



OGRIS OPERATING, LLC

2022 COLORADO RULE 614 COMPLIANCE REPORT RATON BASIN, COLORADO

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**2022 COLORADO RULE 614 COMPLIANCE REPORT
RATON BASIN, COLORADO**

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Ensolum Project No. 05A1226010

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EXECUTIVE SUMMARY

Ensolum, LLC (Ensolum), on behalf of Ogris Operating, LLC (Ogris), has completed applicable tasks to comply with the Colorado Oil and Gas Conservation Commission (COGCC) Rule 614, formerly Rule 608, regulating safety and operations associated with coalbed methane (CBM) production. The work was conducted in association with the Ogris' CBM production in Las Animas County, Colorado (Project Area). The project scope was outlined in a work plan submitted to the COGCC by the former operator of the assets, XTO Energy, Inc. The COGCC approved the *Colorado Rule 608 Compliance, Raton Basin, Colorado* (Work Plan) dated May 5, 2010. While the Work Plan was written to address the former Rule 608, Rule 614 incorporated similar requirements and the Work Plan is consistent with the following requirements under Rule 614:

- 614.a.(1): Assessment and monitoring of plugged and abandoned (P&A) production wells within ¼-mile of proposed CBM production wells
- 614.b.(1): Assessment of gas seeps, springs, or water seeps associated with coal outcrop and coal mine monitoring
- 614.b.(2): Soil gas monitoring from any identified gas seep(s) associated with coal outcrop and coal mine monitoring
- 614.b.(3): Spring/Water Seep survey and sampling

The 2022 Project Area was defined by a 2-mile buffer around the CBM wells proposed to be drilled and those actually drilled by XTO in 2010 and 2011. Neither XTO nor Ogris have drilled new CBM wells in the Raton Basin since 2011 and, as a result, the 2022 Project Area is identical to the Project Area for 2022 (and interim years). Field tasks were completed through pedestrian mapping and monitoring of active seep areas within the 2022 Project Area, combined with natural spring sampling.

Three mapping areas were identified for survey in 2022 based on the findings from 2021 and a review of historical flux surveys. Areas L-1021, 32 & L-1049, and L-1030 appear to be active but diminishing methane seep areas.

One natural spring (Chavez02) was sampled for water quality analysis. Previously identified springs were not sampled due to absence of flow and lack of permissible access after change of property ownership (Chavez01). Dissolved methane exceeding 1 milligram per liter (mg/L) was not detected in the single sample collected. Based on water quality data from this and previous years, the water type appears to be predominately calcium in cationic composition and bicarbonate in anionic composition.

Ensolum recommends proposing a new work plan for COGCC review and approval in 2023. The new work plan should specifically address the requirements of Rule 614 while applying similar data collection methods for correlation and comparison to historical data. The new work plan should consider an appropriate scope based on number of surveys conducted, results of those surveys, and the operator's plan for existing CBM production and future development.

1.0 INTRODUCTION

Ensolum, LLC (Ensolum) on behalf of Ogris Operating, LLC (Ogris), has prepared this 2022 Colorado Rule 614 Compliance Report for the Colorado Oil and Gas Conservation Commission (COGCC) to summarize the tasks completed in association with Ogris's natural gas operations in Las Animas County, Colorado (Project Area, Figure 1). Compliance activities were conducted in accordance with a COGCC-approved *Colorado Rule 608 Compliance, Raton Basin, Colorado*

(Work Plan) submitted by XTO Energy, Inc. (XTO) on May 5, 2010. In October 2017, Timber Creek Operating (TCO) purchased the XTO assets in the Project Area, and Ogris subsequently acquired the assets in 2020. This is the 11th annual event conducting tasks as defined in the Work Plan.

The objective of this work is to meet requirements of the Work Plan, which was associated with the drilling and installation of coalbed methane (CBM) production wells, specifically in Las Animas County, Colorado, and the requirements of former COGCC Rule 608 of the COGCC 600 Series Safety Regulations. The tasks defined in the Work Plan additionally apply to the following subsections of Rule 614, which replaced Rule 608 in 2021:

- 614.a.(1): Assessment and monitoring of plugged and abandoned (P&A) production wells within ¼-mile of proposed CBM production wells
- 614.b.(1): Assessment of gas seeps, springs, or water seeps associated with coal outcrop and coal mine monitoring
- 614.b.(2): Soil gas monitoring from any identified gas seep(s) associated with coal outcrop and coal mine monitoring
- 614.b.(3): Spring/Water Seep survey and sampling

1.1 PROJECT HISTORY

In 2010, a ground survey along the Raton Formation was conducted to meet the requirements of Former Rule 608(c). The survey was completed in a manner similar to an initial baseline ground survey of methane seeps completed by Apogee Scientific, Inc. (Apogee) for the COGCC in 2000 and a more detailed survey conducted by LT Environmental, Inc. (LTE) and Apogee in 2007. The 2010 ground survey was conducted using a 4-wheel drive vehicle equipped with an infrared-based gas detector developed by Apogee. This gas detector was designed to detect leaks in natural gas pipelines and is referred to as the Leak Detection System (LDS). A total of three suspected seep areas were identified and field-verified along 106 miles of roadway. Additionally, pedestrian mapping of six seep areas previously identified during the 2010 ground survey was conducted. Detailed mapping to field-verify the nine suspect seep areas was conducted and confirmed the presence of methane gas near all nine areas. Color infrared imagery was collected along the Vermejo Formation within the Project Area, and field verification of suspect areas identified on the imagery occurred but was limited to those areas where access was granted. No methane was detected in any of the subsurface points within the suspect areas identified by infrared mapping.

In 2011, the survey area was expanded, and ground surveys were again conducted by Apogee and field-verified by LTE. Apogee's ground survey took over two days and identified suspect seep areas over approximately 240 miles of roadway. Through the previous 2007 and 2010 investigation and the 2011 ground survey, 39 suspect seep areas within the Project Area were identified. Of the 39 suspect seep areas, nine areas (L-1021, L-1030, 32 & L-1049, L-1050, 5, 14, L-1033, 13 & L-1026, and 19) were identified as active methane seeps during the investigation and 30 suspect seep areas did not record methane or the detected methane was attributed to other potential sources, such as fugitive gases from oil and gas equipment/production.

Based on the findings in 2011, the nine seep areas were monitored annually from 2011 to 2014. In 2014, areas L-1033, 13 & L-1026, and 19 appeared to be diminished. As a result, these seep

areas were omitted from future monitoring activities. The remaining six seep areas were monitored in 2015. Findings from the 2015 monitoring event identified areas L-1021, 32 & L-1049, and L-1030 to be active methane seep areas; however, areas L-1050, 5, and 14 no longer had reportable methane flux detections and had limited methane detections in previous years. These three mapping areas were characterized as diminishing methane seeps and, supported by the absence of reportable methane flux in 2015, were omitted from future monitoring activities. From 2016 through 2022 areas L-1021, 32 & L-1049, and L-1030 have been surveyed, and appear to be continued active seep areas. Summaries of the mapping areas from 2010 to present are included in Table 1.

Natural spring monitoring initially took place at Spring01 in 2010. When sampled, the water appeared to be predominately calcium and sodium + potassium in cationic composition and carbonate + bicarbonate in anionic composition. Dissolved methane was detected in the sample at a concentration of 0.109 milligrams per liter (mg/L), which was below the 2 mg/L regulatory threshold to analyze the gas composition and carbon and hydrogen isotopes of methane. Spring01 was dry in 2012 and 2013 and stagnant from 2016 to present; therefore, no samples were collected. Springs Chavez01, Chavez02, and Chavez03 were added to the program and sampled in 2012. All Chavez samples appear to be calcium in cationic composition and bicarbonate in anionic composition. In 2012, dissolved methane for all three spring samples was below the 2 mg/L threshold to require additional gas analysis. Chavez03 has not been sampled since 2015 due to the presence of stagnant water. Spring03 (Quiet Spring) was discovered in 2014; however, water in the spring has never been sampled due to lack of access or lack of water. Chavez01 was not sampled in 2022 due to lack of access after a change in property ownership.

1.2 PROJECT AREA

The Project Area is located in the Raton Basin in southern Colorado. The Raton Basin is a geologic structural basin in southern Colorado and northern New Mexico. The basin is situated in Huerfano and Las Animas counties, Colorado, and Colfax County, New Mexico. The basin has long been a source of coal production and CBM. Much of the regional geology presented herein was derived from the report, A Geologic Assessment of Natural Gas from Coal Seams in the Raton and Vermejo Formations, Raton Basin (Stevens, et.al. 1992).

The Raton Basin is an asymmetric synclinal basin with the axis of the La Veta syncline oriented roughly north-south and passing through Weston, Colorado, which is immediately east of the area formerly defined by XTO for development of CBM. The Raton Formation outcrop is exposed over approximately 50 percent (%) of the Project Area. The discontinuous nature of the coal beds both in the subsurface and on the surface make it difficult to identify and/or correlate individual continuous coal beds from the subsurface producing zone to the surface coal outcrop. The area originally proposed for drilling by XTO is located on the western side of the La Veta syncline, suggesting that the formations encountered within the Project Area are dipping to the east.

The Vermejo Formation consists of sandstone, interbedded siltstone, shale, carbonaceous shale, and coal accumulated above the fluvial-deltaic sequences of the Trinidad Sandstone (Stevens, et al. 1992). The Vermejo Formation outcrops along the western edge of the Raton Basin syncline basin, which is on the west side of the Project Area. Of the more than 90,000-acre Project Area, the Vermejo Formation outcrop covers approximately 2% of the overall Project Area. The Raton and Vermejo formation outcrops are depicted on Figure 1.

1.3 SCOPE OF WORK

XTO originally proposed to drill CBM production wells in the Project Area of the Raton Basin over several years starting in 2010 (orange and green dots on Figure 2). Drilling began in 2010; however, XTO did not install any CBM production wells in the Project Area between 2012 and 2017 and sold their assets in the Project Area to TCO in late 2017. TCO assets were purchased by Ogris in 2020. As a result of drilling inactivity since 2012, the 2018 through 2022 Project Areas were determined by the location of 2010 and 2011 proposed CBM production wells and CBM production wells XTO installed in 2010 and 2011. The 2022 Project Area (green outline on Figure 2) proposed 2010 and 2011 CBM production well locations, groundwater well locations, and topography are illustrated on Figure 2. The 2022 scope of work include the following tasks:

- 614.a.(1): Assessment and monitoring of plugged and abandoned (P&A) production wells within ¼-mile of proposed CBM production wells
- 614.b.(1): Assessment of gas seeps, springs, or water seeps associated with coal outcrop and coal mine monitoring
- 614.b.(2): Soil gas monitoring from any identified gas seep(s) associated with coal outcrop and coal mine monitoring
- 614.b.(3): Spring/Water Seep survey and sampling

2.0 FIELD METHODS

2.1 2022 PROJECT AREA

The 2022 Project Area was determined by a 2-mile buffer around the 2010 and 2011 XTO proposed and drilled CBM production wells from 2010 and 2011. The 2022 Project Area is outlined in green on Figure 2.

2.2 PROPERTY ACCESS

Prior to conducting 2022 field activities, Ensolum acquired landowner information from the Las Animas County Assessor's office. Ensolum cross-referenced parcel data to identify owners of parcels located in the 2022 Project Area. Ensolum requested access through mailed property permission letters to all properties where fieldwork was proposed. The 2022 property owner and access information are presented in Table 2.

2.3 FLUX SURVEY

Flux surveys consist of using a West Systems® portable gas flux meter (flux meter) to measure the flow rate and extent of methane seepage, if detected, within the survey area. Measurements are typically collected using a sampling grid approach.

Grids for detailed mapping areas consisted of varying numbers of squares, with grid nodes spaced 50 feet to 100 feet apart, depending on historical data for previously identified methane seep areas. The smaller grid spacing is typically used to map methane seep areas of relatively small extent. A flux measurement is collected at the corner of each grid square. When methane is detected along the outer edges of the mapping area, additional grid points are developed and measured to determine the extent of methane seepage. Additional measurements are collected

between grid nodes if methane seepage is observed. Where appropriate, photographs of vegetative conditions, visible seeps, and sensitive receptors are collected.

The flux meter measures the flux of methane, hydrogen sulfide (H_2S), and carbon dioxide by employing individual gas-specific sensors that record the increases, if any, of gas concentrations over time for a given surface area. These increases in concentration over time are proportional to the flux of each gas. For this flux survey, only methane flux rates are reported.

The flux meter components include an accumulation chamber connected by circulation tubes to the gas detector unit. At each sampling point, the accumulation chamber is placed on the ground surface to capture gas seeping from the ground. A fan in the chamber continuously mixes the gases in the chamber during the measurement process. A pump moves gases in the accumulation chamber to the detector unit. After passing through the detector unit, gases are returned to the chamber. This closed-loop process allows soil gases discharging to the chamber to increase in concentration over time. Increases in concentrations are measured and recorded automatically. No gas is allowed to escape the system, nor is a vacuum created during the process. This enables measurement of natural gas seep conditions, if present. The result for each gas is reported as a mass flux in units of moles per square meter per day ($mol/(m^2 \text{ per day})$).

Flux measurement accuracy can be limited by surface conditions. One of the most important factors is the quality of the seal between the accumulation chamber base and the ground surface. To ensure a proper seal between the ground surface and the chamber, field personnel choose relatively flat surfaces where possible and place loose soil surrounding the base of the chamber to reduce the potential for gas loss at the base of the chamber. In addition, ground disturbance is minimized during the measurement process in order to maintain the natural seep conditions. In areas with heterogeneous surfaces, the seal is sometimes difficult to achieve. This scenario is evident at locations with poorly developed soil or where the soil surface is obscured by decayed organic matter on the forest floor.

The accuracy of the total flux estimation within the Project Area is influenced by the ability of the grid spacing system to represent the actual flux on a detailed level relative to the subsurface fracture system, coal quality, and stratigraphy within the Raton Formation. The methane sensor within the flux meter unit has a range of 0 parts per million (ppm) to 1,000,000 ppm (0-100%). The flux meter methane measurement range is $0.0 \text{ mol}/(m^2 \text{ per day})$ to $750 \text{ mol}/(m^2 \text{ per day})$. Methane fluxes below $0.2 \text{ mol}/(m^2 \text{ per day})$ are detectable with decreased accuracy. As a result, reporting of methane fluxes will not include values less than $0.2 \text{ mol}/m^2\text{-day}$. Information on the flux meter is provided in Appendix A.

During the measurement process, gas concentrations are recorded at 1-second intervals and directly downloaded via Bluetooth® connection to an Athesi handheld tablet, which is connected via Bluetooth® to a Trimble® Catalyst™ GA2 Global Positioning System (GPS) unit. Other measurements recorded include barometric pressure, temperature, date, and time.

Integrated West Systems Flux Manager 2® software App on the handheld tablet records the gas flux measurement data. The software plots the curve of gas concentration versus time for each measurement collected. The best-fit line for the curve generated is selected. The slope of the best-fit line is proportional to the flux at the measurement point.

Satellite imagery was used as base maps for field use and figures for reporting. The geologic contacts depicted on satellite imagery was derived from geologic maps prepared by the United

States Geologic Survey (USGS) and digitized. Accuracy of the formation contact is reduced when aerial photographs are viewed at a smaller scale.

2.3.1 GLOBAL POSITIONING SYSTEM DATA MANAGEMENT

Each sample location is recorded using a Trimble® Catalyst™ DA2 GPS unit. Soil gas sampling grids are created in ArcGIS® and pre-loaded into the tablet through the ArcGIS Field Maps App, so field personnel can quickly and accurately position detection equipment along the Project Area. Soil gas flux measurements and other relevant field data are then stored as text files in the tablet along with the associated position data. Flux measurement and GPS data stored in the tablet are downloaded later for processing and reporting.

The GPS unit position data are collected in the World Geodetic System 1984 (WGS 84) and projected in Universal Transverse Mercator (UTM) Zone 13 South, North American Datum 1983 (NAD 83) for use in ArcGIS®.

Measurements collected with the GPS unit are generally located with less than 1-meter accuracy. Specifications of the GPS unit are included in Appendix A.

2.3.2 FLUX VOLUME ESTIMATIONS

Ensolum estimated the volumetric flux of methane for each mapping area where sufficient reportable methane flux data points are available. Flux data were interpolated and gridded, then contoured and processed to estimate total volumetric flux.

The results were converted to volumetric flux rates common to the natural gas production industry in units of thousand cubic feet per day (MCFD). For a better perspective of the methane flux rates, Ensolum converted the mass flux values into volumetric flux units of cubic feet per day (CFD), assuming equal areas. The unit conversion is based on the molecular weight of the gas and the density of the gas at approximately 7,100 feet above mean sea level (amsl).

For methane flux, the calculation is as follows:

$$\frac{\text{mol CH}_4}{\text{day}} \times \frac{16.04276 \text{ g CH}_4}{\text{mol CH}_4} \times \frac{0.0698 \text{ ft}^3 \text{ CH}_4}{\text{g CH}_4} = \frac{\text{ft}^3 \text{ CH}_4}{\text{day}}$$

For example,

$$1.0 \text{ mol/day CH}_4 = 1.12 \text{ CFD CH}_4$$

Notes:

ft³ – cubic feet

CH₄ – methane

g – gram

CFD – cubic feet per day

mol – mole

The volumetric flux values calculated are estimates and may not represent actual values for the specific areas. Interpolation calculation techniques are highly sensitive to data skewness and can result in changes in calculated flux values based on measurements made at only a few locations.

2.4 NATURAL SPRINGS MONITORING

Surveys of natural springs are conducted on a spring-by-spring basis. Only natural springs identified on USGS topographic maps within the 2022 Project Area were surveyed. Once a natural spring was identified, collection of water samples was attempted, barring any property access restrictions or lack of flow, stagnant water, and/or dry conditions. At each natural spring, field personnel located the position and elevation using a GPS. Water quality measurements, including pH, total dissolved solids (TDS), specific conductance (SC), and temperature were collected using a AquaTROLL500® meter. The equipment specifications for the water quality field meter are provided in Appendix A.

Water samples from the natural spring were collected and analyzed for the following

- Alkalinity (carbonate/bicarbonate) by Standard Method (SM) 2320B-2011
- Major Anions [chloride (Cl), sulfate (SO₄), bromide (Br), and fluoride (F)] by United States Environmental Protection Agency (EPA) Method 300
- SC by Method SM 2510B-2011
- Nitrate/Nitrite as Nitrogen (N) by EPA Method 300
- TDS by Method SM2540C
- Volatile organic compounds (VOCs) by Method R. S. Kerr (RSK) 175
- pH by Method SM 4500HB
- Metals by EPA Method 200.8
- Metals by EPA Method 200.7
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8260
- Total petroleum hydrocarbons (TPH) – gasoline range organics (GRO) by EPA Method 8015D
- TPH – diesel range organics (DRO) and TPH – motor oil range organics (MRO) by EPA Method 8015M/D
- Presence/Absence of bacteria (Iron-Related, Sulfate-Reducing and Slime-forming)
- H₂S field analysis using Hach® test kit

Laboratory-provided sample bottles were filled with water for analysis of the parameters identified above. All water samples collected were submitted in a cooler under strict chain-of-custody (COC) documentation to Hall Environmental Analysis Laboratory, Inc. (Hall) in Albuquerque, New Mexico and Aerobiology Laboratory in Sterling Virginia (presence/absence of bacteria samples only).

Ensolum sampled natural spring Chavez02 during the sampling event in 2022. Water samples were not collected from Spring01 and Chavez03 due to stagnation of the water from the natural springs, and water samples were not collected from Chavez 01 or Spring03 (Quiet Spring) due to lack of access.

2.5 SOIL GAS MESUREMENT

Ensolum collected subsurface gas measurements using traditional techniques from Seep Area-L-1021, where the highest methane flux of 24.3 parts per million per second (ppm/sec) was observed (point number Area-L-1021-9-01092022). Ensolum advanced a borehole using a hand-driven slide hammer to drive a ½-inch diameter steel rod into the ground surface to a depth ranging from 1-foot below ground surface (bgs) to 3 feet bgs. The rod was removed from the ground and ¼-inch diameter polyethylene tubing was inserted into the borehole. The tubing was perforated at the bottom 6 inches to allow soil gas to enter the tubing at depth.

Once the temporary tubing was in place and the borehole was sealed with native material, Ensolum attached a RKI Eagle 2 portable gas monitor to the tubing. An internal pump extracted gas from the tubing into the gas sensors. The Eagle measured the concentration of methane, carbon monoxide, H₂S, and oxygen in the soil gas. Ensolum recorded the maximum concentration of methane, carbon monoxide, and H₂S at the sample location. Results from the soil gas measurement are presented in Section 3.3.

3.0 RESULTS

3.1 FLUX SURVEY

Reportable methane flux was detected in all three mapping areas. Total reportable volumetric methane flux was calculated as 3.8 MCFD for area L-1021, 2.4 MCFD for area L-1030, and 54.2 MCFD for area 32 & L-1049. Since 2011, each of the three mapping areas have had reportable methane flux detected and have been considered diminished but active seep areas. Methane flux measurements are presented on Figures 3 through 5. Summaries of the mapping areas from 2010 to present are included in Table 1. Flux data is included in Appendix B. Volumetric flux calculations are included in Appendix C.

3.2 NATURAL SPRINGS SURVEY

Ensolum identified 5 natural springs to be sampled within the 2022 Project Area (Figure 2). One natural spring (Chavez02) was sampled on September 1, 2022. Spring01 and Chavez03, were stagnant at the time of sampling. Access was not granted to Chavez01 or Spring03 (Quiet Spring) and as a result, no water samples were collected from these four springs.

3.2.1 SAMPLING AND ANALYSIS

Using data from the previous nine years, the water types in spring samples appear to be predominately calcium in cationic composition and bicarbonate + carbonate in anionic composition. This was consistent from 2012 to 2022.

During the 2022 sampling, dissolved methane in the natural spring water sample was not detected. Laboratory analytical results for the natural spring sample are summarized in Table 4. A Stiff diagram illustrating the water type is depicted on Figure 6. Natural spring laboratory analytical reports are presented in Appendix D.

3.2.2 FIELD OBSERVATIONS

Ensolum collected field measurements from the Chavez02 natural spring, which were documented in a field logbook and include the following:

- Specific Electrical Conductance: 335 micro siemens per centimeter (µS/cm)
- pH: 7.41
- Temperature: 17.0 degrees Celsius (°C)
- TDS: 216 mg/L
- H₂S: 0.0 parts per million (ppm)

The 2022 field observations and measurements for the natural springs are consistent with previous years' sampling events. Field observations and measurements are summarized in Table 3.

