FORM
27
Rev 6/99

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303)894-2100 Fax:(303)894-2109

FOR OGCC USE ONLY

OGCC Employee:
☐ Spill ☐ Complaint
☐ Inspection ☐ NOAV
Tracking No:

SITE INVESTIGATION AND REMEDIATION WORKPLAN

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. Form 27 is intended to be used whenever possible. Additional documentation will be required when large volumes of soil and groundwater have been impacted or involve large facilities with multiple source areas. See Rule 910. Attach as many pages as needed to fully describe the proposed work.

CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED

☐ Spill or Release ☐ Plug & Abandon ☐ Central Facility Closure ☐ Site/Facility Closure ☑ Other (describe): See attached supplement

OGCC Operator Number: 10322
Name of Operator: East Cheyenne Gas Storage, LLC
Address: 10370 Richmond Ave, Suite 510
City: Houston, Texas State: TX Zip: 77042

Contact Name and Telephone:
Ron Richards
No: (713) 403-6479
Fax:

API Number:
County: Logan
Facility Name: Peetz West Field
Facility Number:
Well Name: Langness Water Well (Ron Nelson)
Well Number:
Location: (QtrQtr, Sec, Twp, Rng, Meridian): NENE Sec 6 T11N R52W Latitude: 40.962236 Longitude: -103.212523

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc): Natural Gas

Site Conditions: Is location within a sensitive area (according to Rule 901e)? ☐ Y ☑ N If yes, attach evaluation.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Dry Land Frarming & Non-Crop

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan:

Potential receptors (water wells within 1/4 mi, surface waters, etc.): Shallow groundwater at approximately 550 to 1150 feet

Description of Impact (if previously provided, refer to that form or document):

Impacted Media (check):	Extent of Impact:	How Determined:
☐ Soils		
☐ Vegetation		
☑ Groundwater	Not yet determined - Still evaluating	Water & Isotope analysis
☐ Surface Water		

REMEDIATION WORKPLAN

Describe initial action taken (if previously provided, refer to that form or document):

See attached supplement to this Form 27.

Describe how source is to be removed:

Under investigation / analysis. Required plan to be developed.

Describe how remediation of existing impacts is to be accomplished, including removal and disposal at an injection well or licensed facility, land treatment on site, removal of impacted groundwater, insitu bioremediation, burning of oily vegetation, etc.:

Under investigation / analysis. Required plan to be developed.

Submit Page 2 with Page 1

FORM
27
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Page 2

State of Colorado
Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801, Denver, Colorado 80203
(303)894-2100 Fax:(303)894-2109

Tracking Number: _____
Name of Operator: _____
OGCC Operator No: _____
Received Date: _____
Well Name & No: _____
Facility Name & No: _____

REMEDIATION WORKPLAN (Cont.)

OGCC Employee:

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):

Under investigation / analysis. Required plan to be developed.

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required.

Under investigation / analysis. Required plan to be developed.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing.

Is further site investigation required? ☑ Y ☐ N If yes, describe:

See attached supplement to this Form 27.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):

Under investigation / analysis. Required action plan to be developed.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 10/08/15 Date Site Investigation Completed: _____ Date Remediation Plan Submitted: _____

Remediation Start Date: TBD Anticipated Completion Date: _____ Actual Completion Date: _____

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete.

Print Name: Ron Richards Signed: Ron Richards

Title: Sr. Vice President - Engineering and Operations Date: December 23, 2015

OGCC Approved: _____ Title: _____ Date: _____

East Cheyenne Gas Storage (ECGS)
OGCC Operator Number: 10322
Initial Form 27 Submittal – December 23, 2015

Supplement to Form 27:

On or about October 5, 2015 East Cheyenne Gas Storage (ECGS) received a call from Ron Nelson who rents a home located within the storage field area boundaries of the East Cheyenne Gas Storage Project. Mr. Nelson communicated to ECGS that the water flowing from his domestic water supply well was dirty and gassy. The subject water well is completed in the Fox Hills aquifer. The approximate TD is 1020 ft.

Initial thoughts were he was experiencing this issue due to increased microbial activity in the water well as prior bi-annual analyses commissioned by ECGS indicated the presence of microbial gas in same (see attached Vista Geoscience dated January 2015). In response to Mr. Nelson's water issues, ECGS engaged Dolan Integration Group (DIG) to collect water and gas samples from the subject well, as well as, the four other domestic water supply wells located within the storage field area boundaries that are a part of ECGS' bi-annual testing program and have compositional and isotopic analyses performed. These samples were collected on November 12, 2015

ECGS received preliminary results of the analyses on December 8, 2015, which indicated the presence of both microbial gas and thermogenic gas in the Nelson domestic water supply. On December 9, 2015 ECGS contacted both Matt Lepore (COGCC Executive Director) and John Axelson (COGCC East Environmental Supervisor) to inform the commission of these preliminary results. ECGS emailed a copy of the preliminary analysis results to Mr. Axelson. No thermogenic gas was present in the other four wells sampled.

ECGS has been working with Mr. Nelson to mitigate the presence of gas in his domestic water supply. ECGS procured and on December 17, 2015 installed a Spirovent Jr Model No. VJR100TM inline separator/air eliminator (see attached brochure, and, pre and post installation pictures). Initial feedback from Mr. Nelson is he has seen a dramatic reduction in the amount of gas in the water supply to his home. ECGS will continue to monitor the performance of this device and adjust and/or modify as warranted.

On December 11, 2015 ECGS collected samples of ECGS storage gas from the closest injection/withdrawal well to the Nelson water well and sent same to DIG for compositional and isotopic analysis. DIG will compare the results of this analysis to the results of the abovementioned Nelson water well analysis in an effort to determine if it is possible the gas present in the Nelson well is ECGS storage gas. ECGS expects to receive preliminary results by the 1st or 2nd week of January 2016. ECGS will provide a copy of the analysis to the COGCC when received.

Concurrent to the above activities ECGS has been and continues to review and evaluate well completion, cementing and P&A records in an effort to determine if there may be an obvious issue with any of our storage wells or P&A'd wells within the storage field area. In addition, ECGS is reviewing Fox Hills aquifer hydrology to better understand water flow movement in and around the ECGS storage facility.

Once results of subsequent gas analyses are received and evaluated, and, if it is determined that the probable source of the thermogenic gas in Mr. Nelson's well is ECGS storage gas, ECGS will develop and provide to the COGCC a detailed plan to: identify the location of source; eliminate the source; remediate any damage to the Fox Hills aquifer; and, perform post repair and mitigation monitoring of the Fox Hills aquifer.

ECGS will keep the COGCC apprised of any developments as they arise. Further, ECGS will provide an update to the COGCC the 2nd week of January.

Nelson Water Supply Prior to Installation of Separator / Air Eliminator

Inline Separator / Air Eliminator -- Post Installation

Inline Separator / Air Eliminator Outside Vent Piping

SPIROVENT® JUNIOR

MICROBUBBLE™ SEPARATORS
DIRT SEPARATORS
COMBINATION AIR/DIRT SEPARATORS

SPIROTHERM

THE ULTIMATE IN DISTRIBUTION EFFICIENCY

PERMANENTLY AIR-FREE SYSTEM WATER

AIR IN SYSTEM WATER CAUSES MANY PROBLEMS.

Noisy pipes, valves, and other air-related noises are often accepted as the signs of a functioning system. Excessive pump noise, cavitation, and cascading in terminal units are considered normal.

But... air in system water can cause corrosion, reduced efficiency, poorly heated or inadequately cooled rooms, accelerated component wear and on-going complaints.

There is a device that will keep your system free of air ... permanently. Less maintenance, quiet operation, fewer costs!

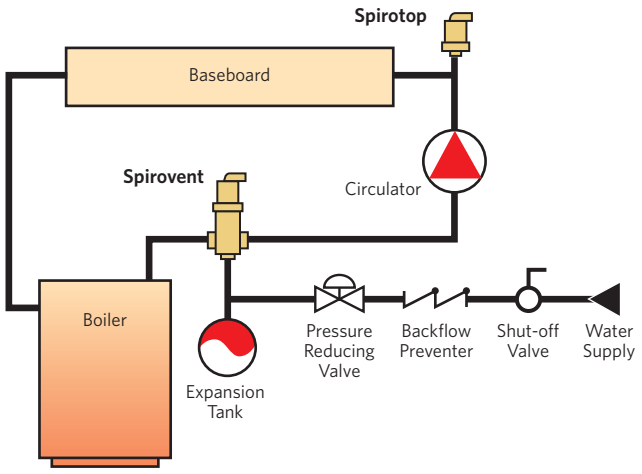
The name:

SPIROVENT

Unlike conventional air eliminators or air scoops, the Spirovent completely eliminates 100% of the free air, 100% of the entrained air, and up to 99.6% of the dissolved air in the system. Consisting of woven copper wire soldered to a copper tube, the patented Spirotube® creates a low velocity area in the Spirovent that scrubs the bubbles from the water. The air bubbles rise and collect in the air chamber before they are vented from the system via an integral automatic valve. Air problems become a thing of the past.

INSTALL THE SPIROVENT FOR OPTIMUM PERFORMANCE

Ideal placement of the Spirovent Junior is based on microbubble separation and Henry's Law*. Simply put, Henry's Law states that air is released from water as the temperature increases or the pressure decreases. In hydronic heating systems, the Spirovent should be installed in the boiler supply line where the temperature is highest. Should the circulator be located on the supply line as well, the Spirovent should be installed between the boiler and the circulator where pressure is also the lowest.

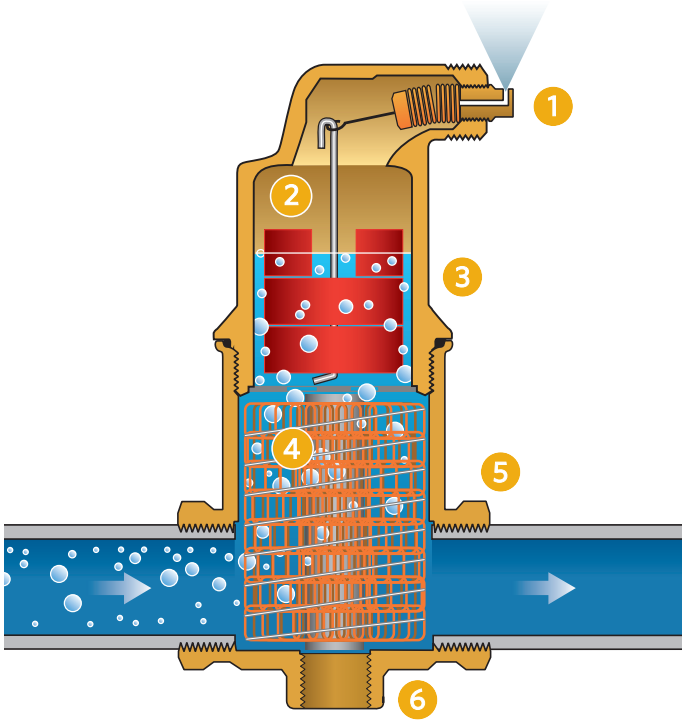


*For more detailed technical information, ask about our Spirotism booklet .

ADVANTAGES TO THE INSTALLER AND END-USER

- Maintenance free.
- No venting required.
- Vent head is designed to stay dry. Dirt and leak resistant.
- ½" male thread port for pressure testing or remote venting of unwanted gases.
- Quiet operation.
- Increased component life.
- Reduced oxygen-based corrosion and pump cavitation.

THE KEY DIFFERENCE



1. Unique valve mechanism is guaranteed not to leak and cannot be shut off. Standard thread for vent pipe connection or pressure testing.
2. Specially constructed air chamber to protect the valve mechanism from dirt. Sufficient volume to handle pressure fluctuations.
3. Solid brass construction for extended service life.
4. The unique Spirotube is the core of the Spirovent. Designed to trap even the smallest microbubbles, yet it offers little resistance to flow.
5. Threaded or sweat connections available.
6. ½" tank mount (not available on vertical models).

The Spirotube is the core of the Spirovent. It allows the Spirovent to scrub out 100% of the free air, 100% of the entrained air, and up to 99.6% of the dissolved air in the system. Even the smallest microbubbles coalesce and rise. Air is eliminated, component life and heat transfer abilities are increased; oxygen-based corrosion and pump cavitation are reduced; and annoying gurgling, cascading, and other air-related system noises are eliminated.

CLEAN SYSTEM WATER THROUGHOUT THE LIFE OF THE INSTALLATION

The life and efficiency of a heating or cooling system is greatly dependent on clean system water. Dirt in the system can cause increased component wear and frequent breakdowns. Corrosion, pump and control valve wear, and reduced efficiency result in increased maintenance, unnecessary costs and dissatisfied owners. Strainers and filters do the job, but if not cleaned on a regular basis, they cause low flow rates and, eventually, blockages.

There is a solution!

A system without dirt is possible. There is a unique device that will remove dirt down to the smallest particle. It works continuously and results in less maintenance, fewer costs and satisfied owners!

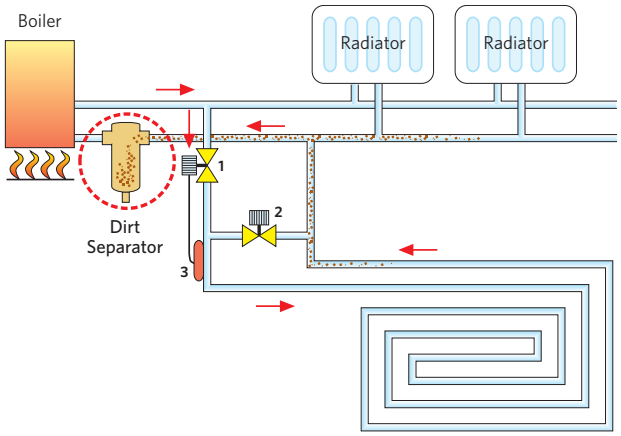
The name:

SPIROTRAP

The Spirotrap's construction is similar to the Spirovent. The patented Spirotube, core of the Spirovent, is also the core of the Spirotrap. In the Spirotrap, the Spirotube creates a low velocity area that forces dirt particles to sink to the dirt collection chamber at the bottom of the unit. Because the dirt is collected outside of the main flow, blockages do not occur, and the Spirotrap's pressure drop remains constant.

THE BENEFITS ARE CLEAR!

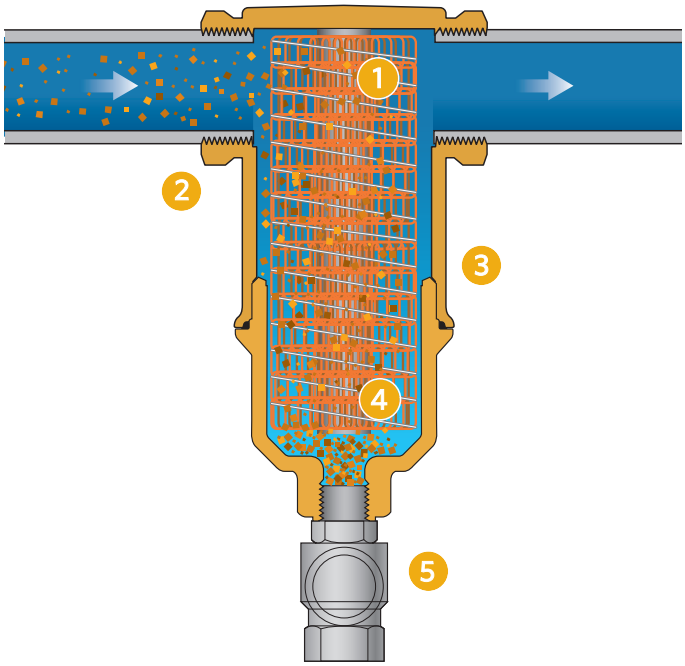
The Spirotrap is so much more than your traditional separator! The unique construction of the Spirotrap dirt separator allows for quick and simple dirt removal while the system remains fully operational, whereas traditional products need to be taken apart for cleaning. There are no strainers, filters or replacement parts to get clogged! Flow remains constant without the high pressure drop. Clearly beneficial, clearly Spirotrap!



ADVANTAGES TO THE INSTALLER AND END-USER

- Virtually no maintenance.
- No replacement filters to get clogged.
- Dirt can be flushed while system is fully operational.
- No bypass or isolating valves required.
- Will not block the flow.
- Minimum pressure drop; always constant.

THE KEY DIFFERENCE



1. The unique Spirotube is the core of the Spirotrap. Designed to allow even the smallest dirt particle to break free of the flow path and drop to the collection chamber.
2. Threaded or sweat connections available.
3. Solid brass construction for extended service life.
4. Large collection chamber reduces the need for frequent cleaning.
5. Drain valve for flushing out the dirt.

Spirotrap's unique construction allows for the removal of small dirt particles with a specific weight heavier than water. The patented Spirotube, the core of the Spirotrap, creates a low velocity area that forces dirt particles to sink to the dirt collection chamber at the bottom of the unit. The Spirotrap works continuously and is not affected by the trapped dirt. Blockages are impossible because the dirt is collected at the bottom of the unit.

AIR- AND DIRT-FREE SYSTEM WATER THROUGH A SINGLE UNIT

The life and efficiency of a heating or cooling system are greatly dependent on the quality of the system water. Air and dirt problems cause frequent breakdowns and increased customer complaints. Corrosion, cavitation, and component wear are consequences of air-saturated, dirty water. Recurring problems and increased maintenance results in unnecessary costs and dissatisfied owners.

There is a solution!

A system without air and dirt is possible! There is a unique dual-purpose device that will remove air and dirt down to the smallest particle, keeping the system free from air and dirt, permanently. It requires little maintenance, and works without strainers or filters. Less maintenance, fewer costs, satisfied owners!

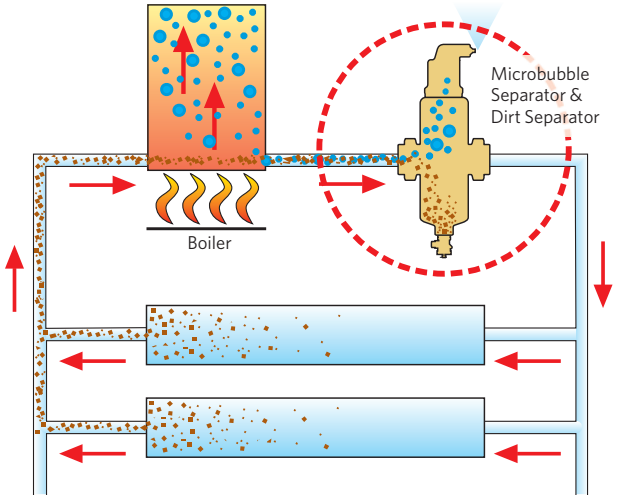
The name:

SPIROVENT VDR

The unique construction of this combined unit allows for the removal of both entrained air and dirt particles. The patented Spirotube®, the core of the Spirovent Dirt unit, causes dirt particles of all sizes to sink to the bottom of the unit and collect in the dirt chamber, eliminating any blockage concerns. The air bubbles rise and collect in the air chamber before being released via an integral automatic valve. The dirt can be flushed through the drain while the system remains fully operational. The large dirt collection chamber ensures infrequent flushing.

INSTALL THE SPIROVENT VDR FOR OPTIMUM PERFORMANCE

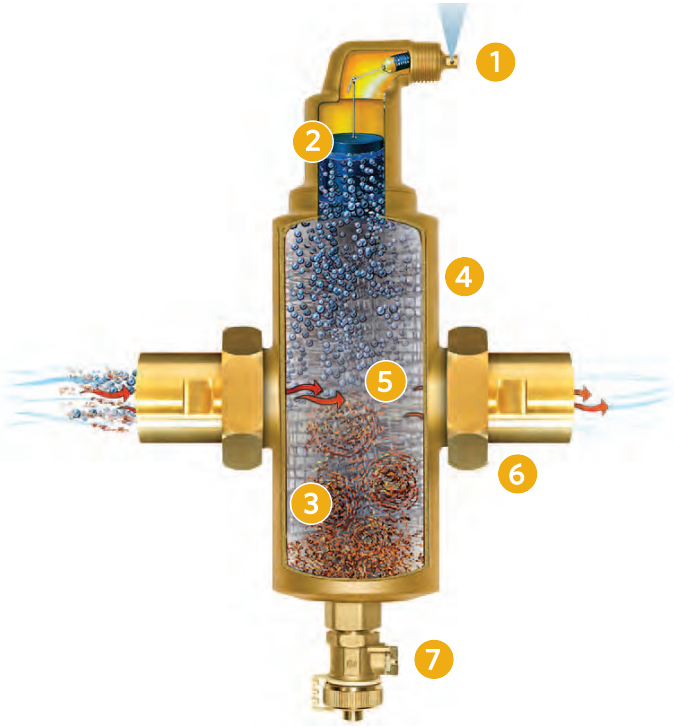
Ideal placement of a Spirovent unit is based on microbubble separation and Henry's Law. Simply put, Henry's Law states that air is released from water as the temperature increases or the pressure decreases*. For this reason, the Spirovent VDR is typically installed in the hottest point in the system. For a heating installation, this is in the supply from the boiler. In a chilled water circuit, the warmest point is in the return to the chiller.



ADVANTAGES TO THE INSTALLER AND END-USER

- No bypass, isolating valves or replacement filters to clog and reduce flow
- Dirt can be flushed while the system is in full operation.
- Quiet operation
- Minimum pressure drop; always constant
- Increased component life
- Reduced oxygen-based corrosion and pump cavitation
- Provides optimum heat transfer
- Optional removable head for bundle inspection

THE KEY DIFFERENCE



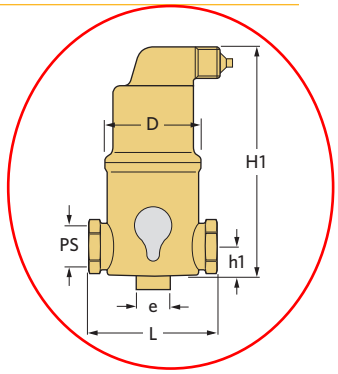
1. The automatic air vent is guaranteed not to leak and can only be closed by the installer for a pressure test.
2. The air chamber has been designed so that dirt cannot reach the valve.
3. Large capacity collection chamber reduces the need for frequent draining.
4. Solid brass construction guarantees long life.
5. The unique Spirotube is the core of the Spirovent VDR. Designed to trap the smallest microbubble and microscopic dirt particle, yet it offers little resistance to flow.
6. Threaded or sweat connections available.
7. Drain valve for flushing out the dirt.

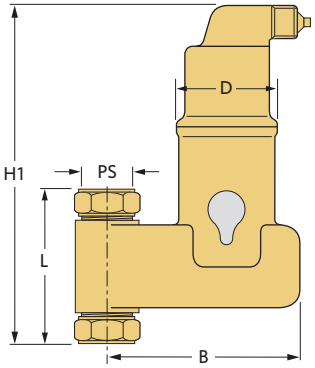
The Spirotube is the core of the Spirovent VDR unit. The Spirotube creates a low velocity area inside the Spirovent that allows air bubbles to rise and dirt particles to sink. There are no strainers, filters or replacement parts to get clogged. Flow always remains constant, without high pressure drop. The result: increased component life and heat transfer capabilities; decreased oxygen-based corrosion and pump cavitation; and the elimination of annoying gurgling, cascading and other air-related noises.

TECHNICAL SPECIFICATIONS

SPIROVENT JUNIOR AIR ELIMINATOR

THREADED SWEAT VERTICAL	Part Number Part Number Part Number		VJR075TM VJS075TM VJV075FT	VJR100TM VJS100TM VJV100FT	VJR125TM VJS125TM VJV125FT	VJR150TM VJS150TM N/A	VJR200TM VJS200TM N/A
Pipe Size			3/4"	1"	1 1/4"	1 1/2"	2"
D		Inch	2.6	2.6	2.6	2.6	4.0
Threaded	H1	Inch	6.0	7.0	7.8	9.1	10.8
	h1	Inch	0.8	1.4	1.5	1.6	2.3
	L	Inch	3.4	3.5	3.5	3.5	5.2
	Wt.	Lbs.	3.0	3.5	4.0	4.5	8.5
Sweat	H1	Inch	6.0	7.0	7.8	8.7	10.3
	h1	Inch	0.8	1.4	1.5	1.2	1.75
	L	Inch	4.1	4.5	4.5	4.7	6.9
	Wt.	Lbs.	3.0	3.0	3.5	4.5	8.5
Vertical	H1	Inch	6.0	7.0	9.1	N/A	N/A
	B	Inch	4.8	4.8	5.4	N/A	N/A
	L	Inch	3.4	3.5	3.8	N/A	N/A
	Wt.	Lbs.	4.8	5.0	6.0	N/A	N/A
e**			1/2"	1/2"	1/2"	1/2"	1/2"
Recom. Flow*		GPM	6	10	15	30	40



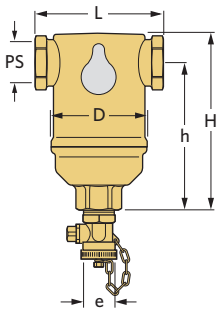


*Approximately 4 ft. per second inlet velocity. Refer to Spirovent Air Brochure for larger models and higher flows.

**Not Available on Vertical units.

SPIROTRAP JUNIOR DIRT SEPARATOR

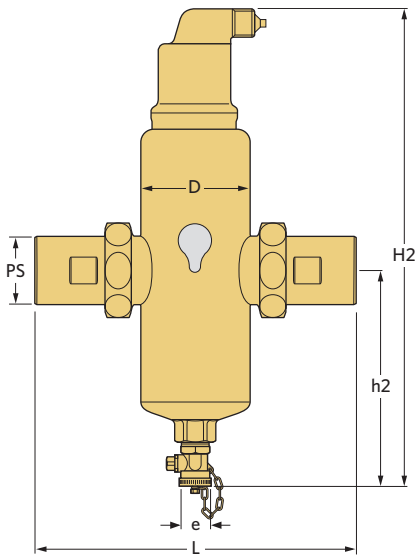
THREADED	Part Number		TDN075FT	TDN100FT	TDN125FT	TDN150FT	TDN200FT
Pipe Size			3/4"	1"	1 1/4"	1 1/2"	2"
D		Inch	2.6	2.6	2.6	2.6	4.0
H		Inch	4.6	5.6	6.3	7.9	9.6
h		Inch	3.8	4.3	4.8	6.3	8.0
L		Inch	3.3	3.5	3.5	3.5	5.2
e			1/2"	1/2"	1/2"	1/2"	1/2"
Wt.		Lbs.	2.5	3.0	3.5	4.0	8.0
Recom. Flow*		GPM	6	10	15	30	40



*Approximately 4 ft. per second inlet velocity. Refer to Spirotrap Brochure for larger models and higher flows.
Also available in sweat connections. Use "SW" in place of "FT for model number.

SPIROVENT JUNIOR AIR ELIMINATOR/DIRT SEPARATOR

THREADED	Part Number		VDR100FT	VDR125FT	VDR150FT	VDR200FT
Pipe Size			1"	1 1/4"	1 1/2"	2"
D		Inch	3.125	3.125	3.125	4.0
H2		Inch	14	14	14	17.25
h2		Inch	6.75	6.75	6.75	7.75
L		Inch	8.625	8.625	8.625	10.125
e			1/2"	1/2"	1/2"	1/2"
Wt.		Lbs.	9.0	9.0	9.0	14.5
Recom. Flow*		GPM	10	15	30	40



*Approximately 4 ft. per second inlet velocity

Also available in sweat connections. Use "SW" in place of "FT" for model number.

