



Western Water & Land, Inc.

October 27, 2014

Mr. Michael Gardner  
Environmental Manager North West  
WPX Energy Rocky Mountain LLC  
1058 County Road 215  
Parachute, Colorado 81635

**RE: GM 323-28 Drill Pad Baseline Results Report, May 2014 Event**

Dear Mr. Gardner,

Western Water & Land, Inc. (WWL) has completed baseline water quality sampling for the WPX Energy Rocky Mountain LLC (WPX) GM 323-28 Drill Pad in accordance with the Colorado Oil and Gas Conservation Commission (COGCC) Rule 609. The GM 323-28 Drill Pad is located in the NE<sup>1</sup>/<sub>4</sub>, SW<sup>1</sup>/<sub>4</sub>, Section 28, Township 6 South, Range 96 West, 6<sup>th</sup> PM.

In accordance with Rule 609, the baseline water quality evaluation considered all water sources (domestic wells or springs) within a 0.5-mile radius of the referenced drill pad (oil and gas location). A preliminary screening of the groundwater sources was completed to identify the sources that are potentially available for sampling pending the consent of the structure owners. Each potentially Available Water Source was then evaluated to identify the preferred sources for the baseline program. If the number of potentially available sources was four or less, all of the sources were included in the list of preferred sources. If more than four sources were potentially available, the sources were prioritized based on WWL's hydrologic expertise and in accordance with Rule 609. A complete description of the water source evaluation process and results are provided in the water source evaluation report (GM 323-28 Drill Pad Baseline Water Quality Evaluation, May 17, 2013).

This report summarizes the selection of sampling locations and associated field sampling activities, and the quality control and water chemistry results.

### **SAMPLING LOCATIONS AND FIELD ACTIVITIES**

As described in the GM 323-28 Drill Pad Baseline Water Quality Evaluation, May 17, 2013, four potential sampling locations were identified for field sampling of water quality consistent with requirements of Rule 609. According to state records, the landowners, water well permit holders or water right holders were mailed access request letters by way of certified U.S. Postal Service mail. Four wells were identified as preferred sampling locations:

- Water Well (Permit No. 151879; well constructed)
- PDC Field Well B (Permit No. 278414; well constructed)
- Puckett Livestock Well No. 1 (Permit No. 185334; well constructed)

- Union 76 Water Well No. 6 (Permit No. 26068-F; well constructed)

After attempting to contact landowners, water well permit holders, and water right holders, sampling access was not acquired for PDC Field Well B (Permit No. 278414); Puckett Land Company did not recognize that water source as a functioning well. WWL was granted access to Water Well (Permit No. 151879), Puckett Livestock Well No. 1 (Permit No. 185334), and Union 76 Water Well No. 6 (Permit No. 26068-F). Union 76 Water Well No. 6 is also a sample location for Drill Pad GM 13-33.

Three samples were collected for the GM 323-28 Drill Pad as shown in the table below.

<b>Sampling Date</b>	<b>Well Identification or Permit No.</b>	<b>Sample Identification</b>	<b>COGCC Facility ID</b>
5/7/2014	26068-F	Union No. 6-26068-F	753285
7/28/2014	185334	GM 11-28-185334	752722
7/28/2014	151879	GM 323-28-151879	752711

WWL personnel located Union 76 Water Well No. 6 (Permit No. 26068-F) at the WPX mancamp May 7, 2014 on the basis of the DWR database location. Sample Union No. 6-26068-F was collected from a hose bib on a water storage tank; there were no available options to collect the sample before the water entered the storage tank. As a result, the well was not purged according to the COGCC SAP guidelines, and the sample may not be representative of the groundwater due to potential degassing and settling during storage tank residence time. WPX Land Representative Mr. Gary Reed was present when the sample was collected.

On July 28, 2014, WWL personnel collected samples from two wells located on Puckett Land Company property. Sample GM 323-28-151879 was collected from a hose bib in the basement of the resident ranch manager, Mr. Craig Kohles. This hose bib is plumbed upstream of any water treatment system. Mr. Kohles was present when this sample was collected. Sample GM 11-28-185334 was collected from a hydrant nearby the well. Water from this well is not plumbed to a treatment system and no landowners, Puckett Land Company representatives, or WPX representatives were present when this sample was collected.

See Figure 1 for the sampled locations. Photographs of the sampling sites are shown in Attachment A. Field monitoring forms are shown in Attachment B.

All sampling procedures followed protocols in the COGCC Model Sampling and Analysis Plan (SAP) as adapted and modified by WPX except for sample Union No. 6-26068-F. Well purging procedures were not implemented as there were no available options to collect the sample before water entered a storage tank. Sampling Method 1 for wells with pumps and effervescent samples, described in Version 1 of the COGCC Model SAP, was used to collect all samples.

Samples were relinquished to the analytical laboratory's (Accutest Mountain States [AMS], Wheat Ridge, Colorado) courier in Rifle, Colorado, who carefully packs them in coolers with ice for preservation and ships them to the analytical laboratory by way of private overnight courier.

## QUALITY CONTROL SUMMARY

WWL conducted a Tier 1 data validation quality control evaluation of the received analytical laboratory data report. Attachment C presents detailed information on the quality control evaluation for field sampling and laboratory analysis associated with the collected samples.

AMS reported that several analytes were outside of control limits for matrix spike, matrix spike duplicate and duplicate relative percent difference (RPD). Some of these excursions are suspected to be the result of matrix interference, sample non-homogeneity or the spike amount being low relative to the sample amount. Other laboratory control samples were within limits and therefore, the laboratory did not assign qualifiers to these analytical results.

AMS Laboratory assigned analytical results that were undetected with a “U” qualifier and “J” qualifier to results that were detected above the method detection limit but below the reporting limit to indicate the result value is estimated. WWL assigned an “H” qualifier to results that exceeded analytical holding times to indicate the result value is estimated. See Attachment C and Attachment D for individual parameters that were qualified.

## ANALYTICAL RESULTS

Laboratory analysis was performed by AMS, in Wheat Ridge, Colorado in accordance with the analytical schedule described in Rule 609 with some deviations in analytical methods. The analytical methods used are considered valid and provide quality results. The analytical results are summarized in Attachment D; the data are qualified as indicated. The full laboratory analytical report is presented in Attachment E.

If you have any questions or concerns, please contact me at (970) 242-0170.

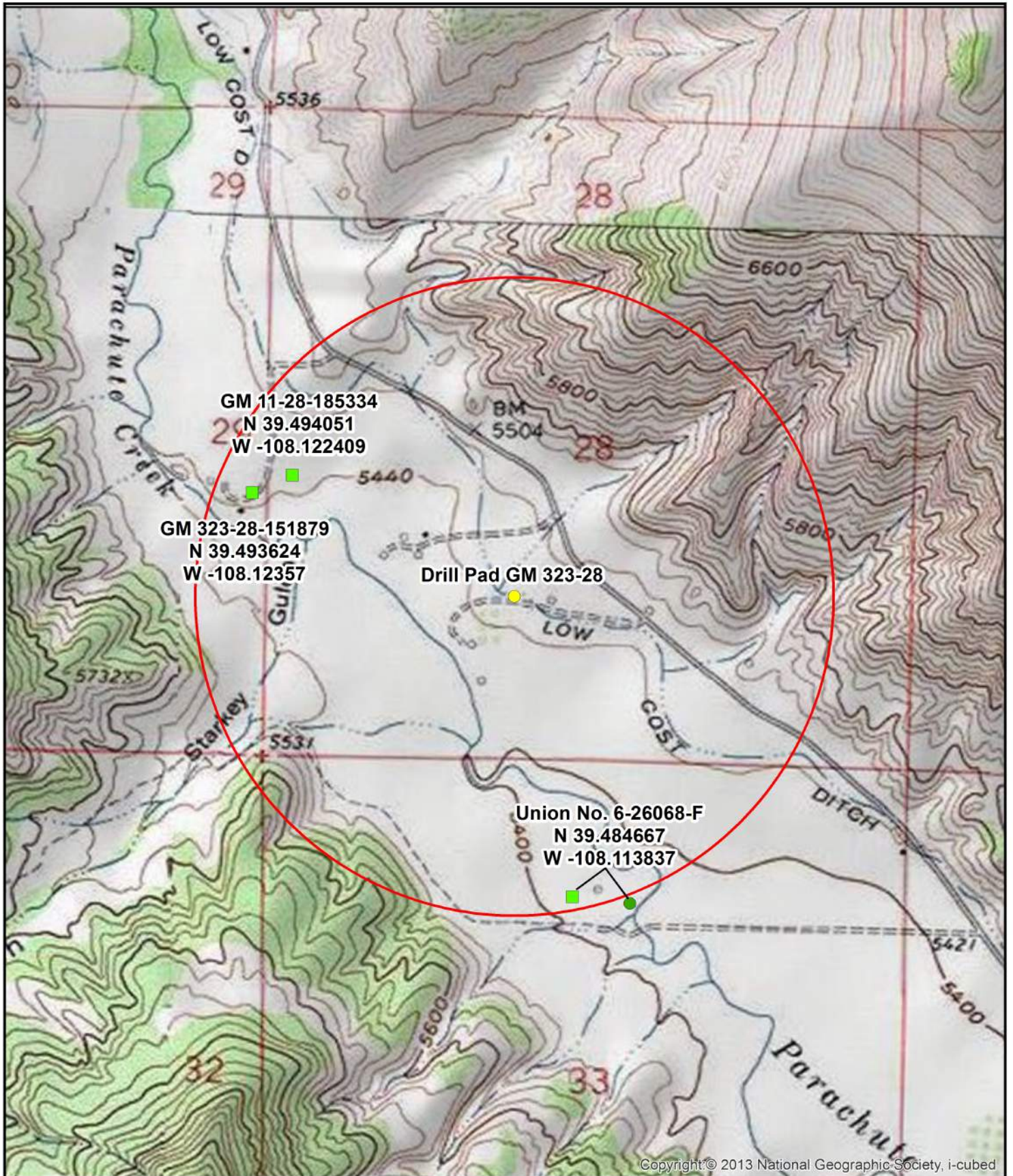
Sincerely,




Bruce D. Smith  
Principal Hydrogeologist  
WESTERN WATER & LAND, INC.

## Attachments

- Figure 1- Sampling Location Map
- Attachment A - Photographs
- Attachment B - Field Monitoring Forms
- Attachment C – Quality Control Evaluation
- Attachment D - Summary of Analytical Results
- Attachment E - Laboratory Analytical Summary Report



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<p><b>Legend</b></p> <ul style="list-style-type: none"> <li><span style="color: green;">■</span> Sample Location(s)</li> <li><span style="color: yellow;">●</span> Drill Pad GM 323-28</li> <li><span style="color: green;">■</span> Decree</li> <li><span style="color: red;">○</span> 0.5-Mile Radius Evaluation Area</li> <li><span style="color: green;">●</span> Constructed well</li> </ul> <p>Feet</p> <p>1,000 500 0 1,000</p> <p>1:13,000</p>	<p align="center"><b>Figure 1: GM 323-28 Sample Location Map</b>  <b>COGCC Rule 609 Baseline Sampling</b>  <b>NE1/4, SW1/4, S28, T6S, R96W, 6 PM</b></p> <p align="center">Garfield County, Colorado</p> <p align="center">WPX Energy Rocky Mountain LLC</p> <p align="center">Basemap Source: Bing Maps and Esri ArcGIS Online</p> <div style="display: flex; justify-content: space-between; align-items: center;">  <p>Western Water &amp; Land, Inc. Applications in Earth Science</p> </div>
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**ATTACHMENT A**

**Photographs**



**Photo 1. Union 76 Water Well No. 6 Sampling Location (Union No. 6-26068-F); cistern**



**Photo 2. Union 76 Water Well No. 6 Sampling Location (Union No. 6-26068-F); cistern**



**Photo 3. Union 76 Water Well No. 6 (Union No. 6-26068-F)**



**Photo 4. Water Well Permit No. 151879 (GM 323-28-151879)**



**Photo 5. Water Well Permit No. 151879 Sampling Location (GM 323-28-151879)**



**Photo 6. Water Well Permit No. 185334 Sampling Location (GM 11-28-185334)**



**Photo 7. Water Well Permit No. 185334 (GM 11-28-185334)**

**ATTACHMENT B**

**Field Monitoring Forms**

# WPX BWQ Groundwater Monitoring Field Form

Project Information			
Project:	WPX BWQ	Sample Purpose:	Baseline 609
Site Name (Well Pad):	GM 323-28	Site API:	
Station Name:	Union 26068-F	Sample Date:	5-7-14
COGCC Facility ID:	753825	Start Time:	1020
Field Sample ID:	Union No. 6 - 26068-F	End Time:	1200
Landowner Name:	WPX Energy Rocky Mountain, LLC	Sample Time:	1130
Landowner Address:	C/O Merit Advisors, PO Box 330, Gainesville, TX	Sample Team:	SLK, NWS
Water Right/Well Owner:	WPX Energy Rocky Mountain, LLC	Observer:	SLK
Water Right/Well Permit:	26068-F / Union No. 6 Water Well	Field Signature/Date:	<i>[Signature]</i> 5-8-14
Receipt Number:	0221184 No 6		

Station Information			
Station Description: Hose bib off irrigation tank at mancamp/yard			
Approximate Distance to Well Pad: 2530 ft			
Station Type: <u>Well</u> / Spring / Seep / Other:		Water Use: Domestic / Irrigation / <u>Other</u>	
Sampling Location: Kitchen Tap / Pipe / Well House / <u>Hose bib</u> / Other:			
GPS Location: Zone x -108.11884 y 39.48467 z 5424			
Total Depth (ft):	<u>NS 88 90</u>	Static Depth to Water (ft):	9.6
Purge Volume (gal):	211.5	Total Volume Purged (gal):	64.7
Well diameter (in): 8" from 53-73' + 73-78' 8 1/2" from 71-53' + 78-83'			

Weather Conditions			
Sky: Clear / <u>Scattered</u> / Cloudy / Overcast		Estimated Air Temp (deg F): 70	
Precipitation: <u>None</u> / Light / Moderate / Heavy		Precip Type: <u>None</u> / Rain / Sleet / Hail / Snow	
Wind: Calm / Light / <u>Mod</u> / Strong		Wind Speed/Direction: <u>NM</u>	

Field Measurements							
Parameter	Units	Reading	Time	Flag Code	Instrument	In-situ or Container	Comments
Water Temp	deg C	14.2	1153		YSI pro	container	
pH	s.u.	7.37	↓				
Sp. Conductivity	uS/cm	2369					
Conductivity	uS/cm	1879					
DO Saturation	%	29.0					
DO	mg/L	2.95					
Baro Press	mmHg	617.2					
ORP	RmV	86.8					
Turbidity	NTU	28.22		AV	MICROTRU		28.0, 28.1, 28.0
Discharge	<u>gpm</u>	1.2	1036	VAR	Seametrics Flow meter		Gravity feed from tank
H2S	mg/L	<u>N/A/A/S</u>					
Color: Clear / White / Yellow / <u>Brown</u> / Green / Blue / Other <u>Light</u> / Med / Dark							
Odor: <u>None</u> / Mild / Mod / Strong							
Effervescence: <u>None</u> / Mild / Mod / Strong				Bubbles: <u>None</u> / Low / Mod / High			
Sediment: <u>None</u> / Light / Mod / Heavy				VOA Headspace: <u>None</u> / ≤ Pea Size / ≥ Pea Size			
Lab Analysis: <u>Rule 609</u> / COA 9 / COA 22 / Other							
Field Filtered: Yes <u>No</u> Filter Size: <u>N/A</u> No. Filters used: <u>N/A</u>							

Flag Codes: NM (not measured), E (estimated), N/A (not applicable), I (insufficient sample), Q (uncertain value), Y (calculated value), AV (averaged value), EC (exceeds calibration range), OT (other flag to be defined later), NS (not stabilized), VAR (variable)

# WPX BWQ Groundwater Monitoring Field Form

Landowner Comments on water quality:

Typically high iron contents. No way to get the sample before the tank (unless well is bailed)

Additional information:

1015': WL BTOC 9.60'

1036': discharge 1.2 gpm

Water gravity fed out of tank - discharge variable. WL BTOC after sampling 9.60' - do not think that well pump turned on during purging/sampling.

Calibration Information			Date: 5-7-14		Location: WWL office			
Instrument	Parameter	Units	Time	Calibration Standard Value	Calibration Standard Temp (°C)	Instrument Reading of Standard	Adjusted Reading	Comments
YSI PRO ↓ ↓	pH	s.u.	0720	7.0	22.9	7.05		
	pH	s.u.	0723	10.01	22.9	10.01		
	pH	s.u.	0726	4.01	22.7	4.00	4.01	
	SpC	uS/cm	0717	2070	22.7	2014	2070	
	SpC	uS/cm						
	DO	%	0739		22.2	82.3		632.7 mmHg
	DO	%						
	ORP	RmV						
micro TPW	Turbidity	NTU	0731					



## WPX BWQ Groundwater Monitoring Field Form

Project Information			
Project:	4M 323-28 BWQ	Sample Purpose:	Rule 609 Baseline
Site Name (Well Pad):	4M 323-28	Site API:	05-045-07698
Station Name:	Pockett 185334	Sample Date:	7-28-14
COGCC Facility ID:	752722	Start Time:	1530
Field Sample ID:	9M 11-28-185334	End Time:	1800
Landowner Name:	Pockett Land Company	Sample Time:	1725
Landowner Address:	N/A	Sample Team:	SLK, NWS
Water Right/Well Owner:	Pockett Land Company	Observer:	NWS
Water Right/Well Permit:	185334	Lead Signature/Date:	J. Kupp 7-29-14
Receipt Number:	0380479		

Station Information			
Station Description: hydrant piped ~300 ft from well			
Approximate Distance to Well Pad: 0.39 miles 0.41 miles			
Station Type: Well / Spring / Seep / Other:		Water Use: Domestic / Irrigation / livestock	
Sampling Location: Kitchen Tap / Pipe / Well House / Hose bib / Other: hydrant			
GPS Location:	Zone 12S	X 0747450	Y 4375554 Z 5458
Total Depth (ft):	120	Static Depth to Water (ft):	28.07 Well diameter (in):
Purge Volume (gal)	281.3	Total Volume Purged (gal)	305.8 5"

Weather Conditions	
Sky: Clear / Scattered / Cloudy / <u>Overcast</u>	Estimated Air Temp (deg F): 75
Precipitation: None / <u>Light</u> / Moderate / Heavy	Precip Type: None / <u>Rain</u> / Sleet / Hail / Snow
Wind: <u>Calm</u> / Light / Mod / Strong	Wind Speed/Direction:

Field Measurements							
Parameter	Units	Reading	Time	Flag Code	Instrument	In-situ or Container	Comments
Water Temp	deg C	11.92	1755	NS	YS. 55U	container	
pH	s.u.	7.18	↓				
Sp. Conductivity	uS/cm	1298					
Conductivity	uS/cm	1096					
DO Saturation	%	4.3					
DO	mg/L	0.39					
Baro Press	mmHg	630.4					
ORP	RmV	123.3					
Turbidity	NTU	1.73		AV	MICROTRU		1.55, 1.41, 2.24
Discharge	gpm	3.5		VAR			
H2S	mg/L	NA					
Color:		Clear / White / Yellow / Brown / Green / Blue / Other			Light / Med / Dark		
Odor:		None / Mild / Mod / Strong					
Effervescence:		None / Mild / <u>Mod</u> / Strong			Bubbles: None / Low / <u>Mod</u> / High		
Sediment:		None / Light / Mod / Heavy			VOA Headspace: <u>None</u> / ≤ Pea Size / ≥ Pea Size		
Lab Analysis:		Rule 609 / COA 9 / COA 22 / Other					
Field Filtered:		Yes / <u>No</u>		Filter Size: NA		No. Filters used: NA	

Flag Codes: NM (not measured), E (estimated), N/A (not applicable), I (insufficient sample), Q (uncertain value), Y (calculated value), AV (averaged value), EC (exceeds calibration range), OT (other flag to be defined later), NS (not stabilized), VAR (variable)

# WPX BWQ Groundwater Monitoring Field Form

Landowner Comments on water quality:

None. No treatment system or storage tanks.

