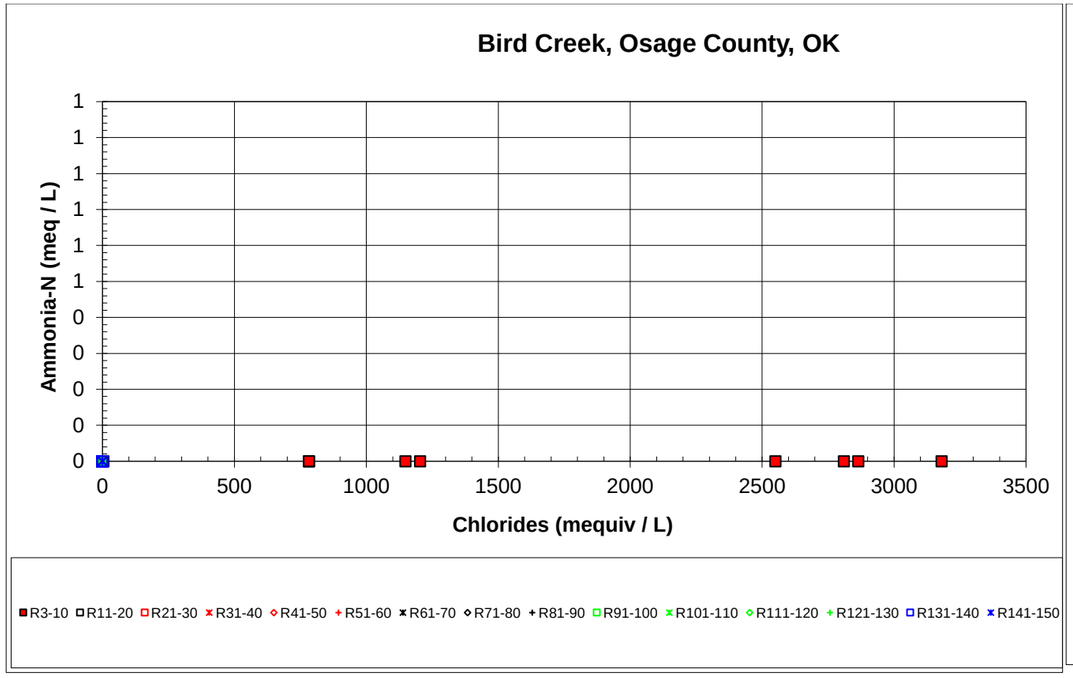


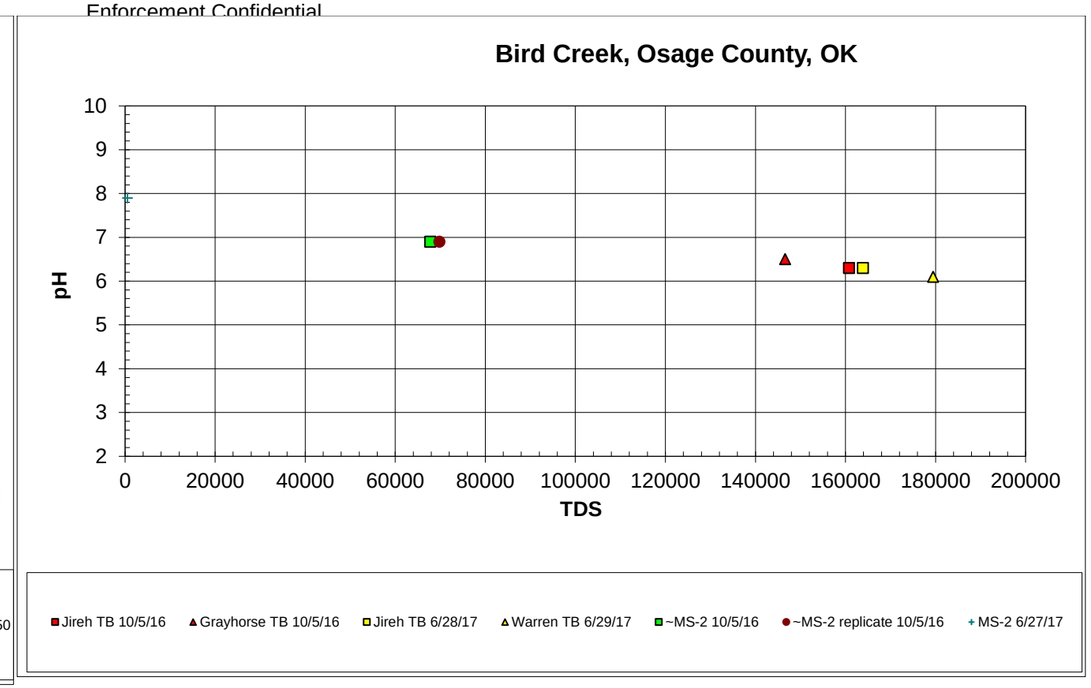
Bird Creek, Osage Co
Piper Diagram
Stiff Diagram

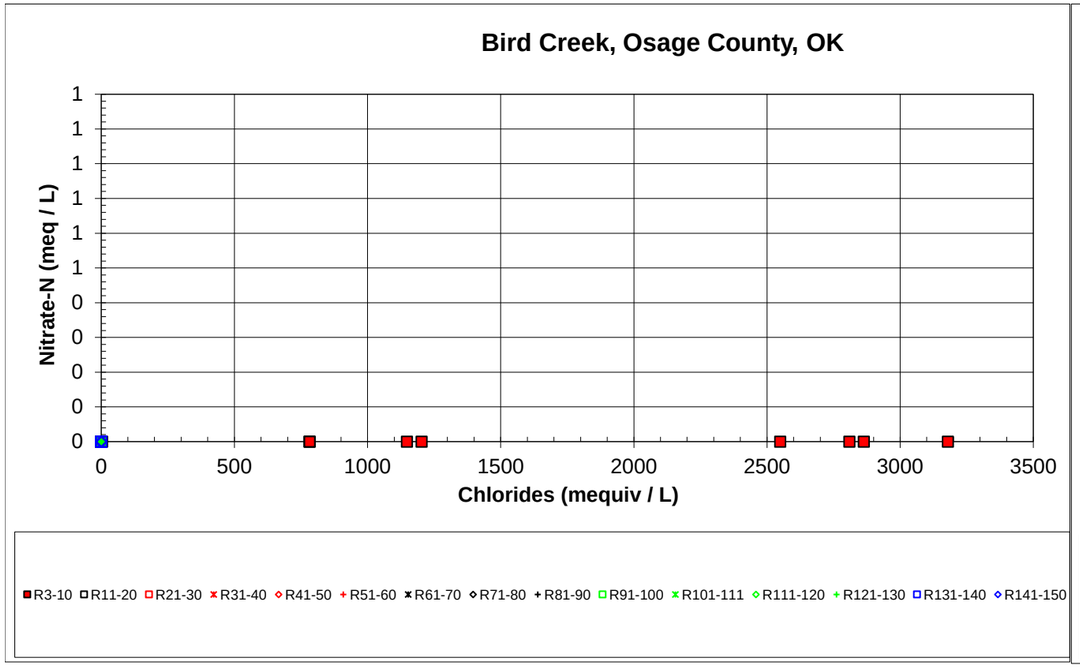

Bird Creek, Osage County, OK Stiff Diagram
CATIONS
ANIONS
Na+K
Ca
Mg
Cl
CO2+HCO3
SO4
-50%
-40%
-30%
-20%
-10%
0%
10%
20%
30%
40%
50%
60%
Jireh TB 10/5/16
Grayhorse TB 10/5/16
Jireh TB 6/28/17
Warren TB 6/29/17
~MS-2 10/5/16
~MS-2 replicate 10/5/16
MS-2 6/27/17
MS-6 6/28/17
MS-6 replicate 6/28/17
Jireh TB 10/5/16 Anions
Grayhorse TB 10/5/16 Anions
Jireh TB 6/28/17 Anions
Warren TB 6/29/17 Anions
~MS-2 10/5/16 Anions
~MS-2 replicate 10/5/16 Anions
MS-2 6/27/17 Anions
MS-6 6/28/17 Anions
MS-6 replicate 6/28/17 Anions

