

# Ground and Surface Water Sampling and Analysis Plan

PA 31-36 Well Pad  
WPX Energy Rocky Mountain, LLC

Prepared for:



**WPX Energy Rocky Mountain, LLC**  
1058 County Road 215  
Parachute, Colorado 81635

Prepared by:  
**HRL Compliance Solutions, Inc.**  
2385 F ½ Road  
Grand Junction, CO 81505  
Phone: 970-243-3271

Prepared: March 2014

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Figure 1: Site Location Map  
Figure 2: Sample Location Map

## **1.0 INTRODUCTION**

WPX Energy Rocky Mountain, LLC (WPX) retained HRL Compliance Solutions, Inc. (HCSI) to conduct groundwater quality sampling at selected locations downgradient of the WPX PA 31-36 well pad. The sampling and analysis plan was requested by WPX on February 27, 2014.

This Sampling and Analysis Plan (SAP) is a guidance document that outlines proposed procedures for the water quality sampling that is intended to confirm that groundwater has not been impacted by the condensate release that was discovered on February 19, 2014 at the WPX PA 31-36 location and reported to COGCC on February 29, 2014.

## **2.0 BACKGROUND**

The following sections report information regarding the site location and release summary for the PA 31-36 well pad.

### **2.1 Site Location**

The WPX PA 31-36 well pad is located in the South Parachute Field located in Garfield County, Colorado. Specifically, the well pad is located in the NWNE of Section 28, Township 6 South Range 95 West of the 6<sup>th</sup> Primary Meridian. The well pad is situated on thick Quaternary age colluvial deposits consisting of loam with interbedded clay loam at the surface to approximately 20 feet and large basalt cobbles and boulders below 20 feet. (See Figure 1 - Site Location Map).

### **2.2 Release Summary**

The release was caused by corrosion of a buried condensate dump line. The leak was discovered during a quarterly pressure integrity test of the dump line. The leaking line, buried approximately six (6) feet below the pad surface, allowed the condensate to be released into subsurface soils. The impacted area has currently been excavated to a depth of twenty (20) to twenty-two (22) feet. Very large basaltic boulders (3' to 4' diameter) and wet soils were encountered at approximately 20 feet. The large boulders in the bottom of the excavation, and moist, unstable soils on the side walls prevented further excavation. Confirmation samples have been collected from all four (4) walls and the bottom of the excavation. Results indicate compliance with the Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 standards with the exception of the east wall at approximately fourteen (14) to fifteen (15) below the surface. A site visit with the COGCC was held on February 26, 2014. Issues with further excavation of the east wall and bottom were discussed and it was decided that the excavation will be backfilled with clean fill and the contamination present on the eastern side of the excavation will be further characterized to determine the vertical and lateral extent of any remaining impacts. The site characterization and the disposition of the remaining impacted soils will be discussed in separate plans.

### **3.0 LOCALIZED GROUNDWATER CONDITIONS**

The purpose of this SAP is to identify downgradient sampling locations that will be used to determine if there have been any impacts to groundwater. As there is no proximal well data to accurately determine the direction of groundwater flow, USGS topographic maps were reviewed to provide an estimated direction of groundwater flow. The general topography of the area slopes gently to the northwest upgradient of the PA 31-36 well pad. It then slopes in a more northerly direction just to the north of the well pad. Based on lithology from nearby well logs the quaternary aged overburden lies on top of the unweathered Wasatch Formation shales and sandstones. The general topography most likely mimics the actual slope of the bedrock surface. Therefore, it could be assumed that groundwater flow would follow the natural topographical contours of the area to the northwest. Nearby well logs indicate the matrix material between the boulders and gravels is noted to be clean sand. The estimated groundwater flow velocity can be up to 25 feet/day based on an average saturated hydraulic conductivity values for clean sand.

### **4.0 SAMPLING LOCATIONS**

To date, WPX has completed five sampling events and collected five surface water samples for laboratory analysis at the various seep and spring locations identified during a site visit on February 25, 2014. Two current sampling locations are located upgradient of the excavation to establish background concentrations. Three current sampling locations are located downgradient, to the north of the well pad where the Colorado River has eroded and exposed the overburden described above. After additional analysis of potential groundwater flow direction, two additional sampling locations were identified on February 28, 2014; a spring located to the northeast of the excavation and a sampling point located at a culvert where a majority of the water flowing from the seeps and springs congregates into one small area. Spring 01 is located approximately 580 feet and newly identified Spring 02 is located approximately 606 feet from the impacted area on the pad. Based on the estimated hydraulic conductivity values noted in section 3.0 potential impacts, if any, would appear 22-25 days from the time of the release. The culvert location is located approximately 606 feet from the impacted area. Surface water collected from the culvert will be representative of all downgradient water discharge from the hillside, including Springs 01 and 02. A Sample Location Map (Figure 2) depicts the existing and the two proposed sample locations. All of the sample locations have been surveyed utilizing a Trimble GeoXT GPS unit and placed on the sample location map. The following table identifies and explains water and soil sample locations for the PA 31-36 well pad.