3.3 SOIL GAS MEASUREMENT

Ensolum collected a soil gas measurement using an RKI Eagle 2 portable gas monitor, from point number Area-L-1021-9-01092022, where a methane flux of 24.3 ppm/sec was observed using the flux meter. Results are as follows:

- Methane: 3,700 ppm
- Oxygen: 19.6 ppm
- H₂S: 0.02 ppm
- Carbon Monoxide: 0.0 ppm
- Carbon Dioxide: 0.16% by volume

4.0 CONCLUSIONS

The 2022 project meets the requirements of COGCC Rule 614. Three previously identified active seep areas were monitored in 2022. Based on the findings from 2022, the three seep areas 32 & L-1049, L-1021 and L-1030 appear to be diminishing seeps. When comparing the results from 2019 to 2022, seep area 32 & L-1049 continues to show a net decrease in total reportable volumetric methane flux over the past 4 years, with 780.2 MCFD in 2019, 58 MCFD in 2020, 71.5 MCFD in 2021, and 54.2 MCFD in 2022. 2022 represents the lowest volumetric flux recorded for seep area 32 & L-1049 since monitoring began. Seep area L-1021 has shown a decrease in volumetric flux since 2018. In 2018 volumetric methane flux was measured at 193.6 MCFD decreasing to 17.8 MCFD in 2019. Volumetric Flux has not exceeded 4.8 MCFD in the past three years indicating it is a diminishing seep. Seep Area L-1030 has not exceeded 4.5 MCFD in the past four years of monitoring and a decrease from 25.4 MCFD measured in 2018 to 2.4 MCFD in 2022 has been observed. Trends for the three seep areas indicate that the emissions of methane being released is diminishing, however diminishing trends have been observed in the past only to rebound in subsequent years. The time period between 2019 and 2022 have seen the most consistent decrease in net volumetric flux without a significant rebound since monitoring began.

Ensolum recommends submitting an updated work plan for 2023 that incorporates language and guidelines specific to Rule 614. Based on the reduction in volumetric methane flux observed at seep areas 32 & L-1049, L-1021 and L-1030 during the 2022 survey, the updated work plan will propose a reduced seep monitoring scope.

One natural spring was sampled for water quality analysis (Chavez02) in 2022. Based on this and previous years' data the water types are predominately calcium in cationic composition and bicarbonate in anionic composition, this composition has been consistent over 10 years of sampling. The updated work plan will propose a reduced scope for natural spring monitoring.

The updated work plan will include language and scope consistent with the new 614 rules and will be submitted to the COGCC for approval prior to commencement of 2023 monitoring.

5.0 REFERENCES

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TABLE 1
MAPPING AREA SUMMARIES
2022 COLORADO RULE 614 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO

Year	Area IDs	L-1021	L-1030	32 & L-1049	L-1050	5	14	L-1033	13 & L-1026	19
2007	Subsurface Methane Gas Detected	-	-	x	-	-	-	-	-	-
2010	Total Number of Flux Points	-	-	-	-	-	94	-	29	-
	Reportable CH ₄ Flux Points*	-	-	-	-	-	16	-	8	-
	Total CH ₄ Flux (MCFD)**	-	-	-	-	-	0.563808	-	10.74	-
2011	Total Number of Sample Points	44	17	372	22	167	50	26	56	23
	Reportable CH ₄ Flux Points*	10	3	146	4	16	7	1	2	0
	Total CH ₄ Flux (MCFD)**	129.71	2.19	304.12	0.69	2.16	0.34	0.02	0.03	0.00
2012	Total Number of Sample Points	47	17	217	22	83	46	40	61	15
	Reportable CH ₄ Flux Points*	6	3	55	2	6	0	4	1	1
	Total CH ₄ Flux (MCFD)**	6.7	2.2	720.4	1.0	1.9	0.0	0.1	1	1
2013	Total Number of Sample Points	46	18	234	22	83	58	40	61	15
	Reportable CH ₄ Flux Points*	2	1	37	0	0	3	0	0	0
	Total CH ₄ Flux (MCFD)**	2.2	1	332.4	0.0	0.0	0.2	0.0	0.0	0.0
2014	Total Number of Sample Points	51	18	233	25	80	66	38	38	14
	Reportable CH ₄ Flux Points*	4	4	33	1	3	4	0	0	0
	Total CH ₄ Flux (MCFD)**	1.9	56.9	150.7	1	0.8	0.4	0.0	0.0	0.0
2015	Total Number of Sample Points	35	18	239	22	76	58	-	-	-
	Reportable CH ₄ Flux Points*	4	2	25	0	0	0	-	-	-
	Total CH ₄ Flux (MCFD)**	6.8	12.7	668.4	0.0	0.0	0.0	-	-	-
2016	Total Number of Sample Points	35	18	238	-	-	-	-	-	-
	Reportable CH ₄ Flux Points*	6	3	32	-	-	-	-	-	-
	Total CH ₄ Flux (MCFD)**	14.1	5.4	204.3	-	-	-	-	-	-
2017	Total Number of Sample Points	35	22	239	-	-	-	-	-	-
	Reportable CH ₄ Flux Points*	2	7	29	-	-	-	-	-	-
	Total CH ₄ Flux (MCFD)**	7.5	19.4	74.3	-	-	-	-	-	-
2018	Total Number of Sample Points	35	22	240	-	-	-	-	-	-
	Reportable CH ₄ Flux Points*	3	4	35	-	-	-	-	-	-
	Total CH ₄ Flux (MCFD)**	193.6	25.4	739.3	-	-	-	-	-	-
2019	Total Number of Sample Points	35	18	238	-	-	-	-	-	-
	Reportable CH ₄ Flux Points*	5	3	23	-	-	-	-	-	-
	Total CH ₄ Flux (MCFD)**	17.8	2.2	780.2	-	-	-	-	-	-
2020	Total Number of Sample Points	28	18	250	-	-	-	-	-	-
	Reportable CH ₄ Flux Points*	2	5	22	-	-	-	-	-	-
	Total CH ₄ Flux (MCFD)**	3.5	4.5	58	-	-	-	-	-	-
2021	Total Number of Sample Points	36	18	240	-	-	-	-	-	-
	Reportable CH ₄ Flux Points*	2	2	7	-	-	-	-	-	-
	Total CH ₄ Flux (MCFD)**	4.8	1.3	71.5	-	-	-	-	-	-
2022	Total Number of Sample Points	26	23	250	-	-	-	-	-	-
	Reportable CH ₄ Flux Points*	2	3	6	-	-	-	-	-	-
	Total CH ₄ Flux (MCFD)**	3.8	2.4	54.2	-	-	-	-	-	-

Notes:

CH₄ - methane

MCFD - thousand cubic feet per day

moles/m²·day - moles per meter squared per day

NA - not applicable

- - not measured

I - not contoured, only one data point

** - volume includes only gridded values > 0.2 moles/m²·day

* - only points where flux values were above the reporting limit of 0.2 moles/m²·day

TABLE 2
PROPERTY OWNER AND ACCESS INFORMATION
2022 COLORADO RULE 614 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO

LANDOWNER	PARCEL ID	SECTION	TOWNSHIP	RANGE	PERMISSION GRANTED
Ogris Operating, LLC	14533300	28	33	67	Yes
	14533405	27, 28	33	67	
	14533200	27	33	67	
Cindy and Brett Morgan	13940200	19	33	67	No
Bill Toupal	NA	28	33	67	Yes
		27, 28	33	67	
		27	33	67	
Veronica Law	NA	19	33	67	Yes

TABLE 3
NATURAL SPRING FIELD OBSERVATIONS
2022 COLORADO RULE 614 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO

Natural Spring	Location	Latitude	Longitude	Inspection Date	Specific Electrical Conductance (µS/cm)	pH (Units)	ORP (mV)	Temperature (°C)	TDS (mg/l)
Spring01	North Fork Apache Canyon	-104.991708	37.108089	8/13/2010	381.0	9.2	140.5	22.4	247.0
				8/19/2011	408.0	7.1	-99.5	13.3	432.0
				9/4/2012	DRY - NOT MEASURED				
				8/15/2013	DRY - NOT MEASURED				
				8/21/2014	515.9	9.1	-61.8	12.4	337.2
				8/13/2015	562.4	8.8	-38.9	11.0	368.8
				8/25/2016	STAGNANT WATER - NOT MEASURED				
				9/6/2017	STAGNANT WATER - NOT MEASURED				
				8/20/2018	STAGNANT WATER - NOT MEASURED				
				10/23/2019	STAGNANT WATER - NOT MEASURED				
				8/26/2020	STAGNANT WATER - NOT MEASURED				
				10/19/2021	STAGNANT WATER - NOT MEASURED				
				9/1/2022	STAGNANT WATER - NOT MEASURED				
Chavez01	Rancho Escondido	-104.9265768	37.15615866	9/4/2012	391.0	6.8	106.5	15.7	200.7
				8/15/2013	356.0	7.0	12.0	14.9	NM
				8/21/2014	329.0	7.7	200.9	16.3	579.0
				8/12/2015	420.8	6.8	279.5	14.7	275.4
				8/25/2016	284.6	7.1	25.5	14.1	233.4
				9/6/2017	383.6	7.6	610	16.15	249.2
				8/20/2018	711.0	8.8	-83	18.34	494.3
				10/23/2019	216.8	8.5	-89.3	9.8	197.3
				8/26/2020	331.4	8.7	-76.8	17.2	253.8
				10/19/2021	330.0	7.3	90.7	11.84	213.7
				9/1/2022	NO ACCESS GRANTED - NOT MEASURED				
Chavez02	Rancho Escondido	-104.9228145	37.152863914	9/4/2012	414.0	6.5	105.5	16.0	207.7
				8/15/2013	417.0	6.9	NM	14.1	NM
				8/21/2014	399.3	7.5	169.7	14.4	260.2
				8/12/2015	550.6	7.1	323.4	14.1	361.2
				8/25/2016	381.4	7.6	44.8	17.5	291.7
				9/6/2017	554.9	7.04	544	16.1	358.8
				8/20/2018	390.0	8.67	-82.9	18.9	245.6
				10/23/2019	368.8	8.09	-90.6	12.8	309.4
				8/26/2020	345.8	8.44	-79.8	16.5	269.2
				10/19/2021	400.0	6.57	83.8	12.7	261.2
				9/1/2022	335	7.41	60.3	17.0	216.0
Chavez03	Rancho Escondido	-104.9167088	37.156096546	9/4/2012	1,864.0	7.0	104.7	14.1	921.9
				8/15/2013	1,464.0	7.3	47.3	14.7	NM
				8/21/2014	1,922.9	7.6	-40.1	16.3	1,255.3
				8/12/2015	STAGNANT WATER - NOT MEASURED				
				8/25/2016	DRY - NOT MEASURED				
				9/6/2017	STAGNANT WATER - NOT MEASURED				
				8/20/2018	STAGNANT WATER - NOT MEASURED				
				10/23/2019	STAGNANT WATER - NOT MEASURED				
				8/26/2020	STAGNANT WATER - NOT MEASURED				
				10/19/2021	STAGNANT WATER - NOT MEASURED				
				9/1/2022	STAGNANT WATER - NOT MEASURED				

TABLE 3 NATURAL SPRING FIELD OBSERVATIONS 2022 COLORADO RULE 614 COMPLIANCE REPORT RATON BASIN, LAS ANIMAS COUNTY, COLORADO									
Natural Spring	Location	Latitude	Longitude	Inspection Date	Specific Electrical Conductance (µS/cm)	pH (Units)	ORP (mV)	Temperature (°C)	TDS (mg/l)
Spring03 - Quiet Spring	Rancho Escondido	-104.915474	37.174474	8/21/2014	STAGNANT WATER - NOT MEASURED				
				8/13/2015	STAGNANT WATER - NOT MEASURED				
				8/25/2016	STAGNANT WATER - NOT MEASURED				
				9/6/2017	NO ACCESS GRANTED - NOT MEASURED				
				8/20/2018	NO ACCESS GRANTED - NOT MEASURED				
				10/23/2019	NO ACCESS GRANTED - NOT MEASURED				
				8/26/2020	NO ACCESS GRANTED - NOT MEASURED				
				10/19/2021	NO ACCESS GRANTED - NOT MEASURED				
				9/1/2022	NO ACCESS GRANTED - NOT MEASURED				

Notes:

°C - degrees Celsius

mg/l - milligrams per liter

mV - millivolts

NM - Not Measured

ORP - oxidation reduction potential

TDS - total dissolved solids

µS/cm - microSiemens per centimeter

TABLE 4
NATURAL SPRING ANALYTICAL RESULTS
2022 COLORADO RULE 614 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO

Natural Spring	Location	Sample Date	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Manganese (mg/l)	Selenium (mg/l)	Methane (mg/l)	Iron (mg/l)	Sodium Adsorption Ratio	Carbonate (mg/l)	Bicarbonate (mg/l)	TDS (mg/l)	Specific Conductivity (umhos/cm)	pH	Sulfate (mg/l)	Chloride (mg/l)	Bromide (mg/l)	Fluoride (mg/l)	Hydrogen Sulfide (mg/l)	Nitrogen as Nitrate (mg/l)	Nitrogen as Nitrite (mg/l)	Iron Reducing Bacteria (cfu/ml)	Slime Forming Bacteria (cfu/ml)	Sulfate Reducing Bacteria (cfu/ml)
Spring01	North Fork Apache Canyon	8/13/2010	3.4	0.65	97.7	1.41	0.0210	<0.00080	0.10900	1.59	11.4	<5.0	205	280	364	10.13	2.9	3.3	<0.20	0.74	<0.50	<0.23	<0.061	500	>350,000	700,000
		8/15/2011	2.2	0.52	136.0	1.64	0.1260	<0.00080	0.277	3.660	22.2	<5.0	332	420	428	8.16	2.7	3.7	<0.20	1.40	NA	<0.045	<0.011	9,000	350,000	700,000
		9/4/2012	DRY - NOT SAMPLED																							
		8/15/2013	DRY - NOT SAMPLED																							
		8/21/2014	1.4	0.35	129.0	<1.0	0.0063	<0.00080	1.00	<0.010	25.0	<5.0	251	338	406	NA	3.5	3.7	<0.050	1.00	0.5	<0.010	<0.0040	<25	<500	<200
		8/13/2015	1.8	0.47	128.0		0.0111	<0.00080	1.09000	0.0212	20.1	10.9	227	304	402	8.64	7.4	3.9	<0.050	0.97	<0.50	<0.020	<0.0080	<25	<500	<200
		8/25/2016	STAGNANT WATER - NOT SAMPLED																							
		9/6/2017	STAGNANT WATER - NOT SAMPLED																							
		8/20/2018	STAGNANT WATER - NOT SAMPLED																							
		10/23/2019	STAGNANT WATER - NOT SAMPLED																							
		8/26/2020	STAGNANT WATER - NOT SAMPLED																							
		10/19/2021	STAGNANT WATER - NOT SAMPLED																							
9/1/2022	STAGNANT WATER - NOT SAMPLED																									
Chavez01	Rancho Escondido	9/4/2012	44.5	8.12	20.4	<1.0	<0.0050	<0.0020	0.0012	<0.070	0.738	<5.0	157	194	323	7.28	19.3	3.4	<0.050	0.27	0.0	0.011	<0.0040	74,500	350,000	359,000
		8/15/2013	50.2	8.59	20.8	1.07	NA	<0.0020	NA	<0.070	0.755	<5.0	171	224	358	7.4	28.7	5.8	<0.050	0.27	NA	0.012	<0.0040	74,500	66,500	1,200
		8/21/2014	49.8	8.92	15.0	1.23	<0.0050	<0.00080	0.0035	<0.010	0.490	<5.0	141	210	278	NA	21.6	5.1	<0.050	0.23	0.0	<0.010	<0.0040	9,000	66,500	700
		8/12/2015	53.6	9.92	15.4	<1.0	<0.0050	<0.00080	0.00250	0.0147	0.507	<5.0	139	220	285	7.19	27.5	15.7	<0.050	0.23	<0.50	<0.010	<0.0040	74,500	350,000	<200
		8/25/2016	41.7	8.09	13.4	<1.0	8.090	0.0011	0.0022	<0.010	0.519	<5.0	141	200	291	7.13	24.6	6.7	<0.050	0.21	0.0	<0.050	<0.0054	74,500	66,500	1,200
		9/6/2017	50.0	9.42	15.0	<1.0	0.0023	<0.00080	0.00260	<0.010	0.510	<5.0	137	202	325	7.80	25.1	8.8	<0.050	0.22	0.0	<0.010	<0.0040	74,500	350,000	5,000
		8/20/2018	43.4	8.07	12.1	<1.0	0.003	<0.00080	0.00049	<0.010	0.442	<5.0	131	188	287	7.97	26.1	3.3	<0.050	0.25	NA	0.024	0.024	35,000	440,000	6,000
		10/23/2019	47.9	8.35	11.5	<1.0	<0.002	<0.00080	0.0038	<0.01	0.403	<5.0	129	183	299	7.49	24.9	4.3	<0.050	0.23	NA	0.015	<0.0040	2,200	440,000	27,000
		8/26/2020	37.6	6.79	9.68	<1.0	0.0025	<0.0008	<0.00080	<0.01	0.422	<5.0	115	166	289	7.89	22.5	2	<0.050	0.21	NA	0.027	<0.0040	35,000	440,000	27,000
		10/19/2021	NA	NA	NA	NA	NA	NA	0.0037	NA	NA	<5.0	125	181	335	7.32	29.1	3.2	<0.050	0.24	NA	0.033	<0.0040	NA	NA	NA
		9/1/2022	NO ACCESS GRANTED - NOT SAMPLED																							
		Chavez02	Rancho Escondido	9/4/2012	49.3	9.56	18.2	1.43	<0.0050	<0.0020	0.00030	<0.070	0.621	<5.0	163	206	330	7.17	20.3	4.0	<0.050	0.30	0.0	0.088	<0.0040	74,500
8/15/2013	59.7			11.00	20.2	1.51	0.0055	<0.0020	NA	<0.070	0.670	<5.0	201	264	428	7.28	31.3	8.1	<0.050	0.29	NA	1.800	1.800	75,500	12,500	5,000
8/21/2014	57.7			11.20	15.9	1.77	<0.0050	<0.00080	0.00054	0.264	0.489	<5.0	167	242	318	NA	24.0	5.8	<0.050	0.29	0.0	0.400	<0.0040	9,000	<500	5,000
8/12/2015	71.7			13.30	14.9	1.61	<0.0020	<0.00080	<0.00080	0.0473	0.472	<5.0	196	291	405	7.45	29.8	14.5	<0.050	0.27	<0.50	0.940	0.940	74,500	350,000	5,000
8/25/2016	56.6			11.80	13.2	15.4	<0.0050	<0.00080	<0.00080	0.0329	0.447	<5.0	195	262	382	7.26	26.7	9.6	<0.050	0.25	0.0	0.42	0.42	74,500	66,500	18,000
9/6/2017	73.0			14.4	16.8	1.620	0.0041	<0.00080	0.00052	0.022	0.470	<5.0	223	290	471	7.51	27.5	9.5	<0.050	0.27	0.0	0.16	<0.0040	74,500	350,000	700
8/20/2018	46.0			9.11	12.5	1.380	0.0023	<0.00080	<0.00080	0.013	0.440	<5.0	143	208	310	8.10	28.1	4.1	<0.050	0.27	NA	0.17	0.17	35,000	440,000	6,000
10/23/2019	72.1			13.30	12.8	1.560	0.0051	<0.00080	0.00097	0.036	0.363	<5.0	191	246	394	7.26	23.9	4.6	<0.050	0.26	NA	0.062	<0.0040	9,000	440,000	115,000
8/26/2020	49.2			9.20	10.9	1.360	0.0056	<0.00080	<0.00080	0.077	0.367	<5.0	165	222	346	7.99	25.2	2.4	<0.050	0.22	NA	0.120	<0.0040	35,000	1,750,000	27,000
10/19/2021	NA			NA	NA	NA	NA	NA	0.00098	NA	NA	<5.0	153	211	398	7.33	27.8	3.9	<0.050	0.28	NA	0.099	<0.0040	NA	NA	NA
9/1/2022	50			9.7	8.7	1.5	0.024	<0.0010	<0.0100	1.1	NA	<2,000	161.7	215	370	7.47	21	4.3	<0.50	<0.50	NA	<1.0	<1.0	PRESENT	PRESENT	ABSENT

TABLE 4
NATURAL SPRING ANALYTICAL RESULTS
2022 COLORADO RULE 614 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO

Natural Spring	Location	Sample Date	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	Potassium (mg/l)	Manganese (mg/l)	Selenium (mg/l)	Methane (mg/l)	Iron (mg/l)	Sodium Adsorption Ratio	Carbonate (mg/l)	Bicarbonate (mg/l)	TDS (mg/l)	Specific Conductivity (umhos/cm)	pH	Sulfate (mg/l)	Chloride (mg/l)	Bromide (mg/l)	Fluoride (mg/l)	Hydrogen Sulfide (mg/l)	Nitrogen as Nitrate (mg/l)	Nitrogen as Nitrite (mg/l)	Iron Reducing Bacteria (cfu/ml)	Slime Forming Bacteria (cfu/ml)	Sulfate Reducing Bacteria (cfu/ml)
Chavez03	Rancho Escondido	9/4/2012	117.0	43.20	20.8	6.25	<0.0050	<0.0020	0.0119	0.235	4.17	<5.0	495	990	160	7.44	63.7	254.0	2.0	0.35	0.0	0.083	0.024	74,500	66,500	359,000
		8/15/2013	113.0	48.20	22.3	5.50	<0.0050	<0.0020	NA	0.200	3.91	<5.0	536	1,090	1,850	7.38	47.4	324.0	2.6	0.72	NA	0.260	0.260	9,000	350,000	359,000
		8/21/2014	117.0	53.30	241.0	5.81	0.3730	<0.00080	0.0285	0.122	4.22	<5.0	539	1,160	1,660	NA	42.5	342.0	2.7	<0.50	0.0	0.063	<0.020	2,300	66,500	359,000
		8/12/2015	STAGNANT WATER - NOT SAMPLED																							
		8/25/2016	DRY - NOT SAMPLED																							
		9/6/2017	STAGNANT WATER - NOT SAMPLED																							
		8/20/2018	STAGNANT WATER - NOT SAMPLED																							
		10/23/2019	STAGNANT WATER - NOT SAMPLED																							
		8/26/2020	STAGNANT WATER - NOT SAMPLED																							
		10/19/2021	STAGNANT WATER - NOT SAMPLED																							
		9/1/2022	STAGNANT WATER - NOT SAMPLED																							
Spring03 - Quiet Spring	Rancho Escondido	8/21/2014	STAGNANT WATER - NOT SAMPLED																							
		8/12/2015	STAGNANT WATER - NOT SAMPLED																							
		8/25/2016	STAGNANT WATER - NOT SAMPLED																							
		9/6/2017	NO ACCESS GRANTED - NOT SAMPLED																							
		8/20/2018	NO ACCESS GRANTED - NOT SAMPLED																							
		10/23/2019	NO ACCESS GRANTED - NOT SAMPLED																							
		8/26/2020	NOT SAMPLED																							
		10/19/2021	NOT SAMPLED																							
		9/1/2022	STAGNANT WATER - NOT SAMPLED																							