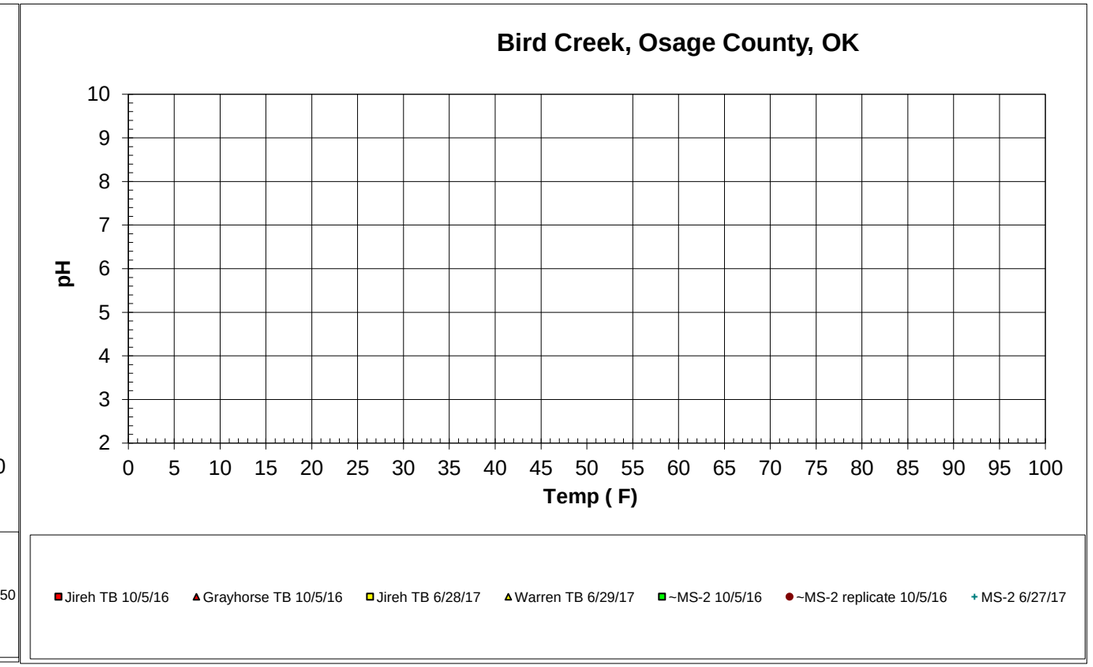
ounty, OK
Bird Creek, Osage County, OK Piper Diagram
Bird Creek, Osage County, OK Stiff Diagram

Ground Water Center
EPA R6 WQ-SG
Enforcement Confidential









	2 Jireh @ 1	3 G.horse (	WS-8 (Jire	WS-9 (Wa	1B (South	1C (South of F	WS-2 (Mor	WS-5 (Mor	WS-7 (Replicate 1 of WS	:	:	:	:	:	:
Na+K	-38.72%	-39.15%	-38.39%	-38.77%	-36.09%	-35.94%	-24.96%	-38.29%	-38.35%						
Ca	-8.65%	-8.05%	-8.98%	-8.72%	-9.44%	-9.39%	-15.91%	-7.37%	-7.32%						
Mg	-2.62%	-2.80%	-2.63%	-2.51%	-4.47%	-4.67%	-9.13%	-4.35%	-4.33%						
Cl-	49.96%	49.98%	49.96%	49.97%	49.91%	49.91%	23.18%	49.87%	49.87%						
HCO3-	0.03%	0.02%	0.02%	0.02%	0.04%	0.04%	22.03%	0.06%	0.06%						
SO4-	0.02%	0.00%	0.01%	0.01%	0.04%	0.04%	4.79%	0.06%	0.06%						

short name	Jireh TB 1(	Grayhorse	Jireh TB 6/	Warren TB	~MS-2 10/	~MS-2 replica	MS-2 6/27/	MS-6 6/28/	MS-6 replicate 6/28/17	0	0	0	0	0	0	0
Cations	Jireh TB 1(	Grayhorse	Jireh TB 6/	Warren TB	~MS-2 10/	~MS-2 replica	MS-2 6/27/	MS-6 6/28/	MS-6 replicate 6/28/17 Ca	0 Cations	0 Cations	0 Cations	0 Cations	0 Cations	0 Cations	0 Cations
Na+K			1													
Ca			0													
Mg			-1													
Anions	Jireh TB 1(	Grayhorse	Jireh TB 6/	Warren TB	~MS-2 10/	~MS-2 replica	MS-2 6/27/	MS-6 6/28/	MS-6 replicate 6/28/17 An	0 Anions	0 Anions	0 Anions	0 Anions	0 Anions	0 Anions	0 Anions
Cl-			1													
HCO3-			0													
SO4-			-1													

fraction	Left Plot			Upper Plot: Cations & Anions = 200%				Right Plot		
	Ca	Mg	Na+K	Na+K	Ca+Mg	SO4+Cl	CO3+HCO3	CO3+HCO3	Cl	SO4
2 Jireh @ 18WSW 1-T27N-R7E: Ji	0.173	0.052	0.774	0.774	0.226	0.999	0.001	0.001	0.999	0.000
3 G.horse @ TBNW18-T27N-R8E:	0.161	0.056	0.783	0.783	0.217	1.000	0.000	0.000	1.000	0.000
WS-8 (Jireh TB)36.846536,-96.506	0.180	0.053	0.768	0.768	0.232	1.000	0.000	0.000	0.999	0.000
WS-9 (Warren American TB)36.84	0.174	0.050	0.775	0.775	0.225	1.000	0.000	0.000	0.999	0.000
1B (South of Rd)SE 12-T27N-R7E:	0.189	0.089	0.722	0.722	0.278	0.999	0.001	0.001	0.998	0.001
1C (South of Rd)SE 12-T27NR-7E:	0.188	0.093	0.719	0.719	0.281	0.999	0.001	0.001	0.998	0.001
WS-2 (Monitoring Station 2)36.832	0.318	0.183	0.499	0.499	0.501	0.559	0.441	0.441	0.464	0.096
WS-5 (Monitoring Station 6)36.827	0.147	0.087	0.766	0.766	0.234	0.999	0.001	0.001	0.997	0.001
WS-7 (Replicate 1 of WS-5)36.827	0.146	0.087	0.767	0.767	0.233	0.999	0.001	0.001	0.997	0.001

	Left Plot			Upper Plot: Cations & Anions = 200%				Right Plot		
	Ca	Mg	Na,K,NH4	Na,K,NH4	Ca+Mg	SO4,Cl,NO3	CO3+HCO3	CO3+HCO3	Cl	SO4+NO3-N
2 Jireh @ 18WSW 1-T27N-R7E: Ji	0.173	0.052	0.774	0.774	0.226	0.999	0.001	0.001	0.999	0.000
3 G.horse @ TBNW18-T27N-R8E:	0.161	0.056	0.783	0.783	0.217	1.000	0.000	0.000	1.000	0.000
WS-8 (Jireh TB)36.846536,-96.506	0.180	0.053	0.768	0.768	0.232	1.000	0.000	0.000	0.999	0.000
WS-9 (Warren American TB)36.84	0.174	0.050	0.775	0.775	0.225	1.000	0.000	0.000	0.999	0.000
1B (South of Rd)SE 12-T27N-R7E:	0.189	0.089	0.722	0.722	0.278	0.999	0.001	0.001	0.998	0.001
1C (South of Rd)SE 12-T27NR-7E:	0.188	0.093	0.719	0.719	0.281	0.999	0.001	0.001	0.998	0.001
WS-2 (Monitoring Station 2)36.832	0.318	0.183	0.499	0.499	0.501	0.559	0.441	0.441	0.464	0.096
WS-5 (Monitoring Station 6)36.827	0.147	0.087	0.766	0.766	0.234	0.999	0.001	0.001	0.997	0.001
WS-7 (Replicate 1 of WS-5)36.827	0.146	0.087	0.767	0.767	0.233	0.999	0.001	0.001	0.997	0.001

x,y	(1-Ca)	Left Plot		Right Plot		Center Plot		(1-Ca)	alt Left Plot		alt Right Plot		alt Center Plot		short name
2 Jireh @ 18WSW 1-T27N-R7E: Jireh TB 10/5/16	0.827	0.901	0.145	2.299	0.100	1.587	1.334	0.827	0.901	0.145	2.299	0.100	1.587	1.334	Jireh TB 10/5/16
3 G.horse @ TBNW18-T27N-R8E: Grayhorse TB 10/5/16	0.839	0.911	0.148	2.300	0.100	1.591	1.327	0.839	0.911	0.148	2.300	0.100	1.591	1.327	Grayhorse TB 10/5/16
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB 6/28/17	0.820	0.894	0.146	2.299	0.100	1.584	1.340	0.820	0.894	0.146	2.299	0.100	1.584	1.340	Jireh TB 6/28/17
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB 6/29/17	0.826	0.901	0.143	2.300	0.100	1.588	1.333	0.826	0.901	0.143	2.300	0.100	1.588	1.333	Warren TB 6/29/17
1B (South of Rd)SE 12-T27N-R7E: ~MS-2 10/5/16	0.811	0.867	0.177	2.299	0.101	1.560	1.379	0.811	0.867	0.177	2.299	0.101	1.560	1.379	~MS-2 10/5/16
1C (South of Rd)SE 12-T27NR-7E: ~MS-2 replicate 10/5/16	0.812	0.865	0.181	2.299	0.101	1.559	1.382	0.812	0.865	0.181	2.299	0.101	1.559	1.382	~MS-2 replicate 10/5/16
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2 6/27/17	0.682	0.691	0.258	1.812	0.183	1.229	1.191	0.682	0.691	0.258	1.812	0.183	1.229	1.191	MS-2 6/27/17
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6 6/28/17	0.853	0.909	0.175	2.298	0.101	1.582	1.341	0.853	0.909	0.175	2.298	0.101	1.582	1.341	MS-6 6/28/17
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate 6/28/17	0.854	0.910	0.175	2.298	0.101	1.583	1.340	0.854	0.910	0.175	2.298	0.101	1.583	1.340	MS-6 replicate 6/28/17
:															0
:															0
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:															0