Note: All standard Spirovent and Spirotrap Junior models are of brass construction designed for a maximum working pressure of 150 psig and temperatures of 270°.

For solar applications and temperature ratings to 360°F, refer to Solar-1 brochure and "HT" options.

FOR INFORMATION ON OTHER SPIROTHERM PRODUCTS...

Spirotop® Automatic Air Vent

Brochure Top-2B

Spirovent® Commercial Air Eliminators

Standard Velocity: Brochure Air-2

High Velocity: Brochure HV Air-2

Spirotrap® Commercial Dirt Separators

Standard Velocity: Brochure Trap-2

High Velocity: Brochure HV Trap-2

Spirovent® Commercial Combination Air Eliminators / Dirt Separators

Standard Velocity: Brochure Dirt-2

High Velocity: Brochure HV Dirt-2

Spirovent Quad® Combination Air Eliminators / Dirt Separators / Hydraulic Separators

Brochure Quad-2

All brochures can be downloaded in PDF format at **http://www.spirotherm.com/docs/brochures**

SPIROTHERM
A SPIRO ENTERPRISES COMPANY

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Vista Geoscience Project 14329

SHALLOW AND DEEP AQUIFER TESTING OVER THE WEST PEETZ AND LEWIS CREEK GAS STORAGE FIELDS, LOGAN COUNTY, COLORADO

-Prepared for-

Greg Francis
East Cheyenne Gas Storage, LLC
10901 W Toller Dr
Suite 200
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-Prepared by-

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January, 2015

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Executive Summary

Testing of groundwater quality in shallow and deep aquifers was carried out over and around the West Peetz and Lewis Creek gas storage fields in the northwest part of Logan County, Colorado on behalf of East Cheyenne Gas Storage, LLC (Figure 1). The groundwater investigation was carried out to assess water quality in four wells during peak inventory gas storage and pressure in the West Peetz D-Sandstone gas storage reservoir and to compare water quality with previous baseline surveys in 2010 and 2012.

In the 2014 baseline program, groundwater samples were collected from the Williams Deep (1,160-feet), Williams Shallow (680-feet) and Nelson (1,020) domestic water wells and the WSW#1 industrial well (1,210-feet). The main conclusions of the 2014 baseline survey are:

(1) The Williams Deep well still has high concentrations of dissolved biogenic methane formed through CO_2 reduction in fresh water. Venting of the methane before it enters Mr. William's residence is strongly recommended to mitigate any damage from explosions if concentrations reach "Lower Explosion Levels (5%)" and ignition occurs. The other wells sampled contain much less (<<<1 mg/l) of dissolved methane and are therefore of no concern from a safety standpoint.

(2) Trace amounts (8 to 19 ug/L above the reporting limit) of Gasoline Range Organics (GRO) were detected only in the WSW#1 well. Diesel Range Organics (DRO) were either not detected or were below reporting limits in the other wells. BTEX compounds (Benzene, Ethylbenzene, Tolune and Xylene) were not detected in any of the four wells sampled.

(3) The inorganic composition of all four well water samples has remained constant over time. The Williams Deep and Nelson wells contain "soft" Na-HCO_3 water from the Fox Hills Formation, and the Williams Shallow well draws "very hard" Ca-Mg-HCO_3 water from the Ogallala Formation. Groundwater from the 1,210-foot deep WSW#1 well is classified as the "moderately hard" Na-Ca-HCO_3 type. Manganese concentrations in the Williams Shallow and WSW#1 water wells and iron concentrations in the Williams Deep and WSW#1 wells are higher than the Secondary Drinking Water Standard. The fluoride concentration in the Williams Deep well water exceeds the Secondary Drinking Water Standard by 0.5 mg/L.

(4) Non-pathogenic bacteria concentrations have increased markedly in the Williams Shallow and Deep wells over a 4 year interval. The WSW#1 well also contains aggressive levels of non-pathogenic bacteria. These bacteria can cause plugging of well screens, corrosion, pitting and staining of well casings and fixtures and foul odors. The wells should be treated (e.g. chlorination) by one or more of the disinfection methods suggested by Colorado State University (http://www.ext.colostate.edu/pubs/natres/06703.html).

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Table of Contents

List of Figures, Tables and Appendices.

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List of Figures, Tables and Appendices (continued).

Page

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1.0 Introduction

Greg Francis of ECGS approved this 2014 baseline study in late November 2014. As per his request, the WSW#1, Williams Shallow and Deep, and Nelson wells were re-sampled and analyzed for organic and inorganic components to assess groundwater quality during peak gas storage inventory and pressures in the West Peetz D-Sandstone gas storage facility in Logan County, Colorado (Figure 1). In addition to assessing water quality in four wells during peak storage conditions, the results of this baseline survey were compared previous groundwater sampling events in 2010 (Seneshen, 2011) and 2012 (Seneshen 2012a and Seneshen 2012b) to see if there were changes in water quality with time.

This report presents methods that were used to collect and analyze water and gas samples in Section 2.0, results in Section 3.0 and Conclusions and Recommendations in Section 4.0.

2.0 Methodology

2.1 Field Procedures

The headspace (top of casing) gas of the water wells sampled (i.e. WSW#1, Williams Shallow and Deep and Nelson) was tested for methane and heavier hydrocarbons using a portable Foxboro TVA 1000B flame/photo ionization gas detector. The instrument has detection limits of 1 part per million (ppm) methane and 0.1 ppm aromatic hydrocarbons (e.g. benzene).

National Water Quality Assessment (NAWQA) protocols were used for sampling the four water wells (Koterba et al., 1995). These protocols are described in Appendix 1 of Seneshen (2011). Well water was collected from hydrants off the Williams and Nelson domestic wells after purging at least 3 well volumes and stabilization of water quality parameters (Figure 2; Table 1).

2.2 Laboratory Analysis

The four well water samples were analyzed for organic and inorganic analytes according to that recommended by COGCC Rule 609, which was finalized in early 2013 (https://cogcc.state.co.us/COGIS_Help/SampleData.pdf). There is overlap of the analytes with previous surveys done for ECGS, but there are some differences, and these are explained in the caption of Table 1. The four water samples were analyzed for pH, conductivity, alkalinity, Total Dissolved Solids, cations, anions, BTEX and GRO/DRO at Test America in Arvada, Colorado (Appendix 1). The test for Iron-related (IRB), Slime Forming (SLYM), and Sulfur Reducing (SRB) bacteria (BART test) was performed at Vista Geoscience in Golden, Colorado. The dissolved C1-C6 hydrocarbon analysis and isotopic analysis of methane (for samples with >1 mg/L) was done at Dolan Integration Group (DIG) in Boulder, Colorado. The data quality is generally good for the organic and inorganic analyses based on laboratory duplicates, method blanks and spikes (Appendix 1).

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2.3 Interpretation and Data Presentation

The dissolved methane C1-C3 concentrations and isotopic compositions of water samples collected between 2010 and 2014 are presented in tabular form and graphically using a Schoell plot (Schoell, 1983) to classify the gases as biogenic or thermogenic in origin. The cation and anion data from 2010 and 2014 analyses are also presented in tabular form and graphically as Piper plots for classification of water types. The Biological Activity Reaction Tests (BART) from 2010 to 2104 baseline surveys are provided in tabular form. The BTEX and TPH (GRO/DRO) are not reported in the main body of the report as they were either not detected or are below or above reporting limits (see Appendix 1). The WSW#1 and WSW#1-Dup samples had GRO concentrations of 33 and 44 ug/L, which are just above the reporting limit of 25 ug/L.

3.0 Results

3.1 Water Well Attributes (Table 2)

The highest methane concentration detected with the portable FID/PID was in the headspace of the Williams Deep well (6,740 ppm). The other wells had much lower headspace methane concentrations (Williams Shallow=340 ppm, WSW#1=115 ppm and Nelson=108 ppm).

The pump rates (gal/min) of the 3 domestic water wells sampled was estimated by purging a known volume of water over a certain time interval. The pump rate of the Williams Shallow well decreased from 14 to 9 gal/min from 2010 to 2014, possibly due to progressive clogging of well screens by Slime Forming bacteria. The Williams Deep well showed an abrupt decrease in yield between 2010 and 2012 from 14 to 5.8 gal/min, which then increased to 12 gal/min during the 2014 sampling event (Table 2). The Nelson well shows less fluctuation in that its yield increased from 8.6 to 10 in 2012 and then to 10.5 gal/min in 2014 (Table 2). A yield of 126 gal/min for the WSW#1 well was estimated during the 2014 sampling event (Table 2).

The water temperatures are about 55% higher in the deeper Fox Hills aquifer wells (Williams Deep and Nelson) compared with the shallower Ogallala aquifer well (Williams Shallow). The reason(s) for the lower water temperatures recorded in 2014 sampling of the Williams Deep, Nelson and WSW#1 wells are unclear. Where recorded, the groundwater samples have good clarity and bubbles were noted in the Williams Deep and Nelson samples as in previous sampling events (Table 2). A distinct sulfur odor was noted for the Nelson well water, which is consistent with this water having the highest sulfate contents (Table 5). The Williams Deep (1,160') and Nelson (1,020') well water samples are more alkaline and conductive (higher TDS) than the Williams Shallow (680') well (Table 2). The 1,210-foot deep WSW#1 well is slightly less alkaline than the Williams Deep and Nelson wells and less conductive (lower TDS) than the Williams Deep, Williams Shallow and Nelson wells. (Table 2).

3.2 Dissolved C1 to C3 Hydrocarbons (Table 3: Figures 3 and 4)

Hazardous concentrations of dissolved methane were again detected in the Williams deep (1,160') well, and concentrations actually increased 18% from 2012 levels (Table 3). Based on

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carbon and deuterium isotopic ratios in the dissolved methane, it is again classified as biogenic in origin formed through carbon dioxide reduction in fresh water (Figures 3 and 4). As indicated in a previous report (Seneshen, 2012a), the dissolved methane in the Williams deep well is isotopically different from injection ("plant) gas and produced gas from the D- and J-Sandstone reservoirs, and it is therefore not derived from these potential sources (Figures 3 and 4). Trace amounts (<<<1 mg/L) of dissolved methane detected in the Nelson (1,020-feet) and WSW#1 (1,210-feet) wells probably have the same origin as methane in the Williams Deep well because they presumably draw water from the same organic-rich Fox Hills Formation. Dissolved methane concentrations in the Williams Shallow well dropped from 473 ppb in 2012 to 2 ppb in 2014, but the reason for this steep drop is not known.

The four well water samples were also analyzed for BTEX compounds (Benzene, Toluene, Ethylbenzene and Xylenes) and Total Petroleum Hydrocarbons (i.e. Gasoline Range Organics – GRO and Diesel Range Organics – DRO) as required by COGCC Rule 609. GRO concentrations are 8 to 19 ug/L above the reporting limit in the WSW#1 well water sample, but GRO/DRO and BTEX were either not detected or concentrations were below reporting limits for the other 3 wells (Appendix 1).

3.3 Inorganic Water Compositions (Tables 4 and 5; Figure 5)

For the most part, the cation and anion concentrations in the four water samples have remained constant over the four years between sampling events (Tables 4 and 5). Of note is the 250% increase in iron concentration in the Williams Deep well between 2010 and 2014 (Table 4), which also coincides with an increase in "Iron Related Bacteria" over that same time period. The iron concentrations in both the Williams Deep and WSW#1 wells exceed the "Secondary Drinking Water Standard" of 0.3 mg/L. Manganese concentrations are 16 and 10 times greater in the Williams Shallow and WSW#1 wells respectively than the "Secondary Drinking Water Standard" of 0.05 mg/L.

There was a 78% decrease in nitrate concentrations in the Williams Shallow well between 2010 and 2014 (Table 5). The Williams shallow well was analyzed outside of its holding time, so that might explain the decrease in its nitrate concentration. The WSW#1 well, however, which was analyzed within its holding time, shows 73% and 75% drops in nitrate and nitrite concentrations between 2012 and 2014. This decrease in nitrate and nitrite concentrations over time are probably related to the water production over the last two years, which removed any existing nitrate/nitrite contamination from the aquifer.

The fluoride concentrations in the Williams Deep well (2.5 mg/L) is slightly above the "Secondary Drinking Water Standard" of 2 mg/L (Table 5). The fluoride concentration in the Williams Shallow well decrease from 2 mg/l in 2010 to 0.59 mg/L in 2014. In the WSW#1 well, fluoride concentrations decreased from 1.85 mg/L in 2012 to 1.1 to 1.4 mg/L in 2014. The Nelson well water contains 0.79 mg/L fluoride, which is well below the Secondary Drinking Water Standard.

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The Williams Shallow well draws very hard Ca-Mg-HCO_3 water from the Ogallala aquifer from a depth of 680 feet. The water composition has not changed significantly between the 2010 and 2014 sampling events (Figure 5). In a similar sense, the Williams Deep well, which taps soft Na-HCO_3 water from the Fox Hills aquifer has not changed in composition either in four years other than having a higher iron concentration now (Table 4; Figure 5). The 1,210-foot deep WSW#1 well draws moderately hard Na-Ca-HCO_3 water and its composition has not varied significantly between the 2012 and 2014 sampling events Tables 4 and 5; Figure 5).

3.4 Biological Activity Reaction Test (BART) Results (Table 6)

The Williams Shallow, Williams Deep and the WSW#1 wells all have aggressive levels of "Iron Related (IRB), Slime Forming (SLYM) and Sulfate Reducing (SRB)" bacteria based BART analysis of the 2014 samples (Table 6). The Nelson well has only moderately aggressive levels of the bacteria. In the case of the Williams Shallow and Deep wells, all three types of bacteria have increased markedly over the 4-year sampling interval (Table 6), which points to a lack of treatment of these wells by Mr. Williams. The WSW#1 well shows more subtle, but significant increases in SLYM and SRB over two years and a decrease in the number of IRB.

IRB oxidize soluble ferrous (Fe^{2+}) iron to insoluble ferric (Fe^{3+}) iron leading to fouling of water and plugging, corrosion, pitting and iron staining of well casing. SLYM are fast-growing, aerobic microorganisms that form slime on the interior of well casing that can trap debris and cause plugging problems. SRB can cause odor problems and pitting of well casing. Colorado State University describes various methods for disinfecting water wells and this information can be found at http://www.ext.colostate.edu/pubs/natres/06703.html.

4.0 Conclusions and Recommendations

The following conclusions are drawn from the analyses of groundwater samples collected over time from the Williams Shallow and Deep, Nelson and WSW#1 water wells:

(1) Significant levels of dissolved methane were again detected in the Williams deep well, which draws water from the Fox Hills Formation. There was an 18% increase in dissolved methane from the 2012 level. As recommended previously to Mr Williams, the methane exolving from well water should be vented at the hydrant to avoid accumulation of methane to "Lower Explosive Levels (LEL)" within his house, which is a serious safety hazard. The isotopic composition of the dissolved methane remains constant over time. The methane is biogenic and was formed through carbon dioxide reduction in fresh water. The Williams Shallow, WSW#1 and Nelson well water samples contain much less than <1 mg/L dissolved methane and are of no concern from a safety standpoint.

(2) Trace amounts (8 to 19 ug/L above the reporting limit) of Gasoline Range Organics (GRO) were detected only in the WSW#1 well. Diesel Range Organics (DRO) with either not detected or were below reporting limits in some wells. BTEX compounds (Benzene, Ethylbenzene, Tolune and Xylene) were not detected in any of the four wells sampled.

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(3) The inorganic composition of the four well waters has remained stable between the 2010 and 2014 sampling events. The deep Williams and Nelson wells draw soft Na-HCO_3 water from the Fox Hills aquifer whereas the shallow 680-foot depth Williams well extracts very hard Ca-Mg-HCO_3 water from the Ogallala aquifer. The 1,210-foot deep WSW#1 well produces moderately hard Na-Ca-HCO_3 water.

(4) Manganese concentrations in the Williams Shallow and WSW#1 wells are 10 to 15 times higher Secondary Drinking Water Standard, and these levels have not changed significantly between sampling events. Iron concentrations in the Williams Deep and WSW#1 wells are about 1.5 times higher than the Secondary Drinking Water Standard. The iron concentration in the Williams Deep well has increased 250% over 4 years. Fluoride concentrations in the Williams deep well are 0.5 mg/L above the Secondary Drinking Water Standard.

(5) Iron Related (IRB), Slime Forming (SLYM) and Sulfate Reducing (SRB) bacteria concentrations have increased dramatically in the Williams Deep and Shallow wells over 4 years because of inadequate treatment of the wells. The WSW#1 well also contains "aggressive" levels of all three bacteria, but there have been more subtle increases in SLYM and SRB and a decrease in IRB over two years. The Nelson well has the least abundance of non-pathogenic bacteria. Water wells with aggressive levels of SLYM (Williams Shallow and Deep and WSW#1), IRB (WSW#1) and SRB (Williams Shallow and Deep and WSW#1) should be treated in the near future to prevent well screen and pipe clogging and corrosion, water discoloration, staining of fixtures and laundry, and foul odors. Colorado State University describes various methods for disinfecting water wells (http://www.ext.colostate.edu/pubs/natres/06703.html).

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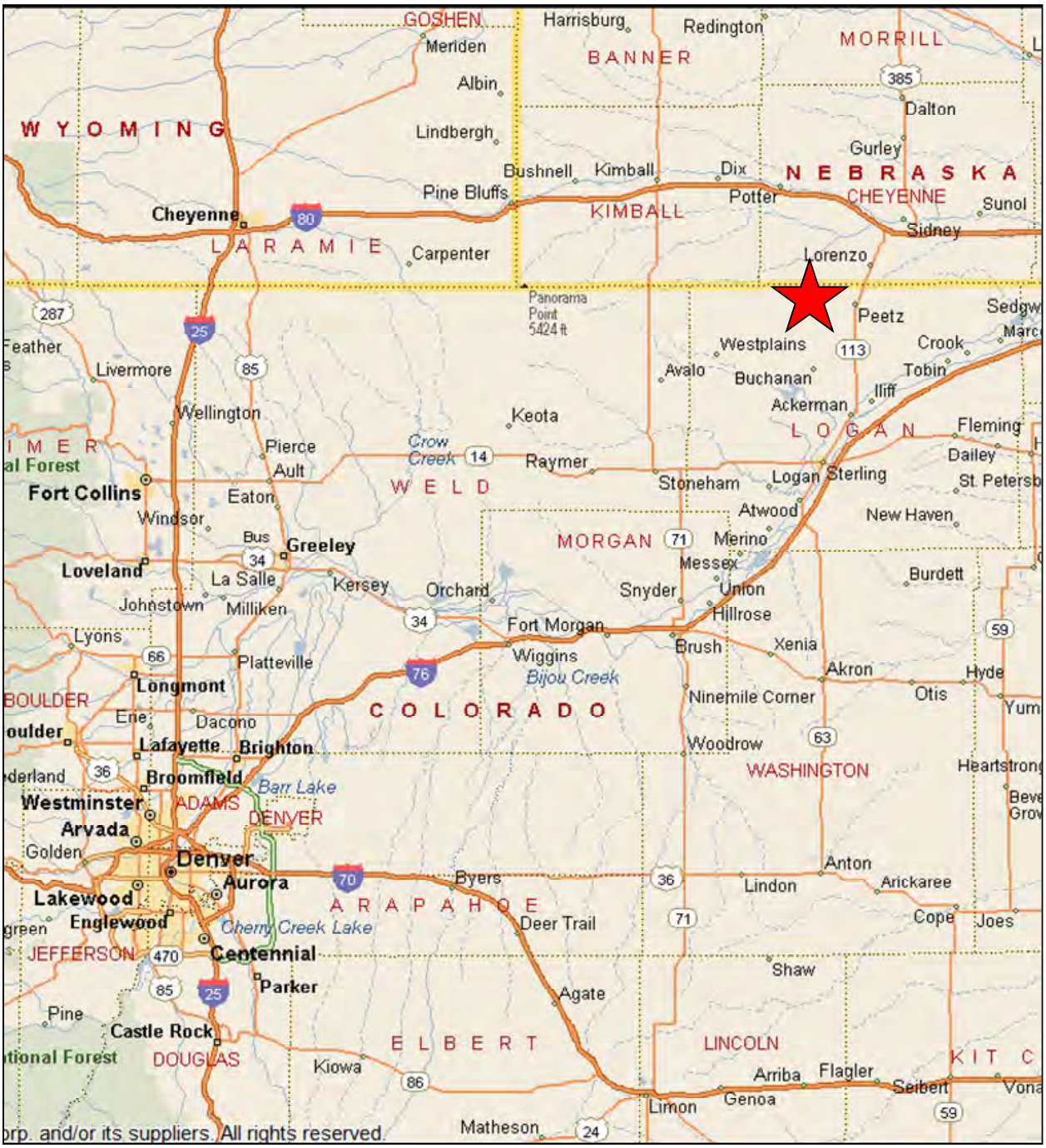

Figure 1. Location of the West Peetz and Lewis Creek aquifer investigation in Logan County, Colorado.

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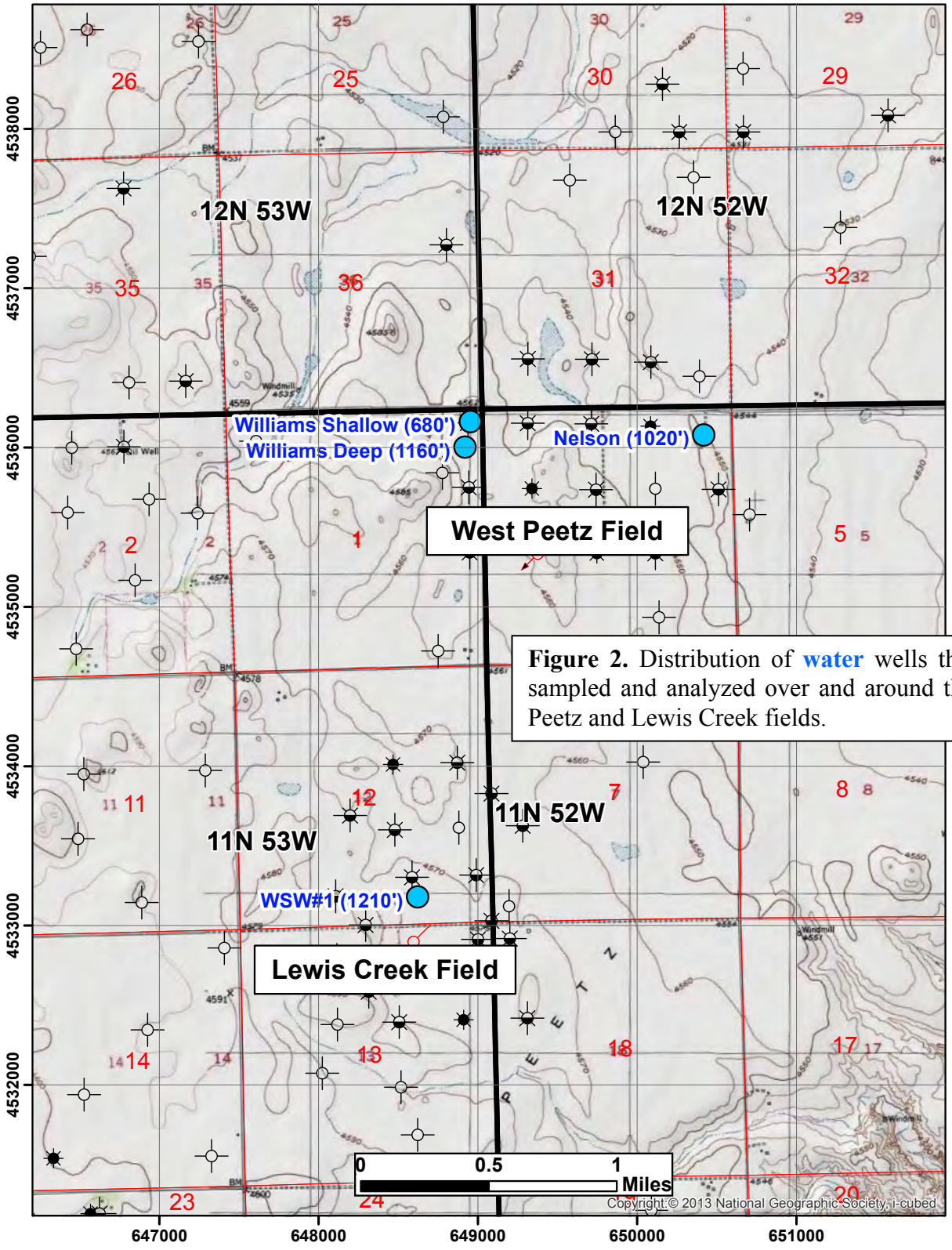

Figure 2. Distribution of water wells that were sampled and analyzed over and around the West Peetz and Lewis Creek fields.

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Table 1. Required analytes for COGCC Rule 609 (Feb 2013) baseline water well surveys in the State of Colorado. Previous baseline surveys (2010 and 2012) for ECGS also analyzed water samples for As, Cr and Co, but not Sr, Se and Total Petroleum Hydrocarbons (TPH), which are required by Rule 609 now. For some unknown reason, Test America did not report fluoride in the analytical results for the 4 water wells.

609. Analyte List

Analyte	Initial Baseline	Susequent Sampling	Analyte	Initial Baseline	Susequent Sampling
pH	X		magnesium	X	X
specific conductance	X		manganese	X	
total dissolved solids (TDS)	X	X	potassium	X	X
dissolved methane	X	X	sodium	X	X
dissolved ethane	X	X	barium	X	
dissolved propane	X	X	boron	X	
total bicarbonate as CaCO3	X	X	selenium	X	
carbonate as CaCO3	X	X	strontium	X	
bromide	X	X	iron related bacteria	X	
chloride	X	X	sulfate reducing bacteria	X	
fluoride	X	X	slime forming bacteria	X	
sulfate	X	X	TPH	X	X
nitrate and nitrite as N	X		benzene	X	X
phosphorus	X		toluene	X	X
calcium	X	X	ethylbenzene	X	X
iron	X		xylenes	X	X

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Table 2. Attributes and parameters of well water samples collected before (2010) and after (2012) injection of gas into the West Peetz gas storage reservoir.