Notes:

< - less than the laboratory reporting limit

> - greater than

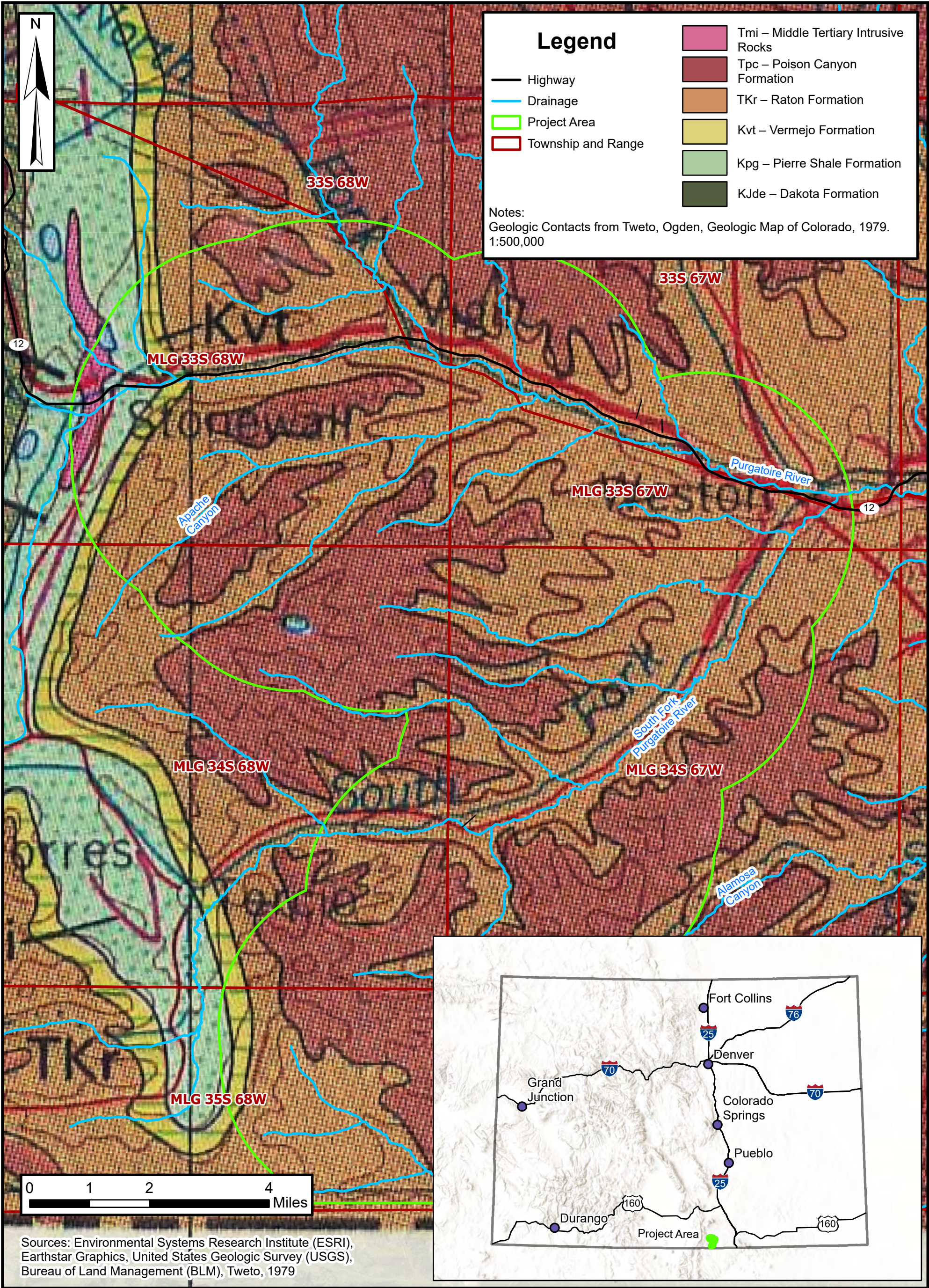
cfu/ml - coliform units per milliliter

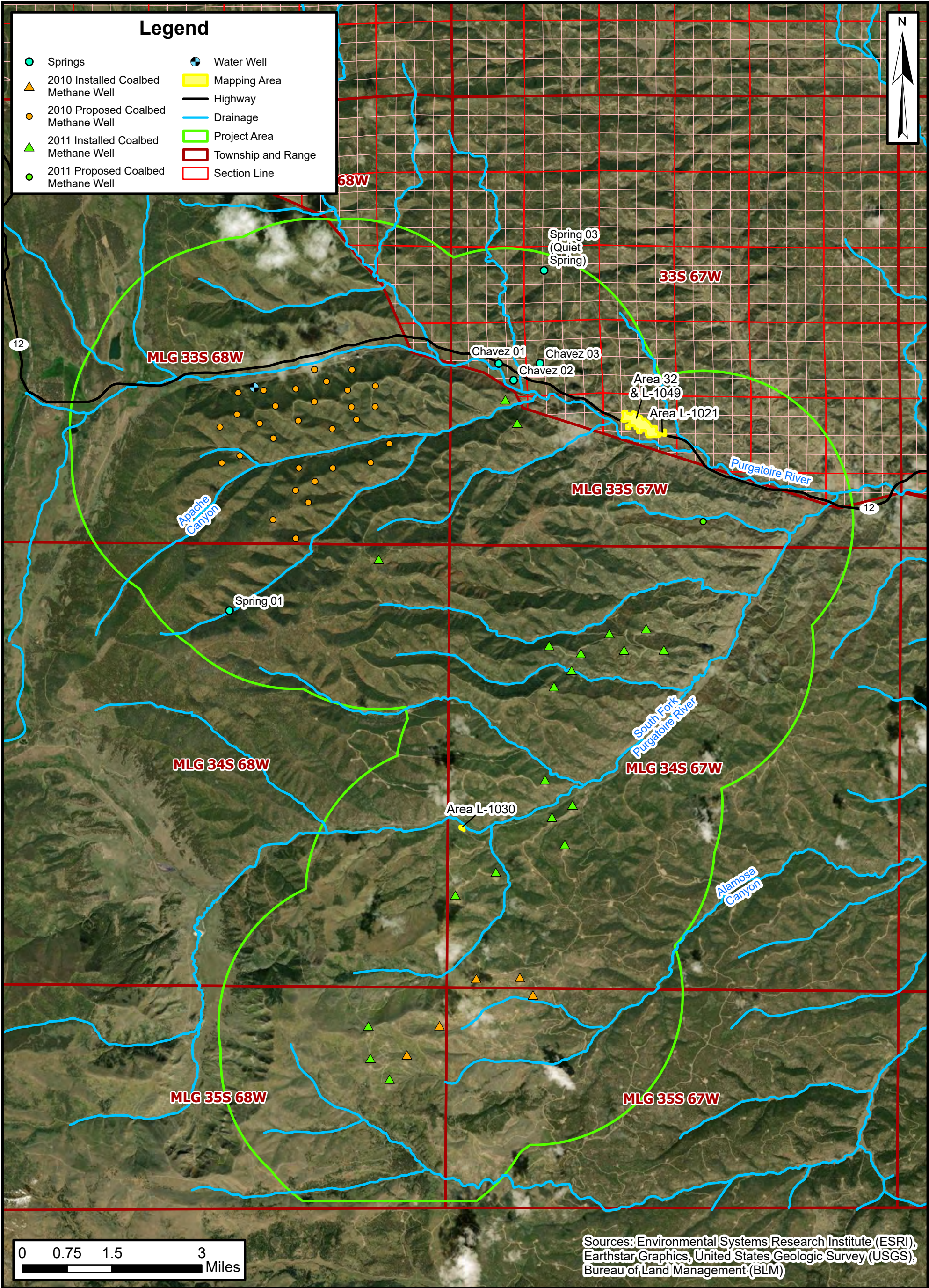
mg/l - milligrams per liter

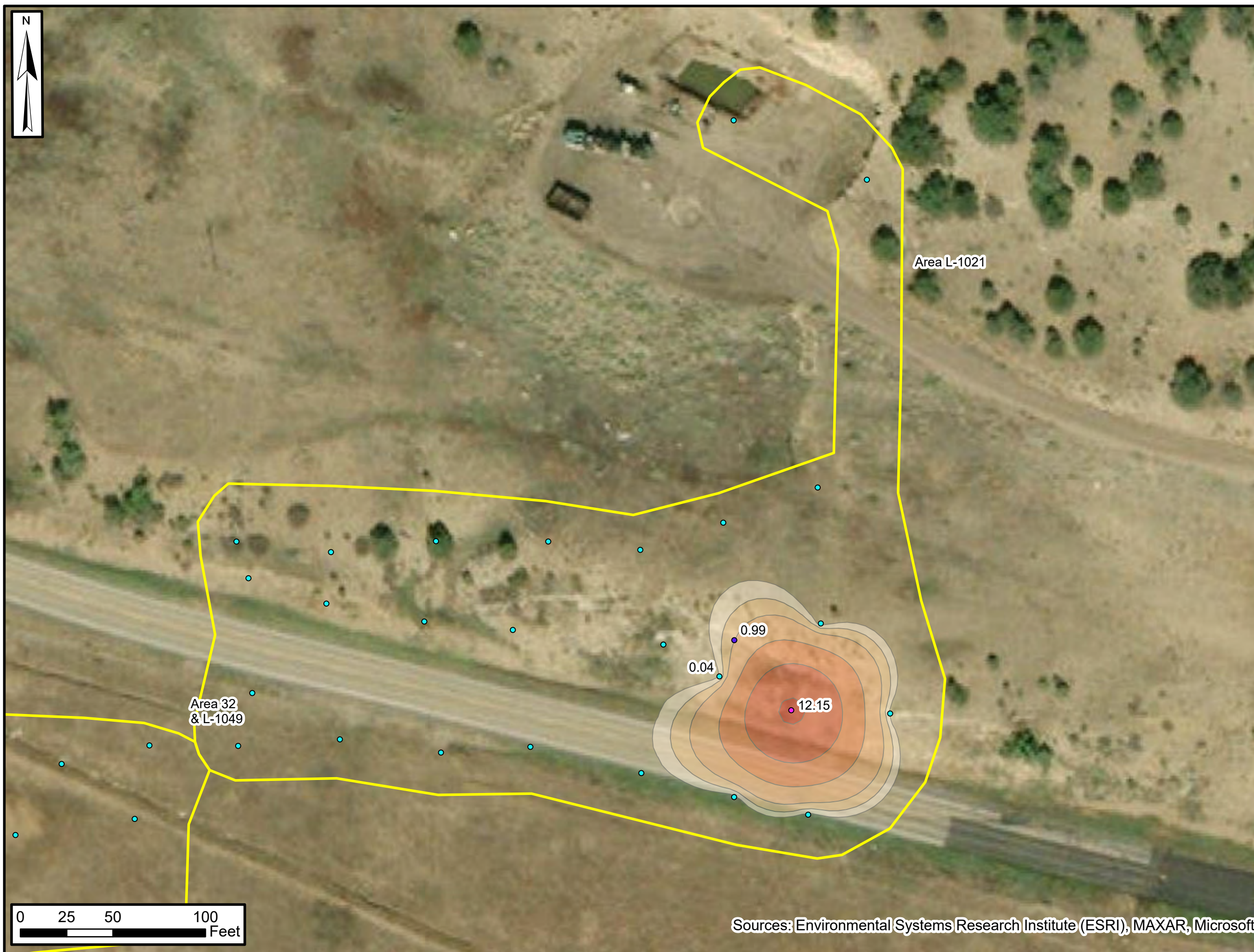
NA - not analyzed

TDS - total dissolved solids

umhos/cm - microhms per centimeter







Legend

2022 Methane Flux Measurement

- 0.000 - 0.200
- 0.2001 - 0.500
- 0.501 - 1.000
- 1.001 - 10.000
- 10.001 - 46.800

Methane Flux Concentration

- 0.200 - 0.500
- 0.501 - 1.000
- 1.001 - 2.500
- 2.501 - 5.000
- 5.001 - 10.000
- 10.001 - 12.150
- Mapping Area

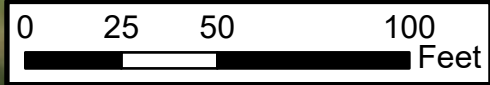
Notes:
Flux Measurement in Moles Per Square Meter Per Day ($\text{mol}/\text{m}^2/\text{day}$)
Methane Flux concentration ($\text{mol}/\text{m}^2/\text{day}$)

Methane Flux Contours Mapping Area L-1021

Ogris Operating, LLC

2022 Colorado Rule 614 Compliance
Raton Basin
Las Animas County, Colorado

Figure 3



Sources: Environmental Systems Research Institute (ESRI), MAXAR, Microsoft

Legend

2022 Methane Flux Measurement

- 0.000 - 0.200
- 0.2001 - 0.500
- 0.501 - 1.000
- 1.001 - 10.000
- 10.001 - 46.800

Methane Flux Concentrations

- 0.200 - 0.500
- 0.501 - 1.000
- 1.001 - 2.500
- 2.500 - 4.990
- Mapping Area

Notes:
Flux Measurement in Moles Per Square Meter Per Day ($\text{mol/m}^2/\text{day}$)
Methane Flux concentration ($\text{mol/m}^2/\text{day}$)

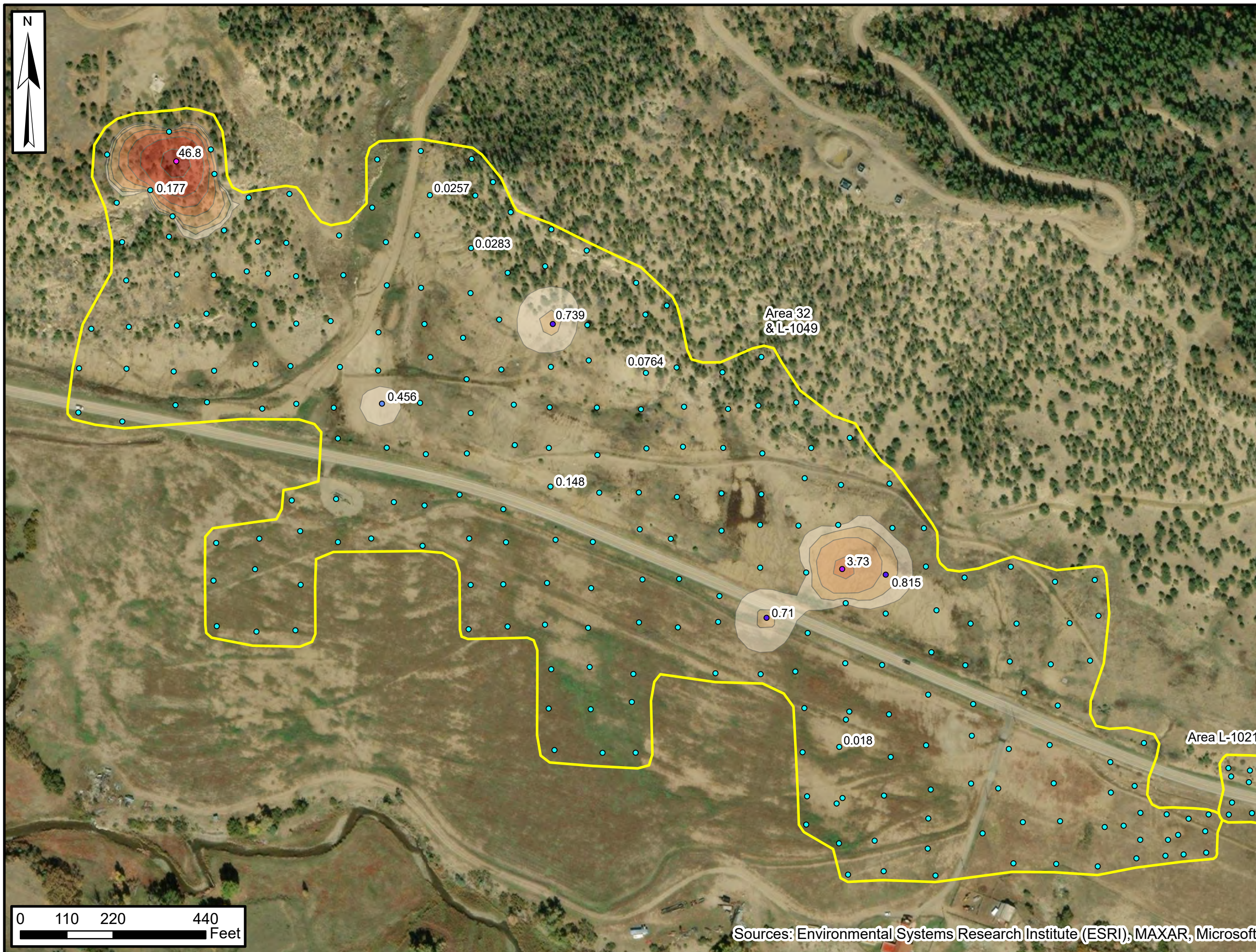
Methane Flux Contours
Mapping Area L-1030

Ogris Operating, LLC

2022 Colorado Rule 614 Compliance
Raton Basin
Las Animas County, Colorado

Figure
4





Legend

2022 Methane Flux Measurement

- 0.000 - 0.200
- 0.2001 - 0.500
- 0.501 - 1.000
- 1.001 - 10.000
- 10.001 - 46.800

Methane Flux Concentration

- 0.200 - 0.500
- 0.501 - 1.000
- 1.001 - 2.500
- 2.501 - 5.000
- 5.001 - 10.000
- 10.001 - 25.000
- 25.001 - 46.800
- Mapping Area

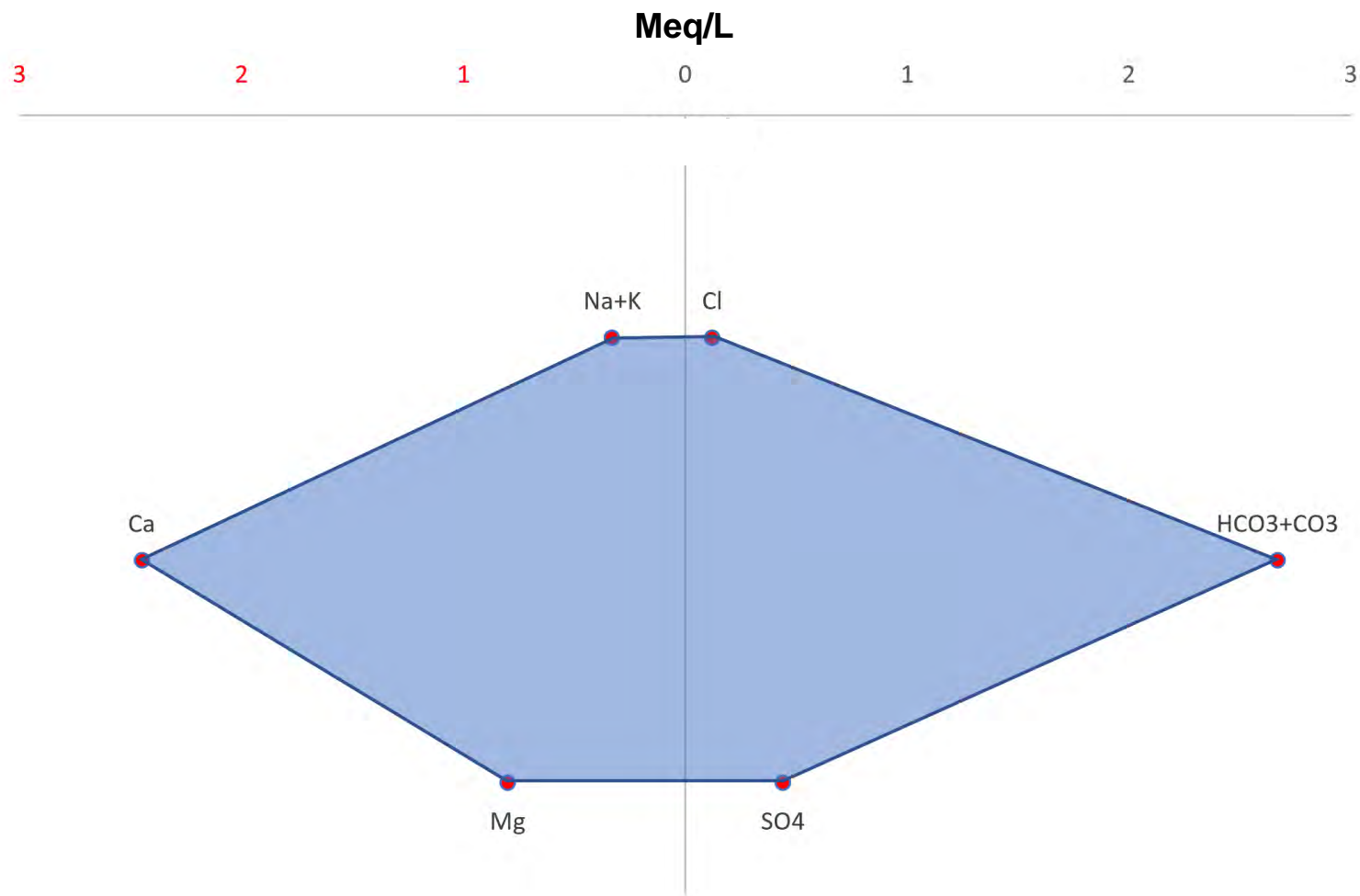
Notes:
Flux Measurement in Moles Per Square Meter Per Day ($\text{mol}/\text{m}^2/\text{day}$)
Methane Flux concentration ($\text{mol}/\text{m}^2/\text{day}$)

Methane Flux Contours Mapping Area 32 & L-1049

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Raton Basin
Las Animas County, Colorado

Figure
5



LEGEND

Ca: CALCIUM
Cl: CHLORIDE
CO₃: CARBONATE
HCO₃: BICARBONATE
K: POTASSIUM
Mg: MAGNESIUM
Na: SODIUM
SO₄: SULFATE
meq/L: MILLIEQUIVALENTS PER LITER

FIGURE 6
STIFF DIAGRAM
Spring Sample: Chavez 02
2022 COLORADO 614 COMPLIANCE REPORT

APPENDIX A

Equipment Specifications

Trimble DA2

GNSS RECEIVER FOR THE TRIMBLE CATALYST SERVICE



Simply precise.