	Aluminium	Ammonium	Boron	Barium	Berylium	Calcium	Cesium	Copper	Copper	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Mercury	Nickel	Potassium	Rubidium	Silver	Sodium
Cations	**Al**	**NH4**	**B**	**Ba**	**Be**	**Ca**	**Cs**	**Cu(1)**	**Cu(2)**	**Cu(3)**	**Fe**	**Pb**	**Li**	**Mg**	**Mn**	**Hg**	**Ni**	**K**	**Rb**	**Ag**	**Na**
MW	26.9815	18.0383	10.81	137.34	9.012	40.08	132.91	63.546	63.546	63.546	55.847	207.2	6.941	24.305	54.938	200.59	58.71	39.0983	85.47	107.868	22.98977
v	3	1	3	2	2	2	1	1	2	3	2	2	1	2	2	2	2	1	1	1	1
mg/mequiv	8.9938	18.0383	3.60333333	68.67	4.506	20.04	132.91	63.546	31.773	21.182	27.9235	103.6	6.941	12.1525	27.469	100.3	29.355	39.0983	85.47	107.868	22.98977

	Acetate	Arsenate	Bromide	Carbonate	Chloride	Chromate	Cyanide	Dichromate	Fluoride	Hydroxide	Iodide	Nitrate	Oxalate	Permanganate	Phosphate	Silicate	Sulfate	Sulfide	Sulfite	Thiocyanate	Thiosulfate
Anions	**CH3CO2**	**AsO4**	**Br**	**CO3**	**Cl**	**CrO4**	**CN**	**Cr2O7**	**F**	**OH**	**I**	**NO3**	**C2O4**	**MnO4**	**PO4**	**SiO3**	**SO4**	**S**	**SO3**	**SCN**	**S2O3**
MW	59.0445	138.9192	79.909	60.0092	35.453	115.9936	26.0177	215.9878	18.9984	33.0679	126.9044	62.0049	88.0196	118.9356	94.9716	76.084	96.0576	32.06	80.0582	58.0777	112.1182
v	-1	-3	-1	-2	-1	-2	-1	-2	-1	-1	-1	-1	-2	-1	-3	-2	-2	-2	-2	-1	-2
mg/mequiv	59.0445	46.3064	79.909	30.0046	35.453	57.9968	26.0177	107.9939	18.9984	33.0679	126.9044	62.0049	44.0098	118.9356	31.6572	38.042	48.0288	16.03	40.0291	58.0777	56.0591

	CaCO3	**CO2**						Bicarbonate													
MW	100.0892	44.0098		cos(60)	sin(60)	tan(60)		**HCO3**	**H2S**						**HPO4**	**SiO2**					
v	2			0.5	0.866025	1.732051		61.0171	34.0758						95.9726	60.084					
mg/mequiv	50.0446							-1	2	sign?					-2	1					
								61.0171	17.0379						47.9863	60.084					
	C	**H**	**N**	**O**	**S**	**Si**	**As**	**Cr**	**Co**												
MW	12.011	1.0079	14.0067	15.9994	32.06	28.0855	74.9216	51.996	58.933												
									+3												
									19.6443												
	NO3-N	**NO2-N**	**NH4-N**			**NO2**															
MW						46.0055															
v						1															
mg/mequiv		use N value				46.0055															
MCL mg/l	10				45																
	0.713944				0.725749																

Hardness

cations	Ca	Mg	Sr	Fe	Mn
	20.04	12.1525	43.81	27.9235	27.469
assoc anions	**HCO3**	SO4	Cl	NO3	SiO3
	61.0171	48.0288	35.453	62.0049	38.04185

Total Alkalinity	**CO3**	**HCO3**	**OH**			**pH**
	30.0046	61.0171	33.0679	pH >9.0	**MOA**	4.5
	PPA > MOA/2		PPA > MOA/2		**PPA**	8.3
	PPA = MOA					
	PPA < MOA/2	PPA < MOA/2				
		PPA = 0				
			PPA = MOA	pH >9.0		
		pH < 8.3				

	Strontium	Tin	Zinc
Cations	**Sr**	**Sn**	**Zn**
MW	87.62	118.69	65.37
v	2	2	2
mg/mequiv	43.81	59.345	32.685

Anions
MW
v
mg/mequiv

MW
v
mg/mequiv

MW

MW
v
mg/mequiv

MCL mg/l

Hardness
cations

assoc anions

Total Alkalinity

fraction								0 Left Plot		0	0 Right Plot		0	
	0	**%Ca**	**%Mg**	**%Na+K**	**%CO3+HCO3**	**%Cl**	**%SO4**	**Ca**	**Mg**	**Na+K**	**CO3+HCO**	**Cl**	**SO4**	**sum**
2 Jireh @ 18WSW 1-T27N-R7E: Jireh TB 10/5/16		-8.65%	-2.62%	-38.72%	0.03%	49.96%	0.02%	0.173038	0.052463	0.774364	0.000606	0.99909	0.000304	1.999866
3 G.horse @ TBNW18-T27N-R8E: Grayhorse TB 10/5/16		-8.05%	-2.80%	-39.15%	0.02%	49.98%	0.00%	0.161003	0.055995	0.782961	0.000411	0.999507	8.16E-05	1.999958
WS-8 (Jireh TB)36.846536,-96.506097: Jireh TB 6/28/17		-8.98%	-2.63%	-38.39%	0.02%	49.96%	0.01%	0.179506	0.052675	0.767813	0.000446	0.999278	0.000276	1.999993
WS-9 (Warren American TB)36.840077,-96.499939: Warren TB 6/29/17		-8.72%	-2.51%	-38.77%	0.02%	49.97%	0.01%	0.174352	0.050188	0.775455	0.000376	0.999441	0.000183	1.999995
1B (South of Rd)SE 12-T27N-R7E: ~MS-2 10/5/16		-9.44%	-4.47%	-36.09%	0.04%	49.91%	0.04%	0.188731	0.089418	0.721849	0.000869	0.998244	0.000887	1.999997
1C (South of Rd)SE 12-T27NR-7E: ~MS-2 replicate 10/5/16		-9.39%	-4.67%	-35.94%	0.04%	49.91%	0.04%	0.18784	0.093403	0.718755	0.00087	0.998249	0.000881	1.999997
WS-2 (Monitoring Station 2)36.832135,-96.498664: MS-2 6/27/17		-15.91%	-9.13%	-24.96%	22.03%	23.18%	4.79%	0.318227	0.182529	0.499095	0.440629	0.463656	0.095715	1.999851
WS-5 (Monitoring Station 6)36.827810,-96.501613: MS-6 6/28/17		-7.37%	-4.35%	-38.29%	0.06%	49.87%	0.06%	0.14736	0.086907	0.765732	0.001274	0.997478	0.001248	1.999999
WS-7 (Replicate 1 of WS-5)36.827810,-96.501613: MS-6 replicate 6/28/17		-7.32%	-4.33%	-38.35%	0.06%	49.87%	0.06%	0.146381	0.086637	0.766981	0.001275	0.997477	0.001248	1.999999
:														0
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Initial Meeting with Jireh Resources, LLC and Warren American Oil Company

August 15, 2017

For Settlement Purposes

Purpose of today's meeting

- EPA will present technical data and discuss concerns
- Engage in dialogue about next steps