Well ID	Well Coordinates (Longitude/Latitude)		Well depth, pump rate, water clarity and temperature				SW-846 9045 (ph units)	EPA 120.1 (uhos/cm)	EPA 300.1 (mg/L)	EPA 160.1 (mg/L)
	Easting	Northing	Well Depth (feet)	Pump Rate (gal/min)	Clarity	Temperature (^{0}C)	pH	Conductivity	Alkalinity, Total (As CaCO3)	Total Dissolved Solids
Williams Shallow (05-01-2010)	-103.22995	40.96312	680	14	Good	15.6	6.95	909	350	665
Williams Shallow (01-06-2012)	-103.22995	40.96312	680	10	Good	13.7	NA	NA	NA	NA
Williams Shallow (12-02-2014)	-103.22995	40.96312	680	9	Good	12.2	7.38	740	310	580
Williams Deep (05-01-10)	-103.23042	40.96158	1160	14	Good (bubbles)	21.6	8.15	1010	550	735
Williams Deep (01-07-2012)	-103.23042	40.96158	1160	5.8	Good (bubbles)	21.2	NA	NA	NA	NA
Williams Deep (12-02-14)	-103.23042	40.96158	1160	12	Good (bubbles)	14.5	8.42	1100	550	720
Nelson-051710 (Accutest 4/8/2010) - ERM Report	-103.21246	40.96220	1020	8.6	Good (bubbles)	21.5	NA	NA	NA	850
Nelson (01-12-2014)	-103.21246	40.96220	1020	10	Good (bubbles)	21.2	NA	NA	NA	NA
Nelson (12-03-2014)	-103.21246	40.96220	1020	10.5	Good (bubbles)	14.5	8.39	1000	410	830
WSW#1 (10-22-2012)	-103.23456	40.93623	1210	NA	NA	NA	7.3	583	170	390
WSW#1 (12-03-2012)	-103.23456	40.93623	1210	126	NA	NA	8.05	540	180	380
WSW#1DUP (12-03-2012)	-103.23456	40.93623	1210	126	Good (bubbles)	14.4	8.14	530	180	400
ND – Not Detected **NA – Not Analyzed**						Secondary Drinking water STD (mg/L)	6.5-8.5			500

Collected before gas injection
Collected after gas injection

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Table 3. Dissolved C1-C3 hydrocarbon concentrations (ug/L) and carbon and deuterium isotopic ratio compositions in well water samples collected before (2010) and after (2012) injection of gas into the West Peetz gas storage reservoir.

Water Well Name	Well Depth (feet)	Methane	Ethane	Propane	$d^{13}C\ C_1$	$dD\ C_1$
Williams Shallow (05-01-2010)	680	253	0.47	0.03		
Williams Shallow (01-06-2012)	680	473	0.70	0.02	-49.5	-250
Williams Shallow (12-02-2014)	680	2	ND	ND		
Williams Deep (05-01-2010)	1160	9410	21.90	0.14	-73.39	-256.1
Williams Deep (01-07-2012)	1160	7637	19.14	0.10	-72.85	-256.2
Williams Deep (12-02-2014)	1160	9020	20.00	ND	-73.1	-254
Nelson (05-17-2010)	1020	72	0.15	0.05		
Nelson (01-05-2012)	1020	17	0.02	0.01		
Nelson (12-03-2014)	1020	190	ND	ND		
WSW#1 (10-22-2012)	1210	51	0.02	ND		
WSW#1 (12-03-2012)	1210	110	ND	ND		
WSW#1DUP (12-03-2012)	1210	100	ND	ND		

Collected before gas injection
Collected after gas injection

ND – Not Detected
NA – Not Analyzed

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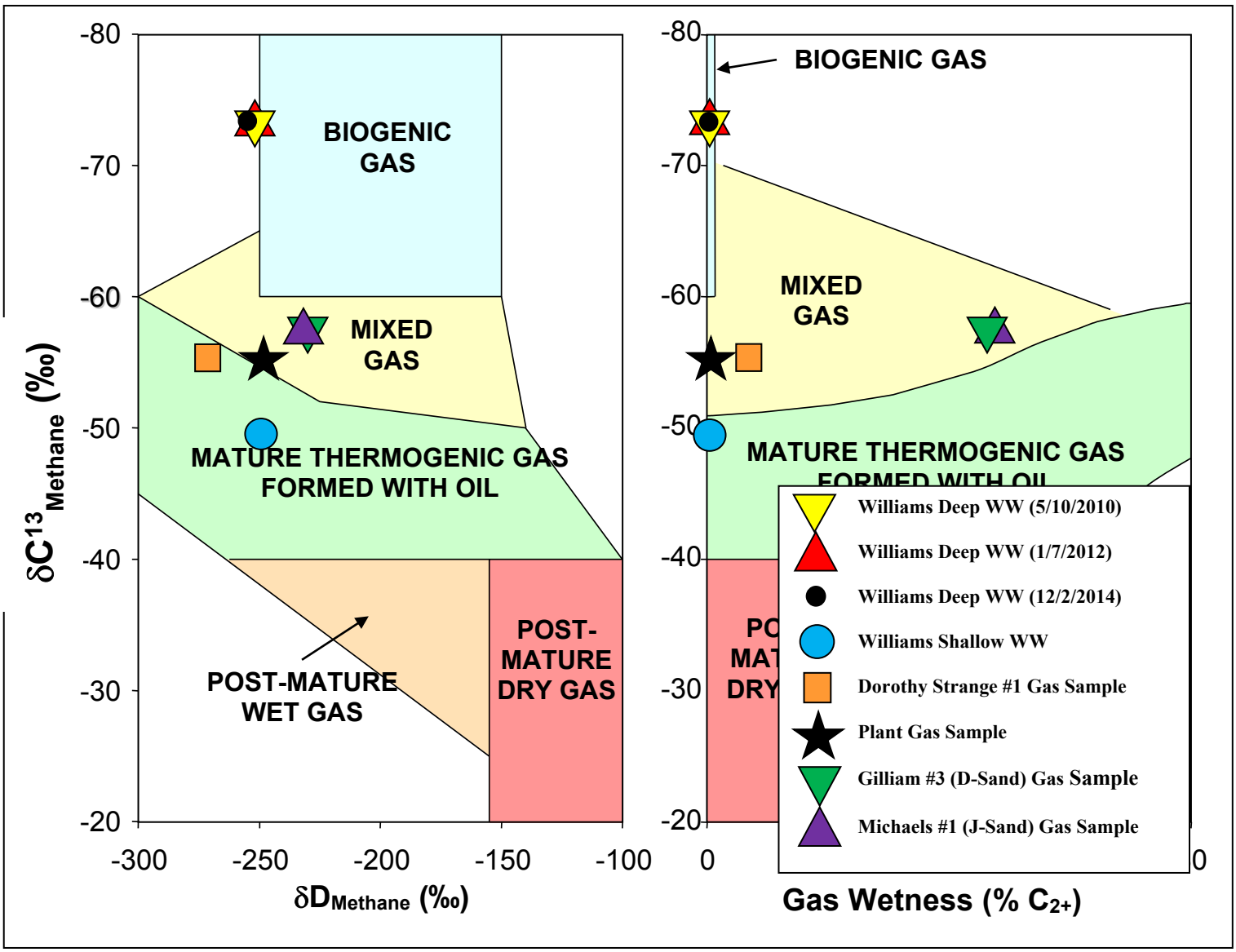

Figure 3. Plot of $\delta C^{13}_{Methane}$ vs. $\delta D_{Methane}$ and gas wetness $\%C_{2+}$ for gas collected from the D- and J-Sandstone reservoirs, ECGS gas plant, Dorothy Strange #1 injection well, and the Williams shallow (680') and deep (1,160') water wells (modified after Schoell, 1983). The dissolved methane in the Williams Deep well records the same carbon and deuterium isotopic composition over time. The methane has a biogenic origin and is clearly different from thermogenic methane from the D- and J-Sandstone reservoirs and the plant (storage) gas. Dissolved methane was detected in the Williams Shallow well in the 2012 survey the concentration was 86% higher than 2010 levels (Table 3). The methane looks thermogenic in origin based on carbon and deuterium isotopic ratios, but the high dry gas ratio ratio (i.e. C1/C2 = 676) in conjunction with the high concentrations of dissolved carbon dioxide and oxygen in the sample, suggests oxidation of biogenic methane resulting in a shift of carbon isotopic ratios to heavier values making it look thermogenic in origin (see Figure 4).

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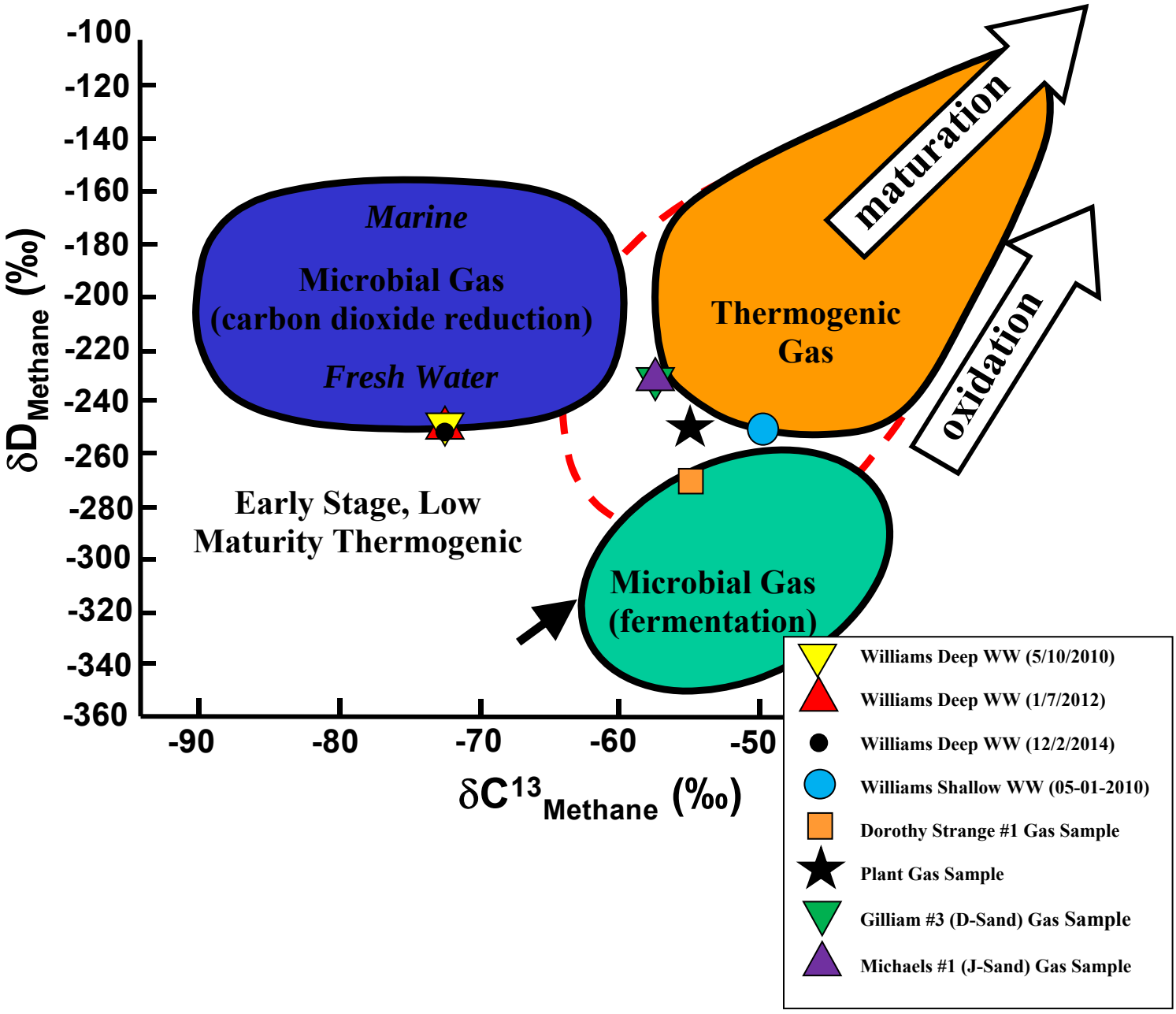

Figure 4. Plot of $\delta D_{Methane}$ vs. $\delta C^{13}_{Methane}$ for gas collected from the D- and J-Sandstone reservoirs, ECGS gas plant, Dorothy Strange #1 injection well, and the Williams shallow (680') and deep (1,160') water wells. The dissolved methane in the Williams Deep well records the same carbon and deuterium isotopic composition over time. The methane was probably produced by CO_2 reduction in organic shales or coals in the Fox Hills Formation. Dissolved methane in the Williams Shallow well plots in the thermogenic field, but it is probably biogenic in origin because of its high dry gas ratio (C1/C2). Oxidation of the carbon isotopic ratio in the methane to heavier thermogenic values is suspected because of associated high concentrations of CO_2 and O_2 in the gas.

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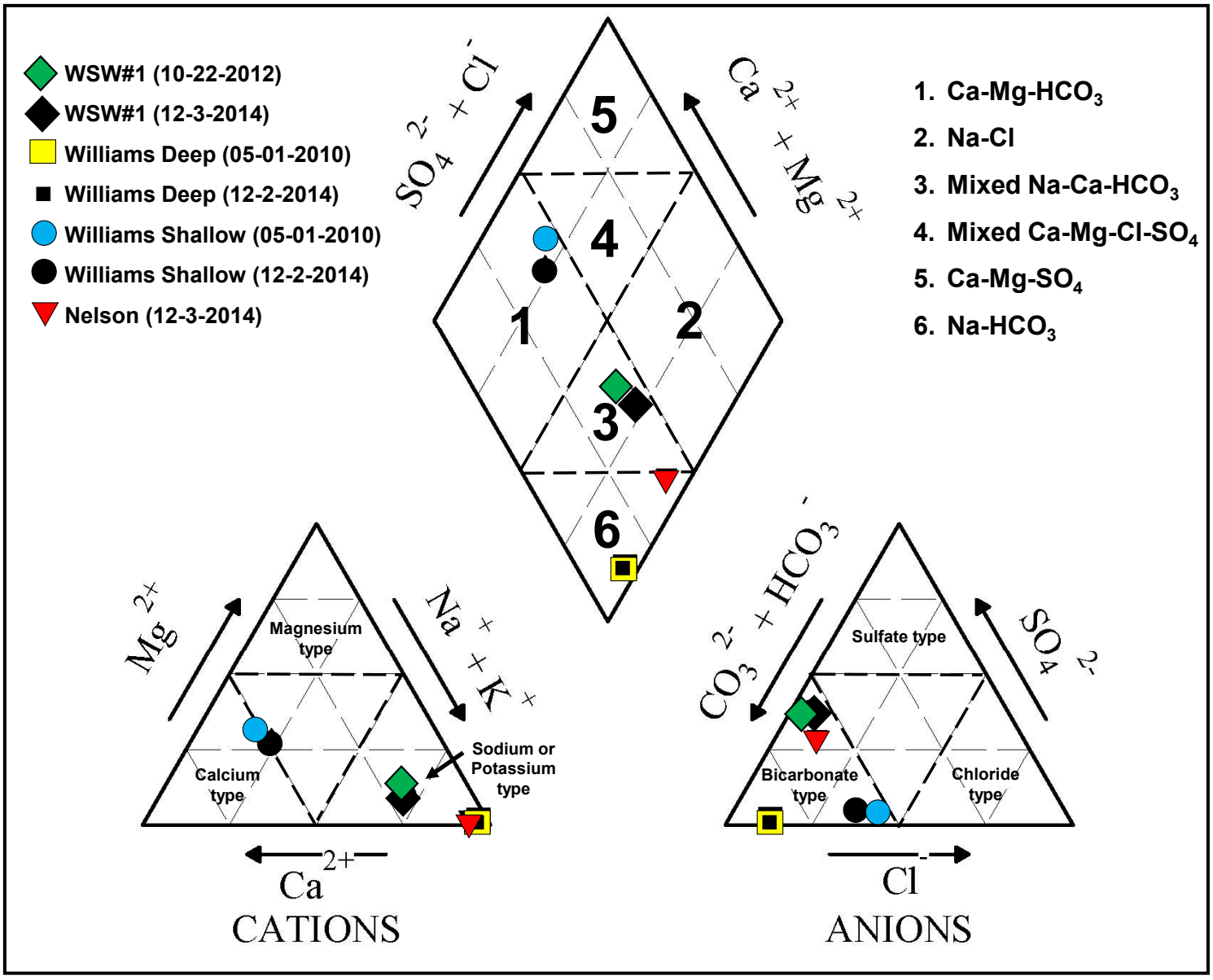

Figure 5. Piper diagram showing relative percentages of cations and anions in well water samples. The shallow Williams well water (680 feet) falls into the calcium-magnesium bicarbonate field, whereas the deeper (1,160-feet) Williams and Nelson (1,020-feet) water is classified as sodium bicarbonate water. The deep WSW#1 well water falls into the sodium-bicarbonate-chloride category. The shallow and deep waters have distinctly different compositions suggesting residence in separate unconnected aquifers.

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Table 4. Dissolved metal concentrations and water hardness estimates in well water samples collected before (2010) and after (2012) injection of gas into the West Peetz gas storage reservoir.

Well ID	Well Depth (feet)	EPA 6010 (mg/L) - Dissolved Metals												Water Hardness	
		As	B	Ca	Cr	Co	Fe	Mg	Mn	K	Se	Na	Sr	Water Hardness (CaCO3 in mg/L)	Class-ification
Williams Shallow (05-01-2010)	680	0.0181	0.31	120	ND	ND	ND	38.9	0.8	11.8	NA	47	NA	459	Very Hard
Williams Shallow (12-02-2014)	680	NA	0.33	100	NA	NA	0.02	35.0	0.77	12.0	ND	47	1.50	394	Very Hard
Williams Deep (05-01-10)	1160	0.011	1.81	8	ND	ND	0.13	3.2	0.01	6.1	NA	246	NA	34	Soft
Williams Deep (12-02-14)	1160	NA	2.00	7	NA	NA	0.45	2.7	0.02	6.3	ND	300	0.28	29	Soft
Nelson-051710 (Accutest 4/8/2010) -ERM Report	1020	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nelson (12-03-2014)	1020	NA	1.70	13	NA	NA	ND	4.3	0.01	10.0	ND	280	0.54	50	Soft
WSW#1 (10-22-2012)	1210	0.013	NA	23	ND	0.0002	0.42	7.1	0.48	9.9	NA	75	NA	87	Moderately Hard
WSW#1 (12-03-2012)	1210	NA	0.18	26	NA	NA	0.46	7.9	0.53	11.0	ND	99	0.57	97	Moderately Hard
WSW#1DUP (12-03-2012)	1210	NA	0.18	25	NA	NA	0.36	7.5	0.51	10.0	ND	96	0.55	93	Moderately Hard
EPA Primary Drinking Water STD (mg/L)		**0.05**			**0.10**										
Secondary Drinking water STD (mg/L)							**0.30**		**0.05**						

Collected before gas injection

Collected after gas injection

ND – Not Detected
NA – Not Analyzed

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Table 5. Dissolved anion concentrations in well water samples collected before (2010) and after (2012) injection of gas into the West Peetz gas storage reservoir.

Well ID	EPA 300.0 (mg/L) - Dissolved Anions								
	Well Depth (feet)	Ion Balance %	Bromide	Chloride	Fluoride	Nitrate	Nitrite	Phosphate	Sulfate
Williams Shallow (05-01-2010)	680	11	ND	144	2	0.80	ND	ND	22
Williams Shallow (12-02-2014)	680	5	0.7	110	0.59	0.17	ND	0.0079	20
Williams Deep (05-01-10)	1160	5	ND	58	2.3	ND	ND	0.1400	12
Williams Deep (12-02-14)	1160	10	0.55	47	2.5	ND	ND	0.1200	10
Nelson-051710 (Accutest 4/8/2010) -ERM Report	1020	NA	NA	47	NA	NA	NA	NA	172
Nelson (12-03-2014)	1020	5	0.78	47	0.79	ND	ND	0.0280	160
WSW#1 (10-22-2012)	1210	13	0.24	11	1.85	1.14	0.210	ND	90
WSW#1 (12-03-2012)	1210	11	0.17	11	1.4	0.31	0.053	0.0190	94
WSW#1DUP (12-03-2012)	1210	8	0.17	10	1.1	0.29	ND	0.0160	94
EPA Primary Drinking Water STD (mg/L)					4	10	1		
Secondary Drinking water STD (mg/L)				250	2				250

Collected before gas injection

Collected after gas injection

ND – Not Detected
NA – Not Analyzed

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Table 6. Non-pathogenic bacteria concentrations in well water samples before (2010) and after (2012) injection of gas into the West Peetz gas storage reservoir.

Well ID	Well Depth (feet)	Biological Activity Reaction Test (colony forming units - cfu)		
		Iron Related Bacteria - IRB	Slime Forming Bacteria - SLYM	Sulfate Reducing Bacteria - SRB
Williams Shallow (05-01-2010)	680	2300	***12500***	**ND**
Williams Shallow (12-02-2014)	680	***35000***	***350000***	***100000***
Williams Deep (05-01-10)	1160	**ND**	***66500***	200
Williams Deep (12-02-14)	1160	***35000***	***350000***	***100000***
Nelson-051710 (Accutest 4/8/2010) -ERM Report	1020	***5000***	2500	ND
Nelson (12-03-2014)	1020	2300	100	18000
WSW#1 (10-22-2012)	1210	***140000***	***100000***	***350000***
WSW#1 (12-03-2012)	1210	***35000***	***350000***	***700000***
WSW#1DUP (12-03-2012)	1210	9000	100	***100000***

Collected before gas injection
Collected after gas injection

ND – Not Detected
NA – Not Analyzed

1. ***Aggressive (treatment should be considered in the near future before the condition degenerates further)***
2. Moderately Aggressive (treatment may not be required but vigilance through ongoing testing should be practiced)
3. **Normal Background Levels (routine testing is recommended)**

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Appendix 1: Organic and Inorganic Analytical Results from Vista Geoscience Test America, and Dolan Integration Group

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Monday, January 12, 2015

Greg Francis
Merchant Energy Partners, LLC
10901 West Toller Drive, Suite 200
Littleton, CO 80127

RE: 14329.01: East Cheyenne Gas Storage

Order No.: 1501001

Dear Greg:

Vista GeoScience received 5 Water Samples, received on 12/4/2014 for Biological Activity Reaction Test (BART) analysis presented in the following report.

The following report contains data, associated QC and laboratory specifications; exceptions are noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Roger Bain
Senior Chemist

CLIENT: Merchant Energy Partners, LLC
Project: 14329.01: East Cheyenne Gas Storage
Lab Order: 1501001

CASE NARRATIVE

Samples were received on 12/4/14 from Vista Field Services. The samples and their containers appeared to be in good condition.

Samples were analyzed using the methods outlined in the following references: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition and EPA Methods for Chemical Analysis of Water and Wastes (MCAWW).

Analyst Comments:
The results are based on observations compared to DBI Biological Activity Reaction Test (BART) User Manual.

Roger Bain
Senior Chemist

Vista GeoScience

Date: *12-Jan-15*

CLIENT:	Merchant Energy Partners, LLC	**Client Sample ID:**	WSW-1
Lab Order:	1501001	**Tag Number:**	
Project:	14329.01:East Cheyenne Gas Storage	**Collection Date:**	12/3/2014
Lab ID:	1501001-001A **Date Received:** 12/4/2014	**Matrix:**	WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BACTERIOLOGICAL TESTING		**BART**				Analyst: **RB**
Iron Related Bacteria - IRB	35000	25.0		CFU/mL	1	12/4/2014
Slime Forming Bacteria - SLYM	350000	10.0		CFU/mL	1	12/4/2014
Sulfate Reducing Bacteria - SRB	700000	200		CFU/mL	1	12/4/2014

IRB: Aggressive (treatment should be considered in the near future before the condition degenerates further)
SLYM: Aggressive (treatment should be considered in the near future before the condition degenerates further)
SRB: Aggressive (treatment should be considered in the near future before the condition degenerates further)

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Vista GeoScience

Date: *12-Jan-15*

CLIENT:	Merchant Energy Partners, LLC	**Client Sample ID:**	WSW1-DUP
Lab Order:	1501001	**Tag Number:**	
Project:	14329.01:East Cheyenne Gas Storage	**Collection Date:**	12/3/2014
Lab ID:	1501001-002A **Date Received:** 12/4/2014	**Matrix:**	WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BACTERIOLOGICAL TESTING		**BART**				Analyst: **RB**
Iron Related Bacteria - IRB	9000	25.0		CFU/mL	1	12/4/2014
Slime Forming Bacteria - SLYM	100	10.0		CFU/mL	1	12/4/2014
Sulfate Reducing Bacteria - SRB	100000	200		CFU/mL	1	12/4/2014

IRB: Moderate (treatment may not be required but vigilance through ongoing testing should be practiced)
SLYM: Moderate (treatment may not be required but vigilance through ongoing testing should be practiced)
SRB: Aggressive (treatment should be considered in the near future before the condition degenerates further)

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Vista GeoScience

Date: *12-Jan-15*

CLIENT:	Merchant Energy Partners, LLC	**Client Sample ID:**	Nelson-WW
Lab Order:	1501001	**Tag Number:**	
Project:	14329.01:East Cheyenne Gas Storage	**Collection Date:**	12/3/2014
Lab ID:	1501001-003A **Date Received:** 12/4/2014	**Matrix:**	WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BACTERIOLOGICAL TESTING		**BART**				Analyst: **RB**
Iron Related Bacteria - IRB	2300	25.0		CFU/mL	1	12/4/2014
Slime Forming Bacteria - SLYM	100	10.0		CFU/mL	1	12/4/2014
Sulfate Reducing Bacteria - SRB	18000	200		CFU/mL	1	12/4/2014

IRB: Moderate (treatment may not be required but vigilance through ongoing testing should be practiced)
SLYM: Moderate (treatment may not be required but vigilance through ongoing testing should be practiced)
SRB: Moderate (treatment may not be required but vigilance through ongoing testing should be practiced)

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Vista GeoScience

Date: *12-Jan-15*

CLIENT:	Merchant Energy Partners, LLC	**Client Sample ID:**	Williams-Deep
Lab Order:	1501001	**Tag Number:**	
Project:	14329.01:East Cheyenne Gas Storage	**Collection Date:**	12/2/2014
Lab ID:	1501001-004A **Date Received:** 12/4/2014	**Matrix:**	WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BACTERIOLOGICAL TESTING		**BART**				Analyst: **RB**
Iron Related Bacteria - IRB	35000	25.0		CFU/mL	1	12/4/2014
Slime Forming Bacteria - SLYM	350000	10.0		CFU/mL	1	12/4/2014
Sulfate Reducing Bacteria - SRB	100000	200		CFU/mL	1	12/4/2014

IRB: Aggressive (treatment should be considered in the near future before the condition degenerates further)
SLYM: Aggressive (treatment should be considered in the near future before the condition degenerates further)
SRB: Aggressive (treatment should be considered in the near future before the condition degenerates further)

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Vista GeoScience

Date: *12-Jan-15*

CLIENT:	Merchant Energy Partners, LLC	**Client Sample ID:**	Williams-S
Lab Order:	1501001	**Tag Number:**	
Project:	14329.01:East Cheyenne Gas Storage	**Collection Date:**	12/2/2014
Lab ID:	1501001-005A **Date Received:** 12/4/2014	**Matrix:**	WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BACTERIOLOGICAL TESTING		**BART**				Analyst: **RB**
Iron Related Bacteria - IRB	35000	25.0		CFU/mL	1	12/4/2014
Slime Forming Bacteria - SLYM	350000	10.0		CFU/mL	1	12/4/2014
Sulfate Reducing Bacteria - SRB	100000	200		CFU/mL	1	12/4/2014

IRB: Aggressive (treatment should be considered in the near future before the condition degenerates further)
SLYM: Aggressive (treatment should be considered in the near future before the condition degenerates further)
SRB: Aggressive (treatment should be considered in the near future before the condition degenerates further)

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Vista GeoScience

12-Jan-15

Lab Order: 1501001

Client: Merchant Energy Partners, LLC

Project: 14329.01:East Cheyenne Gas

DATES REPORT

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date
1501001-001A	WSW-1	12/3/2014	Water	Bacteriological Testing			12/4/2014
1501001-002A	WSW1-DUP			Bacteriological Testing			12/4/2014
1501001-003A	Nelson-WW			Bacteriological Testing			12/4/2014
1501001-004A	Williams-Deep	12/2/2014		Bacteriological Testing			12/4/2014
1501001-005A	Williams-S			Bacteriological Testing			12/4/2014

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

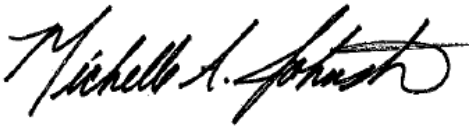
ANALYTICAL REPORT

Job Number: 280-63234-1

Job Description: COGA Baseline Well Water Monitoring

For:
Vista Geoscience
130 Capital Drive, Suite C
Golden, CO 80401

Attention: Mr. Dave Seneshen



Approved for release.
Michelle A Johnston
Project Manager II
1/27/2015 11:00 AM

Designee for
Donna R Rydberg, Senior Project Manager
4955 Yarrow Street, Arvada, CO, 80002
(303)736-0192
donna.rydberg@testamericainc.com
01/27/2015
Revision: 1

The test results in this report relate only to the samples in this report and meet all requirements of NELAC, with any exceptions noted. Pursuant to NELAP, this report shall not be reproduced except in full, without the written approval of the laboratory. All questions regarding this report should be directed to the TestAmerica Denver Project Manager.