PA 31-36 Well Pad		
Sample ID	Matrix	Description
Spring UG	Water	Water sample collected upgradient of the well pad to establish background concentrations for inorganics
Pond	water	water sample collected from the downslope/downgradient of the well pad
Culvert	water	water sample collected downgradient of the well pad
Spring 01	water	water sample collected downgradient of the well pad
Spring 02	water	water sample collected downgradient of the well pad
Colorado River UG	water	water sample collected from the Colorado River upgradient of the well pad
Colorado River DG	water	water sample collected from the Colorado River downgradient of the well pad

## 5.0 SAMPLING PROCEDURES

Water samples will be collected and placed in laboratory supplied containers, placed on ice in a sample cooler and shipped overnight delivery to ALS Environmental, in Holland, Michigan. All samples will be shipped following laboratory chain-of-custody protocol. The samples will be analyzed for the following parameters using the indicated test method:

### Water

- 
- Benzene-Toluene-Ethylbenzene-Xylenes (BTEX).....EPA Method SW8260
  - Total Dissolved Solids .....EPA E.160.1
  - Chloride.....EPA Method SW9056
  - Sulfate .....EPA Method SW9056
  - Temperature .....Field Measurement YSI
  - Electrical Conductivity .....Field Measurement YSI
  - Resistivity .....Field Measurement YSI
  - Salinity .....Field Measurement YSI
  - Dissolved Oxygen.....Field Measurement YSI
  - pH.....Field Measurement YSI
  - Oxygen Reduction Potential .....Field Measurement YSI

Surface water samples will be collected by immersing the sample container into the flowing/standing water until the container is full. If sufficient water is not flowing to allow for immersing the sample container, a low flow submersible pump will be utilized. Pump head tubing, as well as sample collection tubing, will be replaced between samples to ensure the potential for cross contamination is minimized. Water quality parameters, listed above, will be collected utilizing a YSI 556 MPS water quality meter.

## **6.0 DECONTAMINATION PROCEDURES**

All equipment that comes into contact with potentially contaminated water will be decontaminated prior to re-use. Decontamination will consist of washing with a mixture of deionized (DI) water, Alconox soap and rinsing with DI water.

## **7.0 SCHEDULE**

- Based on the estimated groundwater flow velocity, which is up to 25 feet per day, it would take approximately 22 days for any potential contamination to daylight at the spring sampling locations depicted on Figure 2
- All the surface water sampling locations will be sampled Monday, Wednesday, and Friday of each week through mid-April, 2014.
- Sampling frequency may change depending on analytical results observed over this period of time.
- All sampling summary reports will be provided to COGCC as soon as practical upon completion of the last sample event.

## **8.0 FIELD QUALITY CONTROL**

- A single field duplicate sample will be collected once a week. The duplicate will be collected simultaneously with a standard sample from the same source under identical conditions into separate sample containers. The duplicate sample is used to assess laboratory performance through comparison of lab results.
- One trip blank will be prepared and shipped with each sample event when water is collected. The trip blank is used to assess any potential cross contamination during shipment.
- Field equipment will be calibrated prior to each sample event.

## **9.0 LABORATORY QUALITY CONTROL**

The analytical laboratory will perform Quality Control (QC). The QC will consist of method blank results, laboratory control spikes and matrix spike results.

1. Method Blank Results – A method blank is a laboratory generated sample that assesses the degree to which laboratory operations and procedures cause false-positive analytical results. The method blank results associated with the samples will be included in the final lab report.
2. Laboratory Control Spike – A laboratory control spike is a sample that is spiked with known analyte concentrations and then analyzed at approximately 10 percent of the sample load in order to establish method specific control limits.

3. Matrix Spike Results – A matrix spike is a sample that is spiked with known analyte concentrations and analyzed at approximately 10 percent of the sample load in order to establish method specific control limits.
4. Trip Blank – A clean sample of a matrix that is taken from the laboratory to the sampling site and transported back to the laboratory without having been exposed to sampling procedures. A trip blank is typically analyzed for volatile compounds only. The trip blank assesses contamination introduced during shipping and field handling procedures.