BACKGROUND

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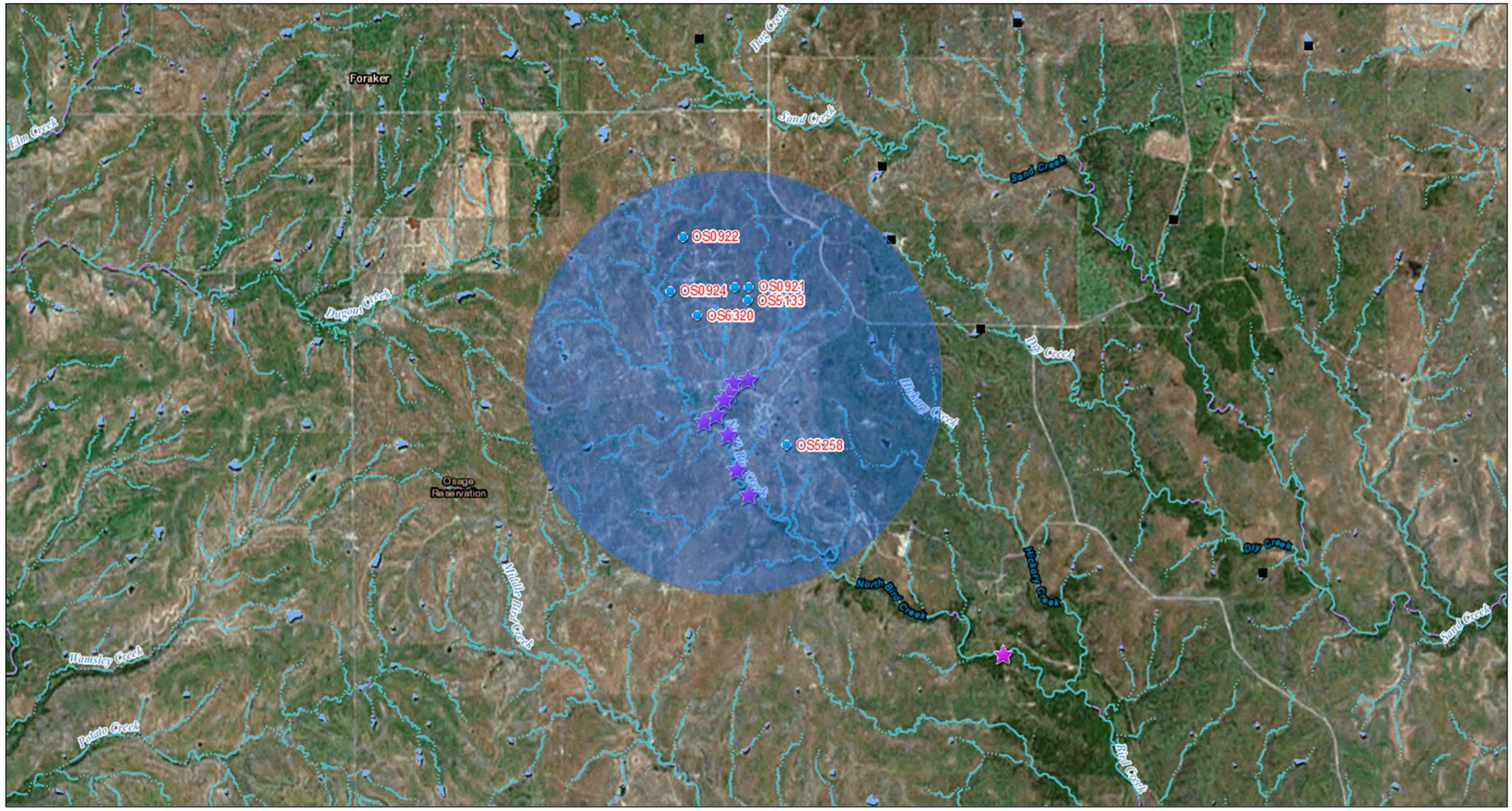
- EPA Osage staff confirmed impacts
- R6 EN staff onsite in August 2016 and found:
  - High Total Dissolved Solids (TDS) and elevated temperature

Monitoring Station Locations in North Bird Creek Area, Osage County, Oklahoma



August 15, 2017

Injection Wells of Concern

Proximity to Monitor Station 6 (2 Miles)

In-Stream Monitoring Station

1:72,224

0 0.75 1.5 3 mi

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USGS The National Map: National Hydrography Dataset. Data Refreshed April, 2017.
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
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Jeanne Eckhart

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EPA INVESTIGATION ACTIVITIES

- Looked at wells proximity to elevated TDS levels within tributary – 2 mile radius
- Multiple stream surveys conducted since August 2016 within the area of concern.
- In-stream monitoring network at 10 locations
  - 8 locations have both shallow and deep probes
- Surface water grab sampling conducted in October 2016 and June 2017
  - Sampling taken at the bottom of the stream channel
  - Cation/anion analysis conducted
- 6 nearest injection wells had mechanical integrity test (MIT) May 2017 (7th had already lost mechanical integrity)

EPA INVESTIGATION ACTIVITIES (Cont.)

- Coordinated shut-in test of 5 of the 7 nearby injection wells (two shut in for MIT failures) to measure static fluid levels in the Mississippi Chat in June 2017
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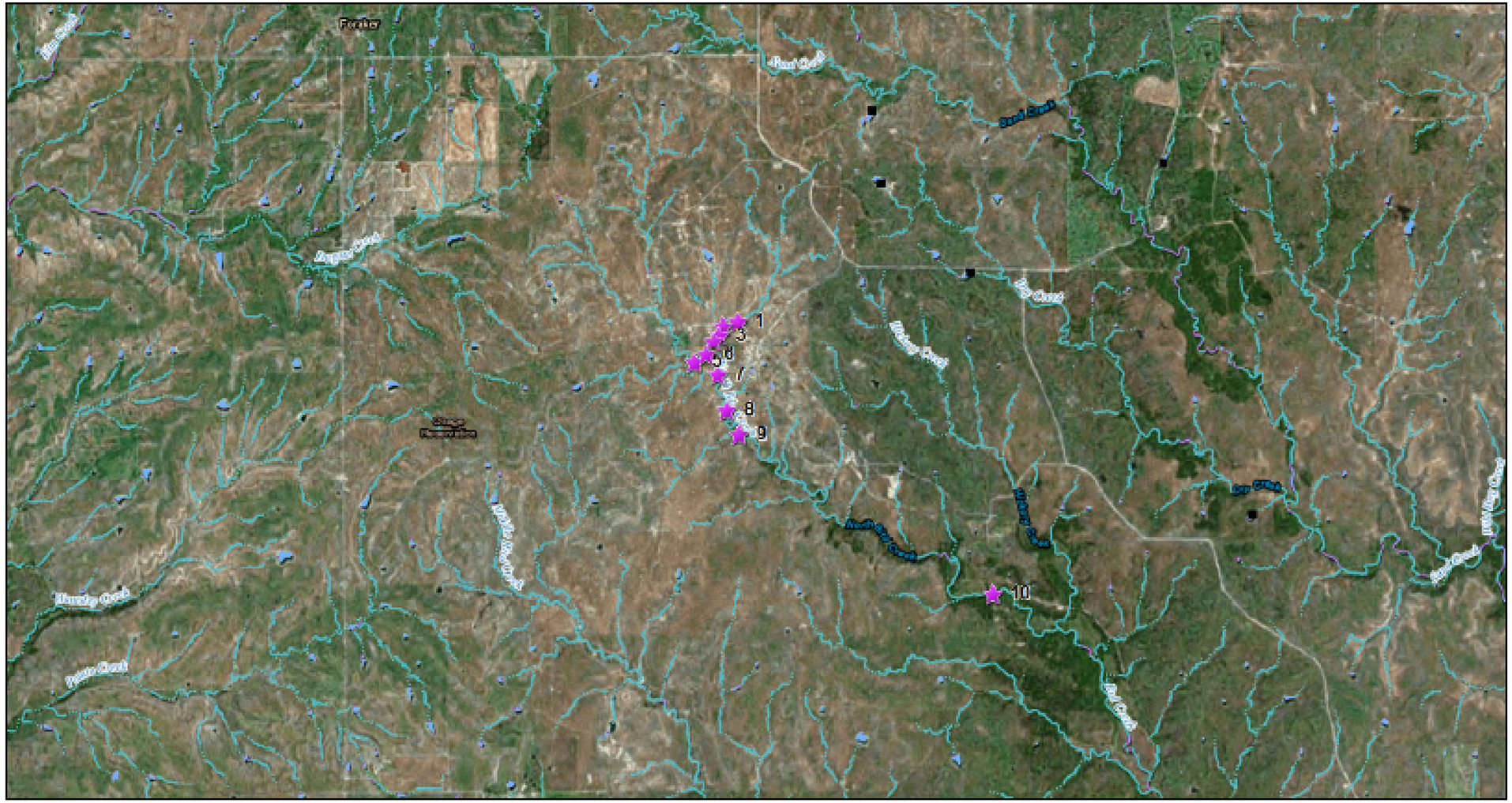