The Lab Certification ID# is 4025.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

CASE NARRATIVE

Client: Vista Geoscience

Project: COGA Baseline Well Water Monitoring

Report Number: 280-63234-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

REVISION
In accordance with the client's instructions provided on 01/26/2015, the 300.0 data was revised to include Fluoride.

RECEIPT
The samples were received on 12/4/2014 at 3:40 PM; the samples arrived in good condition, properly preserved and on ice with the exception of the items listed below. The temperatures of the 2 coolers at receipt were 3.3ºC and 5.9ºC.

All samples were logged per the analytes listed in Table 2, which was received with the COC.

Limited volume was received to perform the volatile analyses (8260B VOCs, 8015B GRO). Per instructions received on Thursday, December 4, 2014, the 8015B GRO analysis was placed on hold and will be activated if sufficient volume remains after the 8260B VOC analysis have been completed.

RSK 175 analysis is listed on Table 2; however, volume was not received for this analysis. Per instructions received on Thursday, December 4, 2014, this analysis will not be performed at TestAmerica.

One of the three 1-L amber bottles submitted for samples WSW1 (280-63234-1), WSW1-DUP (280-63234-5) were approximately 1/2 full. Limited but sufficient volume remains to perform the requested analyses.

The sample collection time is not listed on the COC or the sample container label for sample WILLIAMS S (280-63234-3). The collection time was logged as 17:02 as directed by the client.

Samples WILLIAMS S (280-63234-3) and WILLIAMS DEEP (280-63234-2) were received outside of recommended sample holding time for Nitrate and Nitrite by Method 300.0. The client was notified and the laboratory proceeded with the requested analyses.

Both DRO and GRO were performed on all samples as directed by the client.

VOLATILE ORGANIC COMPOUNDS (GC-MS)
Samples WSW1 (280-63234-1), WILLIAMS DEEP (280-63234-2), WILLIAMS S (280-63234-3), NELSON WW (280-63234-4) and WSW1-DUP (280-63234-5) were analyzed for volatile organic compounds (GC-MS) in accordance with EPA SW-846 Method 8260B.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GAS RANGE ORGANICS
Samples WSW1 (280-63234-1), WILLIAMS DEEP (280-63234-2), WILLIAMS S (280-63234-3), NELSON WW (280-63234-4) and WSW1-DUP (280-63234-5) were analyzed for gas range organics in accordance with EPA SW-846 Method 8015B - GRO.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

DIESEL RANGE ORGANICS
Samples WSW1 (280-63234-1), WILLIAMS DEEP (280-63234-2), WILLIAMS S (280-63234-3), NELSON WW (280-63234-4) and WSW1-DUP (280-63234-5) were analyzed for Diesel Range Organics in accordance with EPA SW-846 Method 8015B - DRO.

Matrix spike samples were not requested and they could not be performed due to insufficient sample volume. The associated LCS and LCD samples were in control and provide evidence that operating procedures were in control.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

DISSOLVED METALS
Samples WSW1 (280-63234-1), WILLIAMS DEEP (280-63234-2), WILLIAMS S (280-63234-3), NELSON WW (280-63234-4) and WSW1-DUP (280-63234-5) were analyzed for Dissolved Metals in accordance with EPA SW-846 Method 6010C.

Manganese was detected in method blank MB 280-255988/1-A at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged. If the associated samples reported a result above the MDL and/or RL, the result has been flagged. Refer to the QC report for details.

Matrix spike samples were not requested and they were not performed in batch 280-2559898. The associated LCS and LCD samples were in control and provide evidence that operating procedures were in control.

No other analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ALKALINITY
Samples WSW1 (280-63234-1), WILLIAMS DEEP (280-63234-2), WILLIAMS S (280-63234-3), NELSON WW (280-63234-4) and WSW1-DUP (280-63234-5) were analyzed for Alkalinity in accordance with SM20 2320B.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

SPECIFIC CONDUCTIVITY
Samples WSW1 (280-63234-1), WILLIAMS DEEP (280-63234-2), WILLIAMS S (280-63234-3), NELSON WW (280-63234-4) and WSW1-DUP (280-63234-5) were analyzed for specific conductivity in accordance with SM20 2510B.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL DISSOLVED SOLIDS
Samples WSW1 (280-63234-1), WILLIAMS DEEP (280-63234-2), WILLIAMS S (280-63234-3), NELSON WW (280-63234-4) and WSW1-DUP (280-63234-5) were analyzed for total dissolved solids in accordance with SM20 2540C.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ANIONS
Samples WSW1 (280-63234-1), WILLIAMS DEEP (280-63234-2), WILLIAMS S (280-63234-3), NELSON WW (280-63234-4) and WSW1-DUP (280-63234-5) were analyzed for anions in accordance with EPA Method 300.0.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL PHOSPHORUS
Samples WSW1 (280-63234-1), WILLIAMS DEEP (280-63234-2), WILLIAMS S (280-63234-3), NELSON WW (280-63234-4) and WSW1-DUP (280-63234-5) were analyzed for total phosphorus in accordance with EPA Method 365.1.

The MS and MSD spike recoveries for Total Phosphorus were outside the recovery criteria low in batch 280-256022. The associated LCS and LCSD samples were in control and provide evidence that operating procedures were in control.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

CORROSIVITY (PH)
Samples WSW1 (280-63234-1), WILLIAMS DEEP (280-63234-2), WILLIAMS S (280-63234-3), NELSON WW (280-63234-4) and WSW1-DUP (280-63234-5) were analyzed for corrosivity (pH) in accordance with SM20 4500 H+ B.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

EXECUTIVE SUMMARY - Detections

Client: Vista Geoscience

Job Number: 280-63234-1

Lab Sample ID / Analyte	Client Sample ID	Result	Qualifier	Reporting Limit	Units	Method
280-63234-1	**WSW1**					
Gasoline Range Organics (GRO)-C6-C10		33		25	ug/L	8015B
Diesel Range Organics [C10-C28]		0.054	J	0.25	mg/L	8015B
Nitrate as N		0.31	J	0.50	mg/L	300.0
Bromide		0.17	J	0.20	mg/L	300.0
Nitrite as N		0.053	J	0.50	mg/L	300.0
Chloride		11		3.0	mg/L	300.0
Sulfate		94		5.0	mg/L	300.0
Fluoride		1.4		0.50	mg/L	300.0
Phosphorus, Total		0.019	J	0.050	mg/L	365.1
Alkalinity		180		5.0	mg/L	SM 2320B
Bicarbonate Alkalinity as CaCO3		180		5.0	mg/L	SM 2320B
Specific Conductance		540		2.0	umhos/cm	SM 2510B
Total Dissolved Solids		380		10	mg/L	SM 2540C
pH adj. to 25 deg C		8.05	HF	0.100	SU	SM 4500 H+ B
Temperature		15.4	HF	1.00	Degrees C	SM 4500 H+ B
Dissolved						
Boron		180		100	ug/L	6010C
Calcium		26000		200	ug/L	6010C
Iron		460		100	ug/L	6010C
Magnesium		7900		200	ug/L	6010C
Manganese		530	B	10	ug/L	6010C
Potassium		11000		3000	ug/L	6010C
Sodium		99000		1000	ug/L	6010C
Strontium		570		10	ug/L	6010C

EXECUTIVE SUMMARY - Detections

Client: Vista Geoscience

Job Number: 280-63234-1

Lab Sample ID / Analyte	Client Sample ID	Result	Qualifier	Reporting Limit	Units	Method
280-63234-2	**WILLIAMS DEEP**					
Diesel Range Organics [C10-C28]		0.078	J	0.25	mg/L	8015B
Bromide		0.55		0.20	mg/L	300.0
Chloride		47		3.0	mg/L	300.0
Sulfate		10		5.0	mg/L	300.0
Fluoride		2.5		0.50	mg/L	300.0
Phosphorus, Total		0.12		0.050	mg/L	365.1
Alkalinity		550		5.0	mg/L	SM 2320B
Bicarbonate Alkalinity as CaCO3		520		5.0	mg/L	SM 2320B
Carbonate Alkalinity as CaCO3		27		5.0	mg/L	SM 2320B
Specific Conductance		1100		2.0	umhos/cm	SM 2510B
Total Dissolved Solids		720		10	mg/L	SM 2540C
pH adj. to 25 deg C		8.42	HF	0.100	SU	SM 4500 H+ B
Temperature		16.1	HF	1.00	Degrees C	SM 4500 H+ B
Dissolved						
Boron		2000		100	ug/L	6010C
Calcium		7100		200	ug/L	6010C
Iron		450		100	ug/L	6010C
Magnesium		2700		200	ug/L	6010C
Manganese		15	B	10	ug/L	6010C
Potassium		6300		3000	ug/L	6010C
Sodium		300000		1000	ug/L	6010C
Strontium		280		10	ug/L	6010C

EXECUTIVE SUMMARY - Detections

Client: Vista Geoscience

Job Number: 280-63234-1

Lab Sample ID / Analyte	Client Sample ID	Result	Qualifier	Reporting Limit	Units	Method
280-63234-3	**WILLIAMS S**					
Diesel Range Organics [C10-C28]		0.077	J	0.25	mg/L	8015B
Nitrate as N		0.17	J H	0.50	mg/L	300.0
Bromide		0.70		0.20	mg/L	300.0
Chloride		110		3.0	mg/L	300.0
Sulfate		20		5.0	mg/L	300.0
Fluoride		0.59		0.50	mg/L	300.0
Phosphorus, Total		0.0079	J	0.050	mg/L	365.1
Alkalinity		310		5.0	mg/L	SM 2320B
Bicarbonate Alkalinity as CaCO3		310		5.0	mg/L	SM 2320B
Specific Conductance		740		2.0	umhos/cm	SM 2510B
Total Dissolved Solids		580		10	mg/L	SM 2540C
pH adj. to 25 deg C		7.38	HF	0.100	SU	SM 4500 H+ B
Temperature		16.2	HF	1.00	Degrees C	SM 4500 H+ B
Dissolved						
Boron		330		100	ug/L	6010C
Calcium		100000		200	ug/L	6010C
Iron		24	J	100	ug/L	6010C
Magnesium		35000		200	ug/L	6010C
Manganese		770	B	10	ug/L	6010C
Potassium		12000		3000	ug/L	6010C
Sodium		47000		1000	ug/L	6010C
Strontium		1500		10	ug/L	6010C

EXECUTIVE SUMMARY - Detections

Client: Vista Geoscience

Job Number: 280-63234-1

Lab Sample ID / Analyte	Client Sample ID	Result	Qualifier	Reporting Limit	Units	Method
280-63234-4	**NELSON WW**					
Gasoline Range Organics (GRO)-C6-C10		11	J	25	ug/L	8015B
Diesel Range Organics [C10-C28]		0.067	J	0.25	mg/L	8015B
Bromide		0.78		0.20	mg/L	300.0
Chloride		47		3.0	mg/L	300.0
Sulfate		160		5.0	mg/L	300.0
Fluoride		0.79		0.50	mg/L	300.0
Phosphorus, Total		0.028	J	0.050	mg/L	365.1
Alkalinity		410		5.0	mg/L	SM 2320B
Bicarbonate Alkalinity as CaCO3		400		5.0	mg/L	SM 2320B
Carbonate Alkalinity as CaCO3		3.1	J	5.0	mg/L	SM 2320B
Specific Conductance		1000		2.0	umhos/cm	SM 2510B
Total Dissolved Solids		830		10	mg/L	SM 2540C
pH adj. to 25 deg C		8.39	HF	0.100	SU	SM 4500 H+ B
Temperature		11.0	HF	1.00	Degrees C	SM 4500 H+ B
Dissolved						
Boron		1700		100	ug/L	6010C
Calcium		13000		200	ug/L	6010C
Magnesium		4300		200	ug/L	6010C
Manganese		8.5	J B	10	ug/L	6010C
Potassium		10000		3000	ug/L	6010C
Sodium		280000		1000	ug/L	6010C
Strontium		540		10	ug/L	6010C

EXECUTIVE SUMMARY - Detections

Client: Vista Geoscience

Job Number: 280-63234-1

Lab Sample ID / Analyte	Client Sample ID	Result	Qualifier	Reporting Limit	Units	Method
280-63234-5FD	**WSW1-DUP**					
Gasoline Range Organics (GRO)-C6-C10		44		25	ug/L	8015B
Diesel Range Organics [C10-C28]		0.058	J	0.25	mg/L	8015B
Nitrate as N		0.29	J	0.50	mg/L	300.0
Bromide		0.17	J	0.20	mg/L	300.0
Chloride		10		3.0	mg/L	300.0
Sulfate		94		5.0	mg/L	300.0
Fluoride		1.1		0.50	mg/L	300.0
Phosphorus, Total		0.016	J	0.050	mg/L	365.1
Alkalinity		180		5.0	mg/L	SM 2320B
Bicarbonate Alkalinity as CaCO3		180		5.0	mg/L	SM 2320B
Specific Conductance		530		2.0	umhos/cm	SM 2510B
Total Dissolved Solids		400		10	mg/L	SM 2540C
pH adj. to 25 deg C		8.14	HF	0.100	SU	SM 4500 H+ B
Temperature		15.2	HF	1.00	Degrees C	SM 4500 H+ B
Dissolved						
Boron		180		100	ug/L	6010C
Calcium		25000		200	ug/L	6010C
Iron		360		100	ug/L	6010C
Magnesium		7500		200	ug/L	6010C
Manganese		510	B	10	ug/L	6010C
Potassium		10000		3000	ug/L	6010C
Sodium		96000		1000	ug/L	6010C
Strontium		550		10	ug/L	6010C

METHOD SUMMARY

Client: Vista Geoscience Job Number: 280-63234-1

Description	Lab Location	Method	Preparation Method
Matrix: Water			
Volatile Organic Compounds (GC/MS)	TAL DEN	SW846 8260B	
Purge and Trap	TAL DEN		SW846 5030B
Gasoline Range Organics - (GC)	TAL DEN	SW846 8015B	
Purge and Trap	TAL DEN		SW846 5030B
Diesel Range Organics (DRO) (GC)	TAL DEN	SW846 8015B	
Liquid-Liquid Extraction (Separatory Funnel)	TAL DEN		SW846 3510C
Metals (ICP)	TAL DEN	SW846 6010C	
Preparation, Total Recoverable or Dissolved Metals	TAL DEN		SW846 3005A
Sample Filtration, Field			FIELD_FLTRD
Anions, Ion Chromatography	TAL DEN	MCAWW 300.0	
Phosphorus, Total	TAL DEN	EPA 365.1	
Phosphorus, Total	TAL DEN		MCAWW 365.2/365.3/365
Alkalinity	TAL DEN	SM SM 2320B	
Conductivity, Specific Conductance	TAL DEN	SM SM 2510B	
Solids, Total Dissolved (TDS)	TAL DEN	SM SM 2540C	
pH	TAL DEN	SM SM 4500 H+ B	

Lab References:

TAL DEN = TestAmerica Denver

Method References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

METHOD / ANALYST SUMMARY

Client: Vista Geoscience

Job Number: 280-63234-1

Method	Analyst	Analyst ID
SW846 8260B	Moan, Matthew R	MRM
SW846 8015B	Redman, Erin E	EER
SW846 8015B	Moore, Tegan E	TEM
SW846 6010C	Broander, Laura L	LLB
MCAWW 300.0	Phan, Thu L	TLP
EPA 365.1	Schwemin, Andrew J	AJS
SM SM 2320B	Jewell, Connie C	CCJ
SM SM 2510B	Bland, Morgan R	MRB
SM SM 2540C	Shaheen, Scott W	SWS
SM SM 4500 H+ B	Simons, Nicole A	NAS

SAMPLE SUMMARY

Client: Vista Geoscience

Job Number: 280-63234-1

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
280-63234-1	WSW1	Water	12/03/2014 1530	12/04/2014 1540
280-63234-2	WILLIAMS DEEP	Water	12/02/2014 1334	12/04/2014 1540
280-63234-3	WILLIAMS S	Water	12/02/2014 1702	12/04/2014 1540
280-63234-4	NELSON WW	Water	12/03/2014 1307	12/04/2014 1540
280-63234-5FD	WSW1-DUP	Water	12/03/2014 1530	12/04/2014 1540

SAMPLE RESULTS

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WSW1**

Lab Sample ID: 280-63234-1
Client Matrix: Water

Date Sampled: 12/03/2014 1530
Date Received: 12/04/2014 1540

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	280-256360	Instrument ID:	VMS_H
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	H7426.D
Dilution:	1.0			Initial Weight/Volume:	20 mL
Analysis Date:	12/09/2014 1607			Final Weight/Volume:	20 mL
Prep Date:	12/09/2014 1607				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Benzene	ND		0.16	1.0
Ethylbenzene	ND		0.16	1.0
Toluene	ND		0.17	1.0
m-Xylene & p-Xylene	ND		0.34	2.0
o-Xylene	ND		0.19	1.0
Xylenes, Total	ND		0.19	2.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	96		70 - 127
Toluene-d8 (Surr)	101		80 - 125
4-Bromofluorobenzene (Surr)	97		78 - 120
Dibromofluoromethane (Surr)	102		77 - 120

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WILLIAMS DEEP**

Lab Sample ID: 280-63234-2
Client Matrix: Water

Date Sampled: 12/02/2014 1334
Date Received: 12/04/2014 1540

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	280-256360	Instrument ID:	VMS_H
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	H7427.D
Dilution:	1.0			Initial Weight/Volume:	20 mL
Analysis Date:	12/09/2014 1630			Final Weight/Volume:	20 mL
Prep Date:	12/09/2014 1630				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Benzene	ND		0.16	1.0
Ethylbenzene	ND		0.16	1.0
Toluene	ND		0.17	1.0
m-Xylene & p-Xylene	ND		0.34	2.0
o-Xylene	ND		0.19	1.0
Xylenes, Total	ND		0.19	2.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	104		70 - 127
Toluene-d8 (Surr)	106		80 - 125
4-Bromofluorobenzene (Surr)	102		78 - 120
Dibromofluoromethane (Surr)	107		77 - 120

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WILLIAMS S**

Lab Sample ID: 280-63234-3
Client Matrix: Water

Date Sampled: 12/02/2014 1702
Date Received: 12/04/2014 1540

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	280-256360	Instrument ID:	VMS_H
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	H7428.D
Dilution:	1.0			Initial Weight/Volume:	20 mL
Analysis Date:	12/09/2014 1652			Final Weight/Volume:	20 mL
Prep Date:	12/09/2014 1652				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Benzene	ND		0.16	1.0
Ethylbenzene	ND		0.16	1.0
Toluene	ND		0.17	1.0
m-Xylene & p-Xylene	ND		0.34	2.0
o-Xylene	ND		0.19	1.0
Xylenes, Total	ND		0.19	2.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	102		70 - 127
Toluene-d8 (Surr)	104		80 - 125
4-Bromofluorobenzene (Surr)	101		78 - 120
Dibromofluoromethane (Surr)	106		77 - 120

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **NELSON WW**

Lab Sample ID: 280-63234-4
Client Matrix: Water

Date Sampled: 12/03/2014 1307
Date Received: 12/04/2014 1540

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	280-256360	Instrument ID:	VMS_H
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	H7429.D
Dilution:	1.0			Initial Weight/Volume:	20 mL
Analysis Date:	12/09/2014 1714			Final Weight/Volume:	20 mL
Prep Date:	12/09/2014 1714				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Benzene	ND		0.16	1.0
Ethylbenzene	ND		0.16	1.0
Toluene	ND		0.17	1.0
m-Xylene & p-Xylene	ND		0.34	2.0
o-Xylene	ND		0.19	1.0
Xylenes, Total	ND		0.19	2.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	106		70 - 127
Toluene-d8 (Surr)	105		80 - 125
4-Bromofluorobenzene (Surr)	102		78 - 120
Dibromofluoromethane (Surr)	109		77 - 120

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WSW1-DUP**

Lab Sample ID: 280-63234-5FD
Client Matrix: Water

Date Sampled: 12/03/2014 1530
Date Received: 12/04/2014 1540

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	280-256360	Instrument ID:	VMS_H
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	H7430.D
Dilution:	1.0			Initial Weight/Volume:	20 mL
Analysis Date:	12/09/2014 1736			Final Weight/Volume:	20 mL
Prep Date:	12/09/2014 1736				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Benzene	ND		0.16	1.0
Ethylbenzene	ND		0.16	1.0
Toluene	ND		0.17	1.0
m-Xylene & p-Xylene	ND		0.34	2.0
o-Xylene	ND		0.19	1.0
Xylenes, Total	ND		0.19	2.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	98		70 - 127
Toluene-d8 (Surr)	101		80 - 125
4-Bromofluorobenzene (Surr)	95		78 - 120
Dibromofluoromethane (Surr)	100		77 - 120

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WSW1**

Lab Sample ID: 280-63234-1
Client Matrix: Water

Date Sampled: 12/03/2014 1530
Date Received: 12/04/2014 1540

8015B Gasoline Range Organics - (GC)

Analysis Method:	8015B	Analysis Batch:	280-257181	Instrument ID:	VGC_Q
Prep Method:	5030B		N/A	Initial Weight/Volume:	5 mL
Dilution:	1.0			Final Weight/Volume:	5 mL
Analysis Date:	12/15/2014 1434			Injection Volume:	5 mL
Prep Date:	12/15/2014 1434			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
Gasoline Range Organics (GRO)-C6-C10	33		10	25

Surrogate	%Rec	Qualifier	Acceptance Limits
a,a,a-Trifluorotoluene	98		82 - 110

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WILLIAMS DEEP**

Lab Sample ID: 280-63234-2
Client Matrix: Water

Date Sampled: 12/02/2014 1334
Date Received: 12/04/2014 1540

8015B Gasoline Range Organics - (GC)

Analysis Method:	8015B	Analysis Batch:	280-257181	Instrument ID:	VGC_Q
Prep Method:	5030B		N/A	Initial Weight/Volume:	5 mL
Dilution:	1.0			Final Weight/Volume:	5 mL
Analysis Date:	12/15/2014 1459			Injection Volume:	5 mL
Prep Date:	12/15/2014 1459			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
Gasoline Range Organics (GRO)-C6-C10	ND		10	25

Surrogate	%Rec	Qualifier	Acceptance Limits
a,a,a-Trifluorotoluene	98		82 - 110

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WILLIAMS S**

Lab Sample ID: 280-63234-3
Client Matrix: Water

Date Sampled: 12/02/2014 1702
Date Received: 12/04/2014 1540

8015B Gasoline Range Organics - (GC)

Analysis Method:	8015B	Analysis Batch:	280-257181	Instrument ID:	VGC_Q
Prep Method:	5030B		N/A	Initial Weight/Volume:	5 mL
Dilution:	1.0			Final Weight/Volume:	5 mL
Analysis Date:	12/15/2014 1524			Injection Volume:	5 mL
Prep Date:	12/15/2014 1524			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
Gasoline Range Organics (GRO)-C6-C10	ND		10	25

Surrogate	%Rec	Qualifier	Acceptance Limits
a,a,a-Trifluorotoluene	96		82 - 110

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **NELSON WW**

Lab Sample ID: 280-63234-4
Client Matrix: Water

Date Sampled: 12/03/2014 1307
Date Received: 12/04/2014 1540

8015B Gasoline Range Organics - (GC)

Analysis Method:	8015B	Analysis Batch:	280-257181	Instrument ID:	VGC_Q
Prep Method:	5030B		N/A	Initial Weight/Volume:	5 mL
Dilution:	1.0			Final Weight/Volume:	5 mL
Analysis Date:	12/15/2014 1549			Injection Volume:	5 mL
Prep Date:	12/15/2014 1549			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
Gasoline Range Organics (GRO)-C6-C10	11	J	10	25

Surrogate	%Rec	Qualifier	Acceptance Limits
a,a,a-Trifluorotoluene	95		82 - 110

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WSW1-DUP**

Lab Sample ID: 280-63234-5FD
Client Matrix: Water

Date Sampled: 12/03/2014 1530
Date Received: 12/04/2014 1540

8015B Gasoline Range Organics - (GC)

Analysis Method:	8015B	Analysis Batch:	280-257181	Instrument ID:	VGC_Q
Prep Method:	5030B		N/A	Initial Weight/Volume:	5 mL
Dilution:	1.0			Final Weight/Volume:	5 mL
Analysis Date:	12/15/2014 1614			Injection Volume:	5 mL
Prep Date:	12/15/2014 1614			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	MDL	RL
Gasoline Range Organics (GRO)-C6-C10	44		10	25

Surrogate	%Rec	Qualifier	Acceptance Limits
a,a,a-Trifluorotoluene	95		82 - 110

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WSW1**

Lab Sample ID: 280-63234-1
Client Matrix: Water

Date Sampled: 12/03/2014 1530
Date Received: 12/04/2014 1540

8015B Diesel Range Organics (DRO) (GC)

Analysis Method:	8015B	Analysis Batch:	280-256411	Instrument ID:	SGC_U
Prep Method:	3510C	Prep Batch:	280-255895	Initial Weight/Volume:	998.1 mL
Dilution:	1.0			Final Weight/Volume:	1 mL
Analysis Date:	12/09/2014 1702			Injection Volume:	1 uL
Prep Date:	12/04/2014 2132			Result Type:	PRIMARY

Analyte	Result (mg/L)	Qualifier	MDL	RL
Diesel Range Organics [C10-C28]	0.054	J	0.033	0.25

