2013 OUTCROP ZONE REPORT

FRUITLAND FORMATION OUTCROP ZONE
ARCHULETA COUNTY, COLORADO

OCTOBER 2013

Prepared for:

PETROX RESOURCES, INC.
Meeker, Colorado

and

ELM RIDGE RESOURCES, INC.
Dallas, Texas

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EXECUTIVE SUMMARY

This 2013 Outcrop Zone Report meets the requirements set forth by the United States Forest Service (USFS) and the Bureau of Land Management (BLM) in Decision Point 5 of the Record of Decision (ROD) in order to obtain approval of an application for permit to drill (APD) for coalbed methane (CBM) production of federal minerals in the Project Area. The ROD was developed in response to the 2006 Final Environmental Impact Statement (FEIS) for the Northern San Juan Basin (NSJB). In July, 2011, Petrox Resources, Inc. (Petrox) drilled a horizontal lateral of the Candelaria 10U#3 CBM production well from fee minerals through 172 feet of federal minerals in the northeast quarter of the northwest quarter of Section 15U, Township 34 North, Range 5 West in Archuleta County, Colorado. The APD for the Candelaria 10U#3 CBM production well was approved February 2, 2012. Petrox has subsequently submitted an APD to the BLM/USFS for the FGU 9U#3 CBM production well that is proposed to be installed on a federal lease within the Project Area. The approval of the APD by the BLM/USFS was scheduled for March 2013 with drilling tentatively scheduled for May 2013; however, due to requirements by the USFS for additional wildlife surveys in the vicinity of the FGU 9U#3 CBM production well, the FGU 9U#3 APD has been delayed and drilling has been tentatively scheduled for Spring 2014.

In addition to compliance with the ROD, the monitoring program detailed in this report meets the requirements of Sections 1, 2, and 4 of the Conditions of Approval (COA) for the Candelaria 10U#3 fee CBM production well (Permit), issued by the Colorado Oil and Gas Conservation Commission (COGCC).

The Project Area includes approximately 18 miles of the Fruitland Formation (Kf) outcrop starting on the west end at the La Plata County-Archuleta County boundary near Beaver Creek and extends southeast along the Kf outcrop to the Southern Ute Indian Tribe (SUIT) Reservation boundary at Cabezon Canyon. In addition to the Kf outcrop, the Project Area includes a 1.5-mile buffer from the Kf and Kirkland Shale (Kk) boundary, known collectively as the “outcrop zone”.

The objective of the 2013 Outcrop Zone Report is to characterize the Project Area and evaluate the existing conditions for future CBM production of federal minerals in the Fosset Gulch Unit within the outcrop zone. The 2013 reconnaissance survey represents the third evaluation of the Project Area for development of the Fosset Gulch Unit.

Based on reservoir, geological, and hydrogeological characteristics of the Kf within the Project Area, the potential for water depletion, methane seepage, and/or coal fire impacts at the Kf outcrop appears to be low from CBM production of the Candelaria 10U#3. The Kf aquifer has poor/limited communication with the Kf outcrop as evidenced by test rates of 5 barrels of water per day (BWPD) per well to 15 BWPD/well and the state engineer’s determination of the Kf aquifer in the vicinity of the Candelaria 10U#3 being nontributary water. Based on available data from existing production testing and limited permeability of the formation itself, it is anticipated that water recharge rates of the Kf aquifer will keep pace with water production rates from the Candelaria 10U#3 resulting in negligible water depletion, if any, at the outcrop.

Gas well production rates of 300 thousand cubic feet per day (MCFD) along with COGCC monitoring well data indicate the presence of free gas within the Kf and at the outcrop.

Producing CBM within the outcrop zone would reduce the existing free gas, thereby reducing the potential for seepage at the ground surface.

The Kf coal within the Project Area is characterized as a low permeable coal (0.75 millidarcies), highly anisotropic (2:1 to 4:1), and dominant fracture orientation and maximum horizontal stresses that are trending north-northwest and south-southeast, parallel to the Kf outcrop. The drainage of the reservoir will be in alignment with the maximum horizontal stress. The absence of methane seepage at the ground surface suggests fractures at the surface are resistive and the coal is sealed at the Kf outcrop.