Additional information:

345 WL BTOC 28.07  
1711 Discharge: 3.5 gpm

No landowner/property manager present for sample.

Calibration info on Gm 323-28-151879

Calibration Information			Date: <u>7-28-14</u>	Location: <u>wal office</u>				
Instrument	Parameter	Units	Time	Calibration Standard Value	Calibration Standard Temp (°C)	Instrument Reading of Standard	Adjusted Reading	Comments
	pH	s.u.						
	pH	s.u.						
	pH	s.u.						
	SpC	uS/cm						
	SpC	uS/cm						
	DO	%						
	DO	%						
	ORP	RmV						
	Turbidity	NTU						



## WPX BWQ Groundwater Monitoring Field Form

Project Information			
Project:	GM 323-28 Blvd	Sample Purpose:	Rule 609 Baseline
Site Name (Well Pad):	GM 323-28	Site API:	05-045-07698
Station Name:	Puckett 151879	Sample Date:	7-28-14
COGCC Facility ID:	752711	Start Time:	1300
Field Sample ID:	GM 323-28-151879	End Time:	1530
Landowner Name:	Puckett Land Company	Sample Time:	<del>1250</del> 1450
Landowner Address:	N/A	Sample Team:	BUR, NWS
Water Right/Well Owner:	Atlantic Richfield Co.	Observer:	SLK
Water Right/Well Permit:	151879	Lead Signature/Date:	E. Kupp 7-29-14
Receipt Number:	0290381		

Station Information			
Station Description: Parachute Creek house - hose bib before treatment in basement			
Approximate Distance to Well Pad: 0.48 miles			
Station Type: <u>Well</u> / Spring / Seep / Other:		Water Use: Domestic / Irrigation / <u>Household use only</u>	
Sampling Location: Kitchen Tap / Pipe / Well House / <u>Hose bib</u> / Other:			
GPS Location:	Zone 12S	x 4375508	y 747355 z 5307
Total Depth (ft):	60	Static Depth to Water (ft):	17.03
Purge Volume (gal)	126	Total Volume Purged (gal)	133.6
		Well diameter (in): 4 1/2 10'-40' 4 1/8 40'-60'	

Weather Conditions			
Sky:	Clear / Scattered / <u>Cloudy</u> / Overcast	Estimated Air Temp (deg F):	85
Precipitation:	<u>None</u> / Light / Moderate / Heavy	Precip Type:	<u>None</u> / Rain / Sleet / Hail / Snow
Wind:	<u>Calm</u> / Light / Mod / Strong	Wind Speed/Direction:	Q

Field Measurements							
Parameter	Units	Reading	Time	Flag Code	Instrument	In-situ or Container	Comments
Water Temp	deg C	13.11	1520		YSI 55u	CONTAINER	
pH	s.u.	7.12					
Sp. Conductivity	uS/cm	1318					
Conductivity	uS/cm	1019					
DO Saturation	%	12.4					
DO	mg/L	1.29					
Baro Press	mmHg	633.9					
ORP	RmV	142.8					
Turbidity	NTU	2.40		AV	microTRU		3.94, 1.73, 1.52
Discharge	gpm	2.0		VAR			
H2S	mg/L	N/A					

Color:	<u>Clear</u> / White / Yellow / Brown / Green / Blue / Other	Light / Med / Dark
Odor:	<u>None</u> / Mild / Mod / Strong	
Effervescence:	<u>None</u> / Mild / Mod / Strong	Bubbles: <u>None</u> / Low / Mod / High
Sediment:	<u>None</u> / Light / Mod / Heavy	VOA Headspace: <u>None</u> / ≤ Pea Size / ≥ Pea Size

Lab Analysis:	<u>Rule 609</u> / COA 9 / COA 22 / Other
Field Filtered:	Yes <u>NO</u> Filter Size: <u>NA</u> No. Filters used: <u>NA</u>

Flag Codes: NM (not measured), E (estimated), N/A (not applicable), I (insufficient sample), Q (uncertain value), Y (calculated value), AV (averaged value), EC (exceeds calibration range), OT (other flag to be defined later), NS (not stabilized), VAR (variable)

# WPX BWQ Groundwater Monitoring Field Form

Landowner Comments on water quality:

None. Sample to be taken before the treatment system in the basement. No storage tanks.

Additional information:

1310: WL BTOL 17.03

1530: WL BTOL 17.04

Craig Kones present for sample.

Calibration Information			Date: 7-28-14			Location: WSW office		
Instrument	Parameter	Units	Time	Calibration Standard Value	Calibration Standard Temp (°C)	Instrument Reading of Standard	Adjusted Reading	Comments
YSI 5510 ↓	pH	s.u.	0520	7.0	21.74	7.05	7.00	
	pH	s.u.	0529	10.01	21.80	9.97	10.01	
	pH	s.u.	0532	4.01	21.74	3.91	4.00	
	SpC	uS/cm	0523	2070	21.67	2077	2070	
	SpC	uS/cm						
	DO	%		0541	445.4mmHg	21.76	88.8	84.9
	DO	%						
	ORP	RmV						
micro TPW	Turbidity	NTU	0538	1000, 10, 0.02			1000, 10, 0.02	



**ATTACHMENT C**

**Data Quality Evaluation**

## QUALITY CONTROL EVALUATION

### WPX Drill Pad GM 323-28

**Samples: Union No. 6-26068-F, GM 323-28-151879, and GM 11-28-185334**

Quality control measures consisted of a review of field sampling procedures and the analytical laboratory quality control data. Laboratory quality control information was reviewed and checked for consistency in meeting acceptance criteria and the assignment of data qualifiers. In addition, WWL conducted quality control evaluations of cation-anion balance (CAB) and total dissolved solids (TDS) calculated versus measured ratio. WWL assigned additional qualifiers to analytical results as necessary.

#### **Field Procedures**

WWL conducted field sampling procedures in accordance with the COGCC Model SAP as modified by WPX with the exception of sample Union No. 6-26068-F; well purging procedures were not followed due to presence of a storage tank upstream of the sampling point. All samples were collected by direct filling methods; dissolved gas sampling was done using Method 1 for wells with pumps and effervescent samples. No field procedure deviations occurred that were cause for data qualification.

#### **COC**

The chain-of-custody forms were reviewed for correct and complete sample IDs, requested analysis, and other pertinent information. The analytes requested on the COCs matched the requirements of Rule 609. DRO (diesel range organics) and GRO (gasoline range organics) were designated on the COCs in place of TPH, a required analysis for Rule 609. No errors or pertinent information was observed, and no corrections were needed.

#### **Sample Receipt**

Samples were received by AMS in two coolers within the temperature range criteria ( $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ). Custody seals were intact. No quality control issues were reported on the sample receipt form. No qualifiers were assigned to results based on sample receipt conditions.

#### **Holding Times**

Laboratory pH was analyzed out of holding time; WWL assigned an "H" qualifier to indicate the results are estimated. All other analyses were conducted within recommended holding times.

#### **Analytical Methods**

The analytical methods used by AMS were checked for consistency with the analytical schedule in the SAP. Analytical methods were found to be consistent with the following modifications: Gasoline Range Organics (TPH volatiles) were analyzed using Method SW8260B. Diesel Range Organics (TPH extractables) were analyzed according to Method SW846-8015B.

#### **Detection Limits**

Detection limits provided with the analytical results were compared to the original quoted detection limits from the analytical laboratory. Detection limits were as quoted with no deviations observed except as applied to increased dilution factors.

Sample Union No. 6-26068-F: A dilution factor of 50 was applied for sulfate; a dilution factor of 2 for bromide, chloride, fluoride, nitrate and nitrite, and selenium. All other analytes had a dilution factor of 1. Detection limits were elevated for nitrite, bromide, and nitrate due to matrix interference.

Sample GM 323-28-151879: A dilution factor of 10 was applied for sulfate and nitrate as N; a dilution factor of 2 for bromide, chloride, fluoride, nitrite as N, barium, and selenium. All other analytes had a dilution factor of 1.

Sample GM 11-28-185334: A dilution factor of 10 was applied for chloride and sulfate; a dilution factor of 2 for bromide, fluoride, nitrate as N, nitrite as N, barium, and selenium. All other analytes had a dilution factor of 1.

AMS reports samples at the detection limit as “undetected” or “U” rather than reporting results as less than the reporting or detection limit, e.g. < 0.05 µg/L.

### **Completeness**

Data completeness is a measure of requested analysis and received results. The analytical constituents required under Rule 609 were compared to those analyzed in the laboratory reports. Qualified data are included as analyzed data. No data were rejected for field or analytical reasons. WWL separately designated DRO (Diesel Range Organics) and GRO (Gasoline Range Organics) for the TPH analysis required in Rule 609. All requested analytical data matched the laboratory reported data results; data completeness is considered 100 percent.

### **Cation-Anion Balance**

The cation-anion balance (CAB) calculates the total charge of positively charged ions and the total charge of the negatively charged ions. It is a measure of the quality of the analysis; if the charge is not balanced, an error may exist in the analysis. CAB percent difference calculations were performed for each sample; if the CAB exceeded  $\pm 5\%$ , i.e. less than 95% or greater than 105%, the analytical results data may be qualified as estimated.

In general, WWL will assign a qualifier (estimated result) for a CAB equal to or greater than plus or minus 10%, and may assign a qualifier for CAB percentages between plus or minus 5% and less than 10%. The final CAB calculations for the samples are as follows:

- Union No. 6-26068-F: 1.743%
- GM 323-28-151879: 2.316%
- GM 11-28-185334: 1.040%

The analytical results for cations and anions for the samples were not qualified on the basis of the CAB. See Attachment C, Data Quality Review Sheets.

### **TDS**

The ratio of laboratory-measured TDS versus calculated TDS were computed; sample ratios less than 0.80 and greater than 1.20 are cause for a review of major ion reporting errors. In general, WWL will assign a qualifier (an estimated result) when TDS ratios are less than or equal to 0.5 and equal to or greater than 1.5, and may assign a qualifier for TDS ratios greater than 0.5 and less than 0.8 and greater than 1.2 and less than 1.5. The TDS calculations for samples are as follows:

- Union No. 6-26068-F: 1.06
- GM 323-28-151879: 1.20
- GM 11-28-185334: 1.10

No sample results were rejected or qualified on the basis of the TDS acceptance criteria.

### **Field Duplicates**

Field duplicates evaluate the precision of analytical results for field samples collected for a specific sampling event. Precision is measured by the calculation of the relative percent difference (RPD) using the analytical results from the original investigative sample and the duplicate sample. An RPD limit of 35% is used for the

data qualification criterion. When the original sample has a detected concentration above the reporting limit (RL) and the concentration of the field duplicate is less than the RL, the calculation of a field duplicate RPD is not applied. For sample results less than 5 times the RL, the acceptance criteria is  $\pm$  RL.

No field duplicates were collected, therefore no RPDs were calculated.

### **Trip Blanks**

Trip blanks are analyte-free matrix (water in this case) samples supplied by the analytical laboratory that are shipped inside the sample shipping containers to and from the field investigation site. Trip blanks test for potential contamination during shipping and sampling field procedures. For this project, trip blanks are analyzed for volatiles only. There were no detections of volatiles (benzene, toluene, ethylbenzene, and xylenes; BTEX) in the analyzed trip blank samples. No data were qualified based on trip blank analytical results.

### **Laboratory Quality Control**

The analytical laboratory conducts an extensive quality control program and as part of the overall quality control process. The analytical laboratory quality control program includes the use of various laboratory quality control samples including but not limited to: method blanks (MB), laboratory control samples (LCS) and duplicates (LCSD), matrix spikes (MS) and duplicates (MSD), surrogates, initial calibration verification standards (ICVs), and continuing calibration verification standard (CCVs).

WWL verified that the lab performed and reported quality control data correctly. This included checking laboratory control samples data for meeting laboratory QC limits, acceptance criteria, and recovery limits. QC limits associated with the relative percent difference (RPD) between duplicate samples typically range from a limit of 20% for metals and general or wet chemistry to 30% for organic analytes. Typical percent recovery acceptance limits are 80 to 120% for metals and wet chemistry and 70 to 130% for organics; some organic compounds may have much broader recovery limits.

All sampling event data packages showed that no laboratory control samples exceeded the QC limits or acceptance criteria without data qualification, and no recovery limits were exceeded without qualification. No qualifiers were assigned to the results.

### *Accuracy*

Accuracy was evaluated as a percent recovery of an analyte in a reference standard or a spiked sample, e.g. matrix spike and matrix spike duplicate. In cases where percent recoveries exceeded the laboratory acceptance criteria, data would be qualified depending on whether the analyte was detected above the method detection limit (MDL) or not, if the recovery of the associated control sample was acceptable, or if the analyte concentration in the sample was disproportionate to the spike level and that the recovery of the associated control sample was acceptable. Note that the analytical laboratory may not have selected a sample from this field investigation for testing matrix quality control samples. In these cases, true matrix affects cannot be assessed and the resulting data should be considered as estimated. This will be noted in the DQR sheets (Attachment C), but the data will not be broadly qualified by WWL.

AMS did not select field investigation sample Union No. 6-26068-F for matrix testing quality control. AMS selected field investigation sample GM 323-28-151879 for EPA Method 200.8 (barium and selenium), and GM 11-28-185334 for Method HACH8190/SM4500P-B/E (total phosphorus) and Method SM 2320B-2011 (total alkalinity as CaCO<sub>3</sub>). AMS selected a number of other samples for all other MS and MSD based on the analytical methods being used. The MS and MSD recoveries met guidance criteria for precision and accuracy for all analytes with the exception of the following analytes:

Analyte	MS Recovery (%)	MSD Recovery (%)	QC Limits (%)	Associated Sample
TPH-DRO	46	24	33 - 130	Union No. 6-26068-F
Chloride	124	102 - 108	80-120	GM 323-28-151879 and GM 11-28-185334

The lab reported that the control limits for TPH-DRO associated with sample Union No. 6-26068-F may have been exceeded due to matrix interference. The blank spike (BS) QC results were within acceptable limits. Chloride spike recovery indicates possible matrix interference and/or sample nonhomogeneity. The BS QC results for chloride were within limits.

No qualifiers were assigned to the results by the lab. WWL did not assign additional qualifiers to the analytical results.

*Precision*

Precision is the measurement of how closely replicate sample constituents agree and is not related to the true value (concentration). Precision is measured using RPD calculations for laboratory duplicate samples such as LCSD and MSD samples and any other duplicate samples generated by the laboratory. The RPDs were compared to the laboratory acceptance limit of 20% for metals and general or wet chemistry and 30% for organic analytes. RPDs were not used when the sample concentration was too low (< 10X MDL) for accurate evaluation.

All RPD results met acceptance criteria with the exception of the following:

Analyte	MS and MSD RPD (%)	Lab Duplicate RPD (%)	RPD Limit (%)	Associated Sample
TPH-DRO	64	N/A	30	Union No. 6-26068-F
Total phosphorus	N/A	200	20	GM 323-28-151879 and GM 11-28-185334

The MS and MSD RPD for TPH-DRO associated with sample Union No. 6-26068-F was outside of control limits (high 34%). The lab reported the reason as due to possible nonhomogeneity of the sample. The lab duplicate RPD for total phosphorus associated with samples GM 323-28-151879 and GM 11-28-185334 was outside of control limits (high 180%). The lab reported the result acceptable due to low duplicate and sample concentrations. The BS and MB results were within acceptable limits for both analytes. No qualifiers were assigned by the laboratory because of RPD values exceeding the laboratory acceptance criteria.

Data Quality Review Sheets are presented within this Attachment.