Next generation Trimble® Catalyst™ GNSS receiver. DA2 performance scales with your Trimble Catalyst service subscription to deliver anywhere from 1 cm to 60 cm accuracy, and provides support for any field device.

KEY FEATURES

- ▶ Simple, precise, submeter-to-centimeter GNSS accuracy
- ▶ Scalable and flexible accuracy-based pricing
- ▶ Lightweight and rugged design
- ▶ Simple installation and setup
- ▶ Multi-frequency (L1/L2/L5/MSS) capable
- ▶ Powered by Trimble ProPoint™ GNSS positioning technology
- ▶ Supports all global GNSS systems
- ▶ Flexible mounting options
- ▶ Connect wirelessly to iOS and Android™ devices
- ▶ Conveniently USB powered

Learn more: geospatial.trimble.com/da2

Trimble DA2 CATALYST GNSS RECEIVER

GNSS PERFORMANCE

SBAS	
Horizontal accuracy	0.6 m RMS
Vertical accuracy	1.2 m RMS
Code Differential (DGPS)	
Horizontal accuracy	0.3 m + 1 ppm/RMS
Vertical accuracy	0.6 m + 1 ppm/RMS
Single baseline (<30 km) RTK	
Horizontal accuracy	10 mm + 1 ppm/RMS
Vertical accuracy	20 mm + 1 ppm/RMS
Network RTK	
Horizontal accuracy	10 mm + 0.5 ppm/RMS
Vertical accuracy	20 mm + 0.5 ppm/RMS
Trimble RTX[®] (using Trimble CorrectionsHub)	
Horizontal accuracy	2 cm RMS
Vertical accuracy	5 cm RMS
Positioning rate	1 Hz, 5 Hz, 10 Hz

SIGNAL TRACKING

- Trimble ProRint GNSS positioning technology for improved accuracy and productivity in challenging GNSS conditions¹
- GPS: L1C/A, L2C, L5
- QZSS: L1C/A, L2C, L5
- SBAS: L1C/A, L2C, L5
- Galileo: E1, E5A
- Baidu: B1, B2A
- QZSS: L1C/A, L2C, L5
- NavIC (IRNSS): L5
- Digital channels: Software controlled by Catalyst dynamic signal tracking using mathematical channels

Notes on Specifications and Testing Procedures

Mechanical performance testing was performed by Trimble with production quality DA2 devices. GNSS performance testing was performed by Trimble with production quality DA2 devices. GNSS performance is dictated by the Catalyst subscription type in use. GNSS accuracy may be affected by anomalies such as multipath, signal geometry, atmospheric conditions, and proximity to obstructions such as trees, mountains, buildings, and other structures. Accuracy specifications are valid in normal conditions with clear line of sight to the sky. Accuracy may degrade quickly and significantly under any of the aforementioned anomalous conditions.

MECHANICAL

Dimensions (Diameter x Depth)	128 x 55 mm
Weight	330g (11.6oz)
Ingress protection level	IP65 (dust proof, rain proof)
Drop shock & vibration	Survives 2 m tipping falls Survives 12 m free falls to concrete Survives vibrations & mechanical shocks (MIL-STD-883C test method)

Supported Platforms

Android	Android 5.0 (Pie) and higher
iOS	iOS 13.0 and higher

COMMUNICATIONS/CONNECTIVITY

Bluetooth	4.2
Apple	Made for iOS certified
Ports	USB-A (Power only)
Data protocols	NTRIP VRS, RTCM 3.2 MSM, CMR, DOOL
Position output	NMEA (U/I), DOOL Android Location Services Apple Location Services Android Location Extras

BATTERY AND POWER

Requires external USB battery pack	
External power input	USB-A (5V 1A)
Power consumption	20-25 W

ENVIRONMENTAL

Operating ambient temperature	-20 °C to +60 °C (-4 °F to +140 °F)
Storage temperature	-40 °C to +70 °C (-40 °F to +158 °F)
Operating humidity	35% RH non-condensing
Operating altitude	Tested to 9,000 m (29,500 ft)

COMPLIANCE

USA: FCC Part 15 (Class B device) Canada: ICES 003 Europe: CE, UK: UKCA Australia: RCM. For latest compliance status usa.trimble.com/FAC-compliance

IN THE BOX

- Catalyst DA2
- 1/4" thread mount
- USB power cable
- Battery clamping kit
- Documentation

OPTIONAL ACCESSORIES FROM TRIMBLE

- 1/4" thread mount
- Locking 1/4" thread mount
- USB battery pack
- Soft pouch
- 2 m carbon fiber pole
- 2 m aluminum pole
- Antenna backpack and more

¹ Operating GNSS environments are locations where the receiver has sufficient signal availability to achieve minimum accuracy requirements, but where the signal may be partially obstructed by nearby structures, buildings, and other objects. Actual results may vary based on user's geographic location and atmospheric activity, as well as receiver GNSS constellation health and availability, and level of multipath and signal obstruction.



1 performance subject to change without notice

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Aqua TROLL® 500 Multiparameter Sonde

REDUCE MONITORING COSTS AND GET BETTER DATA FASTER WITH THE AQUA TROLL 500, A COST-EFFECTIVE MULTIPARAMETER SONDE IDEAL FOR BOTH SPOT CHECKS AND LONG-TERM MONITORING. THIS WIRELESS-ENABLED INSTRUMENT STREAMLINES DATA COLLECTION, SAVING HOURS IN THE FIELD WHILE DELIVERING MORE RELIABLE DATA.

The customizable sonde comes with sensors that include:

- RDO® Optical Dissolved Oxygen
- Actual and specific conductivity
- pH/ORP
- Salinity
- Total dissolved solids (TDS)
- Resistivity
- Density
- Turbidity
- Temperature and pressure
- Ion Selective Electrodes
- Fluorometers

Connect the Aqua TROLL 500 to a Wireless TROLL Com and use it as a handheld, or connect the sonde to control systems or telemetry for remote monitoring.

BE SMART

- **Lower cost of ownership:** Rugged multiparameter sonde with wet-mateable sensors replaces single parameter instruments and requires minimal maintenance and calibration.
- **Data you can count on:** The corrosion-resistant multiparameter sonde withstands harsh environments. Highly stable sensors with simple calibration. LCD readout of sensor health and connectivity gives you confidence in your deployment.

www.in-situ.com

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1-800-446-7488 (toll-free in U.S.A. and Canada)
1-970-498-1500 (U.S.A. and international)

- **Simple setup:** Connect easily with telemetry, PLC/SCADA or dataloggers, or download real-time data wirelessly via mobile app for spot checks and profiling. The app walks you through instrument setup, just click to download and share data—no training or post-processing required.

BE MOBILE

- **Save time in the field:** Auto-configuration and fast sensor response speed up sampling, while automated data collection eliminates the need to record data in field logs.
- **Use the Aqua TROLL 500 anywhere:** Flexible multiparameter sonde works for spot checks and low-flow sampling as well as long-term deployments. Anti-fouling wiper and titanium construction provide reliability even in challenging conditions.
- **Take your data with you:** VuSitu Mobile App records data directly from the probe. Log Setup Assistant simplifies instrument setup and reduces errors. Optimize your data with Panoramic Live Data.

TOTAL FIELD SUPPORT

- **Get free 24/7 tech support and application guidance in the field**
- **Guaranteed 7-day maintenance turnaround**
- **Top rated for customer service for over 40 years**

Applications:

- **SURFACE WATER SPOT SAMPLING AND PROFILING**
- **REMOTE MONITORING VIA TELEMETRY**
- **LONG-TERM DRINKING WATER, WASTEWATER OR STORMWATER MONITORING**
- **AQUACULTURE**
- **WIRED OR WIRELESS WATER QUALITY NETWORKS**

GENERAL	AQUA TROLL 500 MULTIPARAMETER SONDE		
OPERATING TEMP. (NON-FREEZING)	-5 to 50°C (23 to 122°F) ISE: Ammonium and Nitrate 0 - 40°C, Chloride 0 - 50°C	EXTERNAL POWER VOLTAGE EXTERNAL POWER CURRENT ¹	8-36 VDC; Required for normal operation Sleep: < 0.2 mA typical; Measurement: 40 mA typical, 75 mA Max
STORAGE TEMP.	Components Without Fluid -40°C to + 65°C (Non Freezing Water) pH/ORP Sensors -5°C to +65°C Ammonium/Nitrate: 0 - 40°C Chloride: 0 - 50°C	INTERNAL MEMORY AND DATA LOGGING	Use external datalogger or telemetry
DIMENSIONS	Length: 46 cm (18.145") (includes connector). With bail: 59 cm (23.25") Diameter: 4.7 cm (1.860")	READING RATES	1 reading every 2 seconds
WEIGHT	0.978 kg / 2.15 lbs. (includes instrument, sensors, restrictor and bumpers)	COMMUNICATION DEVICE	Wireless TROLL Com
WETTED MATERIALS (SONDE AND SENSORS)	PC, PC alloy, Delrin, Santoprene, Inconel, Viton, Titanium, Platinum, Ceramic, Nylon, PVC, Graphite	CABLE OPTIONS	Vented or non-vented polyurethane or vented Tefzel®
SENSOR HEX SCREW DRIVER	0.050, 1.3 mm	LCD DISPLAY	Integrated display shows status of sonde, sensor ports, power voltage and connectivity, enable/disable BT.
ENVIRONMENTAL RATING	IP68 with all sensors and cable attached IP67 without the sensors or cable attached	SOFTWARE	Android: VuSitu through Google Play Windows: Win-Situ 5 Data Services: HydroVu
MAX PRESSURE RATING	Up to 150 PSI Ammonium/Nitrate up to 30PSI	INTERFACE	Android 4.4, requires Bluetooth 2.0
OUTPUT OPTIONS	RS-485/MODBUS, SDI-12, Bluetooth	CERTIFICATIONS	CE, FCC, WEEE, RoHS Compliant

STANDARD SENSORS	ACCURACY	RANGE	RESOLUTION /PRECISION	RESPONSE TIME	UNITS OF MEASURE	METHODOLOGY
TEMPERATURE ²	+/- 0.1°C	-5 to 50°C (23 to 122°F)	0.01°C	T63<2s, T90<15s, T95<30s	Celsius or Fahrenheit	EPA 170.1
BAROMETRIC PRESSURE (VENTED MODELS ONLY)	+/- 1.0 mBars	300 - 1100 mBars	0.1 mBar	T63<1s, T90<1s, T95<1s	Pressure: psi, kPa, bar, mbar, inHg, mmHg;	Silicon strain gauge
pH ³	±0.1 pH unit or better	0-14 pH	0.01 pH	T63<3s, T90<15s, T95<30s	pH, mV	Std. Methods 4500-H+, EPA 150.2
ORP ⁴	+/- 5 mV	±1400 mV	0.1 mV	T63<3s, T90<15s, T95<30s	mV	Std. Methods 2580
CONDUCTIVITY ⁵ -TDS (TOTAL DISSOLVED SOLIDS) -SALINITY	±0.5% of reading plus 1 µS/cm from 0 to 100,000 µS/cm; ±1.0% of reading from 100,000 to 200,000 µS/cm; ±2.0% of reading from 200,000 to 350,000 µS/cm	0 to 350,000 µS/cm 0-350 ppt 0-350 PSU	0.1 µS/cm 0.1 ppt 0.1 PSU	T63<1s, T90<3s, T95<5s	Actual conductivity (µS/cm, mS/cm); Specific conductivity (µS/cm, mS/cm); Salinity (PSU, ppt); Total dissolved solids (ppt, ppm); Resistivity (Ohms-cm); Density (g/cm3)	Std. Methods 2510, EPA 120.1 Std. Methods 2520A
RUGGED DISSOLVED OXYGEN (RDO) WITH RDO-X OR FAST CAP ⁶	±0.1mg/L +/-2% of reading	0 to 20 mg/L 20 to 60 mg/L	0.01 mg/L	RDO-X: T63<15s, T90<45s, T95<60s Fast Cap: T63<1s, T90<15s, T95<30s	mg/L, %saturation, ppm	EPA-approved In-Situ Methods: 1002-8-2009, 1003-8-2009, 1004-8-2009
TURBIDITY - TSS (TOTAL SUSPENDED SOLIDS) ⁷	+/-2% of reading or +/- NTU, FNU, w.i.g. ¹²	0 - 4,000 NTU 0-1,500 mg/L	0.01 NTU (0-1,000); 0.1 NTU (1,000-4,000) 0.1 mg/L	T63<1s, T90<1s, T95<1s	NTU, FNU ppt, mg/L	ISO 7027
AMMONIUM (NH4+ - N) ^{8,9} RATED TO 25 M DEPTH -Unionized Ammonia, Total Ammonia (requires salinity, temperature and pH)	±10% or ± 2 mg/L, w.i.g. ¹² (freshwater only)	0-10,000 mg/L as N	0.01 mg/L	T63<1s, T90<10s, T95<30s	mg/L, ppm, mV	N/A
NITRATE (NO3 - - N) ⁸ RATED TO 25 m DEPTH	±10% or ± 2 mg/L, w.i.g. ¹² (freshwater only)	0-40,000 mg/L as N	0.01 mg/L	T63<1s, T90<1s, T95<1s	mg/L, ppm, mV	Std. Methods 4500-NO3 D
CHLORIDE (CL-) ⁸	±10% or ± 2 mg/L, w.i.g. ¹² (freshwater only)	0-150,000 mg/L	0.01 mg/L	T63<1s, T90<10s, T95<30s	mg/L, ppm, mV	Std. Methods 4500-Cl- D
PRESSURE (OPTIONAL) ¹⁰	±0.1% FS from -5 to 50°C	Non-Vented or Vented 9.0 m (30 ft.) - Burst: 27 m (90 ft.) 30 m (100 ft.) - Burst: 40 m (130 ft.) 76 m (250 ft.) - Burst: 107 m (350 ft.) 100 m (325 ft.) - Burst: 200 m (650 ft.)	0.01% full scale	T63<1s, T90<1s, T95<1s	Pressure: psi, kPa, bar, mbar, inHg, mmHg; Level: in, ft., mm, cm, m; Level: in, ft., mm, cm, m	Piezoresistive; Ceramic
WARRANTY ¹¹	2 year - Sonde, RDO and sensor cap, temperature/conductivity, temperature only, turbidity (excluding pH/ORP); 1 year - pH/ORP, chloride ISE, accessories 90 Days - Nitrate and Ammonium ISE sensors; See warranty policy (www.in-situ.com/warranty)					

NOTES

¹External power current dependent on display and wiping. ²Typical system response with instrument, sensors and restrictor when changing approximately 15°C in moderate flow. ³pH sensor Response time at thermal equilibrium. ⁴ORP sensor Accuracy from calibration standard @ 25C, response-at thermal equilibrium immediately following calibration in ZoBell's measuring from air to +400 mV. ⁵Conductivity Accuracy at calibration points. ⁶RDO sensor full range 0-50mg/L, 0-500% sat. EPA-approved under the Alternate Test Procedure process. ⁷TSS User defined reference. ⁸ISE Between 2 calibration points immediately following proper conditioning and calibration. Varies on site conditions and environmental interferences. See sensor summary sheet for potential interferences. ⁹Ammonia Average response, can be longer with increasing concentrations of ammonium. ¹⁰Pressure Typical performance across full temperature and pressure calibrated range. ¹¹Warranty Extended warranty option for sonde only (1-3 year extension for up to 5 years total). ¹²Whichever is greater.

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ONE TO SIX GAS PORTABLE MONITOR

Gas Detection For Life

EAGLE 2 Model



Features

- **Monitor up to 6 different gases**
- **PPM, % LEL, or % Vol. auto-ranging combustible detection**
- **Specialty Sensors**
 - **PID (Photoionization Detector)**
 - Low or high range for VOC detection
 - Fence Electrode Technology for humidity and contamination resistance
 - **Infrared (IR)**
 - CO₂, % LEL CH₄, % Vol. CH₄, % LEL HC, % Vol. HC
 - **Thermal Conductivity (TC)**
 - % Vol. H₂, % Vol. CH₄
 - **Smart toxic, plug and play sensors**
 - NH₃, AsH₃, Cl₂, HCN, PH₃, & SO₂
 - **Hydrogen specific LEL / ppm sensor**
- **Powerful long-life pump up to 125' range**
- **Low flow pump shut off and alarm**
- **Methane elimination for environmental use**
- **Alkaline 18 hours or NiMH 20 hours capability**
- **EPA Method 21 VOC Monitoring**
- **Internal hydrophobic dust filter**
- **External probe with hydrophobic filter**
- **Multilingual (5 languages)**
- **Ergonomic RFI / EMI / chemical / weather resistant enclosure**
- **Intrinsically safe design, CSA approval**
- **Datalogging standard**

The EAGLE 2 is the solution for just about any portable gas monitoring situation. Equipped with features that are not available on competitive units, the EAGLE 2 is a powerful instrument that does more than just offer the standard confined space protection for LEL, O₂, H₂S and CO. The EAGLE 2 offers easy access to controls such as autocalibration, alarm silence, demand zero, peak hold, and methane elimination. Each channel has two alarm levels plus TWA and STEL alarms for toxic channels. The two alarm levels are user adjustable and can be latching or self resetting.

The EAGLE 2 available features include a PID sensor for detecting high or low ppm levels (0-50 & 0-2,000) of VOC gases; % volume capability for CH₄ and H₂ using a TC (thermal conductivity) sensor; PPM or LEL hydrocarbon detection at the push of a button; infrared sensors for CO₂ (ppm or % volume), methane or hydrocarbons in LEL and % volume ranges; methane elimination feature for environmental applications; and a variety of super toxic gases. The EAGLE 2 has a strong internal pump with a low flow auto pump shut off and alarm, which can draw samples from up to 125 feet. This allows for quick response and recovery from distant sampling locations. The EAGLE 2 will continuously operate for over 18 hours on alkaline batteries or 20 hours on NiMH. A variety of accessories are also available to help satisfy almost any application such as long sample hoses, special float probes for tank testing, and dilution fittings, just to name a few. Datalogging is a standard feature for all sensors on all versions.

The Eagle 2 is ideal for performing EPA Method 21 fugitive emission monitoring of VOC leaks from process equipment.. EPA Method 21- Determination of Volatile Organic Compound Leaks, is a test method used for the determination of leaks of VOCs from process equipment. The Eagle 2 meets the requirements for portable instruments used for this purpose as outlined in Sections 6 and 8 of Method 21.

RKI Instruments, Inc. • 33248 Central Ave. Union City, CA 94587 • Phone (800) 754-5165 • (510) 441-5656 • Fax (510) 441-5650

World Leader In Gas Detection & Sensor Technology
www.rkiinstruments.com

EAGLE 2 Model

Enclosure	Weatherproof, chemical resistant, RFI / EMI coated high impact polycarbonate-PBT blend. Can operate in 2.0" of water without leakage. Ergonomically balanced with rugged top mounted handle. Water & dust resistant equivalent to IP64.
Dimensions	9.5" L x 5.25" W x 5.875" H
Weight	3.8 Lbs (standard 4 gas with batteries).
Detection Principle	Catalytic combustion, electrochemical cell, galvanic cell, infrared, Photoionization detector, and thermal conductivity.
Sampling Method	Powerful, long-life internal pump (over 6,000 hours) can draw samples over 125 feet. Flow rate approximately 2.0 SCFH.
Display	3 display modes: display all gases, large font-autoscroll, or large font-manual scroll. Polyurethane protected overlay. Backlight, illuminates for alarms and by demand, with adjustable time.
Language	Readout can display in 5 languages (English, French, German, Italian, or Spanish).
Alarms	2 Alarms per channel plus TWA and STEL alarms for toxics. The two alarms are fully adjustable for levels, latching or self reset, and silenceable.
Alarm Method	Buzzer 95 dB at 30 cm, four high intensity LED's.
Controls	4 External glove friendly push buttons for operation, demand zero, and autocalibration. Buttons also access LEL/ppm, alarm silence, peak hold, TWA/STEL values, battery status, conversion factors, and many other features.
Continuous Operation	At 70°F, 18 hours using alkaline batteries, or 20 hours using NiMH.
Power Source	4 alkaline or NiMH, size C batteries (Charger has alkaline recognition to prevent battery damage if charging is attempted with alkalines).
Operating Temp. & Humidity	-20°C to 50°C (-4°F to 122°F), 0 to 95% RH, non-condensing.
Environmental	IP-64
Response Time	30 Seconds to 90% (for most gases) using standard 5 ft hose.
Safety Rating	Intrinsically Safe, Class I, Groups A, B, C, D. Approvals: CSA / CE
Standard Accessories	Shoulder strap, alkaline batteries, hydrophobic probe, and 5 foot hose, internal hydrophobic filter.
Optional Accessories	<ul style="list-style-type: none"> Dilution fitting (50/50) NiMH batteries Battery charger, 115 VAC, 220 VAC, or 12 VDC (charge time 4 hours) Continuous operation adapter, 115 VAC or 12 VDC Extension hoses IRDA cable for datalogging download
Warranty	Two year material and workmanship, one year for PID sensor.