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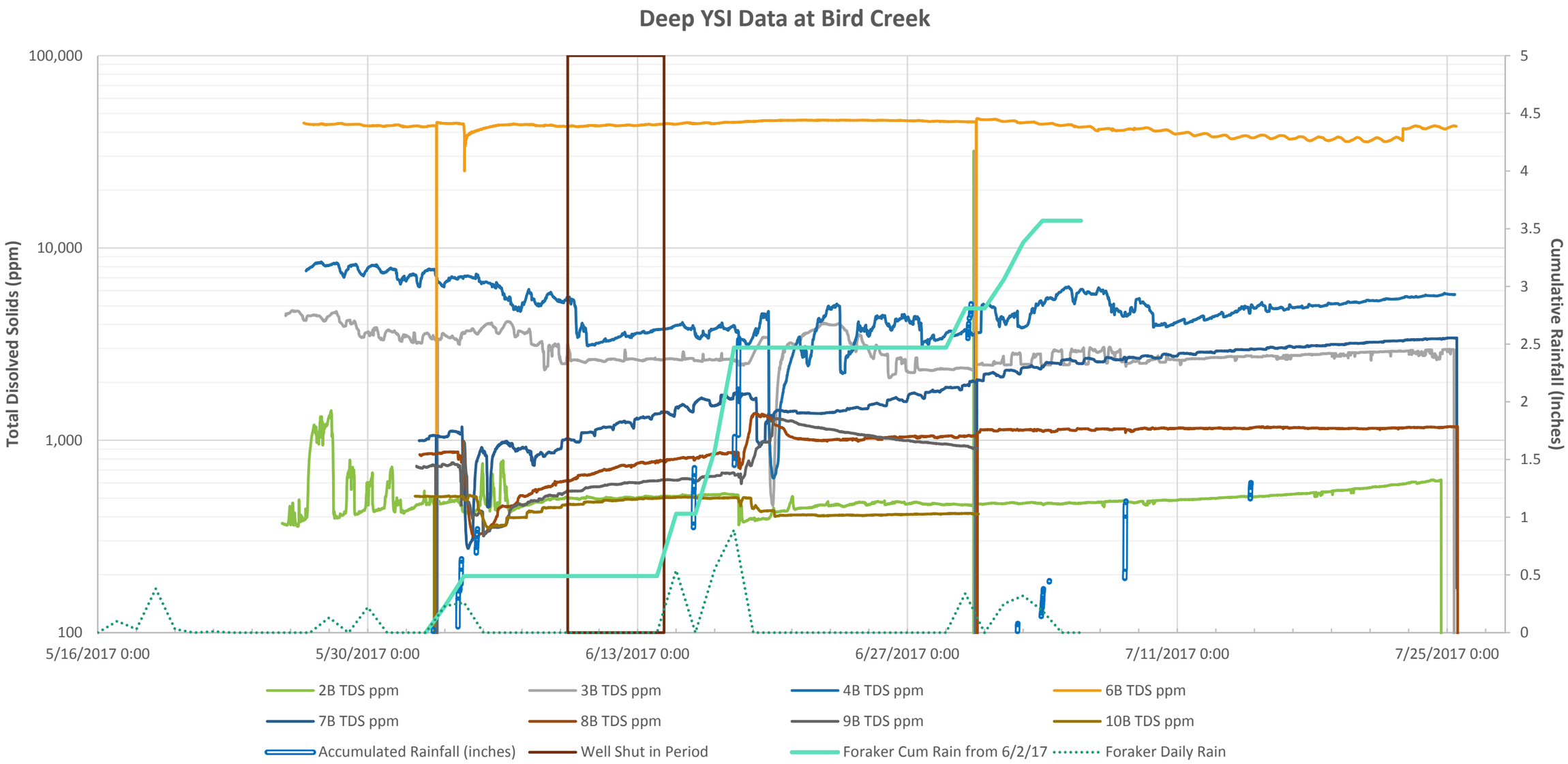
Surface Water Quality at MS2

- TDS initially over 80,000 ppm in August 2016
- After Jireh's MI repair in Sept 2016
  - Injection volumes increased
  - TDS in-stream began dropping
  - At 15,800 ppm TDS on May 9, 2017
- After Novy/Grayhorse shut in on May 9, 2017
  - On May 18, 2017, TDS in-stream dropped to 4,900 ppm
- TDS is now below 1,000 ppm

Jireh Resources
Disposal Well OS6320 (18W)

- Lost mechanical integrity before August – September 2016
- Closest well to original location (MS2)
- Repaired/resumed injection early September
- High volume (up to 80K bbls/month)
- High pressure 220 psi