## DATA QUALITY REVIEW SHEET

Facility ID: 753285  
 Station Name: Union 26068-F  
 Sample Date: 5/7/14  
 Field Sample ID: Union No. 6-26068-F

Project: WPX BWQ: GM 323-28  
 Lab Work Order: D57545  
 QA/QC Review Date: 6/3/14  
 Reviewer: J. Pahler

Field Sampling Data Review	Yes	No	N/A
1. Well properly purged?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Flow rate reduced prior to sampling?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Water quality parameters stable prior to sampling?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Field instruments calibrated properly?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Sampling methods performed according to SAP procedures?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Procedures consistent with obtaining a representative sample?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Lab Data Report Review			
7. Proper sample custody maintained until laboratory receipt?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Receipt form is without discrepancies? <i>If no, list in comments.</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. All samples analyzed for the requested analyses?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Proper laboratory methods used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. All sample holding times met (other than lab pH)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Lab QA samples (e.g., matrix spikes and matrix spike duplicates) collected and analyzed according to lab method and results within method acceptance limits?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13. Was the field investigation sample matrix used by the lab for matrix QC for all analyses?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
14. Laboratory qualifiers for data (other than non-detect)? <i>List in comments.</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Additional qualifiers assigned (other than pH)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
16. Are corrective actions required? <i>If yes, list actions and dates to be completed by:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Corrective Action</i>	<i>Date to be completed</i>		

Calculated Parameters	Calculated Value	Lab Value	Ratio/Percent Difference	Acceptable Limit	Meets QC Criteria?
Cation/Anion Balance, % (CAB)	1.743	N/A	N/A	±5%	<input checked="" type="checkbox"/>
Total Dissolved Solids, mg/L (TDS)	1817	1720	1.06	0.8 – 1.2	<input checked="" type="checkbox"/>
Specific Conductance, µS/cm (SpC)	2567	2090	1.23	0.8 – 1.2	<input type="checkbox"/>

**Comments:**

Sample collected from large cistern; unable to drain cistern and purge well. Sample not representative due to possible degassing and settling during cistern residence time. MSD recovery of DRO outside control limits (low 9%), probable cause matrix interference. RPD for MS and MSD of DRO outside control limits (high 34%), possible sample nonhomogeneity. Elevated detection limits for nitrite, bromide, and nitrate due to matrix interference. Lab qualified bromide with "J" to indicate result estimated, between MDL and RL. pH analyzed outside of holding time; WWL qualified with "H" to indicate result estimated.

## DATA QUALITY REVIEW SHEET

Facility ID: 752711  
 Station Name: Puckett 151879  
 Sample Date: 7/28/14  
 Field Sample ID: GM 323-28-151879

Project: WPX BWQ: GM 323-28  
 Lab Work Order: D60208  
 QA/QC Review Date: 9/26/14  
 Reviewer: J. Pahler

Field Sampling Data Review	Yes	No	N/A
1. Well properly purged?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Flow rate reduced prior to sampling?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Water quality parameters stable prior to sampling?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Field instruments calibrated properly?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Sampling methods performed according to SAP procedures?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Procedures consistent with obtaining a representative sample?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lab Data Report Review			
7. Proper sample custody maintained until laboratory receipt?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Receipt form is without discrepancies? <i>If no, list in comments.</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. All samples analyzed for the requested analyses?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Proper laboratory methods used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. All sample holding times met (other than lab pH)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Lab QA samples (e.g., matrix spikes and matrix spike duplicates) collected and analyzed according to lab method and results within method acceptance limits?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13. Was the field investigation sample matrix used by the lab for matrix QC for all analyses?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
14. Laboratory qualifiers for data (other than non-detect)? <i>List in comments.</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Additional qualifiers assigned (other than pH)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
16. Are corrective actions required? <i>If yes, list actions and dates to be completed by:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Corrective Action</i>	<i>Date to be completed</i>		

Calculated Parameters	Calculated Value	Lab Value	Ratio/Percent Difference	Acceptable Limit	Meets QC Criteria?
Cation/Anion Balance, % (CAB)	2.316	N/A	N/A	±5%	<input checked="" type="checkbox"/>
Total Dissolved Solids, mg/L (TDS)	993	825	1.20	0.8 – 1.2	<input checked="" type="checkbox"/>
Specific Conductance, µS/cm (SpC)	1231	1120	1.10	0.8 – 1.2	<input checked="" type="checkbox"/>

**Comments:**

MS recovery of chloride outside limits; possible cause matrix interference and/or sample nonhomogeneity. Field investigation sample used for phosphorus QC (lab duplicate): RPD high at 200% (limit 20%), acceptable due to low duplicate and sample concentrations. Iron assigned "J" qualifier to indicate result between RL and MDL, result considered estimated. pH analyzed outside of holding time; WWL qualified with "H" to indicate result estimated.

## DATA QUALITY REVIEW SHEET

Facility ID: 752722  
 Station Name: Puckett 185334  
 Sample Date: 7/28/14  
 Field Sample ID: GM 11-28-185334

Project: WPX BWQ: GM 323-28  
 Lab Work Order: D60208  
 QA/QC Review Date: 9/26/14  
 Reviewer: J. Pahler

Field Sampling Data Review	Yes	No	N/A
1. Well properly purged?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Flow rate reduced prior to sampling?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Water quality parameters stable prior to sampling?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Field instruments calibrated properly?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Sampling methods performed according to SAP procedures?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Procedures consistent with obtaining a representative sample?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lab Data Report Review			
7. Proper sample custody maintained until laboratory receipt?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Receipt form is without discrepancies? <i>If no, list in comments.</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. All samples analyzed for the requested analyses?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Proper laboratory methods used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. All sample holding times met (other than lab pH)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Lab QA samples (e.g., matrix spikes and matrix spike duplicates) collected and analyzed according to lab method and results within method acceptance limits?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13. Was the field investigation sample matrix used by the lab for matrix QC for all analyses?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
14. Laboratory qualifiers for data (other than non-detect)? <i>List in comments.</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Additional qualifiers assigned (other than pH)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
16. Are corrective actions required? <i>If yes, list actions and dates to be completed by:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>Corrective Action</i>	<i>Date to be completed</i>		

Calculated Parameters	Calculated Value	Lab Value	Ratio/Percent Difference	Acceptable Limit	Meets QC Criteria?
Cation/Anion Balance, % (CAB)	1.040	N/A	N/A	±5%	<input checked="" type="checkbox"/>
Total Dissolved Solids, mg/L (TDS)	978	830	1.18	0.8 – 1.2	<input checked="" type="checkbox"/>
Specific Conductance, µS/cm (SpC)	1239	1130	1.10	0.8 – 1.2	<input checked="" type="checkbox"/>

**Comments:**

VOC/GRO results may be biased low due to headspace (results were non-detect). Field sample water was effervescent. MS recovery of chloride outside limits; possible cause matrix interference and/or sample nonhomogeneity. Phosphorus QC (lab duplicate): RPD high at 200% (limit 20%), acceptable due to low duplicate and sample concentrations. Iron assigned "J" qualifier to indicate result between RL and MDL, result considered estimated. pH analyzed outside of holding time; WWL qualified with "H" to indicate result estimated.

**ATTACHMENT D**

**Summary of Analytical Results**

WPX BWQ: GM 323-28 Baseline Analytic Summary																				
Station Name			Puckett 151879						Puckett 185334						Union 26068-F					
Facility ID			752711						752722						753285					
Sample Date			7/28/2014 14:50						7/28/2014 17:25						5/7/2014 11:30					
Field Sample ID			GM 323-28-151879						GM 11-28-185334						UNION NO. 6-26068-F					
Lab Sample ID			D60208-1						D60208-2						D57542-1					
	Reporting Units	Analytic Method	Result	Lab Qual	WWL Qual	RL	MDL	DF	Result	Lab Qual	WWL Qual	RL	MDL	DF	Result	Lab Qual	WWL Qual	RL	MDL	DF
<b>Inorganics</b>																				
Alkalinity AS CaCO3, Total	mg/l	SM 2320B-2011	485			5	2	1	440			5	2	1	507			5	2	1
Alkalinity, Bicarbonate as CaCO3	mg/l	SM 2320B-2011	485			5	2	1	440			5	2	1	507			5	2	1
Alkalinity, Carbonate as CaCO3	mg/l	SM 2320B-2011	5	U		5	2	1	5	U		5	2	1	5	U		5	2	1
Bromide	mg/l	EPA 300.0/SW846 9056	0.1	U		0.1	0.05	2	0.13			0.1	0.05	2	0.057	J		0.1	0.05	2
Chloride	mg/l	EPA 300.0/SW846 9056	32.6			1	0.8	2	26.9			5	4	10	12.1			1	0.8	2
Fluoride	mg/l	EPA 300.0/SW846 9056	1.4			0.2	0.1	2	1.5			0.2	0.1	2	0.41			0.2	0.1	2
Nitrate as N	mg/l	EPA 300.0/SW846 9056	0.26			0.1	0.06	10	0.021			0.02	0.012	2	0.02	U		0.02	0.012	2
Nitrite as N	mg/l	EPA 300.0/SW846 9056	0.039			0.008	0.006	2	0.008	U		0.008	0.006	2	0.008	U		0.008	0.006	2
pH	s.u.	SM4500HB+-2011/9040C	7.4		H			1	7.44		H			1	7.48		H			1
Specific Conductivity	umhos/cm	SM 2510B-2011	1120			1		1	1130			1		1	2090			1		1
Sulfate	mg/l	EPA 300.0/SW846 9056	187			5	2	10	229			5	2	10	778			25	10	50
Total Dissolved Solids	mg/l	SM 2540C-2011	825			10	5	1	830			10	5	1	1720			10	5	1
Total Phosphorous	mg/l	HACH8190/SM4500P-B/E	0.01	U		0.01	0.008	1	0.012			0.01	0.008	1	0.017			0.01	0.008	1
<b>Dissolved Metals</b>																				
Barium	ug/l	EPA 200.8 <sup>1</sup>	47.5			4	0.16	2	28.8			4	0.16	2	24.2			10	1.4	1
Boron	ug/l	EPA 200.7	176			50	6.6	1	171			50	6.6	1	149			50	6.6	1
Calcium	ug/l	EPA 200.7	118000			400	66	1	123000			400	66	1	131000			400	66	1
Iron	ug/l	EPA 200.7	5.2	J		10	3.2	1	7.8	J		10	3.2	1	21.2			10	3.2	1
Magnesium	ug/l	EPA 200.7	56900			200	29	1	48400			200	29	1	111000			200	29	1
Manganese	ug/l	EPA 200.7	58.1			5	0.29	1	88.1			5	0.29	1	90.2			5	0.29	1
Potassium	ug/l	EPA 200.7	7300			1000	230	1	5870			1000	230	1	3470			1000	230	1
Selenium	ug/l	EPA 200.8	3			0.8	0.42	2	1.9			0.8	0.42	2	0.8	U		0.8	0.42	2
Sodium	ug/l	EPA 200.7	103000			400	36	1	101000			400	36	1	272000			400	36	1
Strontium	ug/l	EPA 200.7	1800			5	0.12	1	1710			5	0.12	1	2220			5	0.12	1
<b>Organics</b>																				
Diesel Range Organics	mg/l	SW846-8015B	0.19	U		0.19	0.17	1	0.19	U		0.19	0.17	1	0.19	U		0.19	0.17	1
Gasoline Range Organics	ug/l	SW846 8260B	200	U		200		1	200	U		200		1	200	U		200		1
<b>Dissolved Gases</b>																				
Ethane	mg/l	RSK175 MOD	0.0016	U		0.0016	0.0008	1	0.0016	U		0.0016	0.0008	1	0.0016	U		0.0016	0.0008	1
Methane	mg/l	RSK175 MOD	0.0013			0.0008	0.0004	1	0.0008	U		0.0008	0.0004	1	0.0022			0.0008	0.0004	1
Propane	mg/l	RSK175 MOD	0.0022	U		0.0022	0.0011	1	0.0022	U		0.0022	0.0011	1	0.0022	U		0.0022	0.0011	1

WPX BWQ: GM 323-28 Baseline Analytic Summary																				
Station Name			Puckett 151879						Puckett 185334						Union 26068-F					
Facility ID			752711						752722						753285					
Sample Date			7/28/2014 14:50						7/28/2014 17:25						5/7/2014 11:30					
Field Sample ID			GM 323-28-151879						GM 11-28-185334						UNION NO. 6-26068-F					
Lab Sample ID			D60208-1						D60208-2						D57542-1					
	Reporting Units	Analytic Method	Result	Lab Qual	WWL Qual	RL	MDL	DF	Result	Lab Qual	WWL Qual	RL	MDL	DF	Result	Lab Qual	WWL Qual	RL	MDL	DF
<b>VOCs</b>																				
Benzene	ug/l	SW846 8260B	1	U		1	0.25	1	1	U		1	0.25	1	1	U		1	0.25	1
Ethylbenzene	ug/l	SW846 8260B	2	U		2	0.31	1	2	U		2	0.31	1	2	U		2	0.31	1
Toluene	ug/l	SW846 8260B	2	U		2	1	1	2	U		2	1	1	2	U		2	1	1
Xylenes (Total)	ug/l	SW846 8260B	3	U		3	1.5	1	3	U		3	1.5	1	3	U		3	1.5	1
<b>Bacteria</b>																				
Iron Related Bacteria	cfu/ml	HACH IRB-BART	74500			25		1	74500			25		1	9000			25		1
Slime forming bacteria	cfu/ml	HACH SLYM-BART	350000			500		1	350000			500		1	66500			500		1
Sulfate Reducing Bacteria	cfu/ml	HACH SRB-BART	5000			200		1	18000			200		1	359000			200		1
<b>Field Parameters</b>																				
Bubbles	nu	Field	None						Mod					1	None					1
Color	nu	Field	None						Clear					1	L. Brown					1
Conductivity, Field	uS/cm	Field	1019						1096						1879					1
Depth to Water	ft	Field	17.03						28.07					1	90					1
Discharge, measured	gpm	Field	2		VAR				3.5		VAR			1	1.2		VAR			1
Dissolved Oxygen, Field	mg/l	Field	1.29						0.39					1	2.95					1
Dissolved Oxygen, Field,%	%	Field	12.4						4.3					1	29					1
Effervescence	nu	Field	None						Mod					1	None					1
Odor	nu	Field	None						None					1	None					1
ORP, field	mv	Field	142.8						123.3					1	86.8					1
pH, Field	s.u.	Field	7.12						7.18					1	7.37					1
Sediment	nu	Field	None						None					1	None					1
Specific Conductivity, Field	uS/cm	Field	1318						1298						2369					1
Temperature, Water	Deg C	Field	13.11						16.92					1	14.2					1
Turbidity, field	NTUs	Field	2.4		AV				1.73		AV			1	28.22		AV			1
VOA Headspace	nu	Field	None						≥ pea size					1	None					1

Notes

<sup>1</sup> Sample Union No. 6-26068-F: barium analyzed using method EPA 200.7

U = not detected at the reporting limit

H = hold time exceeded

J = result between RL and MDL, estimated

AV = result averaged

VAR = varies

**ATTACHMENT E**

**Laboratory Analytical Summary Report**

**Technical Report for**

**WPX Energy Rocky Mountain, LLC**

**WWLCOGJ: GM 323-28 BWQ**

**Accutest Job Number: D57542**

**Sampling Date: 05/07/14**

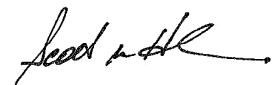
**Report to:**

**Western Water and Land, Inc.**  
**743 Horizon Court Suite 330**  
**Grand Junction, CO 80506**  
**bsmith@westernwaterandland.com; jpahler@westernwaterandland.com**  
**ATTN: Bruce Smith**

**Total number of pages in report: 49**



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.



**Scott Heideman**  
**Laboratory Director**

**Client Service contact: Renea Jackson 303-425-6021**

Certifications: CO (CO00049), ID, NE (CO00049), ND (R-027), NJ (CO 0007), OK (D9942), UT (NELAP CO00049), TX (T104704511)

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Test results relate only to samples analyzed.

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### Sample Summary

WPX Energy Rocky Mountain, LLC

Job No: D57542

WWLCOGJ: GM 323-28 BWQ

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
D57542-1	05/07/14	11:30	NWS 05/08/14	AQ	Ground Water	UNION NO. 6-26068-F
D57542-1F	05/07/14	11:30	NWS 05/08/14	AQ	Groundwater Filtered	UNION NO. 6-26068-F
D57542-2	05/07/14	00:00	NWS 05/08/14	AQ	Trip Blank Water	TRIP BLANK

## CASE NARRATIVE / CONFORMANCE SUMMARY

**Client:** WPX Energy Rocky Mountain, LLC

**Job No** D57542

**Site:** WWLCOGJ: GM 323-28 BWQ

**Report Date** 5/21/2014 11:15:35 AM

On 05/08/2014, 1 sample(s), 1 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 2.1 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D57542 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

### Volatiles by GCMS By Method SW846 8260B

<b>Matrix</b> AQ	<b>Batch ID:</b> V7V1448
------------------	--------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D57587-5MS, D57582-10DUP were used as the QC samples indicated.
- D57582-10DUP: The pH of the sample aliquot for VOA analysis was >2 at time of analysis.
- D57542-2: The pH of the sample aliquot for VOA analysis was >2 at time of analysis.
- D57542-1: The pH of the sample aliquot for VOA analysis was >2 at time of analysis.

### Volatiles by GC By Method RSK175 MOD

<b>Matrix</b> AQ	<b>Batch ID:</b> GFB508
------------------	-------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D57479-1MS, D57479-1MSD were used as the QC samples indicated.
- D57542-1: Sample was not preserved to a pH < 2.

### Extractables by GC By Method SW846-8015B

<b>Matrix</b> AQ	<b>Batch ID:</b> OP9893
------------------	-------------------------

- All samples were extracted within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- Sample(s) D57451-13MS, D57451-13MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- The matrix spike duplicate (MSD) recovery(s) of TPH-DRO (C10-C28) are outside control limits. Probable cause due to matrix interference.
- The RPD(s) for the MS and MSD recoveries of TPH-DRO (C10-C28) are outside control limits for sample OP9893-MSD. High RPD due to possible sample nonhomogeneity.

### Metals By Method EPA 200.7

<b>Matrix</b> AQ	<b>Batch ID:</b> MP12880
------------------	--------------------------

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D57351-1FMS, D57351-1FMSD were used as the QC samples for the metals analysis.

## Metals By Method EPA 200.8

<b>Matrix</b> AQ	<b>Batch ID:</b> MP12878
------------------	--------------------------

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D57450-1FMS, D57450-1FMSD were used as the QC samples for the metals analysis.

## Wet Chemistry By Method EPA 300.0/SW846 9056

<b>Matrix</b> AQ	<b>Batch ID:</b> GP12530
------------------	--------------------------

- All samples were prepared within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D57520-2MS, D57520-2MSD were used as the QC samples for the Bromide, Chloride, Fluoride, Nitrogen, Nitrate, Nitrogen, Nitrite, Sulfate, Bromide analysis.
- D57542-1 for Nitrogen, Nitrite: Elevated detection limit due to matrix interference.
- D57542-1 for Bromide: Elevated detection limit due to matrix interference.
- D57542-1 for Nitrogen, Nitrate: Elevated detection limit due to matrix interference.