Surrogate	%Rec	Qualifier	Acceptance Limits
o-Terphenyl	81		50 - 115

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WILLIAMS DEEP**

Lab Sample ID: 280-63234-2
Client Matrix: Water

Date Sampled: 12/02/2014 1334
Date Received: 12/04/2014 1540

8015B Diesel Range Organics (DRO) (GC)

Analysis Method:	8015B	Analysis Batch:	280-256411	Instrument ID:	SGC_U
Prep Method:	3510C	Prep Batch:	280-255895	Initial Weight/Volume:	993.1 mL
Dilution:	1.0			Final Weight/Volume:	1 mL
Analysis Date:	12/09/2014 1633			Injection Volume:	1 uL
Prep Date:	12/04/2014 2132			Result Type:	PRIMARY

Analyte	Result (mg/L)	Qualifier	MDL	RL
Diesel Range Organics [C10-C28]	0.078	J	0.033	0.25

Surrogate	%Rec	Qualifier	Acceptance Limits
o-Terphenyl	83		50 - 115

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WILLIAMS S**

Lab Sample ID: 280-63234-3
Client Matrix: Water

Date Sampled: 12/02/2014 1702
Date Received: 12/04/2014 1540

8015B Diesel Range Organics (DRO) (GC)

Analysis Method:	8015B	Analysis Batch:	280-256411	Instrument ID:	SGC_U
Prep Method:	3510C	Prep Batch:	280-255895	Initial Weight/Volume:	1000.2 mL
Dilution:	1.0			Final Weight/Volume:	1 mL
Analysis Date:	12/09/2014 1759			Injection Volume:	1 uL
Prep Date:	12/04/2014 2132			Result Type:	PRIMARY

Analyte	Result (mg/L)	Qualifier	MDL	RL
Diesel Range Organics [C10-C28]	0.077	J	0.033	0.25

Surrogate	%Rec	Qualifier	Acceptance Limits
o-Terphenyl	85		50 - 115

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **NELSON WW**

Lab Sample ID: 280-63234-4
Client Matrix: Water

Date Sampled: 12/03/2014 1307
Date Received: 12/04/2014 1540

8015B Diesel Range Organics (DRO) (GC)

Analysis Method:	8015B	Analysis Batch:	280-256411	Instrument ID:	SGC_U
Prep Method:	3510C	Prep Batch:	280-255895	Initial Weight/Volume:	999.7 mL
Dilution:	1.0			Final Weight/Volume:	1 mL
Analysis Date:	12/09/2014 1827			Injection Volume:	1 uL
Prep Date:	12/04/2014 2132			Result Type:	PRIMARY

Analyte	Result (mg/L)	Qualifier	MDL	RL
Diesel Range Organics [C10-C28]	0.067	J	0.033	0.25

Surrogate	%Rec	Qualifier	Acceptance Limits
o-Terphenyl	83		50 - 115

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WSW1-DUP**

Lab Sample ID: 280-63234-5FD
Client Matrix: Water

Date Sampled: 12/03/2014 1530
Date Received: 12/04/2014 1540

8015B Diesel Range Organics (DRO) (GC)

Analysis Method:	8015B	Analysis Batch:	280-256411	Instrument ID:	SGC_U
Prep Method:	3510C	Prep Batch:	280-255895	Initial Weight/Volume:	993.8 mL
Dilution:	1.0			Final Weight/Volume:	1 mL
Analysis Date:	12/09/2014 1731			Injection Volume:	1 uL
Prep Date:	12/04/2014 2132			Result Type:	PRIMARY

Analyte	Result (mg/L)	Qualifier	MDL	RL
Diesel Range Organics [C10-C28]	0.058	J	0.033	0.25

Surrogate	%Rec	Qualifier	Acceptance Limits
o-Terphenyl	85		50 - 115

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WSW1**

Lab Sample ID: 280-63234-1
Client Matrix: Water

Date Sampled: 12/03/2014 1530
Date Received: 12/04/2014 1540

6010C Metals (ICP)-Dissolved

Analysis Method:	6010C	Analysis Batch:	280-257625	Instrument ID:	MT_026
Prep Method:	3005A	Prep Batch:	280-255988	Lab File ID:	26b121714.asc
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	12/17/2014 1318			Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1500				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Boron	180		4.4	100
Calcium	26000		35	200
Iron	460		22	100
Magnesium	7900		11	200
Manganese	530	B	0.25	10
Potassium	11000		240	3000
Selenium	ND		4.9	15
Sodium	99000		92	1000
Strontium	570		0.30	10

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WILLIAMS DEEP**

Lab Sample ID: 280-63234-2
Client Matrix: Water

Date Sampled: 12/02/2014 1334
Date Received: 12/04/2014 1540

6010C Metals (ICP)-Dissolved

Analysis Method:	6010C	Analysis Batch:	280-257625	Instrument ID:	MT_026
Prep Method:	3005A	Prep Batch:	280-255988	Lab File ID:	26b121714.asc
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	12/17/2014 1321			Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1500				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Boron	2000		4.4	100
Calcium	7100		35	200
Iron	450		22	100
Magnesium	2700		11	200
Manganese	15	B	0.25	10
Potassium	6300		240	3000
Selenium	ND		4.9	15
Sodium	300000		92	1000
Strontium	280		0.30	10

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WILLIAMS S**

Lab Sample ID: 280-63234-3
Client Matrix: Water

Date Sampled: 12/02/2014 1702
Date Received: 12/04/2014 1540

6010C Metals (ICP)-Dissolved

Analysis Method:	6010C	Analysis Batch:	280-257625	Instrument ID:	MT_026
Prep Method:	3005A	Prep Batch:	280-255988	Lab File ID:	26b121714.asc
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	12/17/2014 1323			Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1500				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Boron	330		4.4	100
Calcium	100000		35	200
Iron	24	J	22	100
Magnesium	35000		11	200
Manganese	770	B	0.25	10
Potassium	12000		240	3000
Selenium	ND		4.9	15
Sodium	47000		92	1000
Strontium	1500		0.30	10

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **NELSON WW**

Lab Sample ID: 280-63234-4
Client Matrix: Water

Date Sampled: 12/03/2014 1307
Date Received: 12/04/2014 1540

6010C Metals (ICP)-Dissolved

Analysis Method:	6010C	Analysis Batch:	280-257625	Instrument ID:	MT_026
Prep Method:	3005A	Prep Batch:	280-255988	Lab File ID:	26b121714.asc
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	12/17/2014 1326			Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1500				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Boron	1700		4.4	100
Calcium	13000		35	200
Iron	ND		22	100
Magnesium	4300		11	200
Manganese	8.5	J B	0.25	10
Potassium	10000		240	3000
Selenium	ND		4.9	15
Sodium	280000		92	1000
Strontium	540		0.30	10

Client: Vista Geoscience

Job Number: 280-63234-1

Client Sample ID: **WSW1-DUP**

Lab Sample ID: 280-63234-5FD
Client Matrix: Water

Date Sampled: 12/03/2014 1530
Date Received: 12/04/2014 1540

6010C Metals (ICP)-Dissolved

Analysis Method:	6010C	Analysis Batch:	280-257625	Instrument ID:	MT_026
Prep Method:	3005A	Prep Batch:	280-255988	Lab File ID:	26b121714.asc
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	12/17/2014 1329			Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1500				

Analyte	Result (ug/L)	Qualifier	MDL	RL
Boron	180		4.4	100
Calcium	25000		35	200
Iron	360		22	100
Magnesium	7500		11	200
Manganese	510	B	0.25	10
Potassium	10000		240	3000
Selenium	ND		4.9	15
Sodium	96000		92	1000
Strontium	550		0.30	10

General Chemistry

Client Sample ID: **WSW1**

Lab Sample ID: 280-63234-1 Date Sampled: 12/03/2014 1530
Client Matrix: Water Date Received: 12/04/2014 1540

Analyte	Result	Qual	Units	MDL	RL	Dil	Method
Bromide	0.17	J	mg/L	0.11	0.20	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2127						
Nitrate as N	0.31	J	mg/L	0.042	0.50	1.0	300.0
Analysis Batch: 280-255747	Analysis Date: 12/04/2014 2127						
Chloride	11		mg/L	0.25	3.0	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2127						
Nitrite as N	0.053	J	mg/L	0.049	0.50	1.0	300.0
Analysis Batch: 280-255747	Analysis Date: 12/04/2014 2127						
Sulfate	94		mg/L	0.23	5.0	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2127						
Fluoride	1.4		mg/L	0.060	0.50	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2127						
Phosphorus, Total	0.019	J	mg/L	0.0050	0.050	1.0	365.1
Analysis Batch: 280-256082	Analysis Date: 12/05/2014 2042						
Prep Batch: 280-256022	Prep Date: 12/05/2014 1412						
Alkalinity	180		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1256						
Bicarbonate Alkalinity as CaCO3	180		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1256						
Carbonate Alkalinity as CaCO3	ND		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1256						
Total Dissolved Solids	380		mg/L	4.7	10	1.0	SM 2540C
Analysis Batch: 280-256116	Analysis Date: 12/06/2014 1002						

Analyte	Result	Qual	Units	RL	RL	Dil	Method
Specific Conductance	540		umhos/cm	2.0	2.0	1.0	SM 2510B
Analysis Batch: 280-256021	Analysis Date: 12/05/2014 1426						
pH adj. to 25 deg C	8.05	HF	SU	0.100	0.100	1.0	SM 4500 H+ B
Analysis Batch: 280-256500	Analysis Date: 12/09/2014 1713						
Temperature	15.4	HF	Degrees C	1.00	1.00	1.0	SM 4500 H+ B
Analysis Batch: 280-256500	Analysis Date: 12/09/2014 1713						

General Chemistry

Client Sample ID: **WILLIAMS DEEP**

Lab Sample ID: 280-63234-2 Date Sampled: 12/02/2014 1334
Client Matrix: Water Date Received: 12/04/2014 1540

Analyte	Result	Qual	Units	MDL	RL	Dil	Method
Bromide	0.55		mg/L	0.11	0.20	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2145						
Nitrate as N	ND	H	mg/L	0.042	0.50	1.0	300.0
Analysis Batch: 280-255747	Analysis Date: 12/04/2014 2145						
Chloride	47		mg/L	0.25	3.0	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2145						
Nitrite as N	ND	H	mg/L	0.049	0.50	1.0	300.0
Analysis Batch: 280-255747	Analysis Date: 12/04/2014 2145						
Sulfate	10		mg/L	0.23	5.0	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2145						
Fluoride	2.5		mg/L	0.060	0.50	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2145						
Phosphorus, Total	0.12		mg/L	0.0050	0.050	1.0	365.1
Analysis Batch: 280-256082	Analysis Date: 12/05/2014 2045						
Prep Batch: 280-256022	Prep Date: 12/05/2014 1412						
Alkalinity	550		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1301						
Bicarbonate Alkalinity as CaCO3	520		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1301						
Carbonate Alkalinity as CaCO3	27		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1301						
Total Dissolved Solids	720		mg/L	4.7	10	1.0	SM 2540C
Analysis Batch: 280-256116	Analysis Date: 12/06/2014 1002						

Analyte	Result	Qual	Units	RL	RL	Dil	Method
Specific Conductance	1100		umhos/cm	2.0	2.0	1.0	SM 2510B
Analysis Batch: 280-256021	Analysis Date: 12/05/2014 1426						
pH adj. to 25 deg C	8.42	HF	SU	0.100	0.100	1.0	SM 4500 H+ B
Analysis Batch: 280-256500	Analysis Date: 12/09/2014 1713						
Temperature	16.1	HF	Degrees C	1.00	1.00	1.0	SM 4500 H+ B
Analysis Batch: 280-256500	Analysis Date: 12/09/2014 1713						

General Chemistry

Client Sample ID: **WILLIAMS S**

Lab Sample ID: 280-63234-3 Date Sampled: 12/02/2014 1702
Client Matrix: Water Date Received: 12/04/2014 1540

Analyte	Result	Qual	Units	MDL	RL	Dil	Method
Bromide	0.70		mg/L	0.11	0.20	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2203						
Nitrate as N	0.17	J H	mg/L	0.042	0.50	1.0	300.0
Analysis Batch: 280-255747	Analysis Date: 12/04/2014 2203						
Chloride	110		mg/L	0.25	3.0	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2203						
Nitrite as N	ND	H	mg/L	0.049	0.50	1.0	300.0
Analysis Batch: 280-255747	Analysis Date: 12/04/2014 2203						
Sulfate	20		mg/L	0.23	5.0	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2203						
Fluoride	0.59		mg/L	0.060	0.50	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2203						
Phosphorus, Total	0.0079	J	mg/L	0.0050	0.050	1.0	365.1
Analysis Batch: 280-256082	Analysis Date: 12/05/2014 2045						
Prep Batch: 280-256022	Prep Date: 12/05/2014 1412						
Alkalinity	310		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1315						
Bicarbonate Alkalinity as CaCO3	310		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1315						
Carbonate Alkalinity as CaCO3	ND		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1315						
Total Dissolved Solids	580		mg/L	4.7	10	1.0	SM 2540C
Analysis Batch: 280-256116	Analysis Date: 12/06/2014 1002						

Analyte	Result	Qual	Units	RL	RL	Dil	Method
Specific Conductance	740		umhos/cm	2.0	2.0	1.0	SM 2510B
Analysis Batch: 280-256021	Analysis Date: 12/05/2014 1426						
pH adj. to 25 deg C	7.38	HF	SU	0.100	0.100	1.0	SM 4500 H+ B
Analysis Batch: 280-256500	Analysis Date: 12/09/2014 1713						
Temperature	16.2	HF	Degrees C	1.00	1.00	1.0	SM 4500 H+ B
Analysis Batch: 280-256500	Analysis Date: 12/09/2014 1713						

General Chemistry

Client Sample ID: **NELSON WW**

Lab Sample ID: 280-63234-4 Date Sampled: 12/03/2014 1307
Client Matrix: Water Date Received: 12/04/2014 1540

Analyte	Result	Qual	Units	MDL	RL	Dil	Method
Bromide	0.78		mg/L	0.11	0.20	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2220						
Nitrate as N	ND		mg/L	0.042	0.50	1.0	300.0
Analysis Batch: 280-255747	Analysis Date: 12/04/2014 2220						
Chloride	47		mg/L	0.25	3.0	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2220						
Nitrite as N	ND		mg/L	0.049	0.50	1.0	300.0
Analysis Batch: 280-255747	Analysis Date: 12/04/2014 2220						
Sulfate	160		mg/L	0.23	5.0	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2220						
Fluoride	0.79		mg/L	0.060	0.50	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2220						
Phosphorus, Total	0.028	J	mg/L	0.0050	0.050	1.0	365.1
Analysis Batch: 280-256082	Analysis Date: 12/05/2014 2045						
Prep Batch: 280-256022	Prep Date: 12/05/2014 1412						
Alkalinity	410		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1320						
Bicarbonate Alkalinity as CaCO3	400		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1320						
Carbonate Alkalinity as CaCO3	3.1	J	mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1320						
Total Dissolved Solids	830		mg/L	4.7	10	1.0	SM 2540C
Analysis Batch: 280-256116	Analysis Date: 12/06/2014 1002						

Analyte	Result	Qual	Units	RL	RL	Dil	Method
Specific Conductance	1000		umhos/cm	2.0	2.0	1.0	SM 2510B
Analysis Batch: 280-256021	Analysis Date: 12/05/2014 1426						
pH adj. to 25 deg C	8.39	HF	SU	0.100	0.100	1.0	SM 4500 H+ B
Analysis Batch: 280-256500	Analysis Date: 12/09/2014 1713						
Temperature	11.0	HF	Degrees C	1.00	1.00	1.0	SM 4500 H+ B
Analysis Batch: 280-256500	Analysis Date: 12/09/2014 1713						

General Chemistry

Client Sample ID: **WSW1-DUP**

Lab Sample ID: 280-63234-5FD Date Sampled: 12/03/2014 1530
Client Matrix: Water Date Received: 12/04/2014 1540

Analyte	Result	Qual	Units	MDL	RL	Dil	Method
Bromide	0.17	J	mg/L	0.11	0.20	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2238						
Nitrate as N	0.29	J	mg/L	0.042	0.50	1.0	300.0
Analysis Batch: 280-255747	Analysis Date: 12/04/2014 2238						
Chloride	10		mg/L	0.25	3.0	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2238						
Nitrite as N	ND		mg/L	0.049	0.50	1.0	300.0
Analysis Batch: 280-255747	Analysis Date: 12/04/2014 2238						
Sulfate	94		mg/L	0.23	5.0	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2238						
Fluoride	1.1		mg/L	0.060	0.50	1.0	300.0
Analysis Batch: 280-255748	Analysis Date: 12/04/2014 2238						
Phosphorus, Total	0.016	J	mg/L	0.0050	0.050	1.0	365.1
Analysis Batch: 280-256082	Analysis Date: 12/05/2014 2045						
Prep Batch: 280-256022	Prep Date: 12/05/2014 1412						
Alkalinity	180		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1325						
Bicarbonate Alkalinity as CaCO3	180		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1325						
Carbonate Alkalinity as CaCO3	ND		mg/L	1.1	5.0	1.0	SM 2320B
Analysis Batch: 280-256035	Analysis Date: 12/05/2014 1325						
Total Dissolved Solids	400		mg/L	4.7	10	1.0	SM 2540C
Analysis Batch: 280-256116	Analysis Date: 12/06/2014 1002						

Analyte	Result	Qual	Units	RL	RL	Dil	Method
Specific Conductance	530		umhos/cm	2.0	2.0	1.0	SM 2510B
Analysis Batch: 280-256021	Analysis Date: 12/05/2014 1426						
pH adj. to 25 deg C	8.14	HF	SU	0.100	0.100	1.0	SM 4500 H+ B
Analysis Batch: 280-256500	Analysis Date: 12/09/2014 1713						
Temperature	15.2	HF	Degrees C	1.00	1.00	1.0	SM 4500 H+ B
Analysis Batch: 280-256500	Analysis Date: 12/09/2014 1713						

DATA REPORTING QUALIFIERS

Client: Vista Geoscience Job Number: 280-63234-1

Lab Section	Qualifier	Description
GC VOA		
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
GC Semi VOA		
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
Metals		
	B	Compound was found in the blank and sample.
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
General Chemistry		
	HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.
	F1	MS and/or MSD Recovery exceeds the control limits
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
	H	Sample was prepped or analyzed beyond the specified holding time

QUALITY CONTROL RESULTS

Client: Vista Geoscience

Job Number: 280-63234-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
GC/MS VOA					
Analysis Batch:280-256360					
LCS 280-256360/4	Lab Control Sample	T	Water	8260B	
MB 280-256360/6	Method Blank	T	Water	8260B	
280-63234-1	WSW1	T	Water	8260B	
280-63234-2	WILLIAMS DEEP	T	Water	8260B	
280-63234-3	WILLIAMS S	T	Water	8260B	
280-63234-4	NELSON WW	T	Water	8260B	
280-63234-5FD	WSW1-DUP	T	Water	8260B	
280-63241-I-6 MS	Matrix Spike	T	Water	8260B	
280-63241-I-6 MSD	Matrix Spike Duplicate	T	Water	8260B	

Report Basis
T = Total

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
GC VOA					
Analysis Batch:280-257181					
LCS 280-257181/5	Lab Control Sample	T	Water	8015B	
LCSD 280-257181/6	Lab Control Sample Duplicate	T	Water	8015B	
MB 280-257181/4	Method Blank	T	Water	8015B	
280-63234-1	WSW1	T	Water	8015B	
280-63234-2	WILLIAMS DEEP	T	Water	8015B	
280-63234-3	WILLIAMS S	T	Water	8015B	
280-63234-4	NELSON WW	T	Water	8015B	
280-63234-5FD	WSW1-DUP	T	Water	8015B	
280-63516-I-4 MS	Matrix Spike	T	Water	8015B	
280-63516-I-4 MSD	Matrix Spike Duplicate	T	Water	8015B	

Report Basis
T = Total

Client: Vista Geoscience

Job Number: 280-63234-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
GC Semi VOA					
Prep Batch: 280-255895					
LCS 280-255895/2-A	Lab Control Sample	T	Water	3510C	
LCSD 280-255895/3-A	Lab Control Sample Duplicate	T	Water	3510C	
MB 280-255895/1-A	Method Blank	T	Water	3510C	
280-63234-1	WSW1	T	Water	3510C	
280-63234-2	WILLIAMS DEEP	T	Water	3510C	
280-63234-3	WILLIAMS S	T	Water	3510C	
280-63234-4	NELSON WW	T	Water	3510C	
280-63234-5FD	WSW1-DUP	T	Water	3510C	
Analysis Batch:280-256411					
LCS 280-255895/2-A	Lab Control Sample	T	Water	8015B	280-255895
LCSD 280-255895/3-A	Lab Control Sample Duplicate	T	Water	8015B	280-255895
MB 280-255895/1-A	Method Blank	T	Water	8015B	280-255895
280-63234-1	WSW1	T	Water	8015B	280-255895
280-63234-2	WILLIAMS DEEP	T	Water	8015B	280-255895
280-63234-3	WILLIAMS S	T	Water	8015B	280-255895
280-63234-4	NELSON WW	T	Water	8015B	280-255895
280-63234-5FD	WSW1-DUP	T	Water	8015B	280-255895

Report Basis

T = Total

Client: Vista Geoscience

Job Number: 280-63234-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
Metals					
Prep Batch: 280-255988					
LCS 280-255988/2-A	Lab Control Sample	R	Water	3005A	
LCSD 280-255988/3-A	Lab Control Sample Duplicate	R	Water	3005A	
MB 280-255988/1-A	Method Blank	R	Water	3005A	
280-63234-1	WSW1	D	Water	3005A	
280-63234-2	WILLIAMS DEEP	D	Water	3005A	
280-63234-3	WILLIAMS S	D	Water	3005A	
280-63234-4	NELSON WW	D	Water	3005A	
280-63234-5FD	WSW1-DUP	D	Water	3005A	
Analysis Batch:280-257625					
LCS 280-255988/2-A	Lab Control Sample	R	Water	6010C	280-255988
LCSD 280-255988/3-A	Lab Control Sample Duplicate	R	Water	6010C	280-255988
MB 280-255988/1-A	Method Blank	R	Water	6010C	280-255988
280-63234-1	WSW1	D	Water	6010C	280-255988
280-63234-2	WILLIAMS DEEP	D	Water	6010C	280-255988
280-63234-3	WILLIAMS S	D	Water	6010C	280-255988
280-63234-4	NELSON WW	D	Water	6010C	280-255988
280-63234-5FD	WSW1-DUP	D	Water	6010C	280-255988

Report Basis

D = Dissolved

R = Total Recoverable

Client: Vista Geoscience

Job Number: 280-63234-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
General Chemistry					
Analysis Batch:280-255747					
LCS 280-255747/4	Lab Control Sample	T	Water	300.0	
LCSD 280-255747/5	Lab Control Sample Duplicate	T	Water	300.0	
MB 280-255747/6	Method Blank	T	Water	300.0	
280-63199-I-3 DU	Duplicate	T	Water	300.0	
280-63199-I-3 MS	Matrix Spike	T	Water	300.0	
280-63199-I-3 MSD	Matrix Spike Duplicate	T	Water	300.0	
280-63234-1	WSW1	T	Water	300.0	
280-63234-2	WILLIAMS DEEP	T	Water	300.0	
280-63234-3	WILLIAMS S	T	Water	300.0	
280-63234-4	NELSON WW	T	Water	300.0	
280-63234-5FD	WSW1-DUP	T	Water	300.0	
Analysis Batch:280-255748					
LCS 280-255748/4	Lab Control Sample	T	Water	300.0	
LCSD 280-255748/5	Lab Control Sample Duplicate	T	Water	300.0	
MB 280-255748/6	Method Blank	T	Water	300.0	
280-63199-I-3 DU	Duplicate	T	Water	300.0	
280-63199-I-3 MS	Matrix Spike	T	Water	300.0	
280-63199-I-3 MSD	Matrix Spike Duplicate	T	Water	300.0	
280-63234-1	WSW1	T	Water	300.0	
280-63234-2	WILLIAMS DEEP	T	Water	300.0	
280-63234-3	WILLIAMS S	T	Water	300.0	
280-63234-4	NELSON WW	T	Water	300.0	
280-63234-5FD	WSW1-DUP	T	Water	300.0	
Analysis Batch:280-256021					
LCS 280-256021/30	Lab Control Sample	T	Water	SM 2510B	
LCSD 280-256021/31	Lab Control Sample Duplicate	T	Water	SM 2510B	
MB 280-256021/32	Method Blank	T	Water	SM 2510B	
280-63215-C-1 DU	Duplicate	T	Water	SM 2510B	
280-63234-1	WSW1	T	Water	SM 2510B	
280-63234-2	WILLIAMS DEEP	T	Water	SM 2510B	
280-63234-3	WILLIAMS S	T	Water	SM 2510B	
280-63234-4	NELSON WW	T	Water	SM 2510B	
280-63234-5FD	WSW1-DUP	T	Water	SM 2510B	

Client: Vista Geoscience

Job Number: 280-63234-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
General Chemistry					
Prep Batch: 280-256022					
LCS 280-256022/3-A	Lab Control Sample	T	Water	365.2/365.3/365	
LCSD 280-256022/4-A	Lab Control Sample Duplicate	T	Water	365.2/365.3/365	
MB 280-256022/5-A	Method Blank	T	Water	365.2/365.3/365	
280-63207-J-1-B MS	Matrix Spike	T	Water	365.2/365.3/365	
280-63207-J-1-C MSD	Matrix Spike Duplicate	T	Water	365.2/365.3/365	
280-63234-1	WSW1	T	Water	365.2/365.3/365	
280-63234-2	WILLIAMS DEEP	T	Water	365.2/365.3/365	
280-63234-3	WILLIAMS S	T	Water	365.2/365.3/365	
280-63234-4	NELSON WW	T	Water	365.2/365.3/365	
280-63234-5FD	WSW1-DUP	T	Water	365.2/365.3/365	
Analysis Batch:280-256035					
LCS 280-256035/31	Lab Control Sample	T	Water	SM 2320B	
LCSD 280-256035/32	Lab Control Sample Duplicate	T	Water	SM 2320B	
MB 280-256035/33	Method Blank	T	Water	SM 2320B	
280-63213-A-1 DU	Duplicate	T	Water	SM 2320B	
280-63234-1	WSW1	T	Water	SM 2320B	
280-63234-2	WILLIAMS DEEP	T	Water	SM 2320B	
280-63234-3	WILLIAMS S	T	Water	SM 2320B	
280-63234-4	NELSON WW	T	Water	SM 2320B	
280-63234-5FD	WSW1-DUP	T	Water	SM 2320B	
Analysis Batch:280-256082					
LCS 280-256022/3-A	Lab Control Sample	T	Water	365.1	280-256022
LCSD 280-256022/4-A	Lab Control Sample Duplicate	T	Water	365.1	280-256022
MB 280-256022/5-A	Method Blank	T	Water	365.1	280-256022
280-63207-J-1-B MS	Matrix Spike	T	Water	365.1	280-256022
280-63207-J-1-C MSD	Matrix Spike Duplicate	T	Water	365.1	280-256022
280-63234-1	WSW1	T	Water	365.1	280-256022
280-63234-2	WILLIAMS DEEP	T	Water	365.1	280-256022
280-63234-3	WILLIAMS S	T	Water	365.1	280-256022
280-63234-4	NELSON WW	T	Water	365.1	280-256022
280-63234-5FD	WSW1-DUP	T	Water	365.1	280-256022
Analysis Batch:280-256116					
LCS 280-256116/2	Lab Control Sample	T	Water	SM 2540C	
LCSD 280-256116/3	Lab Control Sample Duplicate	T	Water	SM 2540C	
MB 280-256116/1	Method Blank	T	Water	SM 2540C	
280-63234-1	WSW1	T	Water	SM 2540C	
280-63234-1DU	Duplicate	T	Water	SM 2540C	
280-63234-2	WILLIAMS DEEP	T	Water	SM 2540C	
280-63234-3	WILLIAMS S	T	Water	SM 2540C	
280-63234-4	NELSON WW	T	Water	SM 2540C	
280-63234-5FD	WSW1-DUP	T	Water	SM 2540C	