Deep YSI Data at Bird Creek
Total Disolved Solids (ppm)
100,000
10,000
1,000
100
Cumulative Rainfall (Inches)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
5/16/2017 0:00
5/30/2017 0:00
6/13/2017 0:00
6/27/2017 0:00
7/11/2017 0:00
7/25/2017 0:00
2B TDS ppm
3B TDS ppm
4B TDS ppm
6B TDS ppm
7B TDS ppm
8B TDS ppm
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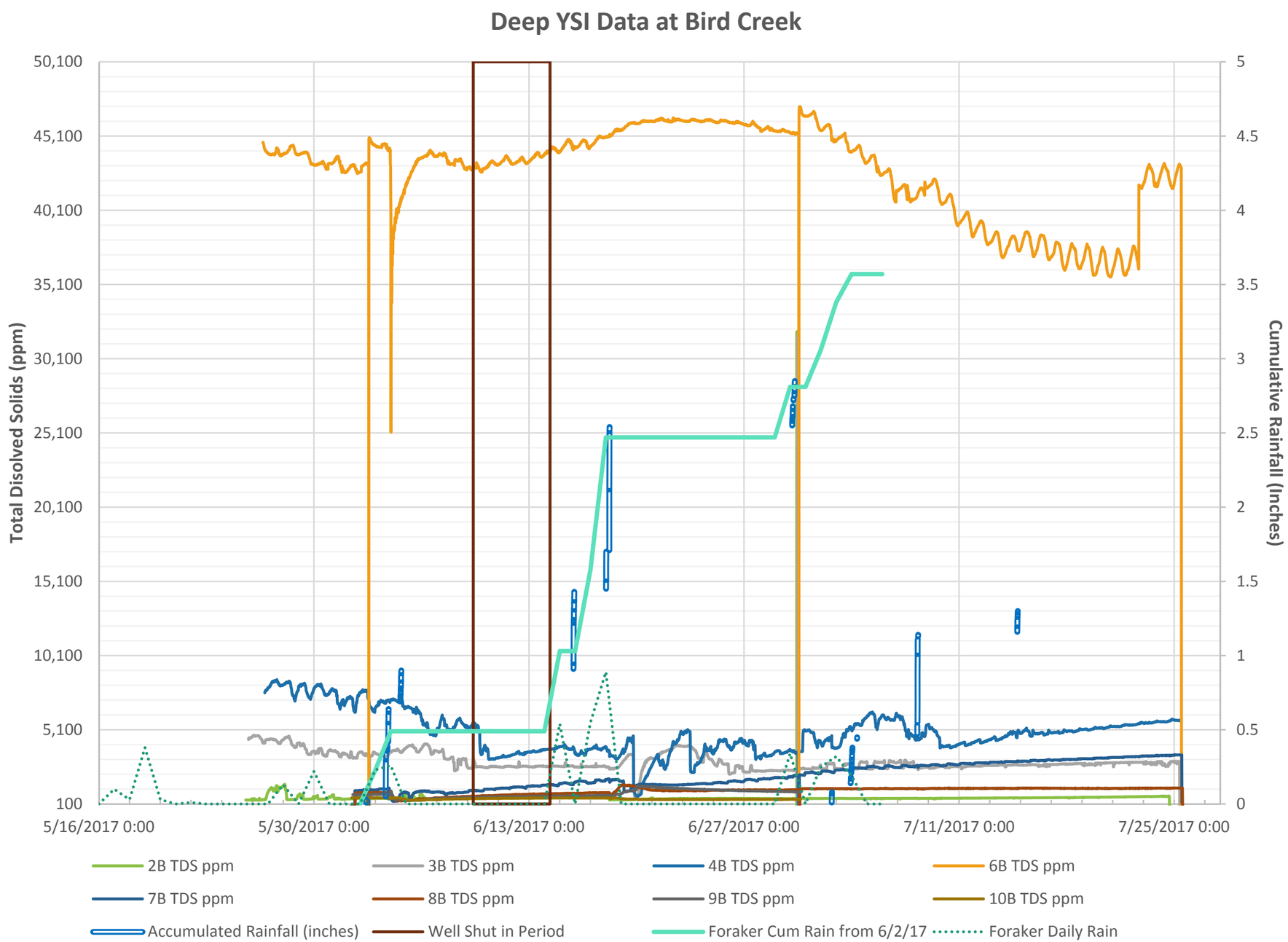
10B TDS ppm
Accumulated Rainfall (inches)
Well Shut in Period
Foraker Cum Rain from 6/2/17
Foraker Daily Rain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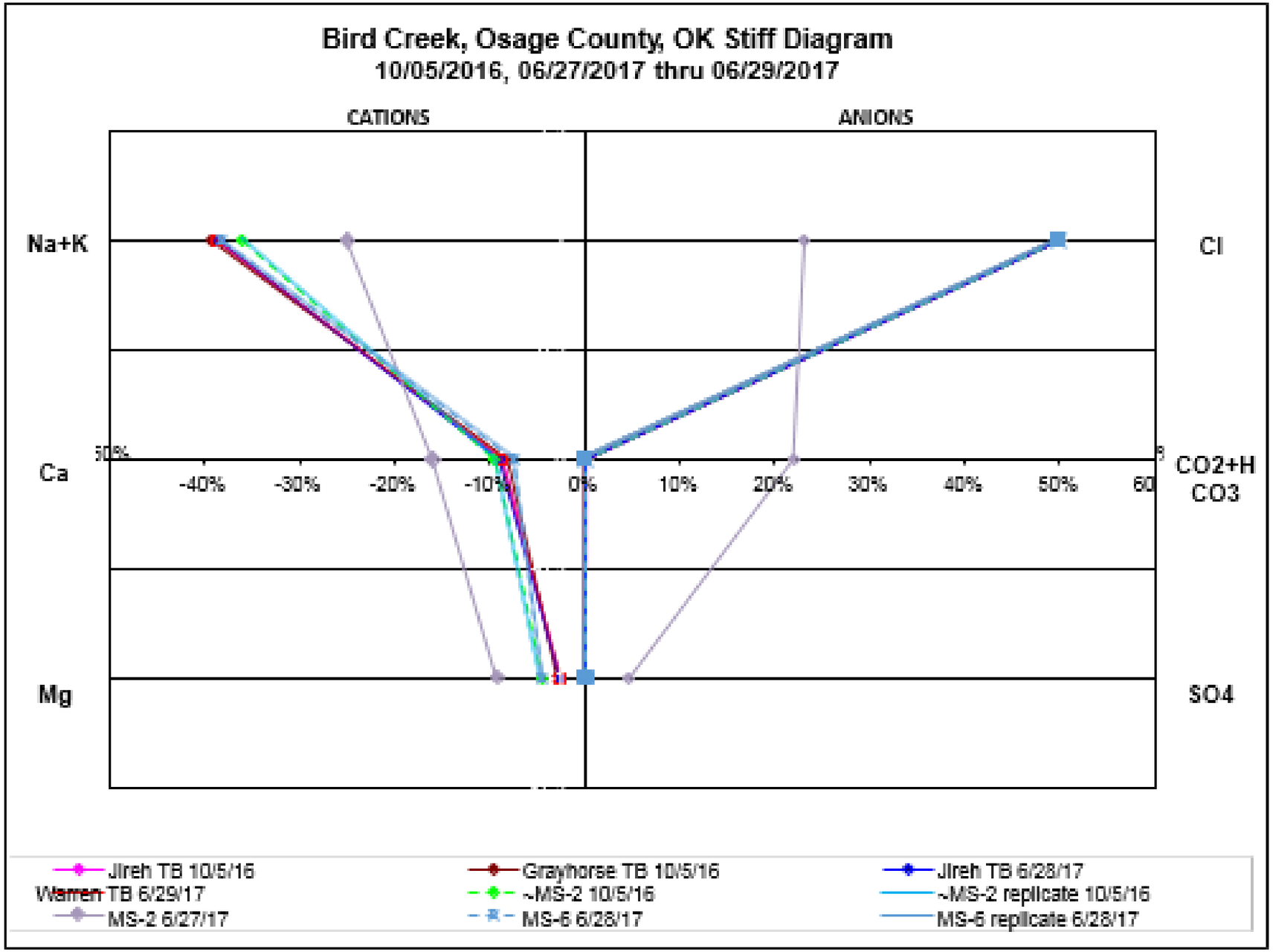
Bird Creek, Osage County, OK Stiff Diagram
10/05/2016, 06/27/2017 thru 06/29/2017
CATIONS
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Na+K
Ca
Mg
Cl
CO2+H CO3
SO4
-40%
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0%
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20%
30%
40%
50%
Jireh TB 10/5/16
Grayhorse TB 10/5/16
Jireh TB 6/28/17
Warren TB 6/29/17
~MS-2 10/5/16
~MS-2 replicate 10/5/16
MS-2 6/27/17
MS-6 6/28/17
MS-6 replicate 6/28/17

KEY FINDINGS

- High TDS waters in the stream are a match for the waters being produced from, and injected into, the Mississippian formation
- The high TDS waters are persistent (rebuilding in concentration after rain events) and hot temperatures
- Injection well cyclical variations

KEY FINDINGS (cont.)

- Coordinated shut-in test showed static fluid levels in the Mississippian Chat cannot flow fluids to the surface without additional pressure buildup provided by injection operations
- Static fluid levels in 4 of the 7 injection wells are above the base of the USDW
- Grab samples along tributary and North Bird Creek, Jireh well 18W, Grayhorse/Novy tank battery and Warren tank battery. Cation/anion analyses show correlation.

Next steps

- Immediately shut-in and disconnect injection piping from the wellheads until it can be proven that injected fluids are being confined to the authorized injection zone.
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Initial Meeting with Novy/Grayhorse

August 29, 2017

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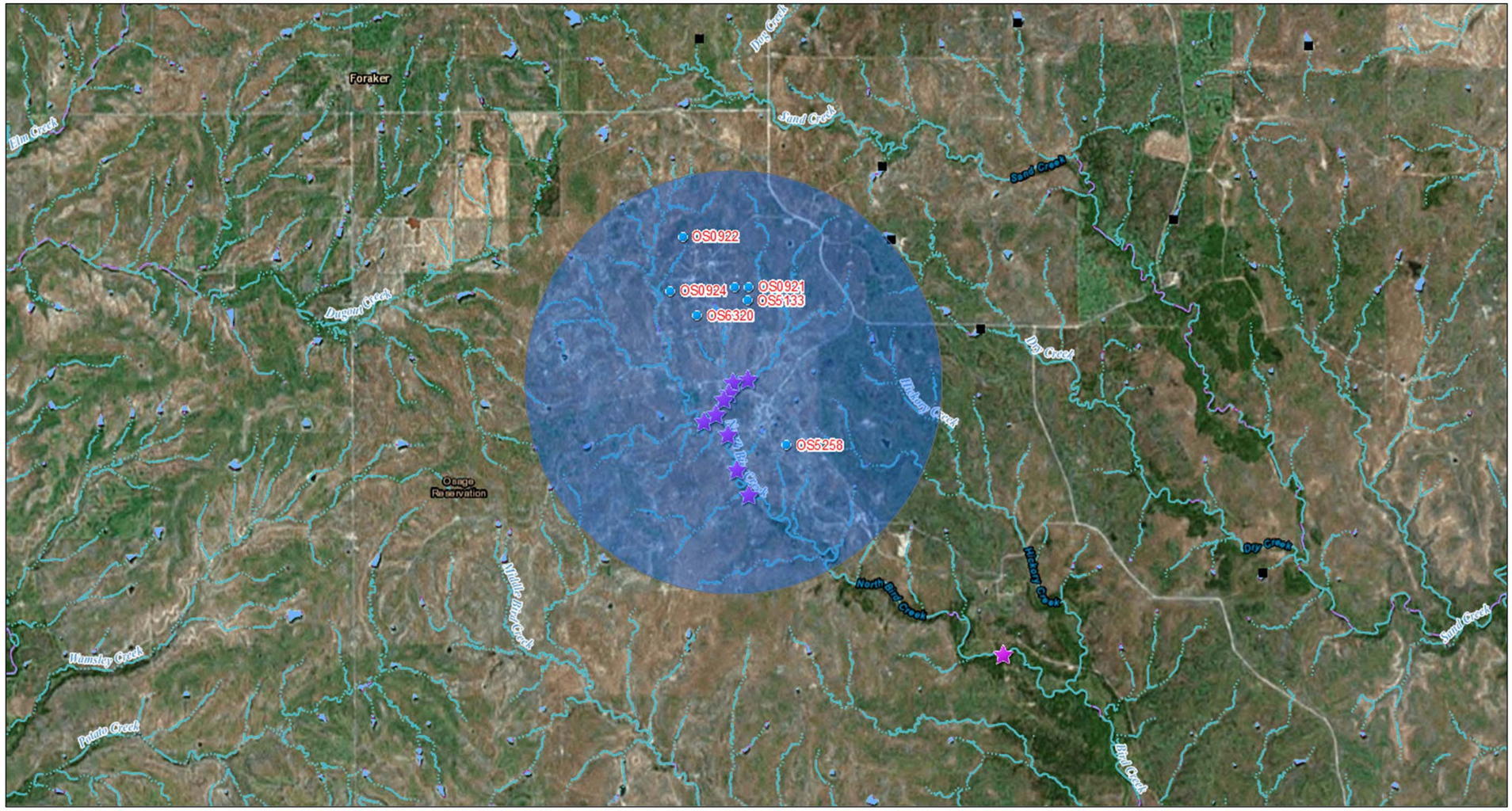