## Wet Chemistry By Method HACH IRB-BART

<b>Matrix</b> AQ	<b>Batch ID:</b> MB365
------------------	------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

## Wet Chemistry By Method HACH SLYM-BART

<b>Matrix</b> AQ	<b>Batch ID:</b> MB366
------------------	------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

## Wet Chemistry By Method HACH SRB-BART

<b>Matrix</b> AQ	<b>Batch ID:</b> MB367
------------------	------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

## Wet Chemistry By Method HACH8190/SM4500P-B/E

<b>Matrix</b> AQ	<b>Batch ID:</b> GP12573
------------------	--------------------------

- All samples were prepared within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D57458-1DUP, D57458-1MS, D57458-1MSD were used as the QC samples for the Phosphorus, Total analysis.

### Wet Chemistry By Method SM 2320B-2011

<b>Matrix</b> AQ	<b>Batch ID:</b> GN24645
------------------	--------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D57409-1MS, D57409-1MSD, D57430-4DUP were used as the QC samples for the Alkalinity, Total as CaCO<sub>3</sub> analysis.

<b>Matrix</b> AQ	<b>Batch ID:</b> GN24646
------------------	--------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

<b>Matrix</b> AQ	<b>Batch ID:</b> GN24647
------------------	--------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

### Wet Chemistry By Method SM 2510B-2011

<b>Matrix</b> AQ	<b>Batch ID:</b> GP12559
------------------	--------------------------

- Sample(s) D57452-1DUP were used as the QC samples for the Specific Conductivity analysis.

### Wet Chemistry By Method SM 2540C-2011

<b>Matrix</b> AQ	<b>Batch ID:</b> GN24686
------------------	--------------------------

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D57539-1DUP were used as the QC samples for the Solids, Total Dissolved analysis.

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

## Summary of Hits

**Job Number:** D57542  
**Account:** WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ  
**Collected:** 05/07/14



Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
---------------	------------------	-----------------	----	-----	-------	--------

**D57542-1      UNION NO. 6-26068-F**

Methane <sup>a</sup>	0.0022	0.00080	0.00040	mg/l	RSK175 MOD
Alkalinity, Bicarbonate as CaCO <sub>3</sub>	507	5.0	2.0	mg/l	SM 2320B-2011
Alkalinity, Total as CaCO <sub>3</sub>	507	5.0	2.0	mg/l	SM 2320B-2011
Bromide <sup>b</sup>	0.057 J	0.10	0.050	mg/l	EPA 300.0/SW846 9056
Chloride	12.1	1.0	0.80	mg/l	EPA 300.0/SW846 9056
Fluoride	0.41	0.20	0.10	mg/l	EPA 300.0/SW846 9056
Iron Reducing Bacteria	9000	25		CFU/ml	HACH IRB-BART
Phosphorus, Total	0.017	0.010	0.0080	mg/l	HACH8190/SM4500P-B/E
Slime Forming Bacteria	66500	500		CFU/ml	HACH SLYM-BART
Solids, Total Dissolved	1720	10	5.0	mg/l	SM 2540C-2011
Specific Conductivity	2090	1.0		umhos/cm	SM 2510B-2011
Sulfate	778	25	10	mg/l	EPA 300.0/SW846 9056
Sulfate Reducing Bacteria	359000	200		CFU/ml	HACH SRB-BART
pH	7.48			su	SM4500HB+-2011/9040C

**D57542-1F      UNION NO. 6-26068-F**

Barium	24.2	10	1.4	ug/l	EPA 200.7
Boron	149	50	6.6	ug/l	EPA 200.7
Calcium	131000	400	66	ug/l	EPA 200.7
Iron	21.2	10	3.2	ug/l	EPA 200.7
Magnesium	111000	200	29	ug/l	EPA 200.7
Manganese	90.2	5.0	0.29	ug/l	EPA 200.7
Potassium	3470	1000	230	ug/l	EPA 200.7
Sodium	272000	400	36	ug/l	EPA 200.7
Strontium	2220	5.0	0.12	ug/l	EPA 200.7

**D57542-2      TRIP BLANK**

No hits reported in this sample.

- (a) Sample was not preserved to a pH < 2.
- (b) Elevated detection limit due to matrix interference.



Sample Results

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Report of Analysis

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## Report of Analysis

<b>Client Sample ID:</b> UNION NO. 6-26068-F	<b>Date Sampled:</b> 05/07/14
<b>Lab Sample ID:</b> D57542-1	<b>Date Received:</b> 05/08/14
<b>Matrix:</b> AQ - Ground Water	<b>Percent Solids:</b> n/a
<b>Method:</b> SW846 8260B	
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 <sup>a</sup>	7V26338.D	1	05/08/14	JL	n/a	n/a	V7V1448
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

**Purgeable Aromatics+GRO**

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	0.31	ug/l	
1330-20-7	Xylene (total)	ND	3.0	1.5	ug/l	
	TPH-GRO (C6-C10)	ND	200	200	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
17060-07-0	1,2-Dichloroethane-D4	93%		62-130%
2037-26-5	Toluene-D8	96%		70-130%
460-00-4	4-Bromofluorobenzene	95%		69-130%

(a) The pH of the sample aliquot for VOA analysis was >2 at time of analysis.

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.1  
4

## Report of Analysis

<b>Client Sample ID:</b> UNION NO. 6-26068-F		<b>Date Sampled:</b> 05/07/14
<b>Lab Sample ID:</b> D57542-1		<b>Date Received:</b> 05/08/14
<b>Matrix:</b> AQ - Ground Water		<b>Percent Solids:</b> n/a
<b>Method:</b> RSK175 MOD		
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 <sup>a</sup>	FB11119.D	1	05/08/14	JS	n/a	n/a	GFB508
Run #2							

Run #	Initial Volume	Headspace Volume	Volume Injected	Temperature
Run #1	39.0 ml	4.0 ml	500 ul	20.0 Deg. C
Run #2				

### Methane, Ethane and Propane

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	0.0022	0.00080	0.00040	mg/l	
74-84-0	Ethane	ND	0.0016	0.00080	mg/l	
74-98-6	Propane	ND	0.0022	0.0011	mg/l	

(a) Sample was not preserved to a pH < 2.

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.1  
4

## Report of Analysis

<b>Client Sample ID:</b> UNION NO. 6-26068-F	<b>Date Sampled:</b> 05/07/14
<b>Lab Sample ID:</b> D57542-1	<b>Date Received:</b> 05/08/14
<b>Matrix:</b> AQ - Ground Water	<b>Percent Solids:</b> n/a
<b>Method:</b> SW846-8015B SW846 3510C	
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD31288.D	1	05/13/14	JS	05/13/14	OP9893	GFD1503
Run #2							

Run #	Initial Volume	Final Volume
Run #1	1060 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	0.19	0.17	mg/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	62%		10-130%		

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.1  
4

## Report of Analysis

<b>Client Sample ID:</b> UNION NO. 6-26068-F	<b>Date Sampled:</b> 05/07/14
<b>Lab Sample ID:</b> D57542-1	<b>Date Received:</b> 05/08/14
<b>Matrix:</b> AQ - Ground Water	<b>Percent Solids:</b> n/a
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ	

## General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Alkalinity, Bicarbonate as CaC	507	5.0	2.0	mg/l	1	05/12/14	JD	SM 2320B-2011
Alkalinity, Carbonate	2.0 U	5.0	2.0	mg/l	1	05/12/14	JD	SM 2320B-2011
Alkalinity, Total as CaCO <sub>3</sub>	507	5.0	2.0	mg/l	1	05/12/14	JD	SM 2320B-2011
Bromide <sup>a</sup>	0.057 J	0.10	0.050	mg/l	2	05/08/14 12:51	SK	EPA 300.0/SW846 9056
Chloride	12.1	1.0	0.80	mg/l	2	05/08/14 12:51	SK	EPA 300.0/SW846 9056
Fluoride	0.41	0.20	0.10	mg/l	2	05/08/14 12:51	SK	EPA 300.0/SW846 9056
Iron Reducing Bacteria	9000	25		CFU/ml	1	05/13/14	MM	HACH IRB-BART
Nitrogen, Nitrate <sup>a</sup>	0.012 U	0.020	0.012	mg/l	2	05/08/14 12:51	SK	EPA 300.0/SW846 9056
Nitrogen, Nitrite <sup>a</sup>	0.0060 U	0.0080	0.0060	mg/l	2	05/08/14 12:51	SK	EPA 300.0/SW846 9056
Phosphorus, Total	0.017	0.010	0.0080	mg/l	1	05/14/14	BF	HACH8190/SM4500P-B/E
Slime Forming Bacteria	66500	500		CFU/ml	1	05/13/14	MM	HACH SLYM-BART
Solids, Total Dissolved	1720	10	5.0	mg/l	1	05/14/14	JD	SM 2540C-2011
Specific Conductivity	2090	1.0		umhos/cm	1	05/13/14	AK	SM 2510B-2011
Sulfate	778	25	10	mg/l	50	05/08/14 18:45	SK	EPA 300.0/SW846 9056
Sulfate Reducing Bacteria	359000	200		CFU/ml	1	05/13/14	MM	HACH SRB-BART
pH	7.48			su	1	05/08/14 14:55	SK	SM4500HB+-2011/9040C

(a) Elevated detection limit due to matrix interference.

RL = Reporting Limit  
MDL = Method Detection Limit

U = Indicates a result < MDL  
J = Indicates a result >= MDL but < RL

## Report of Analysis

<b>Client Sample ID:</b> UNION NO. 6-26068-F <b>Lab Sample ID:</b> D57542-1F <b>Matrix:</b> AQ - Groundwater Filtered <b>Project:</b> WWLCOGJ: GM 323-28 BWQ	<b>Date Sampled:</b> 05/07/14 <b>Date Received:</b> 05/08/14 <b>Percent Solids:</b> n/a
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**Dissolved Metals Analysis**

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Barium	24.2	10	1.4	ug/l	1	05/09/14	05/09/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>4</sup>
Boron	149	50	6.6	ug/l	1	05/09/14	05/09/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>4</sup>
Calcium	131000	400	66	ug/l	1	05/09/14	05/09/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>4</sup>
Iron	21.2	10	3.2	ug/l	1	05/09/14	05/09/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>4</sup>
Magnesium	111000	200	29	ug/l	1	05/09/14	05/09/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>4</sup>
Manganese	90.2	5.0	0.29	ug/l	1	05/09/14	05/09/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>4</sup>
Potassium	3470	1000	230	ug/l	1	05/09/14	05/09/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>4</sup>
Selenium	0.42 U	0.80	0.42	ug/l	2	05/09/14	05/20/14 NT	EPA 200.8 <sup>2</sup>	EPA 200.8 <sup>3</sup>
Sodium	272000	400	36	ug/l	1	05/09/14	05/09/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>4</sup>
Strontium	2220	5.0	0.12	ug/l	1	05/09/14	05/09/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>4</sup>

- (1) Instrument QC Batch: MA4747
- (2) Instrument QC Batch: MA4783
- (3) Prep QC Batch: MP12878
- (4) Prep QC Batch: MP12880

RL = Reporting Limit  
 MDL = Method Detection Limit

U = Indicates a result < MDL  
 J = Indicates a result >= MDL but < RL

4.2  
4

## Report of Analysis

<b>Client Sample ID:</b> TRIP BLANK		<b>Date Sampled:</b> 05/07/14
<b>Lab Sample ID:</b> D57542-2		<b>Date Received:</b> 05/08/14
<b>Matrix:</b> AQ - Trip Blank Water		<b>Percent Solids:</b> n/a
<b>Method:</b> SW846 8260B		
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 <sup>a</sup>	7V26339.D	1	05/08/14	JL	n/a	n/a	V7V1448
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

**Purgeable Aromatics+GRO**

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	0.31	ug/l	
1330-20-7	Xylene (total)	ND	3.0	1.5	ug/l	
	TPH-GRO (C6-C10)	ND	200	200	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
17060-07-0	1,2-Dichloroethane-D4	94%		62-130%
2037-26-5	Toluene-D8	96%		70-130%
460-00-4	4-Bromofluorobenzene	93%		69-130%

(a) The pH of the sample aliquot for VOA analysis was >2 at time of analysis.

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.3  
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## Misc. Forms

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### Custody Documents and Other Forms

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Includes the following where applicable:

- Chain of Custody



## GC/MS Volatiles

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### QC Data Summaries

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Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

## Method Blank Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V7V1448-MB	7V26335.D	1	05/08/14	JL	n/a	n/a	V7V1448

The QC reported here applies to the following samples:

Method: SW846 8260B

D57542-1, D57542-2

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	2.0	0.31	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
1330-20-7	Xylene (total)	ND	3.0	1.5	ug/l	
	TPH-GRO (C6-C10)	ND	200	200	ug/l	

CAS No.	Surrogate Recoveries	Limits
17060-07-0	1,2-Dichloroethane-D4	98% 62-130%
2037-26-5	Toluene-D8	93% 70-130%
460-00-4	4-Bromofluorobenzene	97% 69-130%

# Blank Spike Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V7V1448-BS	7V26336.D	1	05/08/14	JL	n/a	n/a	V7V1448

The QC reported here applies to the following samples:

Method: SW846 8260B

D57542-1, D57542-2

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
71-43-2	Benzene	50	52.4	105	70-130
100-41-4	Ethylbenzene	50	50.8	102	70-130
108-88-3	Toluene	50	48.9	98	70-130
1330-20-7	Xylene (total)	150	153	102	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
17060-07-0	1,2-Dichloroethane-D4	97%	62-130%
2037-26-5	Toluene-D8	93%	70-130%
460-00-4	4-Bromofluorobenzene	104%	69-130%

\* = Outside of Control Limits.

# Blank Spike Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V7V1448-BS	7V26337.D	1	05/08/14	JL	n/a	n/a	V7V1448

The QC reported here applies to the following samples:

Method: SW846 8260B

D57542-1, D57542-2

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
	TPH-GRO (C6-C10)	2200	1840	84	39-144

CAS No.	Surrogate Recoveries	BSP	Limits
17060-07-0	1,2-Dichloroethane-D4	91%	62-130%
2037-26-5	Toluene-D8	94%	70-130%
460-00-4	4-Bromofluorobenzene	100%	69-130%

\* = Outside of Control Limits.

# Matrix Spike Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D57587-5MS	7V26351.D	5	05/08/14	JL	n/a	n/a	V7V1448
D57587-5	7V26350.D	5	05/08/14	JL	n/a	n/a	V7V1448

The QC reported here applies to the following samples:

Method: SW846 8260B

D57542-1, D57542-2

CAS No.	Compound	D57587-5 ug/l	Spike Q	ug/l	MS ug/l	MS %	Limits
71-43-2	Benzene	605	250	904	120	62-130	
100-41-4	Ethylbenzene	66.7	250	333	107	63-130	
108-88-3	Toluene	28.4	250	283	102	60-130	
1330-20-7	Xylene (total)	131	750	923	106	67-130	

CAS No.	Surrogate Recoveries	MS	D57587-5	Limits
17060-07-0	1,2-Dichloroethane-D4	95%	94%	62-130%
2037-26-5	Toluene-D8	92%	95%	70-130%
460-00-4	4-Bromofluorobenzene	102%	98%	69-130%

\* = Outside of Control Limits.

# Matrix Spike Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D57587-5MS	7V26352.D	5	05/08/14	JL	n/a	n/a	V7V1448
D57587-5	7V26350.D	5	05/08/14	JL	n/a	n/a	V7V1448

The QC reported here applies to the following samples:

Method: SW846 8260B

D57542-1, D57542-2

CAS No.	Compound	D57587-5 ug/l	Spike Q	MS ug/l	MS %	Limits
	TPH-GRO (C6-C10)	2170	11000	11700	87	19-168

CAS No.	Surrogate Recoveries	MS	D57587-5	Limits
17060-07-0	1,2-Dichloroethane-D4	90%	94%	62-130%
2037-26-5	Toluene-D8	96%	95%	70-130%
460-00-4	4-Bromofluorobenzene	102%	98%	69-130%

\* = Outside of Control Limits.

# Duplicate Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D57582-10DUP <sup>a</sup>	7V26345.D	100	05/08/14	JL	n/a	n/a	V7V1448
D57582-10 <sup>a</sup>	7V26344.D	100	05/08/14	JL	n/a	n/a	V7V1448

The QC reported here applies to the following samples:

Method: SW846 8260B

D57542-1, D57542-2

CAS No.	Compound	D57582-10 ug/l	DUP Q	DUP ug/l	Q	RPD	Limits
71-43-2	Benzene	11700		11500		2	30
100-41-4	Ethylbenzene	3470		3420		1	30
108-88-3	Toluene	3050		2950		3	30
1330-20-7	Xylene (total)	12400		12100		2	30
	TPH-GRO (C6-C10)	65100		61900		5	30

CAS No.	Surrogate Recoveries	DUP	D57582-10	Limits
17060-07-0	1,2-Dichloroethane-D4	91%	94%	62-130%
2037-26-5	Toluene-D8	95%	94%	70-130%
460-00-4	4-Bromofluorobenzene	98%	98%	69-130%

(a) The pH of the sample aliquot for VOA analysis was >2 at time of analysis.

\* = Outside of Control Limits.

## GC Volatiles

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## QC Data Summaries

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Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

# Method Blank Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GFB508-MB	FB11108.D	1	05/08/14	JS	n/a	n/a	GFB508

The QC reported here applies to the following samples:

Method: RSK175 MOD

D57542-1

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	ND	0.00080	0.00040	mg/l	
74-84-0	Ethane	ND	0.0016	0.00080	mg/l	
74-98-6	Propane	ND	0.0022	0.0011	mg/l	

7.1.1

7

# Blank Spike Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GFB508-BS	FB11109.D	10	05/08/14	JS	n/a	n/a	GFB508

The QC reported here applies to the following samples:

Method: RSK175 MOD

D57542-1

CAS No.	Compound	Spike mg/l	BSP mg/l	BSP %	Limits
74-82-8	Methane	0.51	0.608	119	70-130
74-84-0	Ethane	0.956	1.04	109	70-130
74-98-6	Propane	1.4	1.52	108	67-130

\* = Outside of Control Limits.