Gas	Measuring Range	Accuracy * Which ever is greater
Gases & Detectable Ranges		
Standard Confined Space Gases		
Hydrocarbons (CH ₄ , std)	0 - 100% LEL	± 5% of reading or ± 2% LEL (*)
	0 - 5% Vol. (CH ₄)	
	0 - 50,000 ppm	± 50 ppm or ± 5% of reading (*)
Oxygen (O ₂)	0 - 40% Vol.	± 0.5% O2
Carbon Monoxide (CO)	0 - 500 ppm	± 5% of reading or ± 5 ppm CO (*)
Hydrogen Sulfide (H ₂ S)	0 - 100 ppm	± 5% of reading or ± 2 ppm H2S (*)
Toxics		
Ammonia (NH ₃)	0 - 75 ppm	± 10% of reading or ± 5% of full scale (*)
Arsine (AsH ₃)	0 - 1.5 ppm	
Chlorine (Cl ₂)	0 - 3 ppm	
Hydrogen Cyanide (HCN)	0 - 15 ppm	
Phosphine (PH ₃)	0 - 1 ppm	
Sulfur Dioxide (SO ₂)	0 - 6 ppm	
IR Sensors		
Carbon Dioxide (CO ₂)	0 - 10,000 ppm 0 - 5% Vol. 0 - 60% Vol.	± 5% of reading or ± 2% of full scale (*)
Methane (CH ₄)	0 - 100% LEL/ 0 - 100% Vol.	
Hydrocarbons	0 - 100% LEL/ 0 - 30% Vol.	
PID Sensors		
VOC	0 - 2,000 ppm 0 - 50 ppm	—
TC Sensors		
Methane (CH ₄)	0 - 100% Vol.	± 5% of reading or ± 2% of full scale (*)
Hydrogen (H ₂)	0 - 10% Vol. 0 - 100% Vol.	
Hydrogen Specific		
Hydrogen (H ₂)	0-100% LEL 0-40,000 ppm	± 5% of reading or ± 2% of full scale (*)

The EAGLE 2 can be configured with up to 6 gas sensors from the above list.

Specifications subject to change without notice.

Made in the USA



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Authorized Distributor:

TECHNICAL ATTACHMENT

Portable soil flux meter

West Systems S.r.l.

Sede Legale: Via Don Mazzolari, 25 - Zona Ind. La Bianca - 56025 Pontedera (PI) - Tel. +39 0587 483335 Fax +39 0587 296068

Sede Operativa: Viale Donato Giannotti, 24 - 50126 Firenze - Tel. +39 055 461429 Fax +39 055 6585750

Sede Operativa: Via Livorno, 8/37 - 50142 Firenze - Tel. +39 055 7327147 Fax +39 055 7328435

Sede Operativa: Via Baranzate, 89 - 20026 Novate Milanese (MI) - Tel. +39 02 49467831 Fax +39 02 49467419

Sede Operativa: Via Adriano Olivetti, 24/26 - Tecnopolo Tiburtino - 00131 Roma - Tel. 06 2242 0490

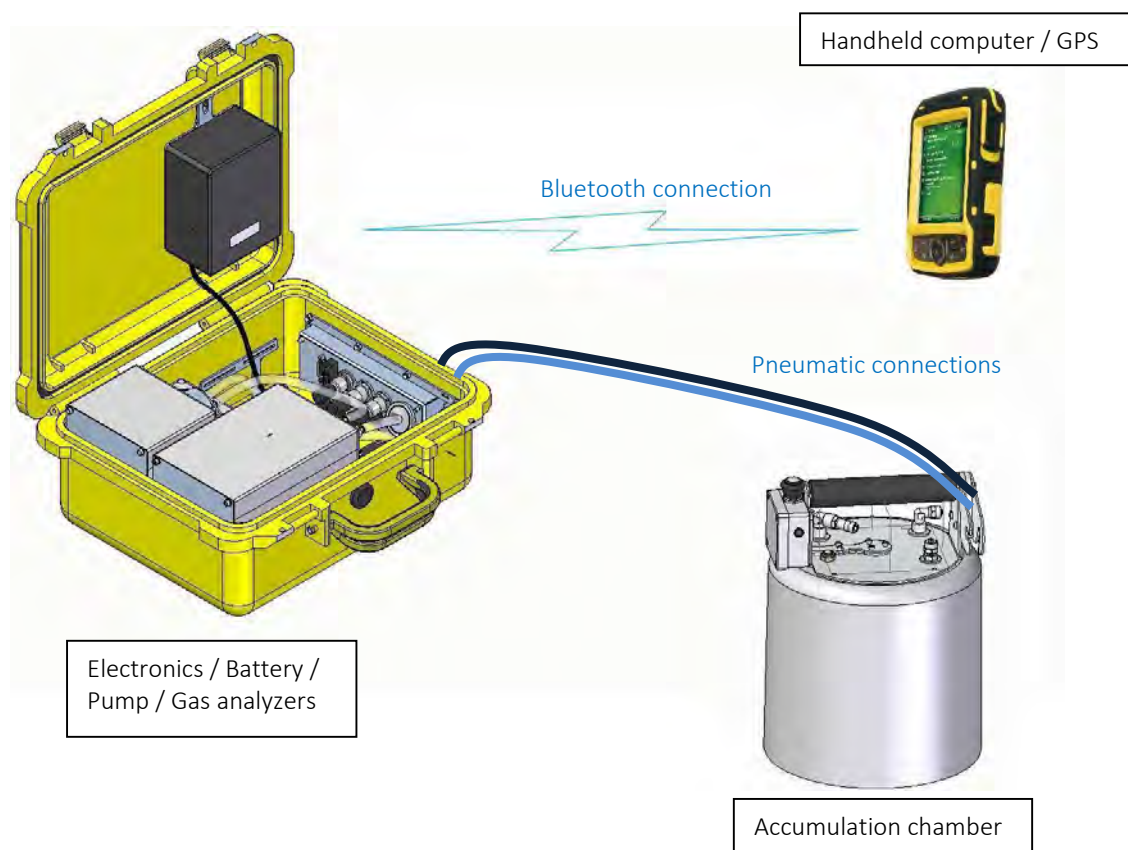
C.F., P.IVA e n. iscrizione Registro Imprese 01071300501 - REA Pisa 98371.



www.westgroup.eu
info@westgroup.eu

The WEST Systems Fluxmeter is a portable instrument for the measurement of soil diffuse flux applying the accumulation chamber method. This method studied for soil respiration in agronomy (Parkinson¹) and for soil degassing in volcanic areas, has been designed by WEST Systems to obtain a portable instrument that allows to take measurements with very high accuracy in a short time. The instrument allows a wide range evaluation of carbon dioxide diffuse flux (and CH₄ / H₂S / VOC / Oxygen using the additional optional detectors).

1 Parkinson K.J.: *An improved method for measuring soil respiration in the field*, J.Appl.Ecology, 18, 221-228, 1981.



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Carbon dioxide analyzer**Option A : WS-LI850: Carbon dioxide flux measurement**

The instrument comes with a LI-COR LI-850-3 carbon dioxide and water vapour analyzer with the following specifications:

CO₂

Measurement Range: 0-20,000 ppm

Accuracy: < 1.5% of reading

RMS Noise @ 370 ppm with 1 second signal filtering: <1ppm

H₂O

Measurement Range: 0-60 millimol/mol

Accuracy: < 1.5% of reading

RMS Noise at 10 mmol/mol with 1 sec signal filtering: <0.01 mmol/mol

CO₂ flux measurement range: from 2 to 150,000 millimoles/m² per day (by using chamber type D)

The accuracy of measurements is a function of the flux:

Range from 2 to 1,500 millimoles/m² per day: ±25%

Range from 1.5 to 150 moles/m² per day: ±10% (Chamber D)

Range from 1.5 to 100 moles/m² per day: ±10% (Chamber C)

Option B: WS-LI830: Carbon dioxide flux measurement

The instrument comes with a LI-COR LI-830-3 carbon dioxide analyzer with the following specifications:

CO₂

Measurement Range: 0-20,000 ppm

Accuracy: < 1.5% of reading

RMS Noise @ 370 ppm with 1 second signal filtering: <1ppm

CO₂ flux measurement range: from 2 to 150,000 millimoles/m² per day (by using chamber type D)

The accuracy of measurements is a function of the flux:

Range from 2 to 1,500 millimoles/m² per day: ±25%

Range from 1.5 to 150 moles/m² per day: ±10% (Chamber D)

Range from 1.5 to 100 moles/m² per day: ±10% (Chamber C)

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Optional: WS-VOC: Volatile organic compounds flux measurement

The volatile organic compounds sensor is based on a PID (Photoionization detector) equipped with a 10.6 eV lamp.

Measurement range: 0-50 ppm Isobutylene.

Limit of detection: 1 ppb Isobutylene.

VOC Flux measurement range: from 0.025 to 500 millimoles/(m² per day).

Optional: WS-CH4-TLD: Methane flux measurement

The analyzer is based on laser diode spectroscopy technology coupled with multipass cell. Technology: TDLAS (Tunable diode Laser Absorption Spectroscopy)

Concentration measurement range: 0.1 ppm to 10%vol

Operating temperature range: -20°C to +45°C

Methane flux measurement range: from 0.5 to 750000 millimoles/(m² per day).

Optional: WS-TOX-H2S: Hydrogen sulphide flux measurement

The hydrogen sulphide detector is a electrochemical cell with the following specifications:

The full-scale concentration range is 25 ppm, with a precision of 3% of reading, and the repeatability is 1.5% of span with a zero offset of 0.3%.

H₂S Flux measurement range: from 0.0025 to 0.5 moles/m² per day.

The accuracy of measurements is a function of the flux:

Range: from 2.5 to 50 millimoles/m² per day: ±25%

Range :from 50 to 500 millimoles/m² per day: ±10%

Optional: WS-OXI: Oxygen balance measurement

The oxygen detector is a optical cell with the following specifications:

The full-scale concentration range is 25 %, with a resolution of 0.01%; the oxygen detector combined with accumulation chamber allows the assessment of chemical processes related with soil respiration / soil contamination.

Global positioning system receiver

The WS-GPS embedded in the palmtop, allows the Geo-referencing of the flux measurement. During the flux measurement the position/elevation data are recorded by the flux-manager software and a "mean" position of the measured point is computed in order to reduce the GPS position-fix error. The

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precision depends on sky-view and on satellites costellation at measurement time. The position data are reported in latitude / longitude degrees (WSG84) and after a PC based post processing (FluxRevision) also in UTM coordinates. The elevation is reported in meters.

Warm Up

Only at instrument cold start-up a warm-up time of 20 minutes is required. The typical measurement time ranges from 2 to 4 minutes and the autonomy of the instrument is about 4 hours with a single NiMH 14.4 Volts, 4.5 A/h battery. The instrument comes with two interchangeable batteries.

Accumulation Chamber specifications:

The instrument comes with one accumulation chamber (type D or C); the D chamber, due to its height, is less sensitive than C chamber but allows the measurement of higher fluxes. The chamber C has a bigger footprint than chamber D. Each camera is equipped with a barometric pressure gauge, a relative humidity and a temperature gauge; The sensors are power supplied with a rechargeable battery and they send the information to the palmtop computer via bluetooth.

Accumulation chamber C

Diameter:	300 mm
Height:	100 mm
Weight:	2 Kg

Accumulation chamber D

Diameter:	200 mm
Height:	150 mm
Weight:	1.5 Kg

As an additional option we can provide a floating ring for flux measurement over water surfaces. If you're interested please request a quotation.

Palmtop computer

Palmtop based on Android operating system; integrated GPS, touchscreen, wireless communication with fluxmeter (via Bluetooth).

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Software

The instrument is supplied with a custom software suite:

- **FluxManager**, which allows to record and visualize the concentration curves of the target gas in the accumulation chamber, and then to calculate the flux. The measurements obtained can be saved on the palmtop computer and then transferred to a desktop PC with a USB connection or using an SD card; every measure is automatically georeferenced.
- **Fluxrevision**, that runs on a Windows based computer, allows the revision of the acquired data and the generation of a report file of the field-work, compatible with MS Excel.

The instrument is supplied complete with:

- Backpack-like support vest
- 2 batteries NiMH 14.4 Volts 4.5 Ah
- Battery Charger NiMH
- One accumulation chamber
- Palmtop computer
- User manual (in english)
- FluxManager software suite

The Fluxmeter can be furnished in two basic configurations:

Enhanced Fluxmeter

Assembled in a ruggedized case of 47 x 36 x 18 cm; the instrument can be equipped with:

- Carbon dioxide: WS-LI850-3 or WS-LI830
- WS-CH4-TLD: Methane
- WS-TOX-H2S: Hydrogen sulphide
- WS-OXI: Oxygen
- WS-VOC: Volatile organic compounds

Classic Fluxmeter

Assembled in a ruggedized case of 34 x 30 x 16 cm; the instrument can be equipped with:

- Carbon dioxide: WS-LI850-3 or WS-LI830
- WS-TOX-H2S: Hydrogen sulphide
- WS-OXI: Oxygen
- WS-VOC: Volatile organic compounds

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APPENDIX B

Individual Flux Measurements and Calculations

INDIVIDUAL FLUX MEASUREMENTS AND CALCULATIONS
2022 COLORADO RULE 614 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO

Site Point ID	Northing	Easting	Date	AcK ((mol/m ² /d)/(ppm/s))	CH ₄ moles (Slope)	H ₂ S moles (Slope)	CO ₂ moles (Slope)	CH ₄ flux (moles/m ² /d)	CO ₂ flux (moles/m ² /d)	H ₂ Sflux (moles/m ² /d)
Area-32-L-1049_1	1174875.27	3176141.321	8/30/2022	0.545086265	0	0	0.477	0	0.481856257	0
Area-32-L-1049_10	1174961.071	3176339.474	8/30/2022	0.542433262	0	0	0.211	0	0.212633833	0
Area-32-L-1049_100	1174765.692	3177184.559	8/31/2022	0.550747335	0	0	0.558	0	0.561762273	0
Area-32-L-1049_101	1174769.54	3177271.352	8/31/2022	0.550747335	0	0	0.502	0	0.506687582	0
Area-32-L-1049_102	1174766.889	3177366.784	8/31/2022	0.550747335	0	0	0.79	0	0.798583686	0
Area-32-L-1049_103	1174753.888	3177459.66	8/31/2022	0.550747335	0	0	0.293	0	0.295751333	0
Area-32-L-1049_104	1174766.619	3177575.572	8/31/2022	0.550747335	0	0	0.383	0	0.386624634	0
Area-32-L-1049_105	1174790.79	3177667.177	8/31/2022	0.550747335	0	0	0.239	0	0.240676582	0
Area-32-L-1049_106	1174682.088	3177761.544	8/31/2022	0.550747335	0	0	0.366	0	0.36955145	0
Area-32-L-1049_107	1174679.109	3177646.412	8/31/2022	0.550747335	0	0	0.452	0	0.456018806	0
Area-32-L-1049_108	1174694.961	3177560.145	8/31/2022	0.550747335	0	0	0.413	0	0.416364968	0
Area-32-L-1049_109	1174656.888	3177457.287	8/31/2022	0.550747335	0	0	0.494	0	0.498977095	0
Area-32-L-1049_11	1174958.921	3176457.013	8/30/2022	0.542433262	0	0	1.05	0	1.063169241	0
Area-32-L-1049_110	1174659.012	3177362.705	8/31/2022	0.550747335	0	0	0.433	0	0.43729341	0
Area-32-L-1049_111	1174650.465	3177257.014	8/31/2022	0.550747335	0	0	0.41	0	0.41416198	0
Area-32-L-1049_112	1174661.064	3177166.61	8/31/2022	0.550747335	0	0	0.364	0	0.367348462	0
Area-32-L-1049_113	1174660.583	3177072.515	8/31/2022	0.550747335	0	0	0.962	0	0.96931529	0
Area-32-L-1049_114	1174675.061	3176956.733	8/31/2022	0.550747335	0.148	0	2.23	0.149252534	2.252556801	0
Area-32-L-1049_115	1174573.601	3177168.713	8/31/2022	0.550747335	0	0	1.54	0	1.547600031	0
Area-32-L-1049_116	1174551.176	3177242.342	8/31/2022	0.550747335	0	0	0.17	0	0.171282411	0
Area-32-L-1049_117	1174570.311	3177362.742	8/31/2022	0.550747335	0	0	0.5	0	0.504484534	0
Area-32-L-1049_118	1174584.331	3177454.393	8/31/2022	0.550747335	0	0	0.254	0	0.256648242	0
Area-32-L-1049_119	1174582.401	3177545.407	8/31/2022	0.550747335	0	0	0.43	0	0.434539646	0
Area-32-L-1049_12	1175067.952	3176434.762	8/30/2022	0.542433262	0	0	0.859	0	0.867893219	0
Area-32-L-1049_120	1174583.983	3177639.75	8/31/2022	0.550747335	0	0	0.503	0	0.507789016	0
Area-32-L-1049_121	1174576.858	3177768.493	8/31/2022	0.550747335	0	0	0.224	0	0.2258064	0
Area-32-L-1049_122	1174576.36	3177843.244	8/31/2022	0.550747335	0	0	0.284	0	0.286939383	0
Area-32-L-1049_123	1174485.204	3177847.916	8/31/2022	0.550747335	0	0	0.427	0	0.430684417	0
Area-32-L-1049_124	1174459.076	3177939.636	8/31/2022	0.550747335	0	0	0.365	0	0.368449986	0
Area-32-L-1049_125	1174484.744	3178049.321	8/31/2022	0.550747335	0	0	0.588	0	0.594807148	0
Area-32-L-1049_126	1174449.098	3178154.412	8/31/2022	0.550747335	0	0	0.435	0	0.438945621	0
Area-32-L-1049_127	1174453.429	3178248.798	8/31/2022	0.550747335	0	0	0.655	0	0.660896838	0
Area-32-L-1049_128	1174368.39	3178257.568	8/31/2022	0.550747335	0	0	0.866	0	0.875688255	0
Area-32-L-1049_129	1174350.961	3178189.05	8/31/2022	0.550747335	0	0	0.502	0	0.507238269	0
Area-32-L-1049_13	1175061.877	3176353.258	8/30/2022	0.542433262	0	0	0.161	0	0.162187546	0
Area-32-L-1049_130	1174349.767	3178063.059	8/31/2022	0.550747335	0	0	0.305	0	0.307867765	0
Area-32-L-1049_131	1174349.838	3177953.944	8/31/2022	0.550747335	0	0	0.387	0	0.39103061	0

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RATON BASIN, LAS ANIMAS COUNTY, COLORADO

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Area-32-L-1049_132	1174253.218	3178144.296	8/31/2022	0.550747335	0	0	0.612	0	0.616837025	0
Area-32-L-1049_133	1174261.918	3178237.534	8/31/2022	0.550747335	0	0	0.161	0	0.16247046	0
Area-32-L-1049_134	1174155.27	3178160.888	8/31/2022	0.550747335	0	0	0.395	0	0.398741066	0
Area-32-L-1049_135	1174185.835	3178080.927	8/31/2022	0.550747335	0	0	0.627	0	0.633359432	0
Area-32-L-1049_136	1174259.99	3178047.036	8/31/2022	0.550747335	0	0	0.666	0	0.671911776	0
Area-32-L-1049_137	1174250.921	3177941.537	8/31/2022	0.550747335	0	0	0.643	0	0.64988184	0
Area-32-L-1049_138	1174281.905	3177860.974	8/31/2022	0.550747335	0	0	0.681	0	0.688434184	0
Area-32-L-1049_139	1174381.415	3177873.06	8/31/2022	0.550747335	0	0	0.312	0	0.315027505	0
Area-32-L-1049_14	1175059.192	3176252.128	8/30/2022	0.542433262	0	0	0.459	0	0.463238001	0
Area-32-L-1049_140	1174465.927	3177752.583	8/31/2022	0.550747335	0.815	0	3.28	0.820613563	3.315498829	0
Area-32-L-1049_141	1174373.596	3177752.531	8/31/2022	0.550747335	0	0	1.05	0	1.057434916	0
Area-32-L-1049_142	1174398.355	3177657.535	8/31/2022	0.550747335	0	0	0.876	0	0.886703193	0
Area-32-L-1049_143	1174479.3	3177649.172	8/31/2022	0.550747335	3.73	0.00232	1.95	3.767111778	1.966167927	2.35E-03
Area-32-L-1049_144	1174471.091	3177563.704	8/31/2022	0.550747335	0	0	0.394	0	0.39819032	0
Area-32-L-1049_145	1174482.561	3177454.533	8/31/2022	0.550747335	0	0	0.315	0	0.31778121	0
Area-32-L-1049_146	1174066.455	3178365.514	8/31/2022	0.550747335	0	0	0.219	0	0.22140044	0
Area-32-L-1049_147	1174021.157	3178285.71	8/31/2022	0.550747335	0	0	0.623	0	0.627851963	0
Area-32-L-1049_148	1174158.912	3177960.155	8/31/2022	0.550747335	0	0	0.925	0	0.930763006	0
Area-32-L-1049_149	1174251.686	3177744.006	8/31/2022	0.550747335	0	0	0.759	0	0.765538812	0
Area-32-L-1049_15	1175085.265	3176140.171	8/30/2022	0.542433262	0	0	0.417	0	0.42092821	0
Area-32-L-1049_150	1174327.511	3177567.318	8/31/2022	0.550747335	0	0	2.48	0	2.505900383	0
Area-32-L-1049_151	1174415.252	3177357.814	8/31/2022	0.550747335	0	0	2.05	0	2.06530261	0
Area-32-L-1049_152	1174455.921	3177262.231	8/31/2022	0.550747335	0	0	0.413	0	0.416364968	0
Area-32-L-1049_153	1174543.75	3177057.234	8/31/2022	0.550747335	0	0	1.19	0	1.200629234	0
Area-32-L-1049_154	1174621.401	3176844.737	8/31/2022	0.550747335	0	0	0.856	0	0.864673316	0
Area-32-L-1049_155	1174655.785	3176740.926	8/31/2022	0.550747335	0	0	0.622	0	0.627851963	0
Area-32-L-1049_156	1174645.687	3176447.873	8/31/2022	0.550747335	0	0	0	0	0	0
Area-32-L-1049_157	1174642.189	3176342.598	8/31/2022	0.550747335	0	0	0.16	0	0.160818219	0
Area-32-L-1049_158	1174569.367	3176362.53	8/31/2022	0.550747335	0	0	0.131	0	0.132179365	0
Area-32-L-1049_159	1174551.545	3176265.561	8/31/2022	0.550747335	0	0	0.287	0	0.289693117	0
Area-32-L-1049_16	1175057.225	3176069.927	8/30/2022	0.542433262	0	0	0.599	0	0.602100909	0
Area-32-L-1049_160	1174541.257	3176163.278	8/31/2022	0.550747335	0	0	0.14	0	0.14099133	0
Area-32-L-1049_161	1174441.952	3176363.716	8/31/2022	0.550747335	0	0	0.225	0	0.227458641	0
Area-32-L-1049_162	1174333.876	3176351.302	8/31/2022	0.550747335	0	0	0.19	0	0.192210823	0
Area-32-L-1049_163	1174330.826	3176258.796	8/31/2022	0.550747335	0	0	0.304	0	0.307317019	0
Area-32-L-1049_164	1174343.749	3176164.582	8/31/2022	0.550747335	0	0	0.629	0	0.633359432	0
Area-32-L-1049_165	1174451.829	3176156.825	8/31/2022	0.550747335	0	0	0.307	0	0.309519976	0