Client: Vista Geoscience

Job Number: 280-63234-1

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
General Chemistry					
Analysis Batch:280-256500					
LCS 280-256500/30	Lab Control Sample	T	Water	SM 4500 H+ B	
LCS 280-256500/56	Lab Control Sample	T	Water	SM 4500 H+ B	
LCSD 280-256500/31	Lab Control Sample Duplicate	T	Water	SM 4500 H+ B	
LCSD 280-256500/57	Lab Control Sample Duplicate	T	Water	SM 4500 H+ B	
280-63233-C-3 DU	Duplicate	T	Water	SM 4500 H+ B	
280-63234-1	WSW1	T	Water	SM 4500 H+ B	
280-63234-2	WILLIAMS DEEP	T	Water	SM 4500 H+ B	
280-63234-3	WILLIAMS S	T	Water	SM 4500 H+ B	
280-63234-4	NELSON WW	T	Water	SM 4500 H+ B	
280-63234-5FD	WSW1-DUP	T	Water	SM 4500 H+ B	
280-63345-C-2 DU	Duplicate	T	Water	SM 4500 H+ B	

Report Basis

T = Total

Client: Vista Geoscience

Job Number: 280-63234-1

Surrogate Recovery Report

8260B Volatile Organic Compounds (GC/MS)

Client Matrix: Water

Lab Sample ID	Client Sample ID	DCA %Rec	TOL %Rec	BFB %Rec	DBFM %Rec
280-63234-1	WSW1	96	101	97	102
280-63234-2	WILLIAMS DEEP	104	106	102	107
280-63234-3	WILLIAMS S	102	104	101	106
280-63234-4	NELSON WW	106	105	102	109
280-63234-5	WSW1-DUP	98	101	95	100
MB 280-256360/6		106	107	106	108
LCS 280-256360/4		102	111	94	99
280-63241-I-6 MS		100	109	90	98
280-63241-I-6 MSD		98	107	95	102

Surrogate	Acceptance Limits
DCA = 1,2-Dichloroethane-d4 (Surr)	70-127
TOL = Toluene-d8 (Surr)	80-125
BFB = 4-Bromofluorobenzene (Surr)	78-120
DBFM = Dibromofluoromethane (Surr)	77-120

Client: Vista Geoscience

Job Number: 280-63234-1

Surrogate Recovery Report

8015B Gasoline Range Organics - (GC)

Client Matrix: Water

Lab Sample ID	Client Sample ID	TFT1 %Rec
280-63234-1	WSW1	98
280-63234-2	WILLIAMS DEEP	98
280-63234-3	WILLIAMS S	96
280-63234-4	NELSON WW	95
280-63234-5	WSW1-DUP	95
MB 280-257181/4		96
LCS 280-257181/5		95
LCSD 280-257181/6		83
280-63516-I-4 MS		84
280-63516-I-4 MSD		88

Surrogate	Acceptance Limits
TFT = a,a,a-Trifluorotoluene	82-110

Client: Vista Geoscience

Job Number: 280-63234-1

Surrogate Recovery Report

8015B Diesel Range Organics (DRO) (GC)

Client Matrix: Water

Lab Sample ID	Client Sample ID	OTPH1 %Rec
280-63234-1	WSW1	81
280-63234-2	WILLIAMS DEEP	83
280-63234-3	WILLIAMS S	85
280-63234-4	NELSON WW	83
280-63234-5	WSW1-DUP	85
MB 280-255895/1-A		87
LCS 280-255895/2-A		87
LCSD 280-255895/3-A		88

Surrogate	Acceptance Limits
OTPH = o-Terphenyl	50-115

Client: Vista Geoscience

Job Number: 280-63234-1

Method Blank - Batch: 280-256360

Method: 8260B
Preparation: 5030B

Lab Sample ID:	MB 280-256360/6	Analysis Batch:	280-256360	Instrument ID:	VMS_H
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	H7405.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	20 mL
Analysis Date:	12/09/2014 0821	Units:	ug/L	Final Weight/Volume:	20 mL
Prep Date:	12/09/2014 0821				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Benzene	ND		0.16	1.0
Ethylbenzene	ND		0.16	1.0
Toluene	ND		0.17	1.0
m-Xylene & p-Xylene	ND		0.34	2.0
o-Xylene	ND		0.19	1.0
Xylenes, Total	ND		0.19	2.0

Surrogate	% Rec	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	106	70 - 127
Toluene-d8 (Surr)	107	80 - 125
4-Bromofluorobenzene (Surr)	106	78 - 120
Dibromofluoromethane (Surr)	108	77 - 120

Lab Control Sample - Batch: 280-256360

Method: 8260B
Preparation: 5030B

Lab Sample ID:	LCS 280-256360/4	Analysis Batch:	280-256360	Instrument ID:	VMS_H
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	H7404.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	20 mL
Analysis Date:	12/09/2014 0759	Units:	ug/L	Final Weight/Volume:	20 mL
Prep Date:	12/09/2014 0759				
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Benzene	5.00	5.44	109	65 - 135	
Ethylbenzene	5.00	5.34	107	65 - 135	
Toluene	5.00	5.35	107	65 - 135	
m-Xylene & p-Xylene	5.00	5.16	103	65 - 135	
o-Xylene	5.00	5.27	105	65 - 135	
Xylenes, Total	10.0	10.4	104	65 - 135	

Surrogate	% Rec	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	102	70 - 127
Toluene-d8 (Surr)	111	80 - 125
4-Bromofluorobenzene (Surr)	94	78 - 120
Dibromofluoromethane (Surr)	99	77 - 120

Client: Vista Geoscience

Job Number: 280-63234-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 280-256360

Method: 8260B
Preparation: 5030B

MS Lab Sample ID:	280-63241-I-6 MS	Analysis Batch:	280-256360	Instrument ID:	VMS_H
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	H7409.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	20 mL
Analysis Date:	12/09/2014 0950			Final Weight/Volume:	20 mL
Prep Date:	12/09/2014 0950				20 mL
Leach Date:	N/A				

MSD Lab Sample ID:	280-63241-I-6 MSD	Analysis Batch:	280-256360	Instrument ID:	VMS_H
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	H7410.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	20 mL
Analysis Date:	12/09/2014 1012			Final Weight/Volume:	20 mL
Prep Date:	12/09/2014 1012				20 mL
Leach Date:	N/A				

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Benzene	98	94	65 - 135	4	20		
Ethylbenzene	94	98	65 - 135	5	20		
Toluene	96	104	65 - 135	7	20		
m-Xylene & p-Xylene	93	97	65 - 135	5	20		
o-Xylene	94	96	65 - 135	3	20		
Xylenes, Total	93	97	65 - 135	4	20		

Surrogate	MS % Rec	MSD % Rec	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	100	98	70 - 127
Toluene-d8 (Surr)	109	107	80 - 125
4-Bromofluorobenzene (Surr)	90	95	78 - 120
Dibromofluoromethane (Surr)	98	102	77 - 120

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 280-256360

Method: 8260B
Preparation: 5030B

MS Lab Sample ID:	280-63241-I-6 MS	Units: ug/L		MSD Lab Sample ID:	280-63241-I-6 MSD
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/09/2014 0950			Analysis Date:	12/09/2014 1012
Prep Date:	12/09/2014 0950			Prep Date:	12/09/2014 1012
Leach Date:	N/A			Leach Date:	N/A

Analyte	Sample Result/Qual	MS Spike Amount	MSD Spike Amount	MS Result/Qual	MSD Result/Qual
Benzene	ND	5.00	5.00	4.90	4.71
Ethylbenzene	ND	5.00	5.00	4.69	4.92
Toluene	ND	5.00	5.00	4.82	5.18
m-Xylene & p-Xylene	ND	5.00	5.00	4.66	4.87
o-Xylene	ND	5.00	5.00	4.68	4.80
Xylenes, Total	ND	10.0	10.0	9.34	9.67

Client: Vista Geoscience

Job Number: 280-63234-1

Method Blank - Batch: 280-257181

Method: 8015B
Preparation: 5030B

Lab Sample ID:	MB 280-257181/4	Analysis Batch:	280-257181	Instrument ID:	VGC_Q
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	004F0401.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/15/2014 1221	Units:	ug/L	Final Weight/Volume:	5 mL
Prep Date:	12/15/2014 1221			Injection Volume:	5 mL
Leach Date:	N/A			Column ID:	PRIMARY

Analyte	Result	Qual	MDL	RL
Gasoline Range Organics (GRO)-C6-C10	ND		10	25

Surrogate	% Rec	Acceptance Limits
a,a,a-Trifluorotoluene	96	82 - 110

Lab Control Sample/
Lab Control Sample Duplicate Recovery Report - Batch: 280-257181

Method: 8015B
Preparation: 5030B

LCS Lab Sample ID:	LCS 280-257181/5	Analysis Batch:	280-257181	Instrument ID:	VGC_Q
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	005F0501.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/15/2014 1246	Units:	ug/L	Final Weight/Volume:	5 mL
Prep Date:	12/15/2014 1246			Injection Volume:	5 mL
Leach Date:	N/A			Column ID:	PRIMARY

LCSD Lab Sample ID:	LCSD 280-257181/6	Analysis Batch:	280-257181	Instrument ID:	VGC_Q
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	006F0601.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/15/2014 1311	Units:	ug/L	Final Weight/Volume:	5 mL
Prep Date:	12/15/2014 1311			Injection Volume:	5 mL
Leach Date:	N/A			Column ID:	PRIMARY

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Gasoline Range Organics (GRO)-C6-C10	100	89	79 - 149	11	27		

Surrogate	LCS % Rec	LCSD % Rec	Acceptance Limits
a,a,a-Trifluorotoluene	95	83	82 - 110

Client: Vista Geoscience

Job Number: 280-63234-1

Laboratory Control/
Laboratory Duplicate Data Report - Batch: 280-257181

Method: 8015B
Preparation: 5030B

LCS Lab Sample ID:	LCS 280-257181/5	Units: ug/L		LCSD Lab Sample ID:	LCSD 280-257181/6
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/15/2014 1246			Analysis Date:	12/15/2014 1311
Prep Date:	12/15/2014 1246			Prep Date:	12/15/2014 1311
Leach Date:	N/A			Leach Date:	N/A

Analyte	LCS Spike Amount	LCSD Spike Amount	LCS Result/Qual	LCSD Result/Qual
Gasoline Range Organics (GRO)-C6-C10	101	101	101	90.1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 280-257181

Method: 8015B
Preparation: 5030B

MS Lab Sample ID:	280-63516-I-4 MS	Analysis Batch:	280-257181	Instrument ID:	VGC_Q
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	023F2301.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/15/2014 2047			Final Weight/Volume:	5 mL
Prep Date:	12/15/2014 2047			Injection Volume:	5 mL
Leach Date:	N/A			Column ID:	PRIMARY
MSD Lab Sample ID:	280-63516-I-4 MSD	Analysis Batch:	280-257181	Instrument ID:	VGC_Q
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	024F2401.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/15/2014 2112			Final Weight/Volume:	5 mL
Prep Date:	12/15/2014 2112			Injection Volume:	5 mL
Leach Date:	N/A			Column ID:	PRIMARY

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Gasoline Range Organics (GRO)-C6-C10	101	100	79 - 149	0	27		

Surrogate	MS % Rec	MSD % Rec	Acceptance Limits
a,a,a-Trifluorotoluene	84	88	82 - 110

Client: Vista Geoscience

Job Number: 280-63234-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 280-257181

Method: 8015B
Preparation: 5030B

MS Lab Sample ID:	280-63516-I-4 MS	Units: ug/L	MSD Lab Sample ID:	280-63516-I-4 MSD	
Client Matrix:	Water		Client Matrix:	Water	
Dilution:	1.0		Dilution:	1.0	
Analysis Date:	12/15/2014 2047		Analysis Date:	12/15/2014 2112	
Prep Date:	12/15/2014 2047		Prep Date:	12/15/2014 2112	
Leach Date:	N/A		Leach Date:	N/A	

Analyte	Sample Result/Qual	MS Spike Amount	MSD Spike Amount	MS Result/Qual	MSD Result/Qual
Gasoline Range Organics (GRO)-C6-C10	ND	101	101	102	101

Client: Vista Geoscience

Job Number: 280-63234-1

Method Blank - Batch: 280-255895

Method: 8015B
Preparation: 3510C

Lab Sample ID:	MB 280-255895/1-A	Analysis Batch:	280-256411	Instrument ID:	SGC_U
Client Matrix:	Water	Prep Batch:	280-255895	Lab File ID:	12090012.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	1000 mL
Analysis Date:	12/09/2014 1507	Units:	mg/L	Final Weight/Volume:	1 mL
Prep Date:	12/04/2014 2132			Injection Volume:	1 uL
Leach Date:	N/A			Column ID:	PRIMARY

Analyte	Result	Qual	MDL	RL
Diesel Range Organics [C10-C28]	ND		0.033	0.25

Surrogate	% Rec	Acceptance Limits
o-Terphenyl	87	50 - 115

Lab Control Sample/
Lab Control Sample Duplicate Recovery Report - Batch: 280-255895

Method: 8015B
Preparation: 3510C

LCS Lab Sample ID:	LCS 280-255895/2-A	Analysis Batch:	280-256411	Instrument ID:	SGC_U
Client Matrix:	Water	Prep Batch:	280-255895	Lab File ID:	12090013.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	1000 mL
Analysis Date:	12/09/2014 1536	Units:	mg/L	Final Weight/Volume:	1 mL
Prep Date:	12/04/2014 2132			Injection Volume:	1 uL
Leach Date:	N/A			Column ID:	PRIMARY

LCSD Lab Sample ID:	LCSD 280-255895/3-A	Analysis Batch:	280-256411	Instrument ID:	SGC_U
Client Matrix:	Water	Prep Batch:	280-255895	Lab File ID:	12090014.D
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	1000 mL
Analysis Date:	12/09/2014 1605	Units:	mg/L	Final Weight/Volume:	1 mL
Prep Date:	12/04/2014 2132			Injection Volume:	1 uL
Leach Date:	N/A			Column ID:	PRIMARY

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Diesel Range Organics [C10-C28]	90	93	54 - 115	3	31		

Surrogate	LCS % Rec	LCSD % Rec	Acceptance Limits
o-Terphenyl	87	88	50 - 115

Client: Vista Geoscience

Job Number: 280-63234-1

Laboratory Control/
Laboratory Duplicate Data Report - Batch: 280-255895

Method: 8015B
Preparation: 3510C

LCS Lab Sample ID:	LCS 280-255895/2-A	Units:	mg/L	LCSD Lab Sample ID:	LCSD 280-255895/3-A
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/09/2014 1536			Analysis Date:	12/09/2014 1605
Prep Date:	12/04/2014 2132			Prep Date:	12/04/2014 2132
Leach Date:	N/A			Leach Date:	N/A

Analyte	LCS Spike Amount	LCSD Spike Amount	LCS Result/Qual	LCSD Result/Qual
Diesel Range Organics [C10-C28]	2.00	2.00	1.80	1.86

Client: Vista Geoscience

Job Number: 280-63234-1

Method Blank - Batch: 280-255988

Method: 6010C
Preparation: 3005A
Total Recoverable

Lab Sample ID:	MB 280-255988/1-A	Analysis Batch:	280-257625	Instrument ID:	MT_026
Client Matrix:	Water	Prep Batch:	280-255988	Lab File ID:	26b121714.asc
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	12/17/2014 1311	Units:	ug/L	Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1500				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Boron	ND		4.4	100
Calcium	ND		35	200
Iron	ND		22	100
Magnesium	ND		11	200
Manganese	0.270	J	0.25	10
Potassium	ND		240	3000
Selenium	ND		4.9	15
Sodium	ND		92	1000
Strontium	ND		0.30	10

Lab Control Sample/
Lab Control Sample Duplicate Recovery Report - Batch: 280-255988

Method: 6010C
Preparation: 3005A
Total Recoverable

LCS Lab Sample ID:	LCS 280-255988/2-A	Analysis Batch:	280-257625	Instrument ID:	MT_026
Client Matrix:	Water	Prep Batch:	280-255988	Lab File ID:	26b121714.asc
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	12/17/2014 1313	Units:	ug/L	Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1500				
Leach Date:	N/A				

LCSD Lab Sample ID:	LCSD 280-255988/3-A	Analysis Batch:	280-257625	Instrument ID:	MT_026
Client Matrix:	Water	Prep Batch:	280-255988	Lab File ID:	26b121714.asc
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	12/17/2014 1316	Units:	ug/L	Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1500				
Leach Date:	N/A				

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Boron	103	102	86 - 110	1	20		
Calcium	105	98	90 - 111	7	20		
Iron	105	98	89 - 115	7	20		
Magnesium	106	100	90 - 113	6	20		
Manganese	105	99	90 - 110	6	20		
Potassium	106	100	89 - 114	6	20		
Selenium	104	98	85 - 112	6	20		
Sodium	110	102	90 - 115	8	20		
Strontium	108	101	90 - 111	6	20		

Client: Vista Geoscience

Job Number: 280-63234-1

Laboratory Control/
Laboratory Duplicate Data Report - Batch: 280-255988

Method: 6010C
Preparation: 3005A
Total Recoverable

LCS Lab Sample ID:	LCS 280-255988/2-A	Units:	ug/L	LCSD Lab Sample ID:	LCSD 280-255988/3-A
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/17/2014 1313			Analysis Date:	12/17/2014 1316
Prep Date:	12/05/2014 1500			Prep Date:	12/05/2014 1500
Leach Date:	N/A			Leach Date:	N/A

Analyte	LCS Spike Amount	LCSD Spike Amount	LCS Result/Qual	LCSD Result/Qual
Boron	1000	1000	1030	1020
Calcium	50000	50000	52600	49000
Iron	1000	1000	1050	979
Magnesium	50000	50000	53100	49900
Manganese	500	500	524	494
Potassium	50000	50000	53200	49900
Selenium	2000	2000	2080	1950
Sodium	50000	50000	54900	50900
Strontium	1000	1000	1080	1010

Client: Vista Geoscience

Job Number: 280-63234-1

Method Blank - Batch: 280-255747

Method: 300.0
Preparation: N/A

Lab Sample ID:	MB 280-255747/6	Analysis Batch:	280-255747	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	15.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 1131	Units:	mg/L	Final Weight/Volume:	5 mL
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Nitrate as N	ND		0.042	0.50
Nitrite as N	ND		0.049	0.50

Method Reporting Limit Check - Batch: 280-255747

Method: 300.0
Preparation: N/A

Lab Sample ID:	MRL 280-255747/3	Analysis Batch:	280-255747	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	12.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 1038	Units:	mg/L	Final Weight/Volume:	5 mL
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Nitrate as N	0.200	0.214	107	50 - 150	J
Nitrite as N	0.200	0.209	104	50 - 150	J

Lab Control Sample/
Lab Control Sample Duplicate Recovery Report - Batch: 280-255747

Method: 300.0
Preparation: N/A

LCS Lab Sample ID:	LCS 280-255747/4	Analysis Batch:	280-255747	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	13.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 1056	Units:	mg/L	Final Weight/Volume:	5 mL
Prep Date:	N/A				25 uL
Leach Date:	N/A				

LCSD Lab Sample ID:	LCSD 280-255747/5	Analysis Batch:	280-255747	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	14.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 1114	Units:	mg/L	Final Weight/Volume:	5 mL
Prep Date:	N/A				25 uL
Leach Date:	N/A				

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Nitrate as N	101	101	90 - 110	0	10		
Nitrite as N	108	108	90 - 110	0	10		

Client: Vista Geoscience

Job Number: 280-63234-1

Laboratory Control/
Laboratory Duplicate Data Report - Batch: 280-255747

Method: 300.0
Preparation: N/A

LCS Lab Sample ID:	LCS 280-255747/4	Units:	mg/L	LCSD Lab Sample ID:	LCSD 280-255747/5
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/04/2014 1056			Analysis Date:	12/04/2014 1114
Prep Date:	N/A			Prep Date:	N/A
Leach Date:	N/A			Leach Date:	N/A

Analyte	LCS Spike Amount	LCSD Spike Amount	LCS Result/Qual	LCSD Result/Qual
Nitrate as N	5.00	5.00	5.04	5.05
Nitrite as N	5.00	5.00	5.38	5.40

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 280-255747

Method: 300.0
Preparation: N/A

MS Lab Sample ID:	280-63199-I-3 MS	Analysis Batch:	280-255747	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	40.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 2051			Final Weight/Volume:	5 mL
Prep Date:	N/A				25 uL
Leach Date:	N/A				

MSD Lab Sample ID:	280-63199-I-3 MSD	Analysis Batch:	280-255747	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	41.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 2109			Final Weight/Volume:	5 mL
Prep Date:	N/A				25 uL
Leach Date:	N/A				

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Nitrate as N	108	108	80 - 120	1	20		
Nitrite as N	110	111	80 - 120	1	20		

Client: Vista Geoscience

Job Number: 280-63234-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 280-255747

Method: 300.0
Preparation: N/A

MS Lab Sample ID:	280-63199-I-3 MS	Units: mg/L	MSD Lab Sample ID:	280-63199-I-3 MSD	
Client Matrix:	Water		Client Matrix:	Water	
Dilution:	1.0		Dilution:	1.0	
Analysis Date:	12/04/2014 2051		Analysis Date:	12/04/2014 2109	
Prep Date:	N/A		Prep Date:	N/A	
Leach Date:	N/A		Leach Date:	N/A	

Analyte	Sample Result/Qual	MS Spike Amount	MSD Spike Amount	MS Result/Qual	MSD Result/Qual
Nitrate as N	0.67	5.00	5.00	6.06	6.10
Nitrite as N	ND	5.00	5.00	5.51	5.57

Duplicate - Batch: 280-255747

Method: 300.0
Preparation: N/A

Lab Sample ID:	280-63199-I-3 DU	Analysis Batch:	280-255747	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	39.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 2034	Units:	mg/L	Final Weight/Volume:	5 mL
Prep Date:	N/A				25 uL
Leach Date:	N/A				

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
Nitrate as N	0.67	0.680	0.9	15	
Nitrite as N	ND	ND	NC	15	

Client: Vista Geoscience

Job Number: 280-63234-1

Method Blank - Batch: 280-255748

Method: 300.0
Preparation: N/A

Lab Sample ID:	MB 280-255748/6	Analysis Batch:	280-255748	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	15.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 1131	Units:	mg/L	Final Weight/Volume:	5 mL
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Bromide	ND		0.11	0.20
Chloride	ND		0.25	3.0
Sulfate	ND		0.23	5.0
Fluoride	ND		0.060	0.50

Method Reporting Limit Check - Batch: 280-255748

Method: 300.0
Preparation: N/A

Lab Sample ID:	MRL 280-255748/3	Analysis Batch:	280-255748	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	12.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 1038	Units:	mg/L	Final Weight/Volume:	5 mL
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Bromide	0.200	0.207	104	50 - 150	
Chloride	2.50	2.55	102	50 - 150	J
Sulfate	2.50	2.60	104	50 - 150	J
Fluoride	0.200	0.180	90	50 - 150	J

Client: Vista Geoscience

Job Number: 280-63234-1

Lab Control Sample/
Lab Control Sample Duplicate Recovery Report - Batch: 280-255748

Method: 300.0
Preparation: N/A

LCS Lab Sample ID:	LCS 280-255748/4	Analysis Batch:	280-255748	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	13.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 1056	Units:	mg/L	Final Weight/Volume:	5 mL
Prep Date:	N/A				25 uL
Leach Date:	N/A				

LCSD Lab Sample ID:	LCSD 280-255748/5	Analysis Batch:	280-255748	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	14.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 1114	Units:	mg/L	Final Weight/Volume:	5 mL
Prep Date:	N/A				25 uL
Leach Date:	N/A				

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Bromide	101	101	90 - 110	0	10		
Chloride	102	102	90 - 110	0	10		
Sulfate	105	104	90 - 110	0	10		
Fluoride	99	98	90 - 110	1	10		

Laboratory Control/
Laboratory Duplicate Data Report - Batch: 280-255748

Method: 300.0
Preparation: N/A

LCS Lab Sample ID:	LCS 280-255748/4	Units:	mg/L	LCSD Lab Sample ID:	LCSD 280-255748/5
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/04/2014 1056			Analysis Date:	12/04/2014 1114
Prep Date:	N/A			Prep Date:	N/A
Leach Date:	N/A			Leach Date:	N/A

Analyte	LCS Spike Amount	LCSD Spike Amount	LCS Result/Qual	LCSD Result/Qual
Bromide	5.00	5.00	5.04	5.04
Chloride	100	100	102	102
Sulfate	100	100	105	104
Fluoride	5.00	5.00	4.96	4.91

Client: Vista Geoscience

Job Number: 280-63234-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 280-255748

Method: 300.0
Preparation: N/A

MS Lab Sample ID:	280-63199-I-3 MS	Analysis Batch:	280-255748	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	40.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 2051			Final Weight/Volume:	5 mL
Prep Date:	N/A				25 uL
Leach Date:	N/A				

MSD Lab Sample ID:	280-63199-I-3 MSD	Analysis Batch:	280-255748	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	41.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 2109			Final Weight/Volume:	5 mL
Prep Date:	N/A				25 uL
Leach Date:	N/A				

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Bromide	105	106	80 - 120	1	20		
Chloride	108	108	80 - 120	0	20		
Sulfate	107	110	80 - 120	1	20		
Fluoride	100	101	80 - 120	1	20		

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 280-255748

Method: 300.0
Preparation: N/A

MS Lab Sample ID:	280-63199-I-3 MS	Units:	mg/L	MSD Lab Sample ID:	280-63199-I-3 MSD
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/04/2014 2051			Analysis Date:	12/04/2014 2109
Prep Date:	N/A			Prep Date:	N/A
Leach Date:	N/A			Leach Date:	N/A

Analyte	Sample Result/Qual		MS Spike Amount	MSD Spike Amount	MS Result/Qual	MSD Result/Qual
Bromide	0.28		5.00	5.00	5.54	5.57
Chloride	54		25.0	25.0	81.0	81.1
Sulfate	36		25.0	25.0	62.6	63.5
Fluoride	0.26	J	5.00	5.00	5.26	5.32