# Matrix Spike/Matrix Spike Duplicate Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D57479-1MS	FB11111.D	10	05/08/14	JS	n/a	n/a	GFB508
D57479-1MSD	FB11112.D	10	05/08/14	JS	n/a	n/a	GFB508
D57479-1	FB11110.D	1	05/08/14	JS	n/a	n/a	GFB508

The QC reported here applies to the following samples:

Method: RSK175 MOD

D57542-1

CAS No.	Compound	D57479-1 mg/l	Spike Q mg/l	MS mg/l	MS %	Spike mg/l	MSD mg/l	MSD %	RPD	Limits Rec/RPD
74-82-8	Methane	0.00040	0.51	0.512	100	0.51	0.511	100	0	51-155/30
74-84-0	Ethane	ND	0.956	0.893	93	0.956	0.897	94	0	58-130/30
74-98-6	Propane	ND	1.4	1.33	95	1.4	1.35	96	1	46-130/30

\* = Outside of Control Limits.

7.3.1  
 7

## GC Semi-volatiles

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### QC Data Summaries

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Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

## Method Blank Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9893-MB	FD31266.D	1	05/13/14	JS	05/13/14	OP9893	GFD1503

The QC reported here applies to the following samples:

Method: SW846-8015B

D57542-1

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	0.20	0.18	mg/l	

CAS No.	Surrogate Recoveries	Limits
84-15-1	o-Terphenyl	50% 10-130%

# Blank Spike Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9893-BS	FD31268.D	1	05/13/14	JS	05/13/14	OP9893	GFD1503

The QC reported here applies to the following samples:

Method: SW846-8015B

D57542-1

CAS No.	Compound	Spike mg/l	BSP mg/l	BSP %	Limits
	TPH-DRO (C10-C28)	5	1.67	33	33-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	46%	10-130%

8.2.1

8

\* = Outside of Control Limits.

# Matrix Spike/Matrix Spike Duplicate Summary

**Job Number:** D57542  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP9893-MS	FD31270.D	1	05/13/14	JS	05/13/14	OP9893	GFD1503
OP9893-MSD	FD31272.D	1	05/13/14	JS	05/13/14	OP9893	GFD1503
D57451-13	FD31274.D	1	05/13/14	JS	05/13/14	OP9893	GFD1503

The QC reported here applies to the following samples:

Method: SW846-8015B

D57542-1

CAS No.	Compound	D57451-13 mg/l	Spike Q mg/l	MS mg/l	MS %	Spike mg/l	MSD mg/l	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	ND	5	2.32	46	5	1.20	24* a	64* b	33-130/30

CAS No.	Surrogate Recoveries	MS	MSD	D57451-13	Limits
84-15-1	o-Terphenyl	67%	31%	46%	10-130%

(a) Outside control limits due to possible matrix interference.

(b) High RPD due to possible sample nonhomogeneity.

\* = Outside of Control Limits.

## Metals Analysis

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### QC Data Summaries

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Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: D57542  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP12878  
Matrix Type: AQUEOUS

Methods: EPA 200.8  
Units: ug/l

Prep Date: 05/09/14

Metal	RL	IDL	MDL	MB raw	final
Aluminum	50	1.1	2		
Antimony	0.40	.0022	.011		
Arsenic	0.20	.017	.044		
Barium	2.0	.016	.079		
Beryllium	0.20	.016	.069		
Boron	40	.49	2.1		
Cadmium	0.10	.036	.042		
Calcium	400	5.6	12		
Chromium	2.0	.053	.053		
Cobalt	0.20	.0049	.015		
Copper	2.0	.06	.13		
Iron	10	3.5	4.6		
Lead	0.50	.0079	.008		
Magnesium	100	1.3	1.3		
Manganese	1.0	.12	.13		
Molybdenum	1.0	.049	.029		
Nickel	2.0	.0088	.027		
Phosphorus	60	2.6	4.3		
Potassium	200	2.9	2.9		
Selenium	0.40	.06	.21	0.059	<0.40
Silver	0.10	.0019	.008		
Sodium	500	4.9	4.9		
Strontium	20	.01	.015		
Thallium	0.20	.0024	.005		
Tin	10	.063	1.3		
Titanium	2.0	.059	.092		
Uranium	0.20	.0017	.002		
Vanadium	1.0	.037	.2		
Zinc	10	.21	.96		

Associated samples MP12878: D57542-1F

Results < IDL are shown as zero for calculation purposes  
(\* ) Outside of QC limits  
(anr) Analyte not requested

9.1.1  
9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D57542  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP12878  
 Matrix Type: AQUEOUS

Methods: EPA 200.8  
 Units: ug/l

Prep Date: 05/09/14

Metal	D57450-1F Original MS	SpikeLot ICPAL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium				
Beryllium				
Boron				
Cadmium	anr			
Calcium				
Chromium	anr			
Cobalt				
Copper	anr			
Iron	anr			
Lead	anr			
Magnesium				
Manganese	anr			
Molybdenum				
Nickel	anr			
Phosphorus				
Potassium				
Selenium	0.36	205	200	102.3 70-130
Silver	anr			
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc	anr			

Associated samples MP12878: D57542-1F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits  
 (N) Matrix Spike Rec. outside of QC limits  
 (anr) Analyte not requested

9.1.2  
 9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D57542  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP12878  
 Matrix Type: AQUEOUS

Methods: EPA 200.8  
 Units: ug/l

Prep Date: 05/09/14

Metal	D57450-1F Original MSD	SpikeLot ICPAL2	% Rec	MSD RPD	QC Limit	
Aluminum						
Antimony						
Arsenic	anr					
Barium						
Beryllium						
Boron						
Cadmium	anr					
Calcium						
Chromium	anr					
Cobalt						
Copper	anr					
Iron	anr					
Lead	anr					
Magnesium						
Manganese	anr					
Molybdenum						
Nickel	anr					
Phosphorus						
Potassium						
Selenium	0.36	198	200	98.8	14.6	20
Silver	anr					
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc	anr					

Associated samples MP12878: D57542-1F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits  
 (N) Matrix Spike Rec. outside of QC limits  
 (anr) Analyte not requested

9.1.2  
 9

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D57542  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP12878  
 Matrix Type: AQUEOUS

Methods: EPA 200.8  
 Units: ug/l

Prep Date: 05/09/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium				
Beryllium				
Boron				
Cadmium	anr			
Calcium				
Chromium	anr			
Cobalt				
Copper	anr			
Iron	anr			
Lead	anr			
Magnesium				
Manganese	anr			
Molybdenum				
Nickel	anr			
Phosphorus				
Potassium				
Selenium	214	200	107.0	85-115
Silver	anr			
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc	anr			

Associated samples MP12878: D57542-1F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits  
 (anr) Analyte not requested

9.1.3  
 9

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: D57542  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP12880  
Matrix Type: AQUEOUS

Methods: EPA 200.7  
Units: ug/l

Prep Date: 05/09/14

Metal	RL	IDL	MDL	MB raw	final
Aluminum	100	8.6	11		
Antimony	30	3.2	21		
Arsenic	25	5.2	9		
Barium	10	1.4	1.4	0.10	<10
Beryllium	10	.8	1.7		
Boron	50	6.7	6.6	0.20	<50
Cadmium	10	.4	.36		
Calcium	400	2.2	66	12.4	<400
Chromium	10	.4	1.4		
Cobalt	5.0	.4	.51		
Copper	10	1.2	1.5		
Iron	10	2.2	3.2	3.3	<10
Lead	50	3.6	4.1		
Lithium	5.0	1.9	1.9		
Magnesium	200	14	29	2.8	<200
Manganese	5.0	.01	.29	0.0	<5.0
Molybdenum	10	.8	1.1		
Nickel	30	.9	.87		
Phosphorus	100	15	24		
Potassium	1000	130	230	2.4	<1000
Selenium	50	8.8	9.3		
Silicon	50	5.2	5.6		
Silver	30	.4	.4		
Sodium	400	4.9	36	29.0	<400
Strontium	5.0	.01	.12	0.10	<5.0
Thallium	10	2.9	4.9		
Tin	50	13	13		
Titanium	10	.15	.43		
Uranium	50	3.7	3.9		
Vanadium	10	.4	.39		
Zinc	30	.6	1.9		

Associated samples MP12880: D57542-1F

Results < IDL are shown as zero for calculation purposes  
(\* ) Outside of QC limits

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: D57542  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

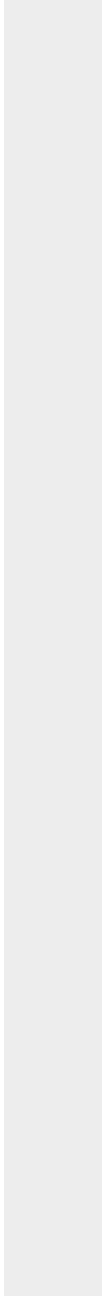
QC Batch ID: MP12880  
Matrix Type: AQUEOUS

Methods: EPA 200.7  
Units: ug/l

Prep Date: 05/09/14

Metal	RL	IDL	MDL	MB raw	final
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(anr) Analyte not requested



MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D57542  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP12880  
 Matrix Type: AQUEOUS

Methods: EPA 200.7  
 Units: ug/l

Prep Date: 05/09/14

Metal	D57351-1F Original MS		SpikeLot ICPAL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium	62.2	2090	2000	101.4	70-130
Beryllium					
Boron	20.9	1080	1000	105.9	70-130
Cadmium					
Calcium	39100	62100	25000	92.0	70-130
Chromium					
Cobalt					
Copper					
Iron	14.5	4950	5000	98.7	70-130
Lead					
Lithium					
Magnesium	9590	34200	25000	98.4	70-130
Manganese	0.60	490	500	97.9	70-130
Molybdenum					
Nickel					
Phosphorus					
Potassium	1650	27300	25000	102.6	70-130
Selenium					
Silicon					
Silver					
Sodium	47600	71900	25000	97.2	70-130
Strontium	593	1080	500	97.4	70-130
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP12880: D57542-1F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

9.2.2  
 9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D57542  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

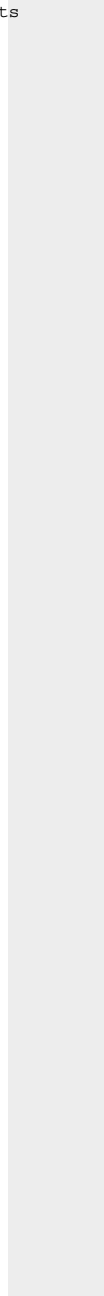
QC Batch ID: MP12880  
Matrix Type: AQUEOUS

Methods: EPA 200.7  
Units: ug/l

Prep Date: 05/09/14

Metal	D57351-1F Original MS	SpikeLot ICPAL2	% Rec	QC Limits
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(N) Matrix Spike Rec. outside of QC limits  
(anr) Analyte not requested



MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D57542  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP12880  
 Matrix Type: AQUEOUS

Methods: EPA 200.7  
 Units: ug/l

Prep Date: 05/09/14

Metal	D57351-1F Original MSD		SpikeLot ICPAL2 % Rec		MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium	62.2	2160	2000	104.9	3.3	20
Beryllium						
Boron	20.9	1100	1000	107.9	1.8	20
Cadmium						
Calcium	39100	63400	25000	97.2	2.1	20
Chromium						
Cobalt						
Copper						
Iron	14.5	5090	5000	101.5	2.8	20
Lead						
Lithium						
Magnesium	9590	35000	25000	101.6	2.3	20
Manganese	0.60	497	500	99.3	1.4	20
Molybdenum						
Nickel						
Phosphorus						
Potassium	1650	28100	25000	105.8	2.9	20
Selenium						
Silicon						
Silver						
Sodium	47600	74500	25000	107.6	3.6	20
Strontium	593	1120	500	105.4	3.6	20
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP12880: D57542-1F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

9.2.2  
 9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D57542  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

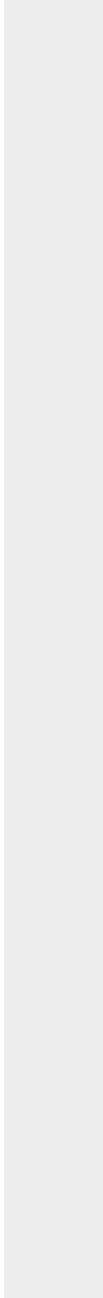
QC Batch ID: MP12880  
Matrix Type: AQUEOUS

Methods: EPA 200.7  
Units: ug/l

Prep Date: 05/09/14

Metal	D57351-1F Original MSD	SpikeLot ICPAL2	% Rec	MSD RPD	QC Limit
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(N) Matrix Spike Rec. outside of QC limits  
(anr) Analyte not requested



9.2.2  
9

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D57542  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP12880  
 Matrix Type: AQUEOUS

Methods: EPA 200.7  
 Units: ug/l

Prep Date: 05/09/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium	2060	2000	103.0	85-115
Beryllium				
Boron	1060	1000	106.0	85-115
Cadmium				
Calcium	25200	25000	100.8	85-115
Chromium				
Cobalt				
Copper				
Iron	5000	5000	100.0	85-115
Lead				
Lithium				
Magnesium	25300	25000	101.2	85-115
Manganese	504	500	100.8	85-115
Molybdenum				
Nickel				
Phosphorus				
Potassium	26000	25000	104.0	85-115
Selenium				
Silicon				
Silver				
Sodium	25900	25000	103.6	85-115
Strontium	507	500	101.4	85-115
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP12880: D57542-1F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

9.2.3  
 9

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D57542  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

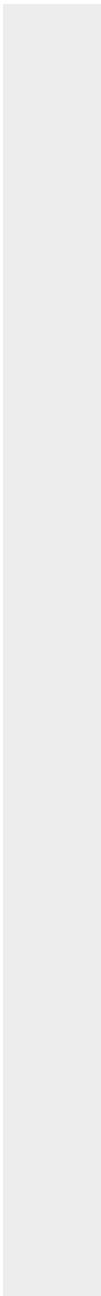
QC Batch ID: MP12880  
Matrix Type: AQUEOUS

Methods: EPA 200.7  
Units: ug/l

Prep Date: 05/09/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
-------	---------------	---------------------	-------	--------------

(anr) Analyte not requested



## General Chemistry

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### QC Data Summaries

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Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D57542  
Account: WILLCOOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Alkalinity, Bicarbonate as CaC	GN24646	5.0	2.5	mg/l	100	100	100.3	90-110%
Alkalinity, Carbonate	GN24647	5.0	0.0	mg/l	100	100	100.3	80-120%
Alkalinity, Total as CaCO3	GN24645	5.0	2.5	mg/l	100	100	100.3	90-110%
Bromide	GP12530/GN24617	0.050	0.0	mg/l	0.5	0.511	102.2	90-110%
Chloride	GP12530/GN24617	0.50	0.0	mg/l	5	4.74	94.8	90-110%
Fluoride	GP12530/GN24617	0.10	0.0	mg/l	1	1.03	103.0	90-110%
Iron Reducing Bacteria	MB365	25	<25	CFU/ml				
Nitrogen, Nitrate	GP12530/GN24617	0.010	0.0	mg/l	0.1	0.103	103.0	90-110%
Nitrogen, Nitrite	GP12530/GN24617	0.0040	0.0	mg/l	0.05	0.0520	104.0	90-110%
Phosphorus, Total	GP12573/GN24694	0.010	0.0	mg/l	0.38	0.37	97.1	80-120%
Slime Forming Bacteria	MB366	500	<500	CFU/ml				
Solids, Total Dissolved	GN24686	10	0.0	mg/l	400	399	99.8	90-110%
Specific Conductivity	GP12559/GN24682			umhos/cm	101	101	101.0	90-110%
Sulfate	GP12530/GN24617	0.50	0.0	mg/l	5	4.93	98.6	90-110%
Sulfate Reducing Bacteria	MB367	200	<200	CFU/ml				
pH	GN24623			su	8.00	7.99	99.9	99.3-100.7%

Associated Samples:

Batch MB365: D57542-1  
Batch MB366: D57542-1  
Batch MB367: D57542-1  
Batch GN24623: D57542-1  
Batch GN24645: D57542-1  
Batch GN24646: D57542-1  
Batch GN24647: D57542-1  
Batch GN24686: D57542-1  
Batch GP12530: D57542-1  
Batch GP12559: D57542-1  
Batch GP12573: D57542-1

(\* ) Outside of QC limits

10.1  
10

DUPLICATE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D57542  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Alkalinity, Total as CaCO3	GN24645	D57430-4	mg/l	501	503	0.4	0-20%
Phosphorus, Total	GP12573/GN24694	D57458-1	mg/l	0.017	0.019	11.1	0-20%
Solids, Total Dissolved	GN24686	D57539-1	mg/l	250	258	3.1	0-20%
Specific Conductivity	GP12559/GN24682	D57452-1	umhos/cm	1150	1140	0.7	0-20%

Associated Samples:

Batch GN24645: D57542-1

Batch GN24686: D57542-1

Batch GP12559: D57542-1

Batch GP12573: D57542-1

(\*) Outside of QC limits

10.2  
10

MATRIX SPIKE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D57542  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Alkalinity, Total as CaCO3	GN24645	D57409-1	mg/l	961	100	380	88.4	80-120%
Bromide	GP12530/GN24617	D57520-2	mg/l	0.0	0.5	0.52	104.0	80-120%
Chloride	GP12530/GN24617	D57520-2	mg/l	1.5	5	6.3	96.0	80-120%
Fluoride	GP12530/GN24617	D57520-2	mg/l	0.15	1	1.2	105.0	80-120%
Nitrogen, Nitrate	GP12530/GN24617	D57520-2	mg/l	0.044	0.1	0.15	106.0	80-120%
Nitrogen, Nitrite	GP12530/GN24617	D57520-2	mg/l	0.0	0.05	0.053	106.0	80-120%
Phosphorus, Total	GP12573/GN24694	D57458-1	mg/l	0.017	0.40	0.43	103.3	80-120%
Sulfate	GP12530/GN24617	D57520-2	mg/l	8.1	5	13.2	102.0	80-120%

Associated Samples:

Batch GN24645: D57542-1

Batch GP12530: D57542-1

Batch GP12573: D57542-1

(\*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

MATRIX SPIKE DUPLICATE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D57542  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Alkalinity, Total as CaCO3	GN24645	D57409-1	mg/l	961	100	381	0.2	20%
Bromide	GP12530/GN24617	D57520-2	mg/l	0.0	0.5	0.52	0.0	20%
Chloride	GP12530/GN24617	D57520-2	mg/l	1.5	5	6.3	0.0	20%
Fluoride	GP12530/GN24617	D57520-2	mg/l	0.15	1	1.2	0.0	20%
Nitrogen, Nitrate	GP12530/GN24617	D57520-2	mg/l	0.044	0.1	0.15	0.0	20%
Nitrogen, Nitrite	GP12530/GN24617	D57520-2	mg/l	0.0	0.05	0.053	0.0	20%
Phosphorus, Total	GP12573/GN24694	D57458-1	mg/l	0.017	0.40	0.430	0.0	20%
Sulfate	GP12530/GN24617	D57520-2	mg/l	8.1	5	13.2	0.0	20%

Associated Samples:

Batch GN24645: D57542-1

Batch GP12530: D57542-1

Batch GP12573: D57542-1

(\*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

10.4  
10

Technical Report for

WPX Energy Rocky Mountain, LLC

WWLCOGJ: GM 323-28 BWQ

Accutest Job Number: D60208

Sampling Date: 07/28/14

Report to:

Western Water and Land, Inc.  
743 Horizon Court Suite 330  
Grand Junction, CO 80506  
bsmith@westernwaterandland.com; jpahler@westernwaterandland.com  
ATTN: Bruce Smith

Total number of pages in report: **55**



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.