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Area-32-L-1049_166	1174478.956	3176255.514	8/31/2022	0.550747335	0	0	0.195	0	0.197167546	0
Area-32-L-1049_167	1174543.337	3176452.25	8/31/2022	0.550747335	0	0	0.366	0	0.369000733	0
Area-32-L-1049_168	1174551.832	3176531.228	8/31/2022	0.550747335	0	0	0.236	0	0.237922862	0
Area-32-L-1049_169	1174638.267	3176584.968	8/31/2022	0.550747335	0	0	0.36	0	0.363493264	0
Area-32-L-1049_17	1175054.085	3175955.881	8/30/2022	0.542433262	0	0	0.211	0	0.21317628	0
Area-32-L-1049_170	1174630.226	3176657.732	8/31/2022	0.550747335	0	0	0.416	0	0.420220226	0
Area-32-L-1049_171	1174534.382	3176653.075	8/31/2022	0.526945174	0	0	0.197	0	0.199185267	0
Area-32-L-1049_172	1174551.865	3176763.879	8/31/2022	0.523460865	0	0	0.249	0	0.251784682	0
Area-32-L-1049_173	1174441.663	3176767.27	8/31/2022	0.523378015	0	0	0.54	0	0.544313133	0
Area-32-L-1049_174	1174336.421	3176762.409	8/31/2022	0.524318874	0	0	0.0378	0	3.81E-02	0
Area-32-L-1049_175	1174342.912	3176854.938	8/31/2022	0.524318874	0	0	0.297	0	0.299910396	0
Area-32-L-1049_176	1174443.176	3176844.723	8/31/2022	0.524318874	0	0	0.214	0	0.215495065	0
Area-32-L-1049_177	1174542.928	3176851.213	8/31/2022	0.524318874	0	0	0.269	0	0.271597177	0
Area-32-L-1049_178	1174548.749	3176968.807	8/31/2022	0.524318874	0	0	0.626	0	0.634425879	0
Area-32-L-1049_179	1174446.225	3176948.609	8/31/2022	0.524318874	0	0	0.262	0	0.264781028	0
Area-32-L-1049_18	1175049.599	3175866.808	8/30/2022	0.542433262	0	0	0.27	0	0.272843957	0
Area-32-L-1049_180	1174347.262	3176943.734	8/31/2022	0.524318874	0	0	0.254	0	0.256916255	0
Area-32-L-1049_181	1174241.513	3176958.533	8/31/2022	0.524318874	0	0	0.352	0	0.355488181	0
Area-32-L-1049_182	1174148.258	3176952.513	8/31/2022	0.524318874	0	0	0.153	0	0.154149756	0
Area-32-L-1049_183	1174049.646	3176966.198	8/31/2022	0.524318874	0	0	0.292	0	0.295191526	0
Area-32-L-1049_184	1174043.106	3177080.377	8/31/2022	0.524318874	0	0	0.347	0	0.349720687	0
Area-32-L-1049_185	1174146.537	3177052.256	8/31/2022	0.524318874	0	0	0.307	0	0.310396791	0
Area-32-L-1049_186	1174246.717	3177049.709	8/31/2022	0.524318874	0	0	0.875	0	0.88085568	0
Area-32-L-1049_187	1174339.713	3177046.138	8/31/2022	0.524318874	0	0	0.241	0	0.243808284	0
Area-32-L-1049_188	1174434.118	3177053.351	8/31/2022	0.524318874	0	0	0.155	0	0.156247035	0
Area-32-L-1049_189	1174454.576	3177175.051	8/31/2022	0.524318874	0	0	0.234	0	0.235943481	0
Area-32-L-1049_19	1175164.358	3175949.728	8/30/2022	0.542433262	0	0	0.481	0	0.485477746	0
Area-32-L-1049_190	1174352.641	3177166.863	8/31/2022	0.524318874	0	0	0.412	0	0.416309208	0
Area-32-L-1049_191	1174230.286	3177153.463	8/31/2022	0.524318874	0	0	0.295	0	0.297813118	0
Area-32-L-1049_192	1174163.769	3177149.837	8/31/2022	0.524318874	0	0	0.2	0	0.201338455	0
Area-32-L-1049_193	1174043.361	3177158.87	8/31/2022	0.524318874	0	0	0.181	0	0.182987288	0
Area-32-L-1049_194	1174340.908	3177259.135	8/31/2022	0.524318874	0	0	0.322	0	0.325077713	0
Area-32-L-1049_195	1174353.89	3177354.785	8/31/2022	0.524318874	0	0	0.217	0	0.219689608	0
Area-32-L-1049_196	1174363.6	3177469.664	8/31/2022	0.524318874	0.71	0	2.15	0.718316853	2.170680046	0
Area-32-L-1049_197	1174231.927	3177348.383	8/31/2022	0.524318874	0	0	0.194	0	0.195570931	0
Area-32-L-1049_198	1174229.848	3177455.622	8/31/2022	0.524318874	0	0	0.128	0	0.129506752	0
Area-32-L-1049_199	1174236.095	3177537.987	8/31/2022	0.524318874	0	0	0.227	0	0.22965166	0

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Area-32-L-1049_2	1174868.34	3176066.644	8/30/2022	0.543557525	0	0	1.65	0	1.668721557	0
Area-32-L-1049_20	1175178.514	3176069.737	8/30/2022	0.542433262	0	0	0.192	0	0.193648666	0
Area-32-L-1049_200	1174149.273	3177559.405	8/31/2022	0.524318874	0	0	0.291	0	0.294142872	0
Area-32-L-1049_201	1174044.495	3177555.121	8/31/2022	0.524318874	0	0	0.118	0	0.11902038	0
Area-32-L-1049_202	1173939.898	3177565.824	8/31/2022	0.524318874	0	0	0.469	0	0.473459929	0
Area-32-L-1049_203	1173872.805	3177563.811	8/31/2022	0.524318874	0	0	0.245	0	0.246954188	0
Area-32-L-1049_204	1173828.291	3177641.555	8/31/2022	0.524318874	0	0	0.299	0	0.302007645	0
Area-32-L-1049_205	1173922.784	3177635.968	8/31/2022	0.524318874	0	0	0.549	0	0.555777967	0
Area-32-L-1049_206	1173935.853	3177650.016	8/31/2022	0.524318874	0	0	0.366	0	0.369120479	0
Area-32-L-1049_207	1174057.169	3177642.259	8/31/2022	0.524318874	0.018	0	0.988	0.018193865	0.996205866	0
Area-32-L-1049_208	1174122.005	3177658.152	8/31/2022	0.524318874	0	0	0.194	0	0.195570931	0
Area-32-L-1049_209	1174141.03	3177666.107	8/31/2022	0.524318874	0	0	0.193	0	0.195046619	0
Area-32-L-1049_21	1175177.144	3176157.277	8/30/2022	0.542433262	0	0	0.279	0	0.280980438	0
Area-32-L-1049_210	1174255.742	3177656.548	8/31/2022	0.524318874	0	0	0.779	0	0.786478281	0
Area-32-L-1049_211	1174134.546	3177760.299	8/31/2022	0.524318874	0	0	0.656	0	0.660641789	0
Area-32-L-1049_212	1174033.24	3177764.382	8/31/2022	0.524318874	0	0	0.306	0	0.308823824	0
Area-32-L-1049_213	1173941.585	3177748.456	8/31/2022	0.524318874	0	0	0.326	0	0.328747928	0
Area-32-L-1049_214	1173834.544	3177726.168	8/31/2022	0.524318874	0	0	0.171	0	0.171976596	0
Area-32-L-1049_215	1173753.95	3177663.062	8/31/2022	0.524318874	0	0	0.221	0	0.223359838	0
Area-32-L-1049_216	1173762.117	3177747.652	8/31/2022	0.524318874	0	0	0.192	0	0.193473652	0
Area-32-L-1049_217	1173751.879	3177870.683	8/31/2022	0.524318874	0	0	0.197	0	0.198192537	0
Area-32-L-1049_218	1173815.876	3177852.302	8/31/2022	0.524318874	0	0	0.179	0	0.180890009	0
Area-32-L-1049_219	1173887.298	3177853.643	8/31/2022	0.524318874	0	0	0.436	0	0.439903527	0
Area-32-L-1049_22	1175185.727	3176235.689	8/30/2022	0.542433262	0	0	0.77	0	0.775679529	0
Area-32-L-1049_220	1173955.998	3177859.371	8/31/2022	0.524318874	0	0	0.227	0	0.229127347	0
Area-32-L-1049_221	1174061.034	3177848.356	8/31/2022	0.524318874	0	0	0.451	0	0.455633104	0
Area-32-L-1049_222	1174181.132	3177853.418	8/31/2022	0.524318874	0	0	0.526	0	0.529562056	0
Area-32-L-1049_223	1174083.619	3177956.891	9/1/2022	0.5	0	0	0	0	0.305000007	0
Area-32-L-1049_224	1173970.226	3177955.147	9/1/2022	0.5	0	0	0	0	1.519999981	0
Area-32-L-1049_225	1174052.345	3178044.795	9/1/2022	0.5	0	0	0	0.064000003	0.235499993	0
Area-32-L-1049_226	1173958.699	3178019.598	9/1/2022	0.5	0	0	0	0	0.291500002	0
Area-32-L-1049_227	1173851.997	3177982.43	9/1/2022	0.5	0	0	0	0	0.162	0
Area-32-L-1049_228	1173878.621	3178078.068	9/1/2022	0.5	0	0	0	0	0.170000002	0
Area-32-L-1049_229	1173780.849	3178055.718	9/1/2022	0.5	0	0	0	0	0.980000019	0
Area-32-L-1049_23	1175180.751	3176285.992	8/30/2022	0.542433262	0	0	0.342	0	0.344987541	0
Area-32-L-1049_230	1173779.389	3178157.27	9/1/2022	0.5	0	0	0	0	0.460999995	0
Area-32-L-1049_231	1173880.912	3178166.377	9/1/2022	0.5	0	0	0	0	0.423999995	0

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Area-32-L-1049_232	1173970.831	3178151.345	9/1/2022	0.5	0	0	0	0	0.745000005	0
Area-32-L-1049_233	1174061.787	3178141.638	9/1/2022	0.5	0	0	0	0	0.165999994	0
Area-32-L-1049_234	1173948.834	3178286.928	9/1/2022	0.5	0	0	0	0	0.247999996	0
Area-32-L-1049_235	1173866.978	3178272.31	9/1/2022	0.5	0	0	0	0	0.193499997	0
Area-32-L-1049_236	1173773.618	3178255.837	9/1/2022	0.5	0	0	0	0	6.15E-02	0
Area-32-L-1049_237	1173870.055	3178317.321	9/1/2022	0.5	0	0	0	0	0.2095	0
Area-32-L-1049_238	1173964.428	3178343.369	9/1/2022	0.5	0	0	0	0	0.311500013	0
Area-32-L-1049_239	1173900.636	3178357.062	9/1/2022	0.5	0	0	0	0	0.115999997	0
Area-32-L-1049_24	1175174.375	3176352.871	8/30/2022	0.542433262	0	0	0.592	0	0.596676588	0
Area-32-L-1049_240	1173836.642	3178356.625	9/1/2022	0.5	0	0	0	0	0.090999998	0
Area-32-L-1049_241	1173792.655	3178347.629	9/1/2022	0.5	0	0	0	0	0.140000001	0
Area-32-L-1049_242	1173798.837	3178416.526	9/1/2022	0.5	0	0	0	0	0.227500007	0
Area-32-L-1049_243	1173802.03	3178459.641	9/1/2022	0.5	0	0	0	0	3.66E-02	0
Area-32-L-1049_244	1173836.592	3178422.613	9/1/2022	0.5	0	0	0	0	0.317999989	0
Area-32-L-1049_245	1173848.291	3178446.63	9/1/2022	0.5	0	0	0	0	0.644999981	0
Area-32-L-1049_246	1173897.163	3178419.409	9/1/2022	0.5	0	0	0	0	6.65E-02	0
Area-32-L-1049_247	1173886.695	3178471.558	9/1/2022	0.5	0	0	0	0	0.196999997	0
Area-32-L-1049_248	1173896.712	3178519.002	9/1/2022	0.5	0	0	0	0	0.105999999	0
Area-32-L-1049_249	1173856.99	3178511.055	9/1/2022	0.5	0	0	0	0	0.143999994	0
Area-32-L-1049_25	1175253.456	3176329.589	8/30/2022	0.542433262	0	0	0.257	0	0.259283096	0
Area-32-L-1049_250	1173806.257	3178513.29	9/1/2022	0.5	0	0	0	0	0.104000002	0
Area-32-L-1049_26	1175256.52	3176261.792	8/30/2022	0.542433262	0	0	0.199	0	0.200700313	0
Area-32-L-1049_27	1175283.212	3176181.905	8/30/2022	0.542433262	0	0	0.233	0	0.234873608	0
Area-32-L-1049_28	1175268.151	3176051.207	8/30/2022	0.542433262	0	0	0.0586	0	5.91E-02	0
Area-32-L-1049_29	1175255.379	3175939.906	8/30/2022	0.542433262	0	0	0.412	0	0.416046321	0
Area-32-L-1049_3	1174829.552	3175940.38	8/30/2022	0.542664647	0	0	0.639	0	0.645770967	0
Area-32-L-1049_30	1175316.541	3176059.674	8/30/2022	0.542433262	0	0	0.135	0	0.13669318	0
Area-32-L-1049_31	1175378.706	3176006.722	8/30/2022	0.542433262	0.177	0	1.06	0.178460538	1.068593502	0
Area-32-L-1049_32	1175348.718	3175927.061	8/30/2022	0.542433262	0	0	0.732	0	0.737709224	0
Area-32-L-1049_33	1175463.092	3175904.352	8/30/2022	0.542433262	0	0	0.43	0	0.434489042	0
Area-32-L-1049_34	1175447.052	3176068.51	8/30/2022	0.542433262	46.8	0	4.38	47.30017853	4.415406704	0
Area-32-L-1049_35	1175517.438	3176051.301	8/30/2022	0.542433262	0	0	0.852	0	0.862468898	0
Area-32-L-1049_36	1175475.217	3176150.411	8/30/2022	0.542433262	0	0	0.176	0	0.177918121	0
Area-32-L-1049_37	1175417.07	3176159.084	8/30/2022	0.542433262	0	0	0.202	0	0.204497337	0
Area-32-L-1049_38	1175360.961	3176240.538	8/30/2022	0.542433262	0	0	0.344	0	0.34715727	0
Area-32-L-1049_39	1175369.691	3176337.036	8/30/2022	0.542433262	0	0	0.218	0	0.219685465	0
Area-32-L-1049_4	1174850.856	3175836.104	8/30/2022	0.542673886	0	0	0.377	0	0.380414367	0

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Area-32-L-1049_40	1175271.074	3176454.974	8/30/2022	0.542433262	0	0	1.12	0	1.13368547	0
Area-32-L-1049_41	1175176.89	3176465.092	8/30/2022	0.542433262	0	0	1.43	0	1.442872524	0
Area-32-L-1049_42	1174871.408	3176353.329	8/30/2022	0.542433262	0	0	0.133	0	0.134523451	0
Area-32-L-1049_43	1174860.011	3176272.517	8/30/2022	0.542433262	0	0	0.559	0	0.564130545	0
Area-32-L-1049_44	1174789.25	3176452.08	8/30/2022	0.542433262	0	0	0.35	0	0.353124052	0
Area-32-L-1049_45	1174862.182	3176442.35	8/30/2022	0.542433262	0	0	0.412	0	0.416046321	0
Area-32-L-1049_46	1174767.29	3176568.078	8/30/2022	0.542433262	0	0	0.583	0	0.585827947	0
Area-32-L-1049_47	1174871.869	3176556.719	8/30/2022	0.542433262	0.456	0	0.59	0.460525841	0.596676588	0
Area-32-L-1049_48	1174950.477	3176547.787	8/30/2022	0.542433262	0	0	0.455	0	0.459440976	0
Area-32-L-1049_49	1175041.19	3176548.517	8/30/2022	0.542433262	0	0	2.94	0	2.97253418	0
Area-32-L-1049_5	1174955.724	3175837.844	8/30/2022	0.542620063	0	0	0.376	0	0.379834026	0
Area-32-L-1049_50	1175152.616	3176568.289	8/30/2022	0.542433262	0	0	0.495	0	0.500123441	0
Area-32-L-1049_51	1175255.249	3176566.041	8/30/2022	0.542433262	0	0	0.541	0	0.547857583	0
Area-32-L-1049_52	1175337.219	3176533.605	8/30/2022	0.542433262	0	0	0.861	0	0.867893219	0
Area-32-L-1049_53	1175451.48	3176545.545	8/30/2022	0.542433262	0	0	0.414	0	0.417673588	0
Area-32-L-1049_54	1175471.613	3176648.825	8/30/2022	0.542433262	0	0	0.25	0	0.252773881	0
Area-32-L-1049_55	1175366.746	3176670.47	8/30/2022	0.542433262	0.0257	0	0.747	0.025928311	0.753982246	0
Area-32-L-1049_56	1175271.68	3176640.425	8/30/2022	0.542433262	0	0	0.518	0	0.522905648	0
Area-32-L-1049_57	1175146.872	3176649.563	8/30/2022	0.542433262	0	0	0.298	0	0.301050454	0
Area-32-L-1049_58	1175060.831	3176657.562	8/30/2022	0.542433262	0	0	0.222	0	0.224024937	0
Area-32-L-1049_59	1174982.014	3176671.617	8/30/2022	0.542433262	0	0	0.919	0	0.927560925	0
Area-32-L-1049_6	1174954.815	3175950.321	8/30/2022	0.542433262	0	0	0.618	0	0.623798251	0
Area-32-L-1049_60	1174873.78	3176647.198	8/30/2022	0.542433262	0	0	0.407	0	0.411164433	0
Area-32-L-1049_61	1174752.011	3176660.936	8/30/2022	0.542433262	0	0	1.23	0	1.242172122	0
Area-32-L-1049_62	1174753.745	3176758.289	8/30/2022	0.531882882	0	0	1.14	0	1.14886713	0
Area-32-L-1049_63	1174849.526	3176767.386	8/30/2022	0.531213701	0	0	0.578	0	0.584335089	0
Area-32-L-1049_64	1174929.86	3176757.604	8/30/2022	0.531587481	0	0	1.12	0	1.132281423	0
Area-32-L-1049_65	1175028.131	3176749.308	8/30/2022	0.520520985	0	0	1.73	0	1.743745208	0
Area-32-L-1049_66	1175134.305	3176766.872	8/30/2022	0.529821575	0	0	0.438	0	0.442400992	0
Area-32-L-1049_67	1175241.07	3176768.241	8/30/2022	0.528832376	0.0283	0	0.539	0.028556949	0.544697344	0
Area-32-L-1049_68	1175365.866	3176778.311	8/30/2022	0.528211117	0	0	0.148	0	0.148955539	0
Area-32-L-1049_69	1175452.626	3176769.611	8/30/2022	0.527156293	0	0	0.372	0	0.375862449	0
Area-32-L-1049_7	1174948.244	3176062.345	8/30/2022	0.542433262	0	0	0.667	0	0.672617257	0
Area-32-L-1049_70	1175397.874	3176820.376	8/30/2022	0.527216613	0	0	0.502	0	0.50718236	0
Area-32-L-1049_71	1175326.375	3176862.26	8/30/2022	0.526763618	0	0	0.458	0	0.46197167	0
Area-32-L-1049_72	1175285.631	3176958.731	8/30/2022	0.525902689	0	0	0.783	0	0.788854003	0
Area-32-L-1049_73	1175235.336	3177042.78	8/30/2022	0.526228368	0	0	0.4	0	0.403617173	0

INDIVIDUAL FLUX MEASUREMENTS AND CALCULATIONS
2022 COLORADO RULE 614 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO