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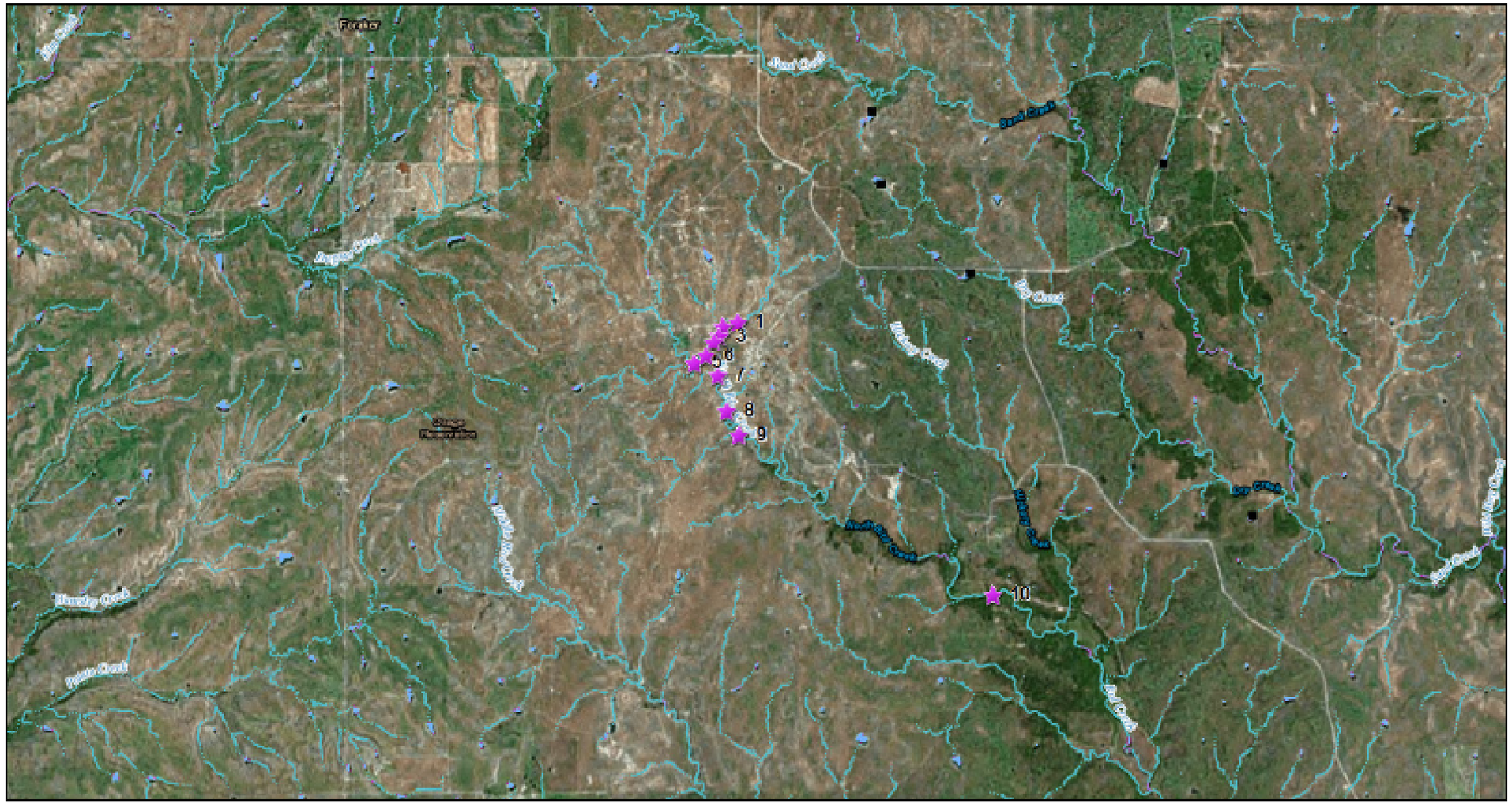

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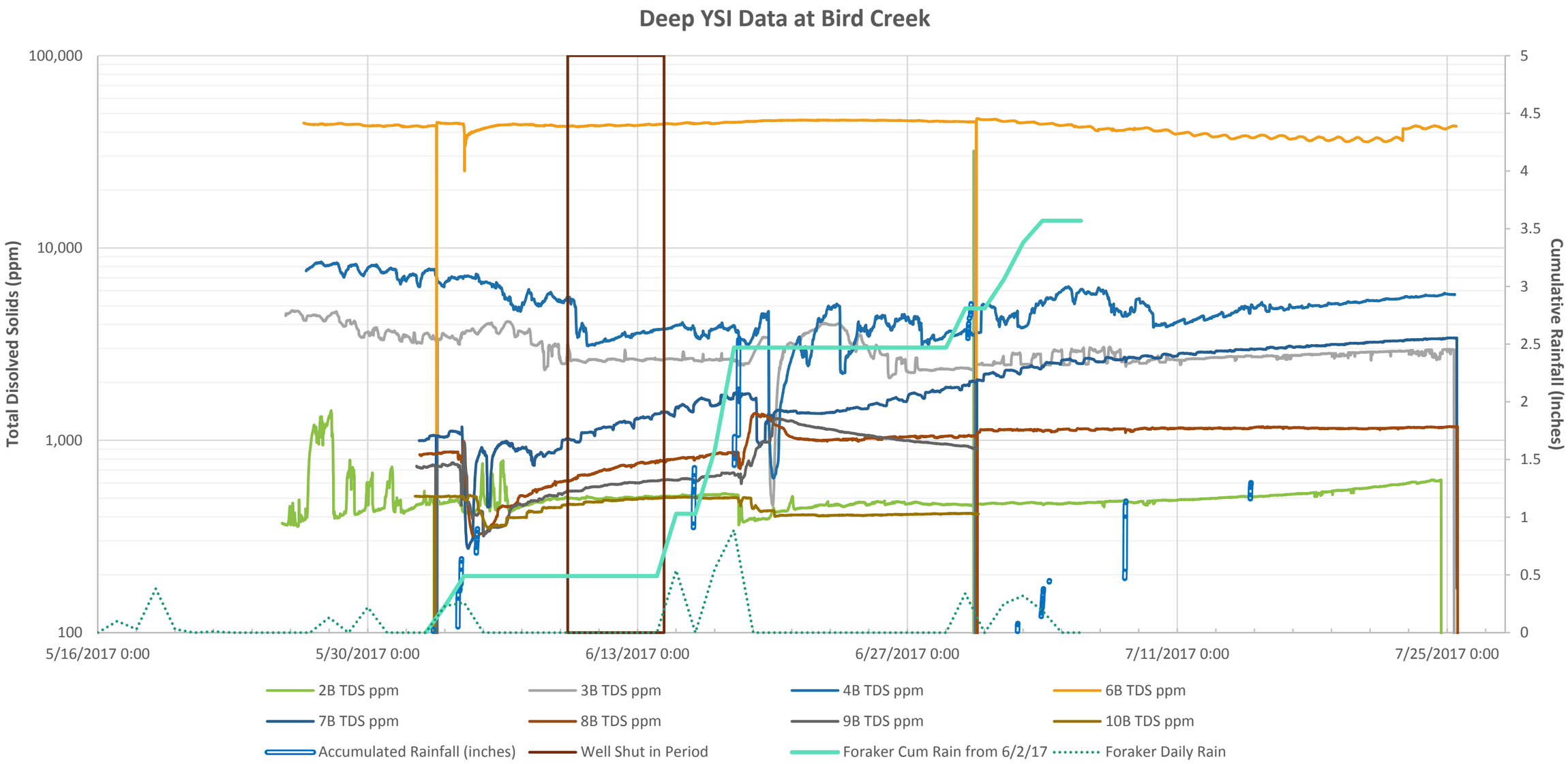
Novy Oil and Gas/Grayhorse Operating Disposal Well OS5258