Scott Heideman  
Laboratory Director

Client Service contact: Renea Jackson 303-425-6021

Certifications: CO (CO00049), ID, NE (CO00049), ND (R-027), NJ (CO 0007), OK (D9942), UT (NELAP CO00049), TX (T104704511)

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Test results relate only to samples analyzed.

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## Sample Summary

WPX Energy Rocky Mountain, LLC

**Job No:** D60208

WWLCOGJ: GM 323-28 BWQ

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
D60208-1	07/28/14	14:50 NWS	07/29/14	AQ	Ground Water	GM 323-28-151879
D60208-1F	07/28/14	14:50 NWS	07/29/14	AQ	Groundwater Filtered	GM 323-28-151879
D60208-2	07/28/14	17:25 NWS	07/29/14	AQ	Ground Water	GM 11-28-185334
D60208-2F	07/28/14	17:25 NWS	07/29/14	AQ	Groundwater Filtered	GM 11-28-185334
D60208-3	07/28/14	00:00 NWS	07/29/14	AQ	Trip Blank Water	TRIP BLANK
D60208-4	07/28/14	00:00 NWS	07/29/14	AQ	Trip Blank Water	TRIP BLANK

## CASE NARRATIVE / CONFORMANCE SUMMARY

**Client:** WPX Energy Rocky Mountain, LLC

**Job No** D60208

**Site:** WWLCOGJ: GM 323-28 BWQ

**Report Date** 8/12/2014 1:03:13 PM

On 07/29/2014, 2 sample(s), 1 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 4.2 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D60208 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

### Volatiles by GCMS By Method SW846 8260B

**Matrix:** AQ

**Batch ID:** V6V1484

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60175-4MS, D60175-4MSD were used as the QC samples indicated.
- D60208-1,-2: The pH of the sample aliquot for VOA analysis was >2 at time of analysis.
- D60175-4MS and D60175-4MSD: The pH of the sample aliquot for VOA analysis was >2 at time of analysis.

### Volatiles by GC By Method RSK175 MOD

**Matrix:** AQ

**Batch ID:** GFB547

- All samples were analyzed within the recommended method holding time.
- Sample(s) D59888-23MS, D59888-23MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- D60208-2: The pH of the sample was >2 at time of analysis. Results may be bias low due to headspace. Analyzed per client instruction.
- D60208-1: The pH of the sample was >2 at time of analysis.
- D59888-23MSD: The pH of the sample was >2 at time of analysis.
- D59888-23MS: The pH of the sample was >2 at time of analysis.

### Extractables by GC By Method SW846-8015B

**Matrix:** AQ

**Batch ID:** OP10341

- All samples were extracted and analyzed within the recommended method holding time.
- Sample(s) D60175-5MS, D60175-5MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

### Metals By Method EPA 200.7

**Matrix:** AQ

**Batch ID:** MP13559

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60211-1FMS, D60211-1FMSD were used as the QC samples for the metals analysis.
- MP13559-MB1 for Iron: All sample results < RL or > 10x MB concentration.

## Metals By Method EPA 200.8

**Matrix:** AQ                      **Batch ID:** MP13588

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60208-1FMS, D60208-1FMSD were used as the QC samples for the metals analysis.

## Wet Chemistry By Method EPA 300.0/SW846 9056

**Matrix:** AQ                      **Batch ID:** GP13155

- All samples were prepared and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60188-1MS, D60188-1MSD were used as the QC samples for the Bromide, Fluoride, Nitrogen, Nitrate, Nitrogen, Nitrite, Sulfate, Bromide, Chloride analysis.
- The matrix spike (MS) recovery(s) of Chloride are outside control limits. Spike recovery indicates possible matrix interference and/or sample nonhomogeneity.

## Wet Chemistry By Method HACH IRB-BART

**Matrix:** AQ                      **Batch ID:** MB403

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

## Wet Chemistry By Method HACH SLYM-BART

**Matrix:** AQ                      **Batch ID:** MB404

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

## Wet Chemistry By Method HACH SRB-BART

**Matrix:** AQ                      **Batch ID:** MB405

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

## Wet Chemistry By Method HACH8190/SM4500P-B/E

**Matrix:** AQ                      **Batch ID:** GP13193

- All samples were prepared and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60208-2MS, D60208-2MSD, D60208-1DUP were used as the QC samples for the Phosphorus, Total analysis.
- The duplicate RPD(s) for Phosphorus, Total are outside control limits for sample GP13193-D1. RPD acceptable due to low duplicate and sample concentrations.

### Wet Chemistry By Method SM 2320B-2011

**Matrix:** AQ                      **Batch ID:** GN25790

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60208-2DUP, D60208-2MS, D60208-2MSD were used as the QC samples for the Alkalinity, Total as CaCO<sub>3</sub> analysis.

**Matrix:** AQ                      **Batch ID:** GN25791

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

**Matrix:** AQ                      **Batch ID:** GN25792

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

### Wet Chemistry By Method SM 2510B-2011

**Matrix:** AQ                      **Batch ID:** GP13162

- Sample(s) D60208-2DUP were used as the QC samples for the Specific Conductivity analysis.

### Wet Chemistry By Method SM 2540C-2011

**Matrix:** AQ                      **Batch ID:** GN25825

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D60289-2DUP were used as the QC samples for the Solids, Total Dissolved analysis.

### Wet Chemistry By Method SM4500HB+-2011/9040C

**Matrix:** AQ                      **Batch ID:** GN25779

- The following samples were run outside of holding time for method SM4500HB+-2011/9040C: D60208-1, D60208-2

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

## Summary of Hits

**Job Number:** D60208  
**Account:** WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ  
**Collected:** 07/28/14



Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
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**D60208-1 GM 323-28-151879**

Methane <sup>a</sup>	0.0013	0.00080	0.00040	mg/l	RSK175 MOD
Alkalinity, Bicarbonate as CaCO <sub>3</sub>	485	5.0	2.0	mg/l	SM 2320B-2011
Alkalinity, Total as CaCO <sub>3</sub>	485	5.0	2.0	mg/l	SM 2320B-2011
Chloride	32.6	1.0	0.80	mg/l	EPA 300.0/SW846 9056
Fluoride	1.4	0.20	0.10	mg/l	EPA 300.0/SW846 9056
Iron Reducing Bacteria	74500	25		CFU/ml	HACH IRB-BART
Nitrogen, Nitrate	0.26	0.10	0.060	mg/l	EPA 300.0/SW846 9056
Nitrogen, Nitrite	0.039	0.0080	0.0060	mg/l	EPA 300.0/SW846 9056
Slime Forming Bacteria	350000	500		CFU/ml	HACH SLYM-BART
Solids, Total Dissolved	825	10	5.0	mg/l	SM 2540C-2011
Specific Conductivity	1120	1.0		umhos/cm	SM 2510B-2011
Sulfate	187	5.0	2.0	mg/l	EPA 300.0/SW846 9056
Sulfate Reducing Bacteria	5000	200		CFU/ml	HACH SRB-BART
pH	7.40			su	SM4500HB+-2011/9040C

**D60208-1F GM 323-28-151879**

Barium	47.5	4.0	0.16	ug/l	EPA 200.8
Boron	176	50	6.6	ug/l	EPA 200.7
Calcium	118000	400	66	ug/l	EPA 200.7
Iron	5.2 J	10	3.2	ug/l	EPA 200.7
Magnesium	56900	200	29	ug/l	EPA 200.7
Manganese	58.1	5.0	0.29	ug/l	EPA 200.7
Potassium	7300	1000	230	ug/l	EPA 200.7
Selenium	3.0	0.80	0.42	ug/l	EPA 200.8
Sodium	103000	400	36	ug/l	EPA 200.7
Strontium	1800	5.0	0.12	ug/l	EPA 200.7

**D60208-2 GM 11-28-185334**

Alkalinity, Bicarbonate as CaCO <sub>3</sub>	440	5.0	2.0	mg/l	SM 2320B-2011
Alkalinity, Total as CaCO <sub>3</sub>	440	5.0	2.0	mg/l	SM 2320B-2011
Bromide	0.13	0.10	0.050	mg/l	EPA 300.0/SW846 9056
Chloride	26.9	5.0	4.0	mg/l	EPA 300.0/SW846 9056
Fluoride	1.5	0.20	0.10	mg/l	EPA 300.0/SW846 9056
Iron Reducing Bacteria	74500	25		CFU/ml	HACH IRB-BART
Nitrogen, Nitrate	0.021	0.020	0.012	mg/l	EPA 300.0/SW846 9056
Phosphorus, Total	0.012	0.010	0.0080	mg/l	HACH8190/SM4500P-B/E
Slime Forming Bacteria	350000	500		CFU/ml	HACH SLYM-BART
Solids, Total Dissolved	830	10	5.0	mg/l	SM 2540C-2011
Specific Conductivity	1130	1.0		umhos/cm	SM 2510B-2011
Sulfate	229	5.0	2.0	mg/l	EPA 300.0/SW846 9056
Sulfate Reducing Bacteria	18000	200		CFU/ml	HACH SRB-BART

## Summary of Hits

**Job Number:** D60208  
**Account:** WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ  
**Collected:** 07/28/14



Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
pH		7.44			su	SM4500HB+-2011/9040C
<b>D60208-2F</b>	<b>GM 11-28-185334</b>					
Barium		28.8	4.0	0.16	ug/l	EPA 200.8
Boron		171	50	6.6	ug/l	EPA 200.7
Calcium		123000	400	66	ug/l	EPA 200.7
Iron		7.8 J	10	3.2	ug/l	EPA 200.7
Magnesium		48400	200	29	ug/l	EPA 200.7
Manganese		88.1	5.0	0.29	ug/l	EPA 200.7
Potassium		5870	1000	230	ug/l	EPA 200.7
Selenium		1.9	0.80	0.42	ug/l	EPA 200.8
Sodium		101000	400	36	ug/l	EPA 200.7
Strontium		1710	5.0	0.12	ug/l	EPA 200.7

**D60208-3 TRIP BLANK**

No hits reported in this sample.

**D60208-4 TRIP BLANK**

No hits reported in this sample.

(a) The pH of the sample was >2 at time of analysis.



Sample Results

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Report of Analysis

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## Report of Analysis

<b>Client Sample ID:</b> GM 323-28-151879		<b>Date Sampled:</b> 07/28/14
<b>Lab Sample ID:</b> D60208-1		<b>Date Received:</b> 07/29/14
<b>Matrix:</b> AQ - Ground Water		<b>Percent Solids:</b> n/a
<b>Method:</b> SW846 8260B		
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 <sup>a</sup>	6V26278.D	1	07/29/14	BR	n/a	n/a	V6V1484
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

### Purgeable Aromatics+GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	0.31	ug/l	
1330-20-7	Xylene (total)	ND	3.0	1.5	ug/l	
	TPH-GRO (C6-C10)	ND	200	200	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
17060-07-0	1,2-Dichloroethane-D4	110%		62-130%
2037-26-5	Toluene-D8	100%		70-130%
460-00-4	4-Bromofluorobenzene	96%		69-130%

(a) The pH of the sample aliquot for VOA analysis was >2 at time of analysis.

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.1  
4

## Report of Analysis

<b>Client Sample ID:</b> GM 323-28-151879		<b>Date Sampled:</b> 07/28/14
<b>Lab Sample ID:</b> D60208-1		<b>Date Received:</b> 07/29/14
<b>Matrix:</b> AQ - Ground Water		<b>Percent Solids:</b> n/a
<b>Method:</b> RSK175 MOD		
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 <sup>a</sup>	FB11771.D	1	08/04/14	JJ	n/a	n/a	GFB547
Run #2							

Run #	Initial Volume	Headspace Volume	Volume Injected	Temperature
Run #1	39.0 ml	4.0 ml	500 ul	20.0 Deg. C
Run #2				

### Methane, Ethane and Propane

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	0.0013	0.00080	0.00040	mg/l	
74-84-0	Ethane	ND	0.0016	0.00080	mg/l	
74-98-6	Propane	ND	0.0022	0.0011	mg/l	

(a) The pH of the sample was >2 at time of analysis.

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.1  
4

## Report of Analysis

<b>Client Sample ID:</b> GM 323-28-151879	<b>Date Sampled:</b> 07/28/14
<b>Lab Sample ID:</b> D60208-1	<b>Date Received:</b> 07/29/14
<b>Matrix:</b> AQ - Ground Water	<b>Percent Solids:</b> n/a
<b>Method:</b> SW846-8015B SW846 3510C	
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI14912.D	1	08/01/14	JJ	07/31/14	OP10341	GFI887
Run #2							

Run #	Initial Volume	Final Volume
Run #1	1040 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	0.19	0.17	mg/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	87%		10-130%		

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.1  
4

# Report of Analysis

<b>Client Sample ID:</b> GM 323-28-151879	<b>Date Sampled:</b> 07/28/14
<b>Lab Sample ID:</b> D60208-1	<b>Date Received:</b> 07/29/14
<b>Matrix:</b> AQ - Ground Water	<b>Percent Solids:</b> n/a
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ	

## General Chemistry

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Alkalinity, Bicarbonate as CaC	485	5.0	2.0	mg/l	1	07/30/14	BF	SM 2320B-2011
Alkalinity, Carbonate	2.0 U	5.0	2.0	mg/l	1	07/30/14	BF	SM 2320B-2011
Alkalinity, Total as CaCO3	485	5.0	2.0	mg/l	1	07/30/14	BF	SM 2320B-2011
Bromide	0.050 U	0.10	0.050	mg/l	2	07/29/14 14:51	SK	EPA 300.0/SW846 9056
Chloride	32.6	1.0	0.80	mg/l	2	07/29/14 14:51	SK	EPA 300.0/SW846 9056
Fluoride	1.4	0.20	0.10	mg/l	2	07/29/14 14:51	SK	EPA 300.0/SW846 9056
Iron Reducing Bacteria	74500	25		CFU/ml	1	08/04/14	MM	HACH IRB-BART
Nitrogen, Nitrate	0.26	0.10	0.060	mg/l	10	07/29/14 19:07	SK	EPA 300.0/SW846 9056
Nitrogen, Nitrite	0.039	0.0080	0.0060	mg/l	2	07/29/14 14:51	SK	EPA 300.0/SW846 9056
Phosphorus, Total	0.0080 U	0.010	0.0080	mg/l	1	08/05/14	JD	HACH8190/SM4500P-B/E
Slime Forming Bacteria	350000	500		CFU/ml	1	08/04/14	MM	HACH SLYM-BART
Solids, Total Dissolved	825	10	5.0	mg/l	1	08/04/14	BF	SM 2540C-2011
Specific Conductivity	1120	1.0		umhos/cm	1	07/30/14	JD	SM 2510B-2011
Sulfate	187	5.0	2.0	mg/l	10	07/29/14 19:07	SK	EPA 300.0/SW846 9056
Sulfate Reducing Bacteria	5000	200		CFU/ml	1	08/04/14	MM	HACH SRB-BART
pH	7.40			su	1	07/30/14 12:55	SK	SM4500HB+-2011/9040C

RL = Reporting Limit  
 MDL = Method Detection Limit

U = Indicates a result < MDL  
 J = Indicates a result >= MDL but < RL

4.1  
 4

## Report of Analysis

<b>Client Sample ID:</b> GM 323-28-151879	<b>Date Sampled:</b> 07/28/14
<b>Lab Sample ID:</b> D60208-1F	<b>Date Received:</b> 07/29/14
<b>Matrix:</b> AQ - Groundwater Filtered	<b>Percent Solids:</b> n/a
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ	

**Dissolved Metals Analysis**

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Barium	47.5	4.0	0.16	ug/l	2	08/04/14	08/06/14 JB	EPA 200.8 <sup>2</sup>	EPA 200.8 <sup>4</sup>
Boron	176	50	6.6	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Calcium	118000	400	66	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Iron	5.2 J	10	3.2	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Magnesium	56900	200	29	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Manganese	58.1	5.0	0.29	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Potassium	7300	1000	230	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Selenium	3.0	0.80	0.42	ug/l	2	08/04/14	08/06/14 JB	EPA 200.8 <sup>2</sup>	EPA 200.8 <sup>4</sup>
Sodium	103000	400	36	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Strontium	1800	5.0	0.12	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>

- (1) Instrument QC Batch: MA5049
- (2) Instrument QC Batch: MA5071
- (3) Prep QC Batch: MP13559
- (4) Prep QC Batch: MP13588

RL = Reporting Limit  
 MDL = Method Detection Limit

U = Indicates a result < MDL  
 J = Indicates a result >= MDL but < RL

4.2  
4

## Report of Analysis

<b>Client Sample ID:</b> GM 11-28-185334	<b>Date Sampled:</b> 07/28/14
<b>Lab Sample ID:</b> D60208-2	<b>Date Received:</b> 07/29/14
<b>Matrix:</b> AQ - Ground Water	<b>Percent Solids:</b> n/a
<b>Method:</b> SW846 8260B	
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 <sup>a</sup>	6V26279.D	1	07/29/14	BR	n/a	n/a	V6V1484
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

### Purgeable Aromatics+GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	0.31	ug/l	
1330-20-7	Xylene (total)	ND	3.0	1.5	ug/l	
	TPH-GRO (C6-C10)	ND	200	200	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
17060-07-0	1,2-Dichloroethane-D4	108%		62-130%
2037-26-5	Toluene-D8	99%		70-130%
460-00-4	4-Bromofluorobenzene	93%		69-130%

(a) The pH of the sample aliquot for VOA analysis was >2 at time of analysis.