Site Point ID	Northing	Easting	Date	AcK ((mol/m ² /d)/(ppm/s))	CH4 moles (Slope)	H2S moles (Slope)	CO2 moles (Slope)	CH4flux (moles/m ² /d)	CO2flux (moles/m ² /d)	H2Sflux (moles/m ² /d)
Area-32-L-1049_74	1175158.741	3177160.082	8/30/2022	0.525744438	0	0	0.817	0	0.82541877	0
Area-32-L-1049_75	1175104.619	3177232.845	8/30/2022	0.526443243	0	0	0.216	0	0.217947498	0
Area-32-L-1049_76	1175083.27	3177182.137	8/30/2022	0.525621116	0	0	1.09	0	1.098548055	0
Area-32-L-1049_77	1175058.41	3177044.263	8/30/2022	0.527219653	0	0	1.47	0	1.486759424	0
Area-32-L-1049_78	1175060.911	3176962.188	8/30/2022	0.527769744	0.739	0	0.795	0.744155347	0.802209973	0
Area-32-L-1049_79	1175197.945	3176944.138	8/30/2022	0.526318789	0	0	0.363	0	0.366844207	0
Area-32-L-1049_8	1174949.933	3176158.316	8/30/2022	0.542433262	0	0	0.323	0	0.326002389	0
Area-32-L-1049_80	1175182.448	3176855.09	8/30/2022	0.526367664	0	0	1.04	0	1.047471642	0
Area-32-L-1049_81	1175071.385	3176835.106	8/30/2022	0.526615262	0	0	0.624	0	0.631938338	0
Area-32-L-1049_82	1174952.882	3176840.055	8/30/2022	0.527011693	0	0	0.869	0	0.874839365	0
Area-32-L-1049_83	1174959.12	3176957.69	8/30/2022	0.527784228	0	0	1.84	0	1.857800484	0
Area-32-L-1049_84	1174974.578	3177047.521	8/30/2022	0.527793467	0	0	0.448	0	0.452318996	0
Area-32-L-1049_85	1174944.848	3177183.219	8/30/2022	0.527535915	0.0764	0	2.35	0.077020243	2.373911619	0
Area-32-L-1049_86	1174957.676	3177256.134	8/30/2022	0.529948294	0	0	0.323	0	0.325918198	0
Area-32-L-1049_87	1174946.269	3177364.938	8/30/2022	0.527528644	0	0	0.533	0	0.538079202	0
Area-32-L-1049_88	1174982.711	3177457.307	8/30/2022	0.527336836	0	0	0.428	0	0.431888878	0
Area-32-L-1049_89	1174874.654	3177540.075	8/30/2022	0.527326286	0	0	0.316	0	0.319032401	0
Area-32-L-1049_9	1174965.972	3176256.586	8/30/2022	0.542433262	0	0	0.291	0	0.293998837	0
Area-32-L-1049_90	1174867.321	3177450.208	8/30/2022	0.525062442	0	0	0.177	0	0.178521231	0
Area-32-L-1049_91	1174859.35	3177378.308	8/30/2022	0.526175916	0	0	0.455	0	0.459351599	0
Area-32-L-1049_92	1174864.479	3177273.833	8/30/2022	0.526175916	0	0	0.749	0	0.75769335	0
Area-32-L-1049_93	1174858.61	3177171.554	8/30/2022	0.526175916	0	0	0.578	0	0.584055245	0
Area-32-L-1049_94	1174862.521	3177066.918	8/30/2022	0.526175916	0	0	0.417	0	0.420414567	0
Area-32-L-1049_95	1174863.065	3176954.727	8/30/2022	0.527393758	0	0	0.603	0	0.611776769	0
Area-32-L-1049_96	1174869.381	3176869.71	8/30/2022	0.5	0	0	0	0	0.448500007	0
Area-32-L-1049_97	1174773.565	3176872.07	8/31/2022	0.551050961	0	0	0.384	0	0.387388825	0
Area-32-L-1049_98	1174766.896	3176952.984	8/31/2022	0.550747335	0	0	0.386	0	0.389929116	0
Area-32-L-1049_99	1174750.045	3177068.078	8/31/2022	0.550747335	0	0	0.823	0	0.831628442	0
Area-L-1021_1	1173896.453	3178566.946	9/1/2022	0.5	0	0	0	0	0.249500006	0
Area-L-1021_10	1173934.017	3178826.999	9/1/2022	0.5	0	0	0	0.0407	0.694999993	0
Area-L-1021_11	1173951.235	3178796.711	9/1/2022	0.5	0	0	0	0	0.600000024	0
Area-L-1021_12	1173953.613	3178835.029	9/1/2022	0.5	0	0	0	0.990000001	1.909999967	0
Area-L-1021_13	1173962.643	3178881.794	9/1/2022	0.5	0	0	0	0	0.112000003	0
Area-L-1021_14	1174036.123	3178880.1	9/1/2022	0.5	0	0	0	0	0.352499992	0
Area-L-1021_15	1174202.481	3178906.687	9/1/2022	0.5	0	0	0	0	0.364499986	0
Area-L-1021_16	1174234.589	3178834.689	9/1/2022	0.5	0	0	0	0	0.033500001	0
Area-L-1021_17	1174017.116	3178829.085	9/1/2022	0.5	0	0	0	0	0.381000012	0

INDIVIDUAL FLUX MEASUREMENTS AND CALCULATIONS
2022 COLORADO RULE 614 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO

Site Point ID	Northing	Easting	Date	AcK ((mol/m ² /d)/(ppm/s))	CH ₄ moles (Slope)	H ₂ S moles (Slope)	CO ₂ moles (Slope)	CH ₄ flux (moles/m ² /d)	CO ₂ flux (moles/m ² /d)	H ₂ Sflux (moles/m ² /d)
Area-L-1021_18	1174002.419	3178784.24	9/1/2022	0.5	0	0	0	0	6.65E-02	0
Area-L-1021_19	1174006.93	3178734.508	9/1/2022	0.5	0	0	0	0	0.201499999	0
Area-L-1021_2	1173925.027	3178574.575	9/1/2022	0.5	0	0	0	0	0.569999993	0
Area-L-1021_20	1173959.141	3178715.38	9/1/2022	0.5	0	0	0	0	0.467999995	0
Area-L-1021_21	1173963.692	3178667.533	9/1/2022	0.5	0	0	0	0	0.579999983	0
Area-L-1021_22	1173973.378	3178614.623	9/1/2022	0.5	0	0	0	0	0.107000001	0
Area-L-1021_23	1174006.91	3178566.019	9/1/2022	0.5	0	0	0	0	0.389999986	0
Area-L-1021_24	1173987.091	3178572.521	9/1/2022	0.5	0	0	0	0	7.10E-02	0
Area-L-1021_25	1174001.207	3178617.094	9/1/2022	0.5	0	0	0	0	0.1175	0
Area-L-1021_26	1174007.119	3178673.852	9/1/2022	0.5	0	0	0	0	0.241999999	0
Area-L-1021_3	1173899.985	3178621.918	9/1/2022	0.5	0	0	0	0	0.179499999	0
Area-L-1021_4	1173892.858	3178676.542	9/1/2022	0.5	0	0	0	0	0.313499987	0
Area-L-1021_5	1173895.945	3178724.852	9/1/2022	0.5	0	0	0	0	0.730000019	0
Area-L-1021_6	1173881.762	3178784.802	9/1/2022	0.5	0	0	0	0	1.36500001	0
Area-L-1021_7	1173868.802	3178834.947	9/1/2022	0.5	0	0	0	0	1.049999952	0
Area-L-1021_8	1173859.268	3178874.955	9/1/2022	0.5	0	0	0	0	2.00999999	0
Area-L-1021_9	1173915.723	3178865.815	9/1/2022	0.5	0	0	0	12.14999962	6.349999905	0
Area-L-1030_01	1146362.677	3164624.214	8/29/2022	0.53044498	0	0	0.0334	0	3.37E-02	0
Area-L-1030_02	1146308.883	3164615.381	8/29/2022	0.529004812	0	0	0.591	0	0.597775459	0
Area-L-1030_03	1146259.157	3164625.394	8/29/2022	0.529703617	0	0	0.283	0	0.284980536	0
Area-L-1030_04	1146198.122	3164671.394	8/29/2022	0.52893889	0	0	0.418	0	0.421564281	0
Area-L-1030_05	1146222.173	3164705.846	8/29/2022	0.528431654	0	0	1.39	0	1.400343895	0
Area-L-1030_06	1146259.438	3164662.069	8/29/2022	0.527346969	4.26	0	6.86	4.297877789	6.908245564	0
Area-L-1030_07	1146324.312	3164668.363	8/29/2022	0.801112354	0	0	0.0483	0	4.88E-02	0
Area-L-1030_08	1146352.601	3164673.444	8/29/2022	0.532987118	0	0	0.666	0	0.671563745	0
Area-L-1030_09	1146358.113	3164720.052	8/29/2022	0.751800895	0	0	1.35	0	1.360759616	0
Area-L-1030_10	1146352.201	3164765.629	8/29/2022	0.650443614	0	0	1.82	0	1.840755343	0
Area-L-1030_11	1146366.45	3164823.627	8/29/2022	0.528675854	0	0	1.25	0	1.258248568	0
Area-L-1030_12	1146306.102	3164809.447	8/29/2022	0.528595209	0	0	1.28	0	1.29505825	0
Area-L-1030_13	1146262.28	3164824.965	8/29/2022	0.528548598	0	0	0.0322	0	3.25E-02	0
Area-L-1030_14	1146303.684	3164774.053	8/29/2022	0.527098835	0	0	0.455	0	0.459103078	0
Area-L-1030_15	1146317.004	3164733.829	8/29/2022	0.525857687	0	0	1.08	0	1.088525414	0
Area-L-1030_16	1146296.548	3164699.225	8/29/2022	0.525730014	0	0	0.078	0	7.89E-02	0
Area-L-1030_17	1146257.783	3164722.746	8/29/2022	0.52400887	0	0	0.266	0	0.268292546	0
Area-L-1030_18	1146277.147	3164757.296	8/29/2022	0.524672627	0	0	1.01	0	1.017864943	0

INDIVIDUAL FLUX MEASUREMENTS AND CALCULATIONS
2022 COLORADO RULE 614 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO

Site Point ID	Northing	Easting	Date	AcK ((mol/m ² /d)/(ppm/s))	CH ₄ moles (Slope)	H ₂ S moles (Slope)	CO ₂ moles (Slope)	CH ₄ flux (moles/m ² /d)	CO ₂ flux (moles/m ² /d)	H ₂ Sflux (moles/m ² /d)
Area-L-1030_19	1146253.431	3164759.373	8/29/2022	0.525811195	4.99	0	2.07	5.042529583	2.087470531	0
Area-L-1030_20	1146207.56	3164773.632	8/29/2022	0.526206017	0.655	0	2.29	0.663019598	2.315306425	0
Area-L-1030_21	1146188.961	3164742.413	8/29/2022	0.527871788	0	0	1.19	0	1.19826889	0
Area-L-1030_22	1146201.599	3164820.056	8/29/2022	0.536749184	0	0	0.518	0	0.52279371	0
Area-L-1030_23	1146109.605	3164855.719	8/29/2022	0.52965939	0	0	0.457	0	0.461333334	0

APPENDIX C

Grid Volume Computations

Grid Volume Computations

Wed Dec 14 12:28:25 2022

Upper Surface

Grid File Name:	C:\Ensolum\Rule614_2022\Surfer\32L1049_CH4_v2.grd
Grid Size:	66 rows x 100 columns
X Minimum:	3175736.103
X Maximum:	3178619.003
X Spacing:	29.120202020201
Y Minimum:	1173651.879
Y Maximum:	1175617.439
Y Spacing:	30.239384615385
Z Minimum:	-10.628380343797
Z Maximum:	37.160876900874

Lower Surface

Level Surface defined by $Z = 0$

Volumes

Z Scale Factor:	0.0929
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Total Volumes by:

Trapezoidal Rule:	21311.857896638
Simpson's Rule:	21257.560401694
Simpson's 3/8 Rule:	21397.918833043

Cut & Fill Volumes

Positive Volume [Cut]:	48429.17933439
Negative Volume [Fill]:	27117.321437753
Net Volume [Cut-Fill]:	21311.857896638

Areas

Planar Areas

Positive Planar Area [Cut]:	1938323.3848057
Negative Planar Area [Fill]:	1409190.0387508

NoData Planar Area:	2318999.5004435
Total Planar Area:	5666512.924

Surface Areas

Positive Surface Area [Cut]:	1938342.6998557
Negative Surface Area [Fill]:	1409194.0155793

Grid Volume Computations

Wed Dec 14 12:42:38 2022

Upper Surface

Grid File Name:	C:\Ensolum\Rule614_2022\Surfer\L1030_CH4flux_2022.grd
Grid Size:	100 rows x 94 columns
X Minimum:	3164615.381
X Maximum:	3164855.719
X Spacing:	2.5842795698924
Y Minimum:	1146109.605
Y Maximum:	1146366.451
Y Spacing:	2.5944040404031
Z Minimum:	-0.86142395820032
Z Maximum:	4.8851069580753

Lower Surface

Level Surface defined by $Z = 0$

Volumes

Z Scale Factor:	0.0929
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Total Volumes by:

Trapezoidal Rule:	1693.600092609
Simpson's Rule:	1694.0922995218
Simpson's 3/8 Rule:	1694.594803465

Cut & Fill Volumes

Positive Volume [Cut]:	2156.631405689
Negative Volume [Fill]:	463.03456209383
Net Volume [Cut-Fill]:	1693.5968435952

Areas

Planar Areas

Positive Planar Area [Cut]:	31548.82319993
Negative Planar Area [Fill]:	30181.030748044

NoData Planar Area: 0
Total Planar Area: 61729.853947974

Surface Areas

Positive Surface Area [Cut]: 31549.26139476
Negative Surface Area [Fill]: 30181.217959618

Grid Volume Computations

Wed Dec 14 12:38:42 2022

Upper Surface

Grid File Name:	C:\Ensolum\Rule614_2022\Surfer\L1021_CH4flux_2022.grd
Grid Size:	100 rows x 91 columns
X Minimum:	3178566.019
X Maximum:	3178906.687
X Spacing:	3.7852000000007
Y Minimum:	1173859.267
Y Maximum:	1174234.589
Y Spacing:	3.7911313131306
Z Minimum:	-1.0751299690166
Z Maximum:	11.853937173988

Lower Surface

Level Surface defined by $Z = 0$

Volumes

Z Scale Factor:	0.0929
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Total Volumes by:

Trapezoidal Rule:	3240.1503105846
Simpson's Rule:	3241.3862746047
Simpson's 3/8 Rule:	3243.1157661064

Cut & Fill Volumes

Positive Volume [Cut]:	3406.1990229808
Negative Volume [Fill]:	165.77266535086
Net Volume [Cut-Fill]:	3240.4263576299

Areas

Planar Areas

Positive Planar Area [Cut]:	76363.108157936
Negative Planar Area [Fill]:	10986.499872294

NoData Planar Area:	40510.587065769
Total Planar Area:	127860.195096

Surface Areas

Positive Surface Area [Cut]:	76364.697803332
Negative Surface Area [Fill]:	10986.583475443

APPENDIX D

Natural Spring Laboratory Analytical Reports



Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

September 19, 2022

Devin Hencmann

ENSOLUM

606 S. Rio Grande Suite A

Aztec, NM 87410

TEL: (903) 821-5603

FAX:

RE: Rule 614 Compliance

OrderNo.: 2209151

Dear Devin Hencmann:

Hall Environmental Analysis Laboratory received 1 sample(s) on 9/3/2022 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

A handwritten signature in black ink, appearing to read "Andy Freeman", is written over a light blue horizontal line.

Andy Freeman

Laboratory Manager

4901 Hawkins NE

Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order 2209151

Date Reported: 9/19/2022

CLIENT: ENSOLUM

Client Sample ID: Chavez 02

Project: Rule 614 Compliance

Collection Date: 9/1/2022 9:30:00 AM

Lab ID: 2209151-001

Matrix: AQUEOUS

Received Date: 9/3/2022 9:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA 200.8: METALS							Analyst: bcv
Selenium	ND	0.0010		mg/L	1	9/12/2022 1:29:55 PM	70033
EPA METHOD 300.0: ANIONS							Analyst: JTT
Fluoride	ND	0.50		mg/L	5	9/6/2022 3:41:55 PM	R90833
Chloride	4.3	2.5		mg/L	5	9/6/2022 3:41:55 PM	R90833
Bromide	ND	0.50		mg/L	5	9/6/2022 3:41:55 PM	R90833
Phosphorus, Orthophosphate (As P)	ND	2.5	H	mg/L	5	9/15/2022 9:39:29 AM	R91085
Sulfate	21	2.5		mg/L	5	9/6/2022 3:41:55 PM	R90833
Nitrate+Nitrite as N	ND	1.0		mg/L	5	9/6/2022 4:07:37 PM	R90833
SM2510B: SPECIFIC CONDUCTANCE							Analyst: JTT
Conductivity	370	10		µmhos/c	1	9/8/2022 1:52:05 PM	R90925
SM2320B: ALKALINITY							Analyst: CAS
Bicarbonate (As CaCO ₃)	161.7	20.00		mg/L Ca	1	9/6/2022 4:45:55 PM	R90834
Carbonate (As CaCO ₃)	ND	2.000		mg/L Ca	1	9/6/2022 4:45:55 PM	R90834
Total Alkalinity (as CaCO ₃)	161.7	20.00		mg/L Ca	1	9/6/2022 4:45:55 PM	R90834
SM2540C MOD: TOTAL DISSOLVED SOLIDS							Analyst: SNS
Total Dissolved Solids	215	20.0		mg/L	1	9/7/2022 3:41:00 PM	69980
SM4500-H+B / 9040C: PH							Analyst: CAS
pH	7.47		H	pH units	1	9/6/2022 4:45:55 PM	R90834
EPA METHOD 200.7: METALS							Analyst: VP
Barium	0.088	0.0030		mg/L	1	9/8/2022 2:39:01 PM	70033
Boron	ND	0.040		mg/L	1	9/8/2022 2:39:01 PM	70033
Calcium	50	5.0		mg/L	5	9/8/2022 2:44:09 PM	70033
Iron	1.1	0.25	*	mg/L	5	9/8/2022 2:44:09 PM	70033
Magnesium	9.7	1.0		mg/L	1	9/8/2022 2:39:01 PM	70033
Manganese	0.024	0.0020		mg/L	1	9/8/2022 2:39:01 PM	70033
Potassium	1.5	1.0		mg/L	1	9/8/2022 2:39:01 PM	70033
Sodium	8.7	1.0		mg/L	1	9/8/2022 2:39:01 PM	70033
Strontium	0.30	0.050		mg/L	5	9/8/2022 2:44:09 PM	70033
EPA METHOD 8015D: GASOLINE RANGE							Analyst: CCM
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	9/7/2022 1:40:00 PM	G90843
Surr: 4-Bromofluorobenzene	83.5	70-130		%Rec	1	9/7/2022 1:40:00 PM	G90843
EPA METHOD 8015M/D: DIESEL RANGE							Analyst: DGH
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	9/9/2022 9:38:23 PM	70034
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	9/9/2022 9:38:23 PM	70034
Surr: DNOP	105	43.2-147		%Rec	1	9/9/2022 9:38:23 PM	70034

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Estimated value
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix interference		

Hall Environmental Analysis Laboratory, Inc.

Analytical Report

Lab Order **2209151**

Date Reported: **9/19/2022**

CLIENT: ENSOLUM

Client Sample ID: Chavez 02

Project: Rule 614 Compliance

Collection Date: 9/1/2022 9:30:00 AM

Lab ID: 2209151-001

Matrix: AQUEOUS

Received Date: 9/3/2022 9:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260: VOLATILES SHORT LIST							Analyst: CCM
Benzene	ND	1.0		µg/L	1	9/7/2022 1:40:00 PM	SL90843
Toluene	ND	1.0		µg/L	1	9/7/2022 1:40:00 PM	SL90843
Ethylbenzene	ND	1.0		µg/L	1	9/7/2022 1:40:00 PM	SL90843
Xylenes, Total	ND	1.5		µg/L	1	9/7/2022 1:40:00 PM	SL90843
Surr: 1,2-Dichloroethane-d4	116	70-130		%Rec	1	9/7/2022 1:40:00 PM	SL90843
Surr: 4-Bromofluorobenzene	89.4	70-130		%Rec	1	9/7/2022 1:40:00 PM	SL90843
Surr: Dibromofluoromethane	113	70-130		%Rec	1	9/7/2022 1:40:00 PM	SL90843
Surr: Toluene-d8	90.9	70-130		%Rec	1	9/7/2022 1:40:00 PM	SL90843

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Estimated value
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	PQL	Practical Quantitative Limit	RL	Reporting Limit
	S	% Recovery outside of range due to dilution or matrix interference		

Hall Environmental Analysis Laboratory

Sample Delivery Group: L1532908

Samples Received: 09/07/2022

Project Number:

Description:

Report To: Andy Freeman
4901 Hawkins NE
Albuquerque, NM 87109

Entire Report Reviewed By:



John Hawkins
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

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SAMPLE SUMMARY

2209151-001E CHAVEZ 02 L1532908-01 GW

Collected by

Collected date/time

Received date/time

09/01/22 09:30

09/07/22 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC) by Method RSK175	WG1923610	1	09/11/22 16:11	09/11/22 16:11	JAP	Mt. Juliet, TN

 ${}^1\text{Cp}$ ^{235}Tc 3S_1 ${}^4\text{Cn}$ ^{88}Sr

Qc

GI

Al

Sc

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



John Hawkins
Project Manager



Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result mg/l	<u>Qualifier</u>	RDL mg/l	Dilution	Analysis date / time	<u>Batch</u>
Methane	ND		0.0100	1	09/11/2022 16:11	WG1923610
Ethane	ND		0.0130	1	09/11/2022 16:11	WG1923610
Ethene	ND		0.0130	1	09/11/2022 16:11	WG1923610
Acetylene	ND		0.0200	1	09/11/2022 16:11	WG1923610
Propane	ND		0.0186	1	09/11/2022 16:11	WG1923610

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Method Blank (MB)

(MB) R3835891-2 09/11/22 13:36

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Methane	U		0.00291	0.0100
Ethane	U		0.00407	0.0130
Ethene	U		0.00426	0.0130
Acetylene	U		0.00560	0.0200
Propane	U		0.00548	0.0186

L1532356-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1532356-02 09/11/22 14:14 • (DUP) R3835891-3 09/11/22 15:44

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Methane	ND	ND	1	0.000		20
Ethane	ND	ND	1	0.000		20
Ethene	ND	ND	1	0.000		20
Acetylene	ND	ND	1	0.000		20
Propane	ND	ND	1	0.000		20

L1533155-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1533155-02 09/11/22 16:18 • (DUP) R3835891-4 09/11/22 16:31

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Methane	ND	ND	1	0.000		20
Ethane	ND	ND	1	0.000		20
Ethene	ND	ND	1	0.000		20
Acetylene	ND	ND	1	0.000		20
Propane	ND	ND	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3835891-1 09/11/22 13:25 • (LCSD) R3835891-5 09/11/22 16:34

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Methane	0.0678	0.0655	0.0644	96.6	95.0	85.0-115			1.69	20
Ethane	0.129	0.113	0.112	87.6	86.8	85.0-115			0.889	20
Ethene	0.127	0.115	0.114	90.6	89.8	85.0-115			0.873	20
Acetylene	0.208	0.196	0.195	94.2	93.7	85.0-115			0.512	20

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3835891-1 09/11/22 13:25 • (LCSD) R3835891-5 09/11/22 16:34

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Propane	0.186	0.170	0.168	91.4	90.3	85.0-115			1.18	20

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

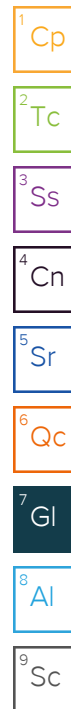
Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.



ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey--NELAP	TN002
California	2932	New Mexico ¹	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio--VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1 6}	KY90010	South Carolina	84004002
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1 4}	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas ⁵	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA -- ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA -- ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA--Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.