- Failed MIT May 4, 2017
- Authorization to Inject terminated May 24th
- Third closest well to original location (MS2)
- High volume (up to 102K bbls/month)
- Low pressure (0 psi)
- Extreme corrosion of the tubing
- Operator preparing P&A plan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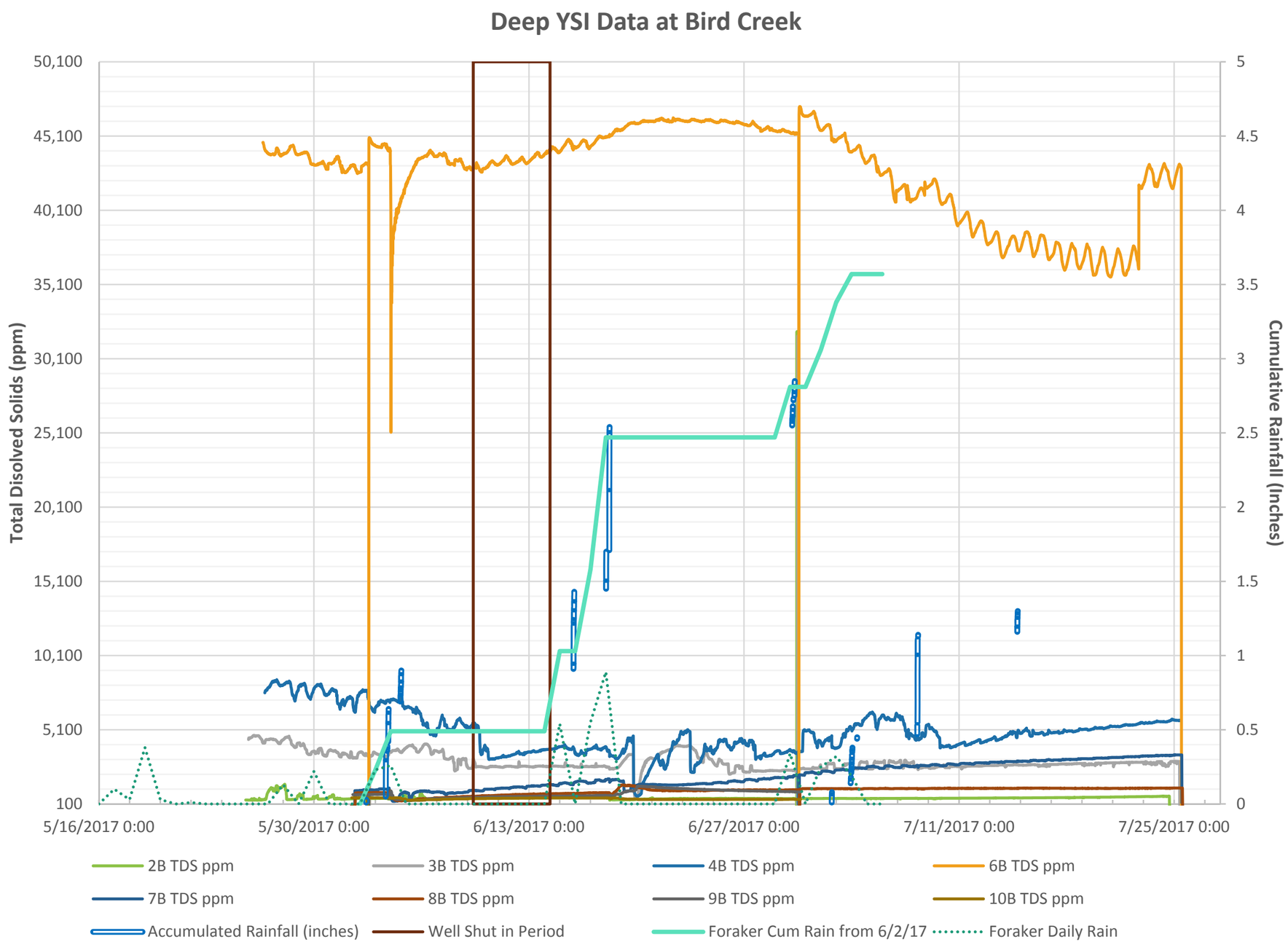
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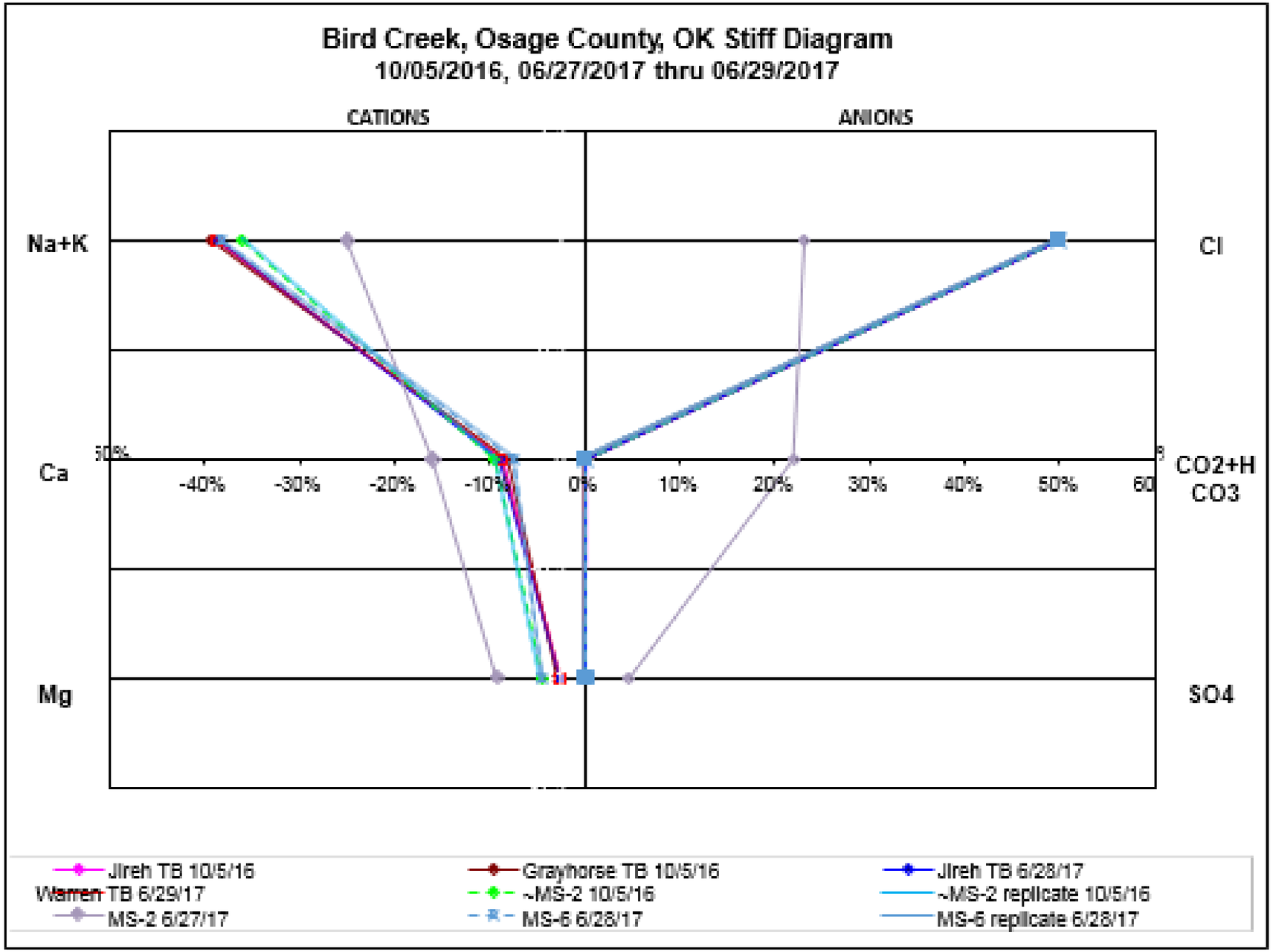
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