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.3  
4

## Report of Analysis

<b>Client Sample ID:</b> GM 11-28-185334	<b>Date Sampled:</b> 07/28/14
<b>Lab Sample ID:</b> D60208-2	<b>Date Received:</b> 07/29/14
<b>Matrix:</b> AQ - Ground Water	<b>Percent Solids:</b> n/a
<b>Method:</b> RSK175 MOD	
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 <sup>a</sup>	FB11772.D	1	08/04/14	JJ	n/a	n/a	GFB547
Run #2							

Run #	Initial Volume	Headspace Volume	Volume Injected	Temperature
Run #1	39.0 ml	4.0 ml	500 ul	20.0 Deg. C
Run #2				

### Methane, Ethane and Propane

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	ND	0.00080	0.00040	mg/l	
74-84-0	Ethane	ND	0.0016	0.00080	mg/l	
74-98-6	Propane	ND	0.0022	0.0011	mg/l	

(a) The pH of the sample was >2 at time of analysis. Results may be bias low due to headspace. Analyzed per client instruction.

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.3  
4

## Report of Analysis

<b>Client Sample ID:</b> GM 11-28-185334	<b>Date Sampled:</b> 07/28/14
<b>Lab Sample ID:</b> D60208-2	<b>Date Received:</b> 07/29/14
<b>Matrix:</b> AQ - Ground Water	<b>Percent Solids:</b> n/a
<b>Method:</b> SW846-8015B SW846 3510C	
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI14914.D	1	08/01/14	JJ	07/31/14	OP10341	GFI887
Run #2							

Run #	Initial Volume	Final Volume
Run #1	1040 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	0.19	0.17	mg/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	51%		10-130%		

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.3  
4

## Report of Analysis

<b>Client Sample ID:</b> GM 11-28-185334 <b>Lab Sample ID:</b> D60208-2 <b>Matrix:</b> AQ - Ground Water <b>Project:</b> WWLCOGJ: GM 323-28 BWQ	<b>Date Sampled:</b> 07/28/14 <b>Date Received:</b> 07/29/14 <b>Percent Solids:</b> n/a
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**General Chemistry**

Analyte	Result	RL	MDL	Units	DF	Analyzed	By	Method
Alkalinity, Bicarbonate as CaC	440	5.0	2.0	mg/l	1	07/30/14	BF	SM 2320B-2011
Alkalinity, Carbonate	2.0 U	5.0	2.0	mg/l	1	07/30/14	BF	SM 2320B-2011
Alkalinity, Total as CaCO3	440	5.0	2.0	mg/l	1	07/30/14	BF	SM 2320B-2011
Bromide	0.13	0.10	0.050	mg/l	2	07/29/14 15:05	SK	EPA 300.0/SW846 9056
Chloride	26.9	5.0	4.0	mg/l	10	07/29/14 19:22	SK	EPA 300.0/SW846 9056
Fluoride	1.5	0.20	0.10	mg/l	2	07/29/14 15:05	SK	EPA 300.0/SW846 9056
Iron Reducing Bacteria	74500	25		CFU/ml	1	08/04/14	MM	HACH IRB-BART
Nitrogen, Nitrate	0.021	0.020	0.012	mg/l	2	07/29/14 15:05	SK	EPA 300.0/SW846 9056
Nitrogen, Nitrite	0.0060 U	0.0080	0.0060	mg/l	2	07/29/14 15:05	SK	EPA 300.0/SW846 9056
Phosphorus, Total	0.012	0.010	0.0080	mg/l	1	08/05/14	JD	HACH8190/SM4500P-B/E
Slime Forming Bacteria	350000	500		CFU/ml	1	08/04/14	MM	HACH SLYM-BART
Solids, Total Dissolved	830	10	5.0	mg/l	1	08/04/14	BF	SM 2540C-2011
Specific Conductivity	1130	1.0		umhos/cm	1	07/30/14	JD	SM 2510B-2011
Sulfate	229	5.0	2.0	mg/l	10	07/29/14 19:22	SK	EPA 300.0/SW846 9056
Sulfate Reducing Bacteria	18000	200		CFU/ml	1	08/04/14	MM	HACH SRB-BART
pH	7.44			su	1	07/30/14 12:55	SK	SM4500HB+-2011/9040C

RL = Reporting Limit  
 MDL = Method Detection Limit

U = Indicates a result < MDL  
 J = Indicates a result >= MDL but < RL

4.3  
4

## Report of Analysis

<b>Client Sample ID:</b> GM 11-28-185334	<b>Date Sampled:</b> 07/28/14
<b>Lab Sample ID:</b> D60208-2F	<b>Date Received:</b> 07/29/14
<b>Matrix:</b> AQ - Groundwater Filtered	<b>Percent Solids:</b> n/a
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ	

**Dissolved Metals Analysis**

Analyte	Result	RL	MDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Barium	28.8	4.0	0.16	ug/l	2	08/04/14	08/06/14 JB	EPA 200.8 <sup>2</sup>	EPA 200.8 <sup>4</sup>
Boron	171	50	6.6	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Calcium	123000	400	66	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Iron	7.8 J	10	3.2	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Magnesium	48400	200	29	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Manganese	88.1	5.0	0.29	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Potassium	5870	1000	230	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Selenium	1.9	0.80	0.42	ug/l	2	08/04/14	08/06/14 JB	EPA 200.8 <sup>2</sup>	EPA 200.8 <sup>4</sup>
Sodium	101000	400	36	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>
Strontium	1710	5.0	0.12	ug/l	1	07/30/14	07/31/14 KV	EPA 200.7 <sup>1</sup>	EPA 200.7 <sup>3</sup>

- (1) Instrument QC Batch: MA5049
- (2) Instrument QC Batch: MA5071
- (3) Prep QC Batch: MP13559
- (4) Prep QC Batch: MP13588

RL = Reporting Limit  
 MDL = Method Detection Limit

U = Indicates a result < MDL  
 J = Indicates a result >= MDL but < RL

4.4  
4

# Report of Analysis

<b>Client Sample ID:</b> TRIP BLANK		<b>Date Sampled:</b> 07/28/14
<b>Lab Sample ID:</b> D60208-3		<b>Date Received:</b> 07/29/14
<b>Matrix:</b> AQ - Trip Blank Water		<b>Percent Solids:</b> n/a
<b>Method:</b> SW846 8260B		
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	6V26280.D	1	07/29/14	BR	n/a	n/a	V6V1484
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

**Purgeable Aromatics+GRO**

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	0.31	ug/l	
1330-20-7	Xylene (total)	ND	3.0	1.5	ug/l	
	TPH-GRO (C6-C10)	ND	200	200	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
17060-07-0	1,2-Dichloroethane-D4	116%		62-130%
2037-26-5	Toluene-D8	98%		70-130%
460-00-4	4-Bromofluorobenzene	93%		69-130%

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.5  
**4**

# Report of Analysis

<b>Client Sample ID:</b> TRIP BLANK		<b>Date Sampled:</b> 07/28/14
<b>Lab Sample ID:</b> D60208-4		<b>Date Received:</b> 07/29/14
<b>Matrix:</b> AQ - Trip Blank Water		<b>Percent Solids:</b> n/a
<b>Method:</b> SW846 8260B		
<b>Project:</b> WWLCOGJ: GM 323-28 BWQ		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	6V26281.D	1	07/29/14	BR	n/a	n/a	V6V1484
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

**Purgeable Aromatics+GRO**

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
100-41-4	Ethylbenzene	ND	2.0	0.31	ug/l	
1330-20-7	Xylene (total)	ND	3.0	1.5	ug/l	
	TPH-GRO (C6-C10)	ND	200	200	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
17060-07-0	1,2-Dichloroethane-D4	113%		62-130%
2037-26-5	Toluene-D8	100%		70-130%
460-00-4	4-Bromofluorobenzene	96%		69-130%

ND = Not detected      MDL = Method Detection Limit  
 RL = Reporting Limit  
 E = Indicates value exceeds calibration range

J = Indicates an estimated value  
 B = Indicates analyte found in associated method blank  
 N = Indicates presumptive evidence of a compound

4.6  
**4**

## Misc. Forms

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5

### Custody Documents and Other Forms

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Includes the following where applicable:

- Chain of Custody



## GC/MS Volatiles

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### QC Data Summaries

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Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

## Method Blank Summary

**Job Number:** D60208  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V6V1484-MB	6V26262.D	1	07/29/14	BR	n/a	n/a	V6V1484

The QC reported here applies to the following samples:

Method: SW846 8260B

D60208-1, D60208-2, D60208-3, D60208-4

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.25	ug/l	
100-41-4	Ethylbenzene	ND	2.0	0.31	ug/l	
108-88-3	Toluene	ND	2.0	1.0	ug/l	
1330-20-7	Xylene (total)	ND	3.0	1.5	ug/l	
	TPH-GRO (C6-C10)	ND	200	200	ug/l	

CAS No.	Surrogate Recoveries	Limits	
17060-07-0	1,2-Dichloroethane-D4	109%	62-130%
2037-26-5	Toluene-D8	98%	70-130%
460-00-4	4-Bromofluorobenzene	97%	69-130%

# Blank Spike Summary

**Job Number:** D60208  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V6V1484-BS	6V26263.D	1	07/29/14	BR	n/a	n/a	V6V1484

The QC reported here applies to the following samples:

Method: SW846 8260B

D60208-1, D60208-2, D60208-3, D60208-4

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
71-43-2	Benzene	50	51.8	104	70-130
100-41-4	Ethylbenzene	50	53.6	107	70-130
108-88-3	Toluene	50	52.2	104	70-130
1330-20-7	Xylene (total)	150	157	105	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
17060-07-0	1,2-Dichloroethane-D4	101%	62-130%
2037-26-5	Toluene-D8	100%	70-130%
460-00-4	4-Bromofluorobenzene	107%	69-130%

\* = Outside of Control Limits.

# Blank Spike Summary

**Job Number:** D60208  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V6V1484-BS	6V26264.D	1	07/29/14	BR	n/a	n/a	V6V1484

The QC reported here applies to the following samples:

Method: SW846 8260B

D60208-1, D60208-2, D60208-3, D60208-4

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
	TPH-GRO (C6-C10)	2200	2450	111	39-144

CAS No.	Surrogate Recoveries	BSP	Limits
17060-07-0	1,2-Dichloroethane-D4	102%	62-130%
2037-26-5	Toluene-D8	98%	70-130%
460-00-4	4-Bromofluorobenzene	100%	69-130%

\* = Outside of Control Limits.

# Matrix Spike/Matrix Spike Duplicate Summary

**Job Number:** D60208  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D60175-4MS <sup>a</sup>	6V26267A.D	25	07/29/14	BR	n/a	n/a	V6V1484
D60175-4MSD <sup>a</sup>	6V26268A.D	25	07/29/14	BR	n/a	n/a	V6V1484
D60175-4 <sup>a</sup>	6V26266A.D	25	07/29/14	BR	n/a	n/a	V6V1484

The QC reported here applies to the following samples:

Method: SW846 8260B

D60208-1, D60208-2, D60208-3, D60208-4

CAS No.	Compound	D60175-4 ug/l	Spike Q ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	ND	1250	1230	98	1250	1310	105	6	62-130/30
100-41-4	Ethylbenzene	ND	1250	1280	102	1250	1360	109	6	63-130/30
108-88-3	Toluene	ND	1250	1240	99	1250	1310	105	5	60-130/30
1330-20-7	Xylene (total)	ND	3750	3730	99	3750	3950	105	6	67-130/30

CAS No.	Surrogate Recoveries	MS	MSD	D60175-4	Limits
17060-07-0	1,2-Dichloroethane-D4	106%	101%	111%	62-130%
2037-26-5	Toluene-D8	101%	98%	97%	70-130%
460-00-4	4-Bromofluorobenzene	106%	102%	98%	69-130%

(a) The pH of the sample aliquot for VOA analysis was >2 at time of analysis.

\* = Outside of Control Limits.

# Matrix Spike/Matrix Spike Duplicate Summary

**Job Number:** D60208  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D60175-4MS <sup>a</sup>	6V26269.D	25	07/29/14	BR	n/a	n/a	V6V1484
D60175-4MSD <sup>a</sup>	6V26270.D	25	07/29/14	BR	n/a	n/a	V6V1484
D60175-4 <sup>a</sup>	6V26266A.D	25	07/29/14	BR	n/a	n/a	V6V1484

The QC reported here applies to the following samples:

Method: SW846 8260B

D60208-1, D60208-2, D60208-3, D60208-4

CAS No.	Compound	D60175-4 ug/l	Spike Q ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
	TPH-GRO (C6-C10)	ND	55000	59600	108	55000	61500	112	3	19-168/30

CAS No.	Surrogate Recoveries	MS	MSD	D60175-4	Limits
17060-07-0	1,2-Dichloroethane-D4	102%	103%	111%	62-130%
2037-26-5	Toluene-D8	100%	99%	97%	70-130%
460-00-4	4-Bromofluorobenzene	101%	103%	98%	69-130%

(a) The pH of the sample aliquot for VOA analysis was >2 at time of analysis.

\* = Outside of Control Limits.

## GC Volatiles

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## QC Data Summaries

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Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

# Method Blank Summary

**Job Number:** D60208  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GFB547-MB	FB11760.D	1	08/04/14	JJ	n/a	n/a	GFB547

The QC reported here applies to the following samples:

Method: RSK175 MOD

D60208-1, D60208-2

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	ND	0.00080	0.00040	mg/l	
74-84-0	Ethane	ND	0.0016	0.00080	mg/l	
74-98-6	Propane	ND	0.0022	0.0011	mg/l	

7.1.1  
7

# Blank Spike Summary

**Job Number:** D60208  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GFB547-BS	FB11761.D	10	08/04/14	JJ	n/a	n/a	GFB547

The QC reported here applies to the following samples:

Method: RSK175 MOD

D60208-1, D60208-2

CAS No.	Compound	Spike mg/l	BSP mg/l	BSP %	Limits
74-82-8	Methane	0.51	0.606	119	70-130
74-84-0	Ethane	0.956	1.16	121	70-130
74-98-6	Propane	1.4	1.74	124	67-130

7.2.1  
7

\* = Outside of Control Limits.

# Matrix Spike/Matrix Spike Duplicate Summary

**Job Number:** D60208  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D59888-23MS <sup>a</sup>	FB11763.D	10	08/04/14	JJ	n/a	n/a	GFB547
D59888-23MSD <sup>a</sup>	FB11764.D	10	08/04/14	JJ	n/a	n/a	GFB547
D59888-23 <sup>a</sup>	FB11762.D	1	08/04/14	JJ	n/a	n/a	GFB547

The QC reported here applies to the following samples:

Method: RSK175 MOD

D60208-1, D60208-2

CAS No.	Compound	D59888-23		MS mg/l	MS %	Spike mg/l	MSD mg/l	MSD %	RPD	Limits Rec/RPD
		mg/l	Q							
74-82-8	Methane	ND	0.51	0.615	121	0.51	0.604	118	2	51-155/30
74-84-0	Ethane	ND	0.956	1.19	124	0.956	1.16	121	3	58-130/30
74-98-6	Propane	ND	1.4	1.79	128	1.4	1.76	126	2	46-130/30

(a) The pH of the sample was >2 at time of analysis.

\* = Outside of Control Limits.

7.3.1  
7

## GC Semi-volatiles

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### QC Data Summaries

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Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

## Method Blank Summary

**Job Number:** D60208  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10341-MB	FH023793.D	1	07/31/14	JS	07/31/14	OP10341	GFH1079

The QC reported here applies to the following samples:

Method: SW846-8015B

D60208-1, D60208-2

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	0.20	0.18	mg/l	

CAS No.	Surrogate Recoveries	Limits
84-15-1	o-Terphenyl	53% 10-130%

# Blank Spike Summary

**Job Number:** D60208  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10341-BS	FH023795.D	1	07/31/14	JS	07/31/14	OP10341	GFH1079

The QC reported here applies to the following samples:

Method: SW846-8015B

D60208-1, D60208-2

CAS No.	Compound	Spike mg/l	BSP mg/l	BSP %	Limits
	TPH-DRO (C10-C28)	5	2.67	53	33-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	72%	10-130%

8.2.1

8

\* = Outside of Control Limits.

# Matrix Spike/Matrix Spike Duplicate Summary

**Job Number:** D60208  
**Account:** WILLCOP WPX Energy Rocky Mountain, LLC  
**Project:** WWLCOGJ: GM 323-28 BWQ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP10341-MS	FH023797.D	1	07/31/14	JS	07/31/14	OP10341	GFH1079
OP10341-MSD	FH023799.D	1	07/31/14	JS	07/31/14	OP10341	GFH1079
D60175-5	FH023801.D	1	07/31/14	JS	07/31/14	OP10341	GFH1079

The QC reported here applies to the following samples:

Method: SW846-8015B

D60208-1, D60208-2

CAS No.	Compound	D60175-5 mg/l	Spike Q mg/l	MS mg/l	MS %	Spike mg/l	MSD mg/l	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	ND	5	3.13	63	5	2.85	57	9	33-130/30

CAS No.	Surrogate Recoveries	MS	MSD	D60175-5	Limits
84-15-1	o-Terphenyl	90%	79%	76%	10-130%

8.3.1  
8

\* = Outside of Control Limits.