Baseline conditions within the Project Area indicate there is virtually no methane seeping to the ground surface. Conditions have not changed within the Project Area since 2004, despite ongoing CBM production since 1990 by Elm Ridge Resources, Inc. (Elm Ridge) in the nearby Pargin Mountain Unit. As stated in Decision Point 5 of the ROD, oil and gas producers are allowed to monitor-as-you-go after wells are drilled and begin production. This approach appears warranted as there are nine years of outcrop monitoring baseline data, the construction and monitoring of seven monitoring wells, the installation and monitoring of soil vapor tubes, and historical/ongoing reservoir pressure data which all provide sufficient monitoring of the Kf outcrop.

Throughout the lifecycle of CBM production in the Fosset Gulch Unit, Petrox will evaluate conditions to determine if production is contributing to methane seepage, coal fires, surface water depletion, or pressure changes in monitoring wells at or near the Kf outcrop. If CBM production is determined to be adversely impacting any of these conditions, Petrox will evaluate the mitigation strategies discussed in the ROD and work with the BLM, USFS, and/or COGCC to implement effective mitigation measures.

The technical working group (TWG) met on September 18, 2012, to discuss, evaluate, and assess the 2011 Outcrop Zone Report. The TWG is made up of the BLM, USFS, COGCC, SUIT, Petrox, and LT Environmental, Inc. (LTE). Minor alterations to the 2011 Outcrop Zone Report and monitoring plans moving forward were agreed to in the September 2012 TWG meeting. As a result of the meeting, the BLM/USFS informed Petrox that a COA would be developed for the pending APD for the Candelaria 10U#3 CBM production well and for future development of the Fosset Gulch Unit. Petrox received the BLM/USFS-approved APD for the Candelaria 10U#3 CBM production well on November 7, 2012. Annual meetings of the TWG will continue to discuss, evaluate, and assess future outcrop zone reports.

Based on the monitoring results, evaluation of this report, and the first TWG meeting, LTE and Petrox recommend the following to monitor the Project Area:

- Conduct annual surveys of methane flux at the ground surface where surface water transects the Kf outcrop. Beginning in 2013, grid spacing for the flux survey has been expanded to 400-foot spacings during those years that the regional reconnaissance is not conducted. During regional reconnaissance years (next conducted in 2014), grid spacing will be reduced to the previously conducted 200-foot spacing flux survey;

- Measure methane flux at nearby abandoned production wells, specifically the Big Horn-Schomburg #1 abandoned production well;

- Identify and sample natural springs along the Kf outcrop on an annual basis;

- Field verify suspect methane seeps along the Kf outcrop using scheduled regional reconnaissance methods of aerial fly-over and field verification on a 3-year cycle (next event in 2014);

- Conduct abandoned coal mine surveys on a quarterly basis during the first year of CBM production from the Candelaria 10U#3 CBM production well and a re-evaluation of frequency to be discussed during the subsequent TWG meeting. The second quarter survey is tentatively scheduled for November 2013;

- Summation and evaluation of the BLM soil vapor monitoring tube data, if available, with statistical analysis using the Mann-Kendell test;

- Summation and evaluation of the COGCC monitoring well pressure data with an emphasis on monitoring wells Fosset Gulch MW 34-5-14-1 (API 05-007-06264) and Fosset Gulch MW 34-5-14-2 (API 05-007-06265);

- Summation and evaluation of annual natural gas and water production data from each Petrox/Elm Ridge CBM production well within the Fosset Gulch Unit; and

- Present this Outcrop Zone Report to the TWG during its second annual review.

In addition to modified monitoring plans developed through the TWG, the following action items were discussed and agreed to:

- No new monitoring wells will be required at this time;

- Petrox will incorporate water chemistry data from new production wells drilled prior to bringing them online per the COGCC COA. The data will be presented in subsequent outcrop zone reports;

- Petrox will collect and provide initial downhole pressure data for all new drill production wells prior to bringing them online. The data will be used in evaluating reservoir production efficiency and in evaluating the Mansoori modeling efforts. Modeling data will be incorporated into subsequent outcrop zone reports;

- Petrox will evaluate reservoir pressure data from new drill production wells as they occur and conduct periodic model runs similar to the initial Mansoori effort to monitor the actual reservoir behavior in comparison to the initial predictive effort. The frequency of this activity will be dependent on the data available. Results will be presented in subsequent outcrop zone reports when available;

- Petrox will commit to utilizing the 10U#4, the FGU 9U#3, or other existing/proposed CBM production wells for pressure monitoring for a period of no more the three

months following completion of the well. The data will be provided to the TWG to evaluation. The data will also be incorporated into the outcrop zone report; and

- The outcrop zone reports and subsequent monitoring will be utilized for all APDs for Petrox within the Fosset Gulch Unit.