Client: Vista Geoscience

Job Number: 280-63234-1

Duplicate - Batch: 280-255748

Method: 300.0
Preparation: N/A

Lab Sample ID:	280-63199-I-3 DU	Analysis Batch:	280-255748	Instrument ID:	WC_IonChrom7
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	39.0000.d
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	5 mL
Analysis Date:	12/04/2014 2034	Units:	mg/L	Final Weight/Volume:	5 mL
Prep Date:	N/A				25 uL
Leach Date:	N/A				

Analyte	Sample Result/Qual		Result	RPD	Limit	Qual
Bromide	0.28		0.284	0.2	15	
Chloride	54		54.1	0	15	
Sulfate	36		35.6	0.9	15	
Fluoride	0.26	J	0.252	2	15	J

Client: Vista Geoscience

Job Number: 280-63234-1

Method Blank - Batch: 280-256022

Method: 365.1
Preparation: 365.2/365.3/365

Lab Sample ID:	MB 280-256022/5-A	Analysis Batch:	280-256082	Instrument ID:	WC_Konelab
Client Matrix:	Water	Prep Batch:	280-256022	Lab File ID:	120514TPHOSb.xls
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	12/05/2014 1958	Units:	mg/L	Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1412				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Phosphorus, Total	ND		0.0050	0.050

Lab Control Sample/
Lab Control Sample Duplicate Recovery Report - Batch: 280-256022

Method: 365.1
Preparation: 365.2/365.3/365

LCS Lab Sample ID:	LCS 280-256022/3-A	Analysis Batch:	280-256082	Instrument ID:	WC_Konelab
Client Matrix:	Water	Prep Batch:	280-256022	Lab File ID:	120514TPHOSb.xls
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	12/05/2014 1958	Units:	mg/L	Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1412				
Leach Date:	N/A				

LCSD Lab Sample ID:	LCSD 280-256022/4-A	Analysis Batch:	280-256082	Instrument ID:	WC_Konelab
Client Matrix:	Water	Prep Batch:	280-256022	Lab File ID:	120514TPHOSb.xls
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	12/05/2014 1958	Units:	mg/L	Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1412				
Leach Date:	N/A				

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Phosphorus, Total	96	100	90 - 110	4	10		

Laboratory Control/
Laboratory Duplicate Data Report - Batch: 280-256022

Method: 365.1
Preparation: 365.2/365.3/365

LCS Lab Sample ID:	LCS 280-256022/3-A	Units:	mg/L	LCSD Lab Sample ID:	LCSD 280-256022/4-A
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/05/2014 1958			Analysis Date:	12/05/2014 1958
Prep Date:	12/05/2014 1412			Prep Date:	12/05/2014 1412
Leach Date:	N/A			Leach Date:	N/A

Analyte	LCS Spike Amount	LCSD Spike Amount	LCS Result/Qual	LCSD Result/Qual
Phosphorus, Total	0.500	0.500	0.479	0.501

Client: Vista Geoscience

Job Number: 280-63234-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 280-256022

Method: 365.1
Preparation: 365.2/365.3/365

MS Lab Sample ID:	280-63207-J-1-B MS	Analysis Batch:	280-256082	Instrument ID:	WC_Konelab
Client Matrix:	Water	Prep Batch:	280-256022	Lab File ID:	120514TPHOSb.xls
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	12/05/2014 2042			Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1412				
Leach Date:	N/A				

MSD Lab Sample ID:	280-63207-J-1-C MSD	Analysis Batch:	280-256082	Instrument ID:	WC_Konelab
Client Matrix:	Water	Prep Batch:	280-256022	Lab File ID:	120514TPHOSb.xls
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	50 mL
Analysis Date:	12/05/2014 2042			Final Weight/Volume:	50 mL
Prep Date:	12/05/2014 1412				
Leach Date:	N/A				

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Phosphorus, Total	83	61	90 - 110	9	10	F1	F1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 280-256022

Method: 365.1
Preparation: 365.2/365.3/365

MS Lab Sample ID:	280-63207-J-1-B MS	Units: mg/L	
Client Matrix:	Water		
Dilution:	1.0		
Analysis Date:	12/05/2014 2042		
Prep Date:	12/05/2014 1412		
Leach Date:	N/A		

MSD Lab Sample ID:	280-63207-J-1-C MSD
Client Matrix:	Water
Dilution:	1.0
Analysis Date:	12/05/2014 2042
Prep Date:	12/05/2014 1412
Leach Date:	N/A

Analyte	Sample Result/Qual	MS Spike Amount	MSD Spike Amount	MS Result/Qual		MSD Result/Qual	
Phosphorus, Total	0.86	0.500	0.500	1.28	F1	1.16	F1

Client: Vista Geoscience

Job Number: 280-63234-1

Method Blank - Batch: 280-256035

Method: SM 2320B
Preparation: N/A

Lab Sample ID:	MB 280-256035/33	Analysis Batch:	280-256035	Instrument ID:	WC-AT3
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	120514a.TXT
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/05/2014 1212	Units:	mg/L	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Alkalinity	ND		1.1	5.0
Bicarbonate Alkalinity as CaCO3	ND		1.1	5.0
Carbonate Alkalinity as CaCO3	ND		1.1	5.0

Lab Control Sample/
Lab Control Sample Duplicate Recovery Report - Batch: 280-256035

Method: SM 2320B
Preparation: N/A

LCS Lab Sample ID:	LCS 280-256035/31	Analysis Batch:	280-256035	Instrument ID:	WC-AT3
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	120514a.TXT
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/05/2014 1201	Units:	mg/L	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

LCSD Lab Sample ID:	LCSD 280-256035/32	Analysis Batch:	280-256035	Instrument ID:	WC-AT3
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	120514a.TXT
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/05/2014 1208	Units:	mg/L	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Alkalinity	93	98	90 - 110	6	10		

Laboratory Control/
Laboratory Duplicate Data Report - Batch: 280-256035

Method: SM 2320B
Preparation: N/A

LCS Lab Sample ID:	LCS 280-256035/31	Units:	mg/L	LCSD Lab Sample ID:	LCSD 280-256035/32
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/05/2014 1201			Analysis Date:	12/05/2014 1208
Prep Date:	N/A			Prep Date:	N/A
Leach Date:	N/A			Leach Date:	N/A

Analyte	LCS Spike Amount	LCSD Spike Amount	LCS Result/Qual	LCSD Result/Qual
Alkalinity	200	200	186	197

Client: Vista Geoscience

Job Number: 280-63234-1

Duplicate - Batch: 280-256035

Method: SM 2320B
Preparation: N/A

Lab Sample ID:	280-63213-A-1 DU	Analysis Batch:	280-256035	Instrument ID:	WC-AT3
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	120514a.TXT
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/05/2014 1236	Units:	mg/L	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
Alkalinity	540	545	1	10	

Client: Vista Geoscience

Job Number: 280-63234-1

Method Blank - Batch: 280-256021

Method: SM 2510B
Preparation: N/A

Lab Sample ID:	MB 280-256021/32	Analysis Batch:	280-256021	Instrument ID:	WC_Cond_Orion
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/05/2014 1408	Units:	umhos/cm	Final Weight/Volume:	25 mL
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Result	Qual	RL	RL
Specific Conductance	ND		2.0	2.0

Lab Control Sample/
Lab Control Sample Duplicate Recovery Report - Batch: 280-256021

Method: SM 2510B
Preparation: N/A

LCS Lab Sample ID:	LCS 280-256021/30	Analysis Batch:	280-256021	Instrument ID:	WC_Cond_Orion
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/05/2014 1408	Units:	umhos/cm	Final Weight/Volume:	25 mL
Prep Date:	N/A				
Leach Date:	N/A				

LCSD Lab Sample ID:	LCSD 280-256021/31	Analysis Batch:	280-256021	Instrument ID:	WC_Cond_Orion
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/05/2014 1408	Units:	umhos/cm	Final Weight/Volume:	25 mL
Prep Date:	N/A				
Leach Date:	N/A				

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Specific Conductance	101	101	90 - 110	0	10		

Laboratory Control/
Laboratory Duplicate Data Report - Batch: 280-256021

Method: SM 2510B
Preparation: N/A

LCS Lab Sample ID:	LCS 280-256021/30	Units:	umhos/cm	LCSD Lab Sample ID:	LCSD 280-256021/31
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/05/2014 1408			Analysis Date:	12/05/2014 1408
Prep Date:	N/A			Prep Date:	N/A
Leach Date:	N/A			Leach Date:	N/A

Analyte	LCS Spike Amount	LCSD Spike Amount	LCS Result/Qual	LCSD Result/Qual
Specific Conductance	1410	1410	1430	1420

Client: Vista Geoscience

Job Number: 280-63234-1

Duplicate - Batch: 280-256021

Method: SM 2510B
Preparation: N/A

Lab Sample ID:	280-63215-C-1 DU	Analysis Batch:	280-256021	Instrument ID:	WC_Cond_Orion
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/05/2014 1408	Units:	umhos/cm	Final Weight/Volume:	25 mL
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
Specific Conductance	100	97.8	4	10	

Client: Vista Geoscience

Job Number: 280-63234-1

Method Blank - Batch: 280-256116

Method: SM 2540C
Preparation: N/A

Lab Sample ID:	MB 280-256116/1	Analysis Batch:	280-256116	Instrument ID:	WC_Cond_Orion
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	100 mL
Analysis Date:	12/06/2014 1002	Units:	mg/L	Final Weight/Volume:	100 mL
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Result	Qual	MDL	RL
Total Dissolved Solids	ND		4.7	10

Lab Control Sample/
Lab Control Sample Duplicate Recovery Report - Batch: 280-256116

Method: SM 2540C
Preparation: N/A

LCS Lab Sample ID:	LCS 280-256116/2	Analysis Batch:	280-256116	Instrument ID:	WC_Cond_Orion
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	100 mL
Analysis Date:	12/06/2014 1002	Units:	mg/L	Final Weight/Volume:	100 mL
Prep Date:	N/A				
Leach Date:	N/A				

LCSD Lab Sample ID:	LCSD 280-256116/3	Analysis Batch:	280-256116	Instrument ID:	WC_Cond_Orion
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	100 mL
Analysis Date:	12/06/2014 1002	Units:	mg/L	Final Weight/Volume:	100 mL
Prep Date:	N/A				
Leach Date:	N/A				

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Total Dissolved Solids	99	101	86 - 110	2	20		

Laboratory Control/
Laboratory Duplicate Data Report - Batch: 280-256116

Method: SM 2540C
Preparation: N/A

LCS Lab Sample ID:	LCS 280-256116/2	Units:	mg/L	LCSD Lab Sample ID:	LCSD 280-256116/3
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/06/2014 1002			Analysis Date:	12/06/2014 1002
Prep Date:	N/A			Prep Date:	N/A
Leach Date:	N/A			Leach Date:	N/A

Analyte	LCS Spike Amount	LCSD Spike Amount	LCS Result/Qual	LCSD Result/Qual
Total Dissolved Solids	501	501	496	507

Client: Vista Geoscience

Job Number: 280-63234-1

Duplicate - Batch: 280-256116

Method: SM 2540C
Preparation: N/A

Lab Sample ID:	280-63234-1	Analysis Batch:	280-256116	Instrument ID:	WC_Cond_Orion
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	100 mL
Analysis Date:	12/06/2014 1002	Units:	mg/L	Final Weight/Volume:	100 mL
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
Total Dissolved Solids	380	411	8	10	

Client: Vista Geoscience

Job Number: 280-63234-1

Lab Control Sample/
Lab Control Sample Duplicate Recovery Report - Batch: 280-256500

Method: SM 4500 H+ B
Preparation: N/A

LCS Lab Sample ID:	LCS 280-256500/30	Analysis Batch:	280-256500	Instrument ID:	No Equipment Assigned
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/09/2014 1713	Units:	SU	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

LCSD Lab Sample ID:	LCSD 280-256500/31	Analysis Batch:	280-256500	Instrument ID:	No Equipment Assigned
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/09/2014 1713	Units:	SU	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
pH adj. to 25 deg C	100	100	99 - 101	0	5		

Lab Control Sample/
Lab Control Sample Duplicate Recovery Report - Batch: 280-256500

Method: SM 4500 H+ B
Preparation: N/A

LCS Lab Sample ID:	LCS 280-256500/56	Analysis Batch:	280-256500	Instrument ID:	No Equipment Assigned
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/09/2014 1713	Units:	SU	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

LCSD Lab Sample ID:	LCSD 280-256500/57	Analysis Batch:	280-256500	Instrument ID:	No Equipment Assigned
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/09/2014 1713	Units:	SU	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
pH adj. to 25 deg C	100	100	99 - 101	0	5		

Client: Vista Geoscience

Job Number: 280-63234-1

Laboratory Control/
Laboratory Duplicate Data Report - Batch: 280-256500

Method: SM 4500 H+ B
Preparation: N/A

LCS Lab Sample ID:	LCS 280-256500/30	Units:	SU	LCSD Lab Sample ID:	LCSD 280-256500/31
Client Matrix:	Water			Client Matrix:	Water
Dilution:	1.0			Dilution:	1.0
Analysis Date:	12/09/2014 1713			Analysis Date:	12/09/2014 1713
Prep Date:	N/A			Prep Date:	N/A
Leach Date:	N/A			Leach Date:	N/A

Analyte	LCS Spike Amount	LCSD Spike Amount	LCS Result/Qual	LCSD Result/Qual
pH adj. to 25 deg C	7.00	7.00	7.010	7.010
pH adj. to 25 deg C	7.00	7.00	7.030	7.020

Client: Vista Geoscience

Job Number: 280-63234-1

Duplicate - Batch: 280-256500

Method: SM 4500 H+ B
Preparation: N/A

Lab Sample ID:	280-63233-C-3 DU	Analysis Batch:	280-256500	Instrument ID:	No Equipment Assigned
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/09/2014 1713	Units:	Degrees C	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
Temperature	12.6	12.00	5	10	

Duplicate - Batch: 280-256500

Method: SM 4500 H+ B
Preparation: N/A

Lab Sample ID:	280-63233-C-3 DU	Analysis Batch:	280-256500	Instrument ID:	No Equipment Assigned
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/09/2014 1713	Units:	SU	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
pH adj. to 25 deg C	8.40	8.410	0.1	5	

Duplicate - Batch: 280-256500

Method: SM 4500 H+ B
Preparation: N/A

Lab Sample ID:	280-63345-C-2 DU	Analysis Batch:	280-256500	Instrument ID:	No Equipment Assigned
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/09/2014 1713	Units:	Degrees C	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
Temperature	14.4	14.20	1	10	

Client: Vista Geoscience

Job Number: 280-63234-1

Duplicate - Batch: 280-256500

Method: SM 4500 H+ B
Preparation: N/A

Lab Sample ID:	280-63345-C-2 DU	Analysis Batch:	280-256500	Instrument ID:	No Equipment Assigned
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0	Leach Batch:	N/A	Initial Weight/Volume:	
Analysis Date:	12/09/2014 1713	Units:	SU	Final Weight/Volume:	
Prep Date:	N/A				
Leach Date:	N/A				

Analyte	Sample Result/Qual	Result	RPD	Limit	Qual
pH adj. to 25 deg C	8.34	8.370	0.4	5	

Client: Vista Geoscience Job Number: 280-63234-1

Laboratory Chronicle

Lab ID: 280-63234-1 **Client ID:** WSW1

Sample Date/Time: 12/03/2014 15:30 Received Date/Time: 12/04/2014 15:40

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
P:5030B	280-63234-H-1		280-256360		12/09/2014 16:07	1	TAL DEN	MRM
A:8260B	280-63234-H-1		280-256360		12/09/2014 16:07	1	TAL DEN	MRM
P:5030B	280-63234-G-1		280-257181		12/15/2014 14:34	1	TAL DEN	EER
A:8015B	280-63234-G-1		280-257181		12/15/2014 14:34	1	TAL DEN	EER
P:3510C	280-63234-B-1-A		280-256411	280-255895	12/04/2014 21:32	1	TAL DEN	AH1
A:8015B	280-63234-B-1-A		280-256411	280-255895	12/09/2014 17:02	1	TAL DEN	TEM
P:3005A	280-63234-D-1-D		280-257625	280-255988	12/05/2014 15:00	1	TAL DEN	SEJ
A:6010C	280-63234-D-1-D		280-257625	280-255988	12/17/2014 13:18	1	TAL DEN	LLB
A:300.0	280-63234-C-1		280-255747		12/04/2014 21:27	1	TAL DEN	TLP
A:300.0	280-63234-C-1		280-255748		12/04/2014 21:27	1	TAL DEN	TLP
P:365.2/365.3/365	280-63234-A-1-A		280-256082	280-256022	12/05/2014 14:12	1	TAL DEN	AJS
A:365.1	280-63234-A-1-A		280-256082	280-256022	12/05/2014 20:42	1	TAL DEN	AJS
A:SM 2320B	280-63234-A-1		280-256035		12/05/2014 12:56	1	TAL DEN	CCJ
A:SM 2510B	280-63234-A-1		280-256021		12/05/2014 14:26	1	TAL DEN	MRB
A:SM 2540C	280-63234-A-1		280-256116		12/06/2014 10:02	1	TAL DEN	SWS
A:SM 4500 H+ B	280-63234-C-1		280-256500		12/09/2014 17:13	1	TAL DEN	NAS

Lab ID: 280-63234-1 DU **Client ID:** WSW1

Sample Date/Time: 12/03/2014 15:30 Received Date/Time: 12/04/2014 15:40

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
A:SM 2540C	280-63234-A-1 DU		280-256116		12/06/2014 10:02	1	TAL DEN	SWS

Client: Vista Geoscience Job Number: 280-63234-1

Laboratory Chronicle

Lab ID: 280-63234-2 **Client ID: WILLIAMS DEEP**

Sample Date/Time: 12/02/2014 13:34 Received Date/Time: 12/04/2014 15:40

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
P:5030B	280-63234-H-2		280-256360		12/09/2014 16:30	1	TAL DEN	MRM
A:8260B	280-63234-H-2		280-256360		12/09/2014 16:30	1	TAL DEN	MRM
P:5030B	280-63234-G-2		280-257181		12/15/2014 14:59	1	TAL DEN	EER
A:8015B	280-63234-G-2		280-257181		12/15/2014 14:59	1	TAL DEN	EER
P:3510C	280-63234-B-2-A		280-256411	280-255895	12/04/2014 21:32	1	TAL DEN	AH1
A:8015B	280-63234-B-2-A		280-256411	280-255895	12/09/2014 16:33	1	TAL DEN	TEM
P:3005A	280-63234-D-2-A		280-257625	280-255988	12/05/2014 15:00	1	TAL DEN	SEJ
A:6010C	280-63234-D-2-A		280-257625	280-255988	12/17/2014 13:21	1	TAL DEN	LLB
A:300.0	280-63234-C-2		280-255747		12/04/2014 21:45	1	TAL DEN	TLP
A:300.0	280-63234-C-2		280-255748		12/04/2014 21:45	1	TAL DEN	TLP
P:365.2/365.3/365	280-63234-A-2-A		280-256082	280-256022	12/05/2014 14:12	1	TAL DEN	AJS
A:365.1	280-63234-A-2-A		280-256082	280-256022	12/05/2014 20:45	1	TAL DEN	AJS
A:SM 2320B	280-63234-A-2		280-256035		12/05/2014 13:01	1	TAL DEN	CCJ
A:SM 2510B	280-63234-A-2		280-256021		12/05/2014 14:26	1	TAL DEN	MRB
A:SM 2540C	280-63234-A-2		280-256116		12/06/2014 10:02	1	TAL DEN	SWS
A:SM 4500 H+ B	280-63234-C-2		280-256500		12/09/2014 17:13	1	TAL DEN	NAS

Lab ID: 280-63234-3 **Client ID: WILLIAMS S**

Sample Date/Time: 12/02/2014 17:02 Received Date/Time: 12/04/2014 15:40

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
P:5030B	280-63234-F-3		280-256360		12/09/2014 16:52	1	TAL DEN	MRM
A:8260B	280-63234-F-3		280-256360		12/09/2014 16:52	1	TAL DEN	MRM
P:5030B	280-63234-H-3		280-257181		12/15/2014 15:24	1	TAL DEN	EER
A:8015B	280-63234-H-3		280-257181		12/15/2014 15:24	1	TAL DEN	EER
P:3510C	280-63234-A-3-A		280-256411	280-255895	12/04/2014 21:32	1	TAL DEN	AH1
A:8015B	280-63234-A-3-A		280-256411	280-255895	12/09/2014 17:59	1	TAL DEN	TEM
P:3005A	280-63234-D-3-A		280-257625	280-255988	12/05/2014 15:00	1	TAL DEN	SEJ
A:6010C	280-63234-D-3-A		280-257625	280-255988	12/17/2014 13:23	1	TAL DEN	LLB
A:300.0	280-63234-C-3		280-255747		12/04/2014 22:03	1	TAL DEN	TLP
A:300.0	280-63234-C-3		280-255748		12/04/2014 22:03	1	TAL DEN	TLP
P:365.2/365.3/365	280-63234-B-3-A		280-256082	280-256022	12/05/2014 14:12	1	TAL DEN	AJS
A:365.1	280-63234-B-3-A		280-256082	280-256022	12/05/2014 20:45	1	TAL DEN	AJS
A:SM 2320B	280-63234-B-3		280-256035		12/05/2014 13:15	1	TAL DEN	CCJ
A:SM 2510B	280-63234-B-3		280-256021		12/05/2014 14:26	1	TAL DEN	MRB
A:SM 2540C	280-63234-B-3		280-256116		12/06/2014 10:02	1	TAL DEN	SWS
A:SM 4500 H+ B	280-63234-C-3		280-256500		12/09/2014 17:13	1	TAL DEN	NAS

Client: Vista Geoscience Job Number: 280-63234-1

Laboratory Chronicle

Lab ID: 280-63234-4 **Client ID: NELSON WW**

Sample Date/Time: 12/03/2014 13:07 Received Date/Time: 12/04/2014 15:40

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
P:5030B	280-63234-H-4		280-256360		12/09/2014 17:14	1	TAL DEN	MRM
A:8260B	280-63234-H-4		280-256360		12/09/2014 17:14	1	TAL DEN	MRM
P:5030B	280-63234-F-4		280-257181		12/15/2014 15:49	1	TAL DEN	EER
A:8015B	280-63234-F-4		280-257181		12/15/2014 15:49	1	TAL DEN	EER
P:3510C	280-63234-B-4-A		280-256411	280-255895	12/04/2014 21:32	1	TAL DEN	AH1
A:8015B	280-63234-B-4-A		280-256411	280-255895	12/09/2014 18:27	1	TAL DEN	TEM
P:3005A	280-63234-D-4-A		280-257625	280-255988	12/05/2014 15:00	1	TAL DEN	SEJ
A:6010C	280-63234-D-4-A		280-257625	280-255988	12/17/2014 13:26	1	TAL DEN	LLB
A:300.0	280-63234-C-4		280-255747		12/04/2014 22:20	1	TAL DEN	TLP
A:300.0	280-63234-C-4		280-255748		12/04/2014 22:20	1	TAL DEN	TLP
P:365.2/365.3/365	280-63234-C-4-A		280-256082	280-256022	12/05/2014 14:12	1	TAL DEN	AJS
A:365.1	280-63234-C-4-A		280-256082	280-256022	12/05/2014 20:45	1	TAL DEN	AJS
A:SM 2320B	280-63234-C-4		280-256035		12/05/2014 13:20	1	TAL DEN	CCJ
A:SM 2510B	280-63234-C-4		280-256021		12/05/2014 14:26	1	TAL DEN	MRB
A:SM 2540C	280-63234-C-4		280-256116		12/06/2014 10:02	1	TAL DEN	SWS
A:SM 4500 H+ B	280-63234-C-4		280-256500		12/09/2014 17:13	1	TAL DEN	NAS

Lab ID: 280-63234-5 **Client ID: WSW1-DUP**

Sample Date/Time: 12/03/2014 15:30 Received Date/Time: 12/04/2014 15:40

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
P:5030B	280-63234-G-5		280-256360		12/09/2014 17:36	1	TAL DEN	MRM
A:8260B	280-63234-G-5		280-256360		12/09/2014 17:36	1	TAL DEN	MRM
P:5030B	280-63234-F-5		280-257181		12/15/2014 16:14	1	TAL DEN	EER
A:8015B	280-63234-F-5		280-257181		12/15/2014 16:14	1	TAL DEN	EER
P:3510C	280-63234-B-5-A		280-256411	280-255895	12/04/2014 21:32	1	TAL DEN	AH1
A:8015B	280-63234-B-5-A		280-256411	280-255895	12/09/2014 17:31	1	TAL DEN	TEM
P:3005A	280-63234-D-5-A		280-257625	280-255988	12/05/2014 15:00	1	TAL DEN	SEJ
A:6010C	280-63234-D-5-A		280-257625	280-255988	12/17/2014 13:29	1	TAL DEN	LLB
A:300.0	280-63234-C-5		280-255747		12/04/2014 22:38	1	TAL DEN	TLP
A:300.0	280-63234-C-5		280-255748		12/04/2014 22:38	1	TAL DEN	TLP
P:365.2/365.3/365	280-63234-A-5-A		280-256082	280-256022	12/05/2014 14:12	1	TAL DEN	AJS
A:365.1	280-63234-A-5-A		280-256082	280-256022	12/05/2014 20:45	1	TAL DEN	AJS
A:SM 2320B	280-63234-A-5		280-256035		12/05/2014 13:25	1	TAL DEN	CCJ
A:SM 2510B	280-63234-A-5		280-256021		12/05/2014 14:26	1	TAL DEN	MRB
A:SM 2540C	280-63234-A-5		280-256116		12/06/2014 10:02	1	TAL DEN	SWS
A:SM 4500 H+ B	280-63234-C-5		280-256500		12/09/2014 17:13	1	TAL DEN	NAS

Client: Vista Geoscience

Job Number: 280-63234-1

Laboratory Chronicle

Lab ID: MB **Client ID: N/A**

Sample Date/Time: N/A Received Date/Time: N/A

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
P:5030B	MB 280-256360/6		280-256360		12/09/2014 08:21	1	TAL DEN	MRM
A:8260B	MB 280-256360/6		280-256360		12/09/2014 08:21	1	TAL DEN	MRM
P:5030B	MB 280-257181/4		280-257181		12/15/2014 12:21	1	TAL DEN	EER
A:8015B	MB 280-257181/4		280-257181		12/15/2014 12:21	1	TAL DEN	EER
P:3510C	MB 280-255895/1-A		280-256411	280-255895	12/04/2014 21:32	1	TAL DEN	AH1
A:8015B	MB 280-255895/1-A		280-256411	280-255895	12/09/2014 15:07	1	TAL DEN	TEM
P:3005A	MB 280-255988/1-A		280-257625	280-255988	12/05/2014 15:00	1	TAL DEN	SEJ
A:6010C	MB 280-255988/1-A		280-257625	280-255988	12/17/2014 13:11	1	TAL DEN	LLB
A:300.0	MB 280-255747/6		280-255747		12/04/2014 11:31	1	TAL DEN	TLP
A:300.0	MB 280-255748/6		280-255748		12/04/2014 11:31	1	TAL DEN	TLP
P:365.2/365.3/365	MB 280-256022/5-A		280-256082	280-256022	12/05/2014 14:12	1	TAL DEN	AJS
A:365.1	MB 280-256022/5-A		280-256082	280-256022	12/05/2014 19:58	1	TAL DEN	AJS
A:SM 2320B	MB 280-256035/33		280-256035		12/05/2014 12:12	1	TAL DEN	CCJ
A:SM 2510B	MB 280-256021/32		280-256021		12/05/2014 14:08	1	TAL DEN	MRB
A:SM 2540C	MB 280-256116/1		280-256116		12/06/2014 10:02	1	TAL DEN	SWS