## **10.0 FIELD NOTES**

A field log book will be used to document the vital project and sample information. At a minimum the following sample information will be recorded.

- Sample ID
- Location (GPS)
- Date and Time
- Ambient temperature
- Field investigator will document all personnel on location, including both contractor and regulating agency personnel
- Any other field comments by field personnel

## **11.0 PHOTOGRAPHS**

Photographs will be taken at the sample location and at surrounding areas. The photographs will verify information entered into the field log book. Each photograph taken will be documented in the field log book with the approximate time, location, and date.

## **12.0 REPORTING**

Following receipt of the final analytical report, HCSI staff will review, evaluate and summarize project data/information utilizing appropriate figures and tables. All sampling summary reports will be provided to COGCC as soon as practical.

## **13.0 CONCLUSION**

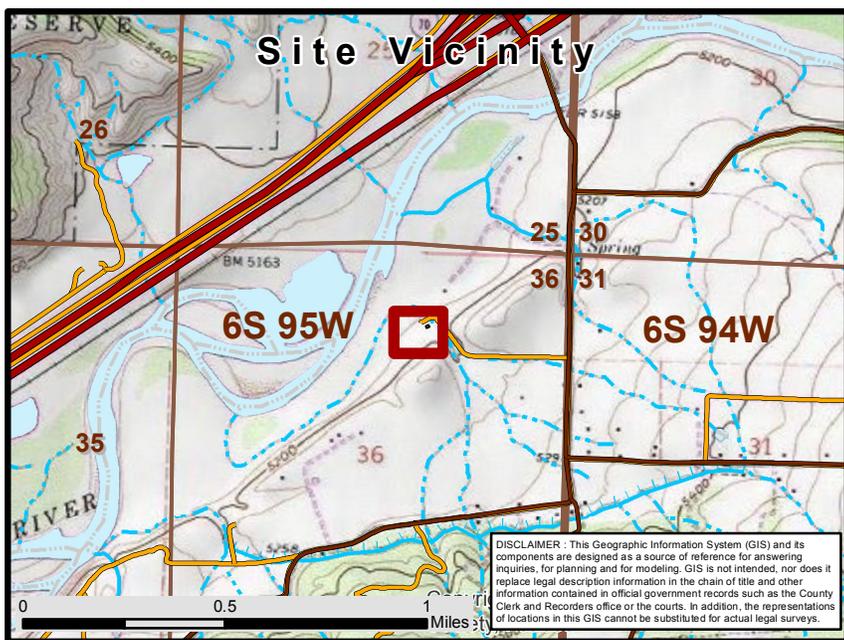
WPX Energy Rocky Mountain, LLC (WPX) retained HRL Compliance Solutions, Inc. (HCSI) to conduct water quality sampling at selected locations downgradient of the WPX PA 31-36 well pad. This Sampling and Analysis Plan has presented this guidance document to outline the water quality sampling protocol for potential groundwater contamination resulting from a condensate release which was discovered on February 19, 2014 at the WPX PA 31-36 location. The results of this ground water investigation will be used to determine if localized ground water resources have been impacted from this incident, and to determine if any further clean-up actions are

warranted. WPX reserves the right to amend or update this SAP if merited by new findings at or near the site location. Any changes will be documented and sent to the COGCC via a Form 4.



PA 31-36 Well Pad

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Site Vicinity

Figure 1  
Site Location Map  
**Location: PA 31-36**  
39.485792 -107.944906  
WPX Energy

- |             |                                |
|-------------|--------------------------------|
| <b>PLSS</b> | <b>Transportation Features</b> |
| Township    | Public Roads                   |
| Section     | Access Roads                   |
|             | <b>Hydrographic Features</b>   |
|             | Perennial Stream               |
|             | Intermittent Stream            |

DISCLAIMER: This Geographic Information System (GIS) and its components are designed as a source of reference for answering inquiries, for planning and for modeling. GIS is not intended, nor does it replace legal description information in the chain of title and other information contained in official government records such as the County Clerk and Recorders office or the courts. In addition, the representations of locations in this GIS cannot be substituted for actual legal surveys.



Figure 2  
Sample Location Map  
PA 31-36

- Point of Origin
- Sample Location
- Proposed Sample Location
- ▨ Excavated Area



0 50 100  
Feet