## Metals Analysis

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### QC Data Summaries

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Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: D60208  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP13559  
Matrix Type: AQUEOUS

Methods: EPA 200.7  
Units: ug/l

Prep Date: 07/30/14

Metal	RL	IDL	MDL	MB raw	final
Aluminum	100	8.6	11		
Antimony	30	3.2	21		
Arsenic	25	5.2	9		
Barium	10	1.4	1.4		
Beryllium	10	.8	1.7		
Boron	50	6.7	6.6	0.30	<50
Cadmium	10	.4	.36		
Calcium	400	2.2	66	6.2	<400
Chromium	10	.4	1.4		
Cobalt	5.0	.4	.51		
Copper	10	1.2	1.5		
Iron	10	2.2	3.2	7.1	* (a)
Lead	50	3.6	4.1		
Lithium	5.0	1.9	1.9		
Magnesium	200	14	29	2.3	<200
Manganese	5.0	.01	.29	0.10	<5.0
Molybdenum	10	.8	1.1		
Nickel	30	.9	.87		
Phosphorus	100	15	24		
Potassium	1000	130	230	-26	<1000
Selenium	50	8.8	9.3		
Silicon	50	5.2	5.6		
Silver	30	.4	.4		
Sodium	400	4.9	36	46.2	<400
Strontium	5.0	.01	.12	0.0	<5.0
Thallium	10	2.9	4.9		
Tin	50	13	13		
Titanium	10	.15	.43		
Uranium	50	3.7	3.9		
Vanadium	10	.4	.39		
Zinc	30	.6	1.9		

Associated samples MP13559: D60208-1F, D60208-2F

Results < IDL are shown as zero for calculation purposes  
(\* ) Outside of QC limits

BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: D60208  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP13559  
Matrix Type: AQUEOUS

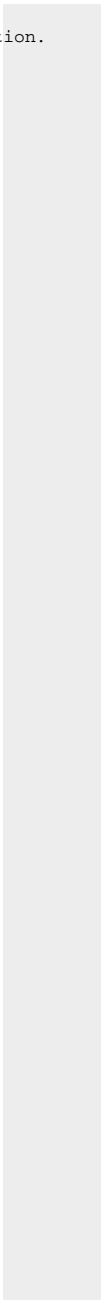
Methods: EPA 200.7  
Units: ug/l

Prep Date: 07/30/14

Metal	RL	IDL	MDL	MB raw	final
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(anr) Analyte not requested

(a) All sample results < RL or > 10x MB concentration.



MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60208  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP13559  
 Matrix Type: AQUEOUS

Methods: EPA 200.7  
 Units: ug/l

Prep Date: 07/30/14

Metal	D60211-1F Original MS	Spikelot ICPAL2	% Rec	QC Limits
Aluminum	anr			
Antimony				
Arsenic				
Barium	anr			
Beryllium				
Boron	314	1450	1000	113.6 70-130
Cadmium				
Calcium	44200	71800	25000	110.4 70-130
Chromium	anr			
Cobalt				
Copper				
Iron				
Lead	anr			
Lithium				
Magnesium	7300	34000	25000	106.8 70-130
Manganese	13.4	536	500	104.5 70-130
Molybdenum				
Nickel				
Phosphorus				
Potassium	19500	48000	25000	114.0 70-130
Selenium				
Silicon				
Silver				
Sodium	119000	147000	25000	112.0 70-130
Strontium	342	875	500	106.6 70-130
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP13559: D60208-1F, D60208-2F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

9.1.2  
 9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60208  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

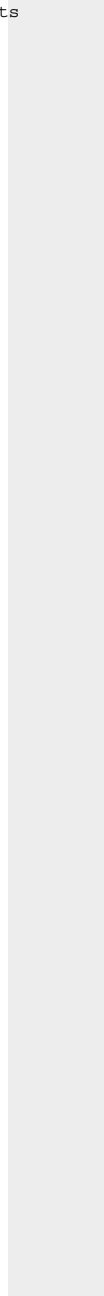
QC Batch ID: MP13559  
Matrix Type: AQUEOUS

Methods: EPA 200.7  
Units: ug/l

Prep Date: 07/30/14

Metal	D60211-1F Original MS	SpikeLot ICPAL2	% Rec	QC Limits
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(N) Matrix Spike Rec. outside of QC limits  
(anr) Analyte not requested



9.1.2  
9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60208  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP13559  
 Matrix Type: AQUEOUS

Methods: EPA 200.7  
 Units: ug/l

Prep Date: 07/30/14

Metal	D60211-1F Original MSD		SpikeLot ICPAL2 % Rec		MSD RPD	QC Limit
Aluminum	anr					
Antimony						
Arsenic						
Barium	anr					
Beryllium						
Boron	314	1410	1000	109.6	2.8	20
Cadmium						
Calcium	44200	69700	25000	102.0	3.0	20
Chromium	anr					
Cobalt						
Copper						
Iron						
Lead	anr					
Lithium						
Magnesium	7300	33800	25000	106.0	0.6	20
Manganese	13.4	526	500	102.5	1.9	20
Molybdenum						
Nickel						
Phosphorus						
Potassium	19500	47700	25000	112.8	0.6	20
Selenium						
Silicon						
Silver						
Sodium	119000	144000	25000	100.0	2.1	20
Strontium	342	862	500	104.0	1.5	20
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP13559: D60208-1F, D60208-2F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

9.1.2  
 9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60208  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

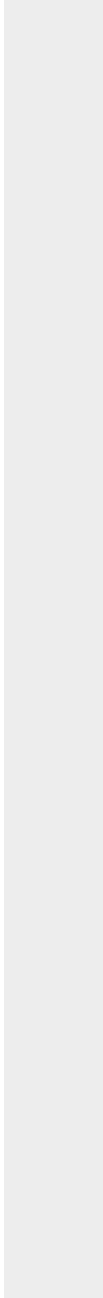
QC Batch ID: MP13559  
 Matrix Type: AQUEOUS

Methods: EPA 200.7  
 Units: ug/l

Prep Date: 07/30/14

Metal	D60211-1F Original MSD	SpikeLot ICPAL2 % Rec	MSD RPD	QC Limit
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(N) Matrix Spike Rec. outside of QC limits  
 (anr) Analyte not requested



SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D60208  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP13559  
 Matrix Type: AQUEOUS

Methods: EPA 200.7  
 Units: ug/l

Prep Date: 07/30/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum	anr			
Antimony				
Arsenic				
Barium	anr			
Beryllium				
Boron	1080	1000	108.0	85-115
Cadmium				
Calcium	26700	25000	106.8	85-115
Chromium	anr			
Cobalt				
Copper				
Iron	5130	5000	102.6	85-115
Lead	anr			
Lithium				
Magnesium	26300	25000	105.2	85-115
Manganese	523	500	104.6	85-115
Molybdenum				
Nickel				
Phosphorus				
Potassium	27700	25000	110.8	85-115
Selenium				
Silicon				
Silver				
Sodium	27100	25000	108.4	85-115
Strontium	529	500	105.8	85-115
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP13559: D60208-1F, D60208-2F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits

9.1.3  
 9

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D60208  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

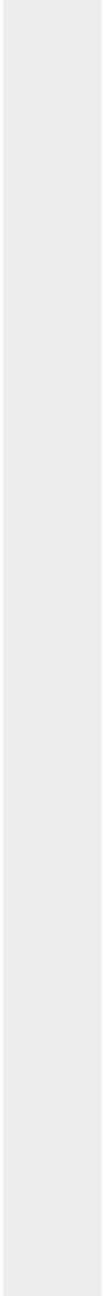
QC Batch ID: MP13559  
Matrix Type: AQUEOUS

Methods: EPA 200.7  
Units: ug/l

Prep Date: 07/30/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
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(anr) Analyte not requested



BLANK RESULTS SUMMARY  
Part 2 - Method Blanks

Login Number: D60208  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP13588  
Matrix Type: AQUEOUS

Methods: EPA 200.8  
Units: ug/l

Prep Date: 08/04/14

Metal	RL	IDL	MDL	MB raw	final
Aluminum	50	1.1	2		
Antimony	0.40	.0022	.011		
Arsenic	0.20	.017	.044		
Barium	2.0	.016	.079	0.035	<2.0
Beryllium	0.20	.016	.069		
Boron	40	.49	2.1		
Cadmium	0.10	.036	.042		
Calcium	400	5.6	12		
Chromium	2.0	.053	.053		
Cobalt	0.20	.0049	.015		
Copper	2.0	.06	.13		
Iron	10	3.5	4.6		
Lead	0.50	.0079	.008		
Magnesium	100	1.3	1.3		
Manganese	1.0	.12	.13		
Molybdenum	1.0	.049	.029		
Nickel	2.0	.0088	.027		
Phosphorus	60	2.6	4.3		
Potassium	200	2.9	2.9		
Selenium	0.40	.06	.21	-0.030	<0.40
Silver	0.10	.0019	.008		
Sodium	500	4.9	4.9		
Strontium	20	.01	.015		
Thallium	0.20	.0024	.005		
Tin	10	.063	1.3		
Titanium	2.0	.059	.092		
Uranium	0.20	.0017	.002		
Vanadium	1.0	.037	.2		
Zinc	10	.21	.96		

Associated samples MP13588: D60208-1F, D60208-2F

Results < IDL are shown as zero for calculation purposes  
(\* ) Outside of QC limits  
(anr) Analyte not requested

9.2.1  
9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60208  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP13588  
 Matrix Type: AQUEOUS

Methods: EPA 200.8  
 Units: ug/l

Prep Date: 08/04/14

Metal	D60208-1F Original MS		SpikeLot ICPAL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	anr				
Barium	47.5	429	400	95.1	70-130
Beryllium					
Boron					
Cadmium	anr				
Calcium					
Chromium	anr				
Cobalt					
Copper	anr				
Iron					
Lead	anr				
Magnesium					
Manganese	anr				
Molybdenum	anr				
Nickel	anr				
Phosphorus					
Potassium	anr				
Selenium	3.0	205	200	101.2	70-130
Silver	anr				
Sodium	anr				
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc	anr				

Associated samples MP13588: D60208-1F, D60208-2F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits  
 (N) Matrix Spike Rec. outside of QC limits  
 (anr) Analyte not requested

9.2.2  
 9

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D60208  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP13588  
 Matrix Type: AQUEOUS

Methods: EPA 200.8  
 Units: ug/l

Prep Date: 08/04/14

Metal	D60208-1F Original MSD		SpikeLot ICPAL2 % Rec		MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	anr					
Barium	47.5	451	400	100.6	5.0	20
Beryllium						
Boron						
Cadmium	anr					
Calcium						
Chromium	anr					
Cobalt						
Copper	anr					
Iron						
Lead	anr					
Magnesium						
Manganese	anr					
Molybdenum	anr					
Nickel	anr					
Phosphorus						
Potassium	anr					
Selenium	3.0	195	200	96.2	5.0	20
Silver	anr					
Sodium	anr					
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc	anr					

Associated samples MP13588: D60208-1F, D60208-2F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits  
 (N) Matrix Spike Rec. outside of QC limits  
 (anr) Analyte not requested

9.2.2  
 9

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D60208  
 Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
 Project: WWLCOGJ: GM 323-28 BWQ

QC Batch ID: MP13588  
 Matrix Type: AQUEOUS

Methods: EPA 200.8  
 Units: ug/l

Prep Date: 08/04/14

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	395	400	98.8	85-115
Beryllium				
Boron				
Cadmium	anr			
Calcium				
Chromium	anr			
Cobalt				
Copper	anr			
Iron				
Lead	anr			
Magnesium				
Manganese	anr			
Molybdenum	anr			
Nickel	anr			
Phosphorus				
Potassium	anr			
Selenium	195	200	97.5	85-115
Silver	anr			
Sodium	anr			
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc	anr			

Associated samples MP13588: D60208-1F, D60208-2F

Results < IDL are shown as zero for calculation purposes  
 (\*) Outside of QC limits  
 (anr) Analyte not requested

9.2.3  
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## General Chemistry

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### QC Data Summaries

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Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D60208  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Alkalinity, Bicarbonate as CaC	GN25791	5.0	0.0	mg/l	100	99.2	99.2	90-110%
Alkalinity, Carbonate	GN25792	5.0	0.0	mg/l	100	99.2	99.2	80-120%
Alkalinity, Total as CaCO3	GN25790	5.0	0.0	mg/l	100	99.2	99.2	90-110%
Bromide	GP13155/GN25768	0.050	0.0	mg/l	0.5	0.522	104.4	90-110%
Chloride	GP13155/GN25768	0.50	0.0	mg/l	5	4.84	96.8	90-110%
Fluoride	GP13155/GN25768	0.10	0.0	mg/l	1	0.984	98.4	90-110%
Iron Reducing Bacteria	MB403	25	<25	CFU/ml				
Nitrogen, Nitrate	GP13155/GN25768	0.010	0.0	mg/l	0.1	0.103	103.0	90-110%
Nitrogen, Nitrite	GP13155/GN25768	0.0040	0.0	mg/l	0.05	0.0530	106.0	90-110%
Phosphorus, Total	GP13193/GN25855	0.010	0.0	mg/l	0.38	0.38	100.7	80-120%
Slime Forming Bacteria	MB404	500	<500	CFU/ml				
Solids, Total Dissolved	GN25825	10	0.0	mg/l	400	392	98.0	90-110%
Specific Conductivity	GP13162/GN25773			umhos/cm	99.6	96.1	96.5	90-110%
Sulfate	GP13155/GN25768	0.50	0.0	mg/l	5	4.92	98.4	90-110%
Sulfate Reducing Bacteria	MB405	200	<200	CFU/ml				
pH	GN25779			su	8.00	7.96	99.5	99.1-100.9%

Associated Samples:

Batch MB403: D60208-1, D60208-2  
Batch MB404: D60208-1, D60208-2  
Batch MB405: D60208-1, D60208-2  
Batch GN25779: D60208-1, D60208-2  
Batch GN25790: D60208-1, D60208-2  
Batch GN25791: D60208-1, D60208-2  
Batch GN25792: D60208-1, D60208-2  
Batch GN25825: D60208-1, D60208-2  
Batch GP13155: D60208-1, D60208-2  
Batch GP13162: D60208-1, D60208-2  
Batch GP13193: D60208-1, D60208-2

(\* ) Outside of QC limits

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DUPLICATE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D60208  
Account: WILLCOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Alkalinity, Total as CaCO3	GN25790	D60208-2	mg/l	440	436	1.1	0-20%
Phosphorus, Total	GP13193/GN25855	D60208-1	mg/l	0.0080 U	0.0	200.0(a)	0-20%
Solids, Total Dissolved	GN25825	D60289-2	mg/l	542	529	2.4	0-20%
Specific Conductivity	GP13162/GN25773	D60208-2	umhos/cm	1130	1130	0.5	0-20%

Associated Samples:

Batch GN25790: D60208-1, D60208-2

Batch GN25825: D60208-1, D60208-2

Batch GP13162: D60208-1, D60208-2

Batch GP13193: D60208-1, D60208-2

(\*) Outside of QC limits

(a) RPD acceptable due to low duplicate and sample concentrations.

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MATRIX SPIKE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D60208  
Account: WILLCOOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Alkalinity, Total as CaCO3	GN25790	D60208-2	mg/l	440	100	535	95.0	80-120%
Bromide	GP13155/GN25768	D60188-1	mg/l	0.13 U	0.5	0.56	112.0	80-120%
Bromide	GP13155/GN25768	D60188-1	mg/l	0.025 U	0.5	0.56	112.0	80-120%
Chloride	GP13155/GN25768	D60188-1	mg/l	9.2	5	15.7	124.0N(a)	80-120%
Chloride	GP13155/GN25768	D60188-1	mg/l	9.5	5	15.7	124.0N(a)	80-120%
Fluoride	GP13155/GN25768	D60188-1	mg/l	0.42 B	1	1.4	98.0	80-120%
Fluoride	GP13155/GN25768	D60188-1	mg/l	0.35	1	1.4	98.0	80-120%
Nitrogen, Nitrate	GP13155/GN25768	D60188-1	mg/l	0.20	0.1	0.31	110.0	80-120%
Nitrogen, Nitrate	GP13155/GN25768	D60188-1	mg/l	0.20	0.1	0.31	110.0	80-120%
Nitrogen, Nitrite	GP13155/GN25768	D60188-1	mg/l	0.028	0.05	0.086	116.0	80-120%
Nitrogen, Nitrite	GP13155/GN25768	D60188-1	mg/l	0.035	0.05	0.086	116.0	80-120%
Phosphorus, Total	GP13193/GN25855	D60208-2	mg/l	0.012	0.40	0.39	95.8	80-120%
Sulfate	GP13155/GN25768	D60188-1	mg/l	29.7	25	54.1	97.6	80-120%
Sulfate	GP13155/GN25768	D60188-1	mg/l	29.9	25	54.1	97.6	80-120%

Associated Samples:

Batch GN25790: D60208-1, D60208-2

Batch GP13155: D60208-1, D60208-2

Batch GP13193: D60208-1, D60208-2

(\*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

(a) Spike recovery indicates possible matrix interference and/or sample nonhomogeneity.

MATRIX SPIKE DUPLICATE RESULTS SUMMARY  
GENERAL CHEMISTRY

Login Number: D60208  
Account: WILLCOOP - WPX Energy Rocky Mountain, LLC  
Project: WWLCOGJ: GM 323-28 BWQ

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Alkalinity, Total as CaCO3	GN25790	D60208-2	mg/l	440	100	532	0.6	20%
Bromide	GP13155/GN25768	D60188-1	mg/l	0.13 U	0.5	0.57	1.8	20%
Bromide	GP13155/GN25768	D60188-1	mg/l	0.025 U	0.5	0.57	1.8	20%
Chloride	GP13155/GN25768	D60188-1	mg/l	9.2	5	14.6	7.3	20%
Chloride	GP13155/GN25768	D60188-1	mg/l	9.5	5	14.6	7.3	20%
Fluoride	GP13155/GN25768	D60188-1	mg/l	0.42 B	1	1.4	0.0	20%
Fluoride	GP13155/GN25768	D60188-1	mg/l	0.35	1	1.4	0.0	20%
Nitrogen, Nitrate	GP13155/GN25768	D60188-1	mg/l	0.20	0.1	0.31	0.0	20%
Nitrogen, Nitrate	GP13155/GN25768	D60188-1	mg/l	0.20	0.1	0.31	0.0	20%
Nitrogen, Nitrite	GP13155/GN25768	D60188-1	mg/l	0.028	0.05	0.086	0.0	20%
Nitrogen, Nitrite	GP13155/GN25768	D60188-1	mg/l	0.035	0.05	0.086	0.0	20%
Phosphorus, Total	GP13193/GN25855	D60208-2	mg/l	0.012	0.40	0.38	3.1	20%
Sulfate	GP13155/GN25768	D60188-1	mg/l	29.7	25	54.3	0.4	20%
Sulfate	GP13155/GN25768	D60188-1	mg/l	29.9	25	54.3	0.4	20%

Associated Samples:

Batch GN25790: D60208-1, D60208-2

Batch GP13155: D60208-1, D60208-2

Batch GP13193: D60208-1, D60208-2

(\*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

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