Lab ID: LCS **Client ID: N/A**

Sample Date/Time: N/A Received Date/Time: N/A

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
P:5030B	LCS 280-256360/4		280-256360		12/09/2014 07:59	1	TAL DEN	MRM
A:8260B	LCS 280-256360/4		280-256360		12/09/2014 07:59	1	TAL DEN	MRM
P:5030B	LCS 280-257181/5		280-257181		12/15/2014 12:46	1	TAL DEN	EER
A:8015B	LCS 280-257181/5		280-257181		12/15/2014 12:46	1	TAL DEN	EER
P:3510C	LCS 280-255895/2-A		280-256411	280-255895	12/04/2014 21:32	1	TAL DEN	AH1
A:8015B	LCS 280-255895/2-A		280-256411	280-255895	12/09/2014 15:36	1	TAL DEN	TEM
P:3005A	LCS 280-255988/2-A		280-257625	280-255988	12/05/2014 15:00	1	TAL DEN	SEJ
A:6010C	LCS 280-255988/2-A		280-257625	280-255988	12/17/2014 13:13	1	TAL DEN	LLB
A:300.0	LCS 280-255747/4		280-255747		12/04/2014 10:56	1	TAL DEN	TLP
A:300.0	LCS 280-255748/4		280-255748		12/04/2014 10:56	1	TAL DEN	TLP
P:365.2/365.3/365	LCS 280-256022/3-A		280-256082	280-256022	12/05/2014 14:12	1	TAL DEN	AJS
A:365.1	LCS 280-256022/3-A		280-256082	280-256022	12/05/2014 19:58	1	TAL DEN	AJS
A:SM 2320B	LCS 280-256035/31		280-256035		12/05/2014 12:01	1	TAL DEN	CCJ
A:SM 2510B	LCS 280-256021/30		280-256021		12/05/2014 14:08	1	TAL DEN	MRB
A:SM 2540C	LCS 280-256116/2		280-256116		12/06/2014 10:02	1	TAL DEN	SWS
A:SM 4500 H+ B	LCS 280-256500/30		280-256500		12/09/2014 17:13	1	TAL DEN	NAS
A:SM 4500 H+ B	LCS 280-256500/56		280-256500		12/09/2014 17:13	1	TAL DEN	NAS

Client: Vista Geoscience Job Number: 280-63234-1

Laboratory Chronicle

Lab ID: LCSD **Client ID: N/A**

Sample Date/Time: N/A Received Date/Time: N/A

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
P:5030B	LCSD 280-257181/6		280-257181		12/15/2014 13:11	1	TAL DEN	EER
A:8015B	LCSD 280-257181/6		280-257181		12/15/2014 13:11	1	TAL DEN	EER
P:3510C	LCSD 280-255895/3-A		280-256411	280-255895	12/04/2014 21:32	1	TAL DEN	AH1
A:8015B	LCSD 280-255895/3-A		280-256411	280-255895	12/09/2014 16:05	1	TAL DEN	TEM
P:3005A	LCSD 280-255988/3-A		280-257625	280-255988	12/05/2014 15:00	1	TAL DEN	SEJ
A:6010C	LCSD 280-255988/3-A		280-257625	280-255988	12/17/2014 13:16	1	TAL DEN	LLB
A:300.0	LCSD 280-255747/5		280-255747		12/04/2014 11:14	1	TAL DEN	TLP
A:300.0	LCSD 280-255748/5		280-255748		12/04/2014 11:14	1	TAL DEN	TLP
P:365.2/365.3/365	LCSD 280-256022/4-A		280-256082	280-256022	12/05/2014 14:12	1	TAL DEN	AJS
A:365.1	LCSD 280-256022/4-A		280-256082	280-256022	12/05/2014 19:58	1	TAL DEN	AJS
A:SM 2320B	LCSD 280-256035/32		280-256035		12/05/2014 12:08	1	TAL DEN	CCJ
A:SM 2510B	LCSD 280-256021/31		280-256021		12/05/2014 14:08	1	TAL DEN	MRB
A:SM 2540C	LCSD 280-256116/3		280-256116		12/06/2014 10:02	1	TAL DEN	SWS
A:SM 4500 H+ B	LCSD 280-256500/31		280-256500		12/09/2014 17:13	1	TAL DEN	NAS
A:SM 4500 H+ B	LCSD 280-256500/57		280-256500		12/09/2014 17:13	1	TAL DEN	NAS

Lab ID: MRL **Client ID: N/A**

Sample Date/Time: N/A Received Date/Time: N/A

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
A:300.0	MRL 280-255747/3		280-255747		12/04/2014 10:38	1	TAL DEN	TLP
A:300.0	MRL 280-255748/3		280-255748		12/04/2014 10:38	1	TAL DEN	TLP

Lab ID: MS **Client ID: N/A**

Sample Date/Time: 12/03/2014 09:35 Received Date/Time: 12/04/2014 09:50

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
P:5030B	280-63241-I-6 MS		280-256360		12/09/2014 09:50	1	TAL DEN	MRM
A:8260B	280-63241-I-6 MS		280-256360		12/09/2014 09:50	1	TAL DEN	MRM
P:5030B	280-63516-I-4 MS		280-257181		12/15/2014 20:47	1	TAL DEN	EER
A:8015B	280-63516-I-4 MS		280-257181		12/15/2014 20:47	1	TAL DEN	EER
A:300.0	280-63199-I-3 MS		280-255747		12/04/2014 20:51	1	TAL DEN	TLP
A:300.0	280-63199-I-3 MS		280-255748		12/04/2014 20:51	1	TAL DEN	TLP
P:365.2/365.3/365	280-63207-J-1-B MS		280-256082	280-256022	12/05/2014 14:12	1	TAL DEN	AJS
A:365.1	280-63207-J-1-B MS		280-256082	280-256022	12/05/2014 20:42	1	TAL DEN	AJS

Client: Vista Geoscience

Job Number: 280-63234-1

Laboratory Chronicle

Lab ID: MSD **Client ID:** N/A

Sample Date/Time: 12/03/2014 09:35 Received Date/Time: 12/04/2014 09:50

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
P:5030B	280-63241-I-6 MSD		280-256360		12/09/2014 10:12	1	TAL DEN	MRM
A:8260B	280-63241-I-6 MSD		280-256360		12/09/2014 10:12	1	TAL DEN	MRM
P:5030B	280-63516-I-4 MSD		280-257181		12/15/2014 21:12	1	TAL DEN	EER
A:8015B	280-63516-I-4 MSD		280-257181		12/15/2014 21:12	1	TAL DEN	EER
A:300.0	280-63199-I-3 MSD		280-255747		12/04/2014 21:09	1	TAL DEN	TLP
A:300.0	280-63199-I-3 MSD		280-255748		12/04/2014 21:09	1	TAL DEN	TLP
P:365.2/365.3/365	280-63207-J-1-C MSD		280-256082	280-256022	12/05/2014 14:12	1	TAL DEN	AJS
A:365.1	280-63207-J-1-C MSD		280-256082	280-256022	12/05/2014 20:42	1	TAL DEN	AJS

Lab ID: DU **Client ID:** N/A

Sample Date/Time: 12/03/2014 12:20 Received Date/Time: 12/04/2014 09:50

Method	Bottle ID	Run	Analysis Batch	Prep Batch	Date Prepared / Analyzed	Dil	Lab	Analyst
A:300.0	280-63199-I-3 DU		280-255747		12/04/2014 20:34	1	TAL DEN	TLP
A:300.0	280-63199-I-3 DU		280-255748		12/04/2014 20:34	1	TAL DEN	TLP
A:SM 2320B	280-63213-A-1 DU		280-256035		12/05/2014 12:36	1	TAL DEN	CCJ
A:SM 2510B	280-63215-C-1 DU		280-256021		12/05/2014 14:08	1	TAL DEN	MRB
A:SM 4500 H+ B	280-63233-C-3 DU		280-256500		12/09/2014 17:13	1	TAL DEN	NAS
A:SM 4500 H+ B	280-63345-C-2 DU		280-256500		12/09/2014 17:13	1	TAL DEN	NAS

Lab References:

TAL DEN = TestAmerica Denver

280-63234 Chain of Custody

2.8, 5.4 IR5 to.5
(Am) 04Dec14

Sampler ID Wm Stearns

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☐

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Client: Vista Geo Science	Project Manager: Dave Seneshen DSENESHEN@VISTAGEOSCIENCE.COM	Date: 12/4/14	Chain of Custody Number: 182973
Address: 130 Capital Drive	Telephone Number (Area Code)/Fax Number: 303 278 1911	Lab Number	Page 1 of 1
City: Golden; State: CO; Zip Code: 80401	Site Contact; Lab Contact		
Project Name and Location (State): East Cheyene Gas Storage	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.: 14329			

Analysis (Attach list if more space is needed)

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Filter	BTEX	TPH	Dissolved Metal	Phosphorus	Anions	General	VOC	Special Instructions/ Conditions of Receipt
2 WSW 1	12/3/14	1530		X			X												X		
WSW 1	12/3/14	1530		X				X									X	?			
WSW 1	12/3/14	1530		X					X				X			X					
WSW 1	12/3/14	1530		X									X		X						
3 WSW 1	12/3/14	1530		X						X										X	
Williams Deep	12/2/14	1334		X			X	X	X	X			X		X	X	X	?	X	X	
Williams 5	12/2/14			X			X	X	X	X			X		X	X	X	?	X	X	
Nelson WW	12/3/14	1307		X			X	X	X	X			X		X	X	X	?	X	X	
WSW 1 - DUP	12/3/14	1530		X			X	X	X	X			X		X	X	X	?	X	X	

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☒ Other STD

QC Requirements (Specify)

1. Relinquished By: [signature]	Date: 12/4/14	Time: 1540	1. Received By: [signature]	Date: 4Dec14	Time: 1540
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments: COGA

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Table 2: Organic and inorganic analyses of groundwater samples required by COGCC Rule 609. The hydrocarbon/fixed gas/isotope analyses of the groundwater samples will **not** be required if they contain less than 1 mg/L of dissolved methane resulting in an estimated cost reduction of $1,800.

Container	Constituent	Field Method	Laboratory Method	Holding Time (Days)	Reporting Limit (mg/L)	# of samples	Cost per sample	Total
2 x 1000 mL plastic, non-preserved	pH	Unfiltered	SM4500H	0	1 (pH Unit)	4	$10	$40
	Specific Conductance		SM2510B	28	10 (umhos/cm)	4	$15	$60
	Total Dissolved Solids		SM2540C	7	10	4	$20	$80
	Alkalinity (total bicarbonate, and carbonate; as CaCO3		SM2320B	14	10	4	$25	$100
250 mL plastic, sulfuric acid preserved	Major Anions							
	Bromide	Unfiltered	EPA 300.1	28	1	4	$100	$400
	Chloride				1			
	Sulfate				1			
	Nitrate and Nitrite as N				0.1			
	Phosphorous		EPA 354.4		0.1	4	$45	$180
250 mLplastic, nitric acid preserved	Major Cations (Dissolved)							
	Boron	Filtered	EPA 200.7 OR 200.8/SW846 6010C OR SW846 6020	180	0.05	4	$160	$640
	Calcium				1			
	Iron				0.05			
	Magnesium				1			
	Manganese				0.15			
	Potassium				1			
	Selenium				0.01			
	Sodium				1			
	Strontium				0.05			
500 ml Boston Round Amber bottle, non-preserved	Dissolved Gases							
	Methane	Dissolved Gases	RSK 175	14	0.026	4	$80	$320
	Ethane				0.026			
	Propane				0.026			
1000 ml amber glass bottle	Total Petroleum Hydrocarbons (TPH)	Filtered	SW-846/8015M	14	2	4	80	$320
3 x 45 mL VOA vial, hydrochloric acid preserved	BTEX Compounds							
	Benzene	Unfiltered	SW846 8260B	14	0.001	4	$40	$160
	Toluene				0.001			
	Ethylbenzene				0.001			
	Xylenes (o-xylene, m-p-xylene, total xylene)				0.003			
Compositional Analysis (performed if dissolved methane concentration exceeds 1 mg/L)								
Specialized (lab supplied) benzalkonium preserved	Fixed gases and C1-C6 hydrocarbons	Dissolved Gases	RSK 175	14	14	4	$150	$600
	Stable isotopic concentration of the carbon (^{12}C and ^{13}C) and hydrogen (^{1}H and ^{2}H) in the methane		Laboratory Specific SOP	28	Variable	4	$300	$1,200
Non-pathogenic Bacteria (recommended by Vista Geoscience)								
Sterile 125 ml plastic vials	Sulfate-reducing bacteria (SRB)	BART	Biological Activity Reaction Test (BART)	2	200 (cfu/mL)	4	$165	$660
	Iron-related Bacteria (IRB)				25 (cfu/mL)			
	Slime Forming Bacteria (SLYM)				10 (cfu/mL)			
Laboratory Subtotal								$4,760

Table 2: Organic and inorganic analyses of groundwater samples required by COGCC Rule 609. The hydrocarbon/fixed gas/isotope analyses of the groundwater samples will **not** be required if they contain less than 1 mg/L of dissolved methane resulting in an estimated cost reduction of $1,800.

Container	Constituent	Field Method	Laboratory Method	Holding Time (Days)	Reporting Limit (mg/L)	# of samples	Cost per sample	Total
2 x 1000 mL plastic, non-preserved	pH	Unfiltered	SM4500H	0	1 (pH Unit)	4	$10	$40
	Specific Conductance		SM2510B	28	10 (umhos/cm)	4	$15	$60
	Total Dissolved Solids		SM2540C	7	10	4	$20	$80
	Alkalinity (total bicarbonate, and carbonate; as CaCO3		SM2320B	14	10	4	$25	$100
250 mL plastic, sulfuric acid preserved	Major Anions							
	Bromide	Unfiltered	EPA 300.1	28	1	4	$100	$400
	Chloride				1			
	Sulfate				1			
	Nitrate and Nitrite as N				0.1			
	Phosphorous		EPA 354.4		0.1	4	$45	$180
250 mL plastic, nitric acid preserved	Major Cations (Dissolved)							
	Boron	Filtered	EPA 200.7 OR 200.8/SW846 6010C OR SW846 6020	180	0.05	4	$160	$640
	Calcium				1			
	Iron				0.05			
	Magnesium				1			
	Manganese				0.15			
	Potassium				1			
	Selenium				0.01			
	Sodium				1			
	Strontium				0.05			
500 ml Boston Round Amber bottle, non-preserved	Dissolved Gases							
	Methane	Dissolved Gases	RSK 175	14	0.026	4	$80	$320
	Ethane				0.026			
	Propane				0.026			
1000 ml amber glass bottle	Total Petroleum Hydrocarbons (TPH)	Filtered	SW-846/8015M	14	2	4	80	$320
3 x 45 mL VOA vial, hydrochloric acid preserved	BTEX Compounds							
	Benzene	Unfiltered	SW846 8260B	14	0.001	4	$40	$160
	Toluene				0.001			
	Ethylbenzene				0.001			
	Xylenes (o-xylene, m-p-xylene, total xylene)				0.003			
Compositional Analysis (performed if dissolved methane concentration exceeds 1 mg/L)								
Specialized (lab supplied) benzalkonium preserved	Fixed gases and C1-C6 hydrocarbons	Dissolved Gases	RSK 175	14	14	4	$150	$600
	Stable isotopic concentration of the carbon (^{12}C and ^{13}C) and hydrogen (^{1}H and ^{2}H) in the methane		Laboratory Specific SOP	28	Variable	4	$300	$1,200
Non-pathogenic Bacteria (recommended by Vista Geoscience)								
Sterile 125 ml plastic vials	Sulfate-reducing bacteria (SRB)	BART	Biological Activity Reaction Test (BART)	2	200 (cfu/mL)	4	$165	$660
	Iron-related Bacteria (IRB)				25 (cfu/mL)			
	Slime Forming Bacteria (SLYM)				10 (cfu/mL)			
Laboratory Subtotal								$4,760

Login Sample Receipt Checklist

Client: Vista Geoscience

Job Number: 280-63234-1

Login Number: 63234

List Source: TestAmerica Denver

List Number: 1

Creator: Muniz, Ashley T

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	No time on COC or containers.
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	False	See CUR
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	False	See CUR
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Analytical Report

Job #:	14120364
Lab #:	DIG-006855
Client:	Vista Geoscience
Sample Name:	Nelson WW
Date Sampled:	12/03/14
Time Sampled:	13:07
Sample Description:	1L Bottle
Sampling Notes:	
Date Received:	12/04/14
Date Analyzed:	Gas Composition: 12/4/14
Date Reported:	12/12/14
Comments:	Analysis is of gas extracted from water by headspace equilibration.

Measured Values:	**Measured** ppm	**Analyte** mol %[a]	**Total Conc** mg/L[c]	**$\delta^{13}C$** ‰ VPDB	**δD** ‰ VSMOW	**Comments**
Nitrogen (N_2)	356610	48.28	-	-	-	
Oxygen + Argon (O_2+Ar)	26722	3.62	-	-	-	
Carbon Dioxide (CO_2)	4398	0.6	-	-	-	
Helium (He)[b]	347307	47.02	-	-	-	
Hydrogen (H_2)	nd	nd	-	-	-	
Methane (CH_4)	3561	0.48	0.19	na	na	
Ethane (C_2H_6)	nd	nd	nd	na	na	
Propane (C_3H_8)	nd	nd	nd	na	na	
iso-Butane (C_4H_{10})	nd	nd	nd	na	na	
n-Butane (C_4H_{10})	nd	nd	nd	na	na	
iso-Pentane (C_5H_{12})	nd	nd	nd	na	na	
n-Pentane (C_5H_{12})	nd	nd	nd	na	na	
Hexanes + (C_6H_{14})	nd	nd	nd	na	na	

Calculated Values:	
Total HCs (ppm)	3561
Gas Wetness (mol % C_2+/C_1+)	0.00
$C_1/(C_2+C_3)$ (mol/mol)	#DIV/0!

[a] Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

[b] Addition of helium negates the ability to detect natice helium and may negate the ability to detect hydrogen.

[c] Sample prep and calculations for dissolved gas analysis using a GC headspace equilibration technique, RSKSOP-175v5, 2010.

HC= Hydrocarbons

nd = not detected

na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}C$ < 0.5 ‰

Error δD < 5.0 ‰

Analytical Report

Job #:	14120364
Lab #:	DIG-006854
Client:	Vista Geoscience
Sample Name:	Williams-Deep
Date Sampled:	12/03/14
Time Sampled:	13:34
Sample Description:	1L Bottle
Sampling Notes:	
Date Received:	12/04/14
Date Analyzed:	Gas Composition: 12/4/14 ; δ13C = 12/11/14 ; δD = 12/9/14
Date Reported:	12/12/14
Comments:	Analysis is of gas extracted from water by headspace equilibration.

Measured Values:	**Measured** ppm	**Analyte** mol %[a]	**Total Conc** mg/L[c]	**$\delta^{13}C$** ‰ VPDB	**δD** ‰ VSMOW	**Comments**
Nitrogen (N_2)	318450	40.19	-	-	-	
Oxygen + Argon (O_2+Ar)	8022	1.01	-	-	-	
Carbon Dioxide (CO_2)	2378	0.3	-	-	-	
Helium (He)[b]	303344	38.28	-	-	-	
Hydrogen (H_2)	nd	nd	-	-	-	
Methane (CH_4)	160060	20.2	9.02	-73.1	-254	
Ethane (C_2H_6)	158	0.02	0.02	na	na	
Propane (C_3H_8)	nd	nd	nd	na	na	
iso-Butane (C_4H_{10})	nd	nd	nd	na	na	
n-Butane (C_4H_{10})	nd	nd	nd	na	na	
iso-Pentane (C_5H_{12})	nd	nd	nd	na	na	
n-Pentane (C_5H_{12})	nd	nd	nd	na	na	
Hexanes + (C_6H_{14})	nd	nd	nd	na	na	

Calculated Values:	
Total HCs (ppm)	160218
Gas Wetness (mol % C_2+/C_1+)	0.22
$C_1/(C_2+C_3)$ (mol/mol)	451

[a] Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

[c] Sample prep and calculations for dissolved gas analysis using a GC headspace equilibration technique, RSKSOP-175v5, 2010.

[b] Addition of helium negates the ability to detect natice helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}C$ < 0.5 ‰

Error δD < 5.0 ‰

Analytical Report

Job #:	14120364
Lab #:	DIG-006851
Client:	Vista Geoscience
Sample Name:	Williams-Shallow
Date Sampled:	12/02/14
Time Sampled:	13:34
Sample Description:	1L Bottle
Sampling Notes:	
Date Received:	12/04/14
Date Analyzed:	Gas Composition:12/4/14
Date Reported:	12/12/14
Comments:	Analysis is of gas extracted from water by headspace equilibration.

Measured Values:	**Measured** ppm	**Analyte** mol %[a]	**Total Conc** mg/L[c]	**$\delta^{13}C$** ‰ VPDB	**δD** ‰ VSMOW	**Comments**
Nitrogen (N_2)	236203	32.45	-	-	-	
Oxygen + Argon (O_2+Ar)	65609	9.01	-	-	-	
Carbon Dioxide (CO_2)	19003	2.61	-	-	-	
Helium (He)[b]	406947	55.92	-	-	-	
Hydrogen (H_2)	nd	nd	-	-	-	
Methane (CH_4)	29	0.00	0.002	na	na	
Ethane (C_2H_6)	nd	nd	nd	na	na	
Propane (C_3H_8)	nd	nd	nd	na	na	
iso-Butane (C_4H_{10})	nd	nd	nd	na	na	
n-Butane (C_4H_{10})	nd	nd	nd	na	na	
iso-Pentane (C_5H_{12})	nd	nd	nd	na	na	
n-Pentane (C_5H_{12})	nd	nd	nd	na	na	
Hexanes + (C_6H_{14})	nd	nd	nd	na	na	

Calculated Values:	
Total HCs (ppm)	29
Gas Wetness (mol % C_2+/C_1+)	0.00
$C_1/(C_2+C_3)$ (mol/mol)	#DIV/0!

[a] Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

[b] Addition of helium negates the ability to detect natice helium and may negate the ability to detect hydrogen.

[c] Sample prep and calculations for dissolved gas analysis using a GC headspace equilibration technique, RSKSOP-175v5, 2010.

HC= Hydrocarbons

nd = not detected

na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}C$ < 0.5 ‰

Error δD < 5.0 ‰

Analytical Report

Job #:	14120364
Lab #:	DIG-006852
Client:	Vista Geoscience
Sample Name:	WSW1
Date Sampled:	12/03/14
Time Sampled:	15:30
Sample Description:	1L Bottle
Sampling Notes:	
Date Received:	12/04/14
Date Analyzed:	Gas Composition: 12/4/14 ; δ13C =
Date Reported:	12/12/14
Comments:	Analysis is of gas extracted from water by headspace equilibration.

Measured Values:	**Measured** ppm	**Analyte** mol %[a]	**Total Conc** mg/L[c]	**$\delta^{13}C$** ‰ VPDB	**δD** ‰ VSMOW	**Comments**
Nitrogen (N_2)	305099	41.63	-	-	-	
Oxygen + Argon (O_2+Ar)	14844	2.03	-	-	-	
Carbon Dioxide (CO_2)	4815	0.66	-	-	-	
Helium (He)[b]	406101	55.41	-	-	-	
Hydrogen (H_2)	nd	nd	-	-	-	
Methane (CH_4)	2033	0.28	0.11	na	na	
Ethane (C_2H_6)	nd	nd	nd	na	na	
Propane (C_3H_8)	nd	nd	nd	na	na	
iso-Butane (C_4H_{10})	nd	nd	nd	na	na	
n-Butane (C_4H_{10})	nd	nd	nd	na	na	
iso-Pentane (C_5H_{12})	nd	nd	nd	na	na	
n-Pentane (C_5H_{12})	nd	nd	nd	na	na	
Hexanes + (C_6H_{14})	nd	nd	nd	na	na	

Calculated Values:	
Total HCs (ppm)	2033
Gas Wetness (mol % C_2+/C_1+)	0.00
$C_1/(C_2+C_3)$ (mol/mol)	#DIV/0!

[a] Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

[b] Addition of helium negates the ability to detect natice helium and may negate the ability to detect hydrogen.

[c] Sample prep and calculations for dissolved gas analysis using a GC headspace equilibration technique, RSKSOP-175v5, 2010.

HC= Hydrocarbons

nd = not detected

na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}C$ < 0.5 ‰

Error δD < 5.0 ‰

Analytical Report

Job #:	14120364
Lab #:	DIG-006853
Client:	Vista Geoscience
Sample Name:	WSW1-Dup
Date Sampled:	12/03/14
Time Sampled:	15:30
Sample Description:	1L Bottle
Sampling Notes:	
Date Received:	12/04/14
Date Analyzed:	Gas Composition: 12/4/14
Date Reported:	12/12/14
Comments:	Analysis is of gas extracted from water by headspace equilibration.

Measured Values:	**Measured** ppm	**Analyte** mol %[a]	**Total Conc** mg/L[c]	**$\delta^{13}C$** ‰ VPDB	**δD** ‰ VSMOW	**Comments**
Nitrogen (N_2)	342393	44.86	-	-	-	
Oxygen + Argon (O_2+Ar)	24953	3.27	-	-	-	
Carbon Dioxide (CO_2)	4723	0.62	-	-	-	
Helium (He)[b]	389348	51.01	-	-	-	
Hydrogen (H_2)	nd	nd	-	-	-	
Methane (CH_4)	1884	0.25	0.10	na	na	
Ethane (C_2H_6)	nd	nd	nd	na	na	
Propane (C_3H_8)	nd	nd	nd	na	na	
iso-Butane (C_4H_{10})	nd	nd	nd	na	na	
n-Butane (C_4H_{10})	nd	nd	nd	na	na	
iso-Pentane (C_5H_{12})	nd	nd	nd	na	na	
n-Pentane (C_5H_{12})	nd	nd	nd	na	na	
Hexanes + (C_6H_{14})	nd	nd	nd	na	na	

Calculated Values:	
Total HCs (ppm)	1884
Gas Wetness (mol % C_2+/C_1+)	0.00
$C_1/(C_2+C_3)$ (mol/mol)	#DIV/0!

[a] Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

[b] Addition of helium negates the ability to detect natice helium and may negate the ability to detect hydrogen.

[c] Sample prep and calculations for dissolved gas analysis using a GC headspace equilibration technique, RSKSOP-175v5, 2010.

HC= Hydrocarbons

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Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}C$ < 0.5 ‰

Error δD < 5.0 ‰