E184

SUB CONTRACTOR: Pace TN		COMPANY: PACE TN		PHONE: (800) 767-5859		FAX: (615) 758-5859	
ADDRESS: 12065 Lebanon Rd				ACCOUNT #:		EMAIL:	
CITY, STATE, ZIP: Mt. Juliet, TN 37122							
ITEM	SAMPLE	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	COLLECTION DATE	# CONTAINERS	ANALYTICAL COMMENTS
1	2209151-001E	Chavez 02	VOAHCL	Aqueous	9/1/2022 9:30:00 AM	2	Methane, Ethane, Ethene, Propane, Acetylene

Sample Receipt Checklist

5785 8093 3400

COC Seal Present/Intact: ☒ Y ☐ N

COC Signed/Accurate: ☒ Y ☐ N

Bottles arrive intact: ☒ Y ☐ N

Correct bottles used: ☒ Y ☐ N

Sufficient volume sent: ☒ Y ☐ N

RAD Screen <0.5 mR/hr: ☒ Y ☐ N

VOA Zero Headspace: ☒ Y ☐ N

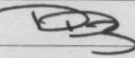
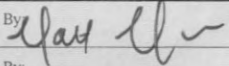
Pres. Correct/Check: ☒ Y ☐ N

NSA7

3.7 + 0 = 3.7

SPECIAL INSTRUCTIONS / COMMENTS:

Please include the LAB ID and the CLIENT SAMPLE ID on all final reports. Please e-mail results to lab@hallenvironmental.com. Please return all coolers and blue ice. Thank you.

Relinquished By: 	Date: 9/6/2022	Time: 9:13 AM	Received By: 	Date: 9-7-22	Time: 0845	REPORT TRANSMITTAL DESIRED: <input type="checkbox"/> HARDCOPY (extra cost) <input type="checkbox"/> FAX <input type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE FOR LAB USE ONLY Temp of samples _____ °C Attempt to Cool? _____ Comments: _____
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	
TAT: Standard <input checked="" type="checkbox"/> RUSH Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>						

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2209151

19-Sep-22

Client: ENSOLUM

Project: Rule 614 Compliance

Sample ID: MB-70033	SampType: MBLK	TestCode: EPA Method 200.7: Metals								
Client ID: PBW	Batch ID: 70033	RunNo: 90910								
Prep Date: 9/7/2022	Analysis Date: 9/8/2022	SeqNo: 3250098 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	ND	0.0030								
Boron	ND	0.040								
Calcium	ND	1.0								
Iron	ND	0.050								
Magnesium	ND	1.0								
Manganese	ND	0.0020								
Potassium	ND	1.0								
Sodium	ND	1.0								
Strontium	ND	0.010								

Sample ID: LCSLL-S-70033	SampType: LCSLL	TestCode: EPA Method 200.7: Metals								
Client ID: BatchQC	Batch ID: 70033	RunNo: 90910								
Prep Date: 9/7/2022	Analysis Date: 9/8/2022	SeqNo: 3250099 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	ND	0.0030	0.002000	0	143	50	150			
Boron	ND	0.040	0.04000	0	97.6	50	150			
Calcium	ND	1.0	0.5000	0	103	50	150			
Iron	ND	0.050	0.02000	0	88.9	50	150			
Magnesium	ND	1.0	0.5000	0	102	50	150			
Manganese	0.0021	0.0020	0.002000	0	105	50	150			
Potassium	ND	1.0	0.5000	0	92.6	50	150			
Sodium	ND	1.0	0.5000	0	99.5	50	150			
Strontium	ND	0.010	0.005000	0	100	50	150			

Sample ID: LCS-S-70033	SampType: LCS	TestCode: EPA Method 200.7: Metals								
Client ID: LCSW	Batch ID: 70033	RunNo: 90910								
Prep Date: 9/7/2022	Analysis Date: 9/8/2022	SeqNo: 3250100 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.48	0.0030	0.5000	0	96.0	85	115			
Boron	0.51	0.040	0.5000	0	102	85	115			
Calcium	50	1.0	50.00	0	100	85	115			
Iron	0.48	0.050	0.5000	0	96.6	85	115			
Magnesium	50	1.0	50.00	0	101	85	115			
Manganese	0.48	0.0020	0.5000	0	96.6	85	115			
Potassium	49	1.0	50.00	0	98.7	85	115			
Sodium	50	1.0	50.00	0	99.5	85	115			
Strontium	0.095	0.010	0.1000	0	95.4	85	115			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2209151

19-Sep-22

Client: ENSOLUM

Project: Rule 614 Compliance

Sample ID: 2209151-001DMS		SampType: MS		TestCode: EPA Method 200.7: Metals						
Client ID: Chavez 02		Batch ID: 70033		RunNo: 90910						
Prep Date: 9/7/2022		Analysis Date: 9/8/2022		SeqNo: 3250115		Units: mg/L				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.57	0.0030	0.5000	0.08830	95.7	70	130			
Boron	0.53	0.040	0.5000	0.01935	103	70	130			
Magnesium	60	1.0	50.00	9.690	101	70	130			
Manganese	0.50	0.0020	0.5000	0.02427	95.8	70	130			
Potassium	51	1.0	50.00	1.482	99.9	70	130			
Sodium	58	1.0	50.00	8.661	99.3	70	130			

Sample ID: 2209151-001DMSD		SampType: MSD		TestCode: EPA Method 200.7: Metals						
Client ID: Chavez 02		Batch ID: 70033		RunNo: 90910						
Prep Date: 9/7/2022		Analysis Date: 9/8/2022		SeqNo: 3250116			Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.56	0.0030	0.5000	0.08830	95.2	70	130	0.465	20	
Boron	0.53	0.040	0.5000	0.01935	102	70	130	0.524	20	
Magnesium	60	1.0	50.00	9.690	99.7	70	130	0.738	20	
Manganese	0.50	0.0020	0.5000	0.02427	95.8	70	130	0.0345	20	
Potassium	51	1.0	50.00	1.482	98.7	70	130	1.20	20	
Sodium	58	1.0	50.00	8.661	97.7	70	130	1.36	20	

Sample ID: 2209151-001DMS	SampType: MS	TestCode: EPA Method 200.7: Metals								
Client ID: Chavez 02	Batch ID: 70033	RunNo: 90910								
Prep Date: 9/7/2022	Analysis Date: 9/8/2022	SeqNo: 3250118					Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	100	5.0	50.00	50.27	101	70	130			
Iron	1.5	0.25	0.5000	1.082	92.6	70	130			
Strontium	0.38	0.050	0.1000	0.2965	87.3	70	130			

Sample ID: 2209151-001DMSD		SampType: MSD		TestCode: EPA Method 200.7: Metals						
Client ID: Chavez 02		Batch ID: 70033			RunNo: 90910					
Prep Date: 9/7/2022		Analysis Date: 9/8/2022			SeqNo: 3250119		Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	98	5.0	50.00	50.27	96.0	70	130	2.55	20	
Iron	1.5	0.25	0.5000	1.082	81.5	70	130	3.66	20	
Strontium	0.38	0.050	0.1000	0.2965	82.5	70	130	1.26	20	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2209151

19-Sep-22

Client: ENSOLUM

Project: Rule 614 Compliance

Sample ID: MB-70033	SampType: MBLK	TestCode: EPA 200.8: Metals
Client ID: PBW	Batch ID: 70033	RunNo: 90957
Prep Date: 9/7/2022	Analysis Date: 9/12/2022	SeqNo: 3252699 Units: mg/L
Analyte	Result	PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual
Selenium	ND	0.0010

Sample ID: MSLCSLL-70033	SampType: LCSLL	TestCode: EPA 200.8: Metals
Client ID: BatchQC	Batch ID: 70033	RunNo: 90957
Prep Date: 9/7/2022	Analysis Date: 9/12/2022	SeqNo: 3252700 Units: mg/L
Analyte	Result	PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual
Selenium	ND	0.0010 0.001000 0 74.1 50 150

Sample ID: MSLCS-70033	SampType: LCS	TestCode: EPA 200.8: Metals
Client ID: LCSW	Batch ID: 70033	RunNo: 90957
Prep Date: 9/7/2022	Analysis Date: 9/12/2022	SeqNo: 3252701 Units: mg/L
Analyte	Result	PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual
Selenium	0.026	0.0010 0.02500 0 102 85 115

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2209151

19-Sep-22

Client: ENSOLUM

Project: Rule 614 Compliance

Sample ID: MB	SampType: MBLK	TestCode: EPA Method 300.0: Anions								
Client ID: PBW	Batch ID: R90833	RunNo: 90833								
Prep Date:	Analysis Date: 9/6/2022	SeqNo: 3247073 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Chloride	ND	0.50								
Bromide	ND	0.10								
Sulfate	ND	0.50								
Nitrate+Nitrite as N	ND	0.20								

Sample ID: LCS	SampType: LCS	TestCode: EPA Method 300.0: Anions								
Client ID: LCSW	Batch ID: R90833	RunNo: 90833								
Prep Date:	Analysis Date: 9/6/2022	SeqNo: 3247074 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.53	0.10	0.5000	0	106	90	110			
Chloride	4.7	0.50	5.000	0	93.1	90	110			
Bromide	2.4	0.10	2.500	0	96.0	90	110			
Sulfate	9.5	0.50	10.00	0	95.4	90	110			
Nitrate+Nitrite as N	3.5	0.20	3.500	0	99.1	90	110			

Sample ID: MB	SampType: MBLK	TestCode: EPA Method 300.0: Anions								
Client ID: PBW	Batch ID: R91085	RunNo: 91085								
Prep Date:	Analysis Date: 9/15/2022	SeqNo: 3258177 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Orthophosphate (As P)	ND	0.50								

Sample ID: LCS	SampType: LCS	TestCode: EPA Method 300.0: Anions								
Client ID: LCSW	Batch ID: R91085	RunNo: 91085								
Prep Date:	Analysis Date: 9/15/2022	SeqNo: 3258178 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phosphorus, Orthophosphate (As P)	4.5	0.50	5.000	0	90.5	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2209151

19-Sep-22

Client: ENSOLUM

Project: Rule 614 Compliance

Sample ID: LCS-70034	SampType: LCS		TestCode: EPA Method 8015M/D: Diesel Range							
Client ID: LCSW	Batch ID: 70034		RunNo: 90851							
Prep Date: 9/8/2022	Analysis Date: 9/9/2022		SeqNo: 3251928		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	2.2	1.0	2.500	0	86.4	70	130			
Surr: DNOP	0.22		0.2500		89.0	43.2	147			

Sample ID: MB-70034	SampType: MBLK		TestCode: EPA Method 8015M/D: Diesel Range							
Client ID: PBW	Batch ID: 70034		RunNo: 90851							
Prep Date: 9/8/2022	Analysis Date: 9/9/2022		SeqNo: 3251930		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	1.0								
Motor Oil Range Organics (MRO)	ND	5.0								
Surr: DNOP	0.51		0.5000		101	43.2	147			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2209151

19-Sep-22

Client: ENSOLUM
Project: Rule 614 Compliance

Sample ID: MB	SampType: MBLK	TestCode: EPA Method 8260: Volatiles Short List								
Client ID: PBW	Batch ID: SL90843	RunNo: 90843								
Prep Date:	Analysis Date: 9/7/2022	SeqNo: 3248607 Units: µg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	11		10.00		111	70	130			
Surr: 4-Bromofluorobenzene	9.0		10.00		90.4	70	130			
Surr: Dibromofluoromethane	11		10.00		108	70	130			
Surr: Toluene-d8	9.1		10.00		91.0	70	130			

Sample ID: 100ng lcs	SampType: LCS	TestCode: EPA Method 8260: Volatiles Short List								
Client ID: LCSW	Batch ID: SL90843	RunNo: 90843								
Prep Date:	Analysis Date: 9/7/2022	SeqNo: 3248612 Units: µg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	21	1.0	20.00	0	103	70	130			
Toluene	20	1.0	20.00	0	100	70	130			
Surr: 1,2-Dichloroethane-d4	11		10.00		106	70	130			
Surr: 4-Bromofluorobenzene	9.2		10.00		92.1	70	130			
Surr: Dibromofluoromethane	11		10.00		105	70	130			
Surr: Toluene-d8	9.2		10.00		91.7	70	130			

Sample ID: 2209151-001ams	SampType: MS	TestCode: EPA Method 8260: Volatiles Short List								
Client ID: Chavez 02	Batch ID: SL90843	RunNo: 90843								
Prep Date:	Analysis Date: 9/7/2022	SeqNo: 3249029 Units: µg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	23	1.0	20.00	0	114	70	130			
Toluene	21	1.0	20.00	0	106	70	130			
Surr: 1,2-Dichloroethane-d4	12		10.00		116	70	130			
Surr: 4-Bromofluorobenzene	9.2		10.00		92.3	70	130			
Surr: Dibromofluoromethane	11		10.00		113	70	130			
Surr: Toluene-d8	9.1		10.00		91.2	70	130			

Sample ID: 2209151-001amsd	SampType: MSD	TestCode: EPA Method 8260: Volatiles Short List								
Client ID: Chavez 02	Batch ID: SL90843	RunNo: 90843								
Prep Date:	Analysis Date: 9/7/2022	SeqNo: 3249030 Units: µg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	22	1.0	20.00	0	110	70	130	3.50	20	
Toluene	20	1.0	20.00	0	100	70	130	5.01	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2209151

19-Sep-22

Client: ENSOLUM

Project: Rule 614 Compliance

Sample ID: 2209151-001amsd		SampType: MSD		TestCode: EPA Method 8260: Volatiles Short List						
Client ID: Chavez 02		Batch ID: SL90843		RunNo: 90843						
Prep Date:		Analysis Date: 9/7/2022		SeqNo: 3249030			Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 1,2-Dichloroethane-d4	12		10.00		119	70	130	0	0	
Surr: 4-Bromofluorobenzene	9.3		10.00		93.0	70	130	0	0	
Surr: Dibromofluoromethane	11		10.00		111	70	130	0	0	
Surr: Toluene-d8	9.0		10.00		90.1	70	130	0	0	

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2209151

19-Sep-22

Client: ENSOLUM

Project: Rule 614 Compliance

Sample ID: Ics-1 98.9uS eC	SampType: LCS	TestCode: SM2510B: Specific Conductance								
Client ID: LCSW	Batch ID: R90925	RunNo: 90925								
Prep Date:	Analysis Date: 9/8/2022	SeqNo: 3250984	Units: µmhos/cm							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Conductivity	98	10	98.90	0	99.3	85	115			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2209151

19-Sep-22

Client: ENSOLUM
Project: Rule 614 Compliance

Sample ID: 2.5ug gro lcs	SampType: LCS		TestCode: EPA Method 8015D: Gasoline Range							
Client ID: LCSW	Batch ID: G90843		RunNo: 90843							
Prep Date:	Analysis Date: 9/7/2022		SeqNo: 3248715		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.47	0.050	0.5000	0	94.8	70	130			
Surr: 4-Bromofluorobenzene	9.3		10.00		92.7	70	130			

Sample ID: MB	SampType: MBLK		TestCode: EPA Method 8015D: Gasoline Range							
Client ID: PBW	Batch ID: G90843		RunNo: 90843							
Prep Date:	Analysis Date: 9/7/2022		SeqNo: 3248730		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	0.050								
Surr: 4-Bromofluorobenzene	8.5		10.00		84.8	70	130			

Sample ID: 2209151-001ams	SampType: MS		TestCode: EPA Method 8015D: Gasoline Range							
Client ID: Chavez 02	Batch ID: G90843		RunNo: 90843							
Prep Date:	Analysis Date: 9/7/2022		SeqNo: 3249037		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.47	0.050	0.5000	0	93.2	49.5	136			
Surr: 4-Bromofluorobenzene	9.4		10.00		93.7	70	130			

Sample ID: 2209151-001amsd	SampType: MSD		TestCode: EPA Method 8015D: Gasoline Range							
Client ID: Chavez 02	Batch ID: G90843		RunNo: 90843							
Prep Date:	Analysis Date: 9/7/2022		SeqNo: 3249038		Units: mg/L					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.47	0.050	0.5000	0	93.2	49.5	136	0	20	
Surr: 4-Bromofluorobenzene	9.6		10.00		96.1	70	130	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2209151

19-Sep-22

Client: ENSOLUM
Project: Rule 614 Compliance

Sample ID: mb-1 alk	SampType: MBLK	TestCode: SM2320B: Alkalinity								
Client ID: PBW	Batch ID: R90834	RunNo: 90834								
Prep Date:	Analysis Date: 9/6/2022	SeqNo: 3247228	Units: mg/L CaCO3							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID: lcs-1 alk	SampType: LCS	TestCode: SM2320B: Alkalinity								
Client ID: LCSW	Batch ID: R90834	RunNo: 90834								
Prep Date:	Analysis Date: 9/6/2022	SeqNo: 3247229	Units: mg/L CaCO3							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	75.72	20.00	80.00	0	94.6	90	110			

Qualifiers:

* Value exceeds Maximum Contaminant Level.
D Sample Diluted Due to Matrix
H Holding times for preparation or analysis exceeded
ND Not Detected at the Reporting Limit
PQL Practical Quantitative Limit
S % Recovery outside of range due to dilution or matrix interference

B Analyte detected in the associated Method Blank
E Estimated value
J Analyte detected below quantitation limits
P Sample pH Not In Range
RL Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: 2209151

19-Sep-22

Client: ENSOLUM

Project: Rule 614 Compliance

Sample ID: MB-69980	SampType: MBLK	TestCode: SM2540C MOD: Total Dissolved Solids								
Client ID: PBW	Batch ID: 69980	RunNo: 90850								
Prep Date: 9/6/2022	Analysis Date: 9/7/2022	SeqNo: 3247843 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID: LCS-69980	SampType: LCS	TestCode: SM2540C MOD: Total Dissolved Solids								
Client ID: LCSW	Batch ID: 69980	RunNo: 90850								
Prep Date: 9/6/2022	Analysis Date: 9/7/2022	SeqNo: 3247844 Units: mg/L								
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1010	20.0	1000	0	101	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Estimated value
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quantitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix interference		

Sample Log-In Check List

Client Name: ENSOLUM

Work Order Number: 2209151

RcptNo: 1

Received By: Tracy Casarrubias 9/3/2022 9:00:00 AM

Completed By: Tracy Casarrubias 9/3/2022 2:27:58 PM

Reviewed By:

KRC 9-06-22

Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
2. How was the sample delivered? Courier

Log In

3. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
4. Were all samples received at a temperature of $>0^{\circ}\text{C}$ to 6.0°C ? Yes ☒ No ☐ NA ☐
5. Sample(s) in proper container(s)? Yes ☒ No ☐
6. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
7. Are samples (except VOA and ONG) properly preserved? Yes ☒ No ☐
8. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
9. Received at least 1 vial with headspace $<1/4$ " for AQ VOA? Yes ☐ No ☐ NA ☒
10. Were any sample containers received broken? Yes ☐ No ☒
11. Does paperwork match bottle labels?
(Note discrepancies on chain of custody) Yes ☒ No ☐
12. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
13. Is it clear what analyses were requested? Yes ☒ No ☐
14. Were all holding times able to be met?
(If no, notify customer for authorization.) Yes ☒ No ☐

of preserved
bottles checked
for pH: 2
(<2 or >12 unless noted)

Adjusted? NO

Checked by: JN 9/6/22

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:		Date:	
By Whom:		Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:			
Client Instructions:			

16. Additional remarks:

17. Cooler Information

Cooler No	Temp $^{\circ}\text{C}$	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	0.4	Good				

Chain-of-Custody Record

Client: Environ, LLC

Mailing Address: 776 E 2nd Ave,

Deming, CO 81301

Phone #: 970-403-6023

email or Fax#: dharcman@ensilum.com

QA/QC Package:

☐ Standard

☐ Level 4 (Full Validation)

Accreditation: ☐ Az Compliance

☐ NELAC ☐ Other

☐ EDD (Type)

Project Manager:

Devin Harcman

dharcman@ensilum.com

Sampler: Greg Palise / Reece Hansen

On Ice: ☒ Yes ☐ No

of Coolers: 1

Cooler Temp (including CP): 0.6-0.2-0.4 (°C)

Container Type and #

Preservative Type

HEAL No.

Multiple

Bottles

labeled

2209151

001

Date

Time

Matrix

Sample Name

9/1/22

930

GV

Chavez 02

Date

Time

Relinquished by:

Relinquished by:

Received by:

Via:

Date

Time

9/2/22

1140

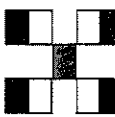
Environ

9/13/22

9:00

Remarks:

CC: charson@ensilum.com



HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

BTEX / MTBE / TMB's (8021)

TPH:8015D(GRO / DRO / MRO)

8081 Pesticides/8082 PCB's

EDB (Method 504.1)

PAHs by 8310 or 8270SIMS

RCRA 8 Metals

Cl, F, Br, NO₃, NO₂, PO₄, SO₄

8260 (VOA)

8270 (Semi-VOA)

Total Coliform (Present/Absent)

See Attached

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

(2) The analyses for samples collected as required by Rule 615 will include:

- A. pH;
- B. Specific conductance;
- C. Total dissolved solids ("TDS");
- D. Dissolved gases (methane, ethane, and propane);
- E. Alkalinity (total, bicarbonate, and carbonate as CaCO_3);
- F. Major anions (bromide, chloride, fluoride, sulfate, nitrate and nitrite as N, and phosphorus);
- G. Major cations (calcium, iron, magnesium, manganese, potassium, and sodium);
- H. Other elements (barium, boron, selenium, and strontium);
- I. Presence of bacteria (iron related, sulfate reducing, and slime forming);
- J. Total petroleum hydrocarbons ("TPH") as total volatile hydrocarbons (C_6 to C_{10}) and total extractable hydrocarbons (C_{10} to C_{36}); and
- K. BTEX compounds (benzene, toluene, ethylbenzene, and xylenes ("BTEX")).

Hall Environmental Analysis Laboratory, Inc.
4901 Hawkins NE
Albuquerque NM, 87109
Project: **Rule 608 Spring Sampling**

Date Collected: 9/1/2022
Date Received: 9/2/2022
Date Analyzed: 9/12/2022
Date Reported: 9/12/2022
Project ID: 22035926
Page 1 of 1

Condition of Sample(s) Upon Receipt: Acceptable

Client Sample #: 1
Sample Location: Chavez 02
Test: 1071 Iron-Related Bacteria (BART Kit), P/A

Lab Sample #: 22035926-001

Liquid Volume: **15 mL**

Results: Iron-Related Bacteria present.

Client Sample #: 1
Sample Location: Chavez 02
Test: 1072 Sulfate-Reducing Bacteria (BART Kit), P/A

Lab Sample #: 22035926-001

Liquid Volume: **15 mL**

Results: Sulfate Reducing Bacteria absent.

Client Sample #: 1
Sample Location: Chavez 02
Test: 2078 Slime-Forming Bacteria (BART Kit)

Lab Sample #: 22035926-001

Liquid Volume: **15 mL**

Results: Slime-Forming Bacteria present.