1.0 INTRODUCTION

This 2013 Outcrop Zone Report has been prepared at the request of Petrox Resources, Inc. (Petrox) and Elm Ridge Resources, Inc. (Elm Ridge) for the eastern half of the Northern San Juan Basin (NSJB) in Archuleta County, Colorado.

The Project Area includes approximately 18 miles of the Fruitland Formation (Kf) outcrop starting on the west end at the Archuleta County-La Plata County boundary near Beaver Creek and extends southeast along the Kf outcrop to the Southern Ute Indian Tribe (SUIT) Reservation boundary at Cabezon Canyon. In addition to the Kf outcrop, the Project Area includes a 1.5-mile buffer from the Kf and Kirkland Shale (Kk) boundary, known collectively as the "outcrop zone". Figure 1 illustrates the Project Area.

1.1 BACKGROUND

This report meets the requirements set forth by the United States Forest Service (USFS) and the Bureau of Land Management (BLM) in Decision Point 5 of the Record of Decision (ROD) in order to obtain approval of an application for permit to drill (APD) for coalbed methane (CBM) production of federal minerals in the Project Area. The ROD was developed in response to the 2006 Final Environmental Impact Statement (FEIS) for the NSJB.

In July, 2011, Petrox drilled a horizontal lateral of the Candelaria 10U#3 CBM production well from fee minerals through 172 feet of federal minerals in the northeast quarter of the northwest quarter of Section 15U, Township 34 North, Range 5 West in Archuleta County, Colorado. The APD from the BLM for the Candelaria 10U#3 was approved February 2, 2012.

Petrox has subsequently submitted an APD to the BLM/USFS for the FGU 9U#3 CBM production well that is proposed to be installed on a federal lease within the Project Area. The approval of the APD by the BLM/USFS was scheduled for March 2013 with drilling tentatively scheduled for May 2013; however, due to requirements by the USFS for additional wildlife surveys in the vicinity of the FGU 9U#3 CBM production well, the FGU 9U#3 APD has been delayed and drilling has been tentatively rescheduled for Spring 2014.

In addition to compliance to the ROD, the monitoring program detailed in this report meets the requirements of Sections 1, 2, and 4 of the Conditions of Approval (COA) for the Candelaria 10U#3 CBM production well (Permit), issued by the Colorado Oil and Gas Conservation Commission (COGCC). Outcrop monitoring has been conducted in Archuleta County since 2004.

As stipulated in the ROD, the technical working group (TWG), comprised of the BLM, USFS, COGCC, the SUIT, Petrox, and LT Environmental, Inc. (LTE), has met on September 18 and December 17, 2012, and March 7, 2013 to discuss the 2011 and 2012 Outcrop Zone reports as well as future plans Petrox has for drilling within the outcrop zone.

1.2 PROJECT OBJECTIVE

The objective of the 2013 Outcrop Zone Report is to continue to characterize the Project Area and evaluate the existing conditions for CBM production of federal minerals within the outcrop zone. This 2013 Outcrop Zone Report marks the third year of evaluating the Project Area conditions based on the BLM Decision Point 5 of the ROD and will continue to be revised annually as new CBM production wells are drilled and monitoring continues. As discussed in Decision Point 5 of the ROD, Project Area conditions will be evaluated through a monitor-as-you-go approach, which allows the oil and gas producer to monitor the Project Area while they drill and produce CBM production wells. The 2013 monitoring event also marks the 10th year of monitoring the Kf outcrop per Sections 1, 2, and 4 of the COA by the COGCC.

1.3 SCOPE OF WORK

The scope of work for this 2013 Outcrop Zone Report included the following tasks:

- Document the baseline conditions within the Project Area;
- Summarize the reservoir, geological, and hydrological data;
- Describe the monitoring and mitigation programs for the Project Area;
- Summarize the monitor-as-you-go results of the current monitoring program;
- Evaluate the Project Area as it relates to CBM production of federal minerals;
- Prepare this report; and
- Discuss, evaluate, and assess the 2013 Outcrop Zone Report with the TWG.

1.4 ORGANIZATION OF REPORT

This report is organized into six sections including this introduction (Section 1.0). The documentation of project baseline conditions is described in Section 2.0. The monitoring and mitigation programs are discussed in Section 3.0. The monitor-as-you-go results are summarized in Section 4.0. The outcrop evaluation is detailed in Section 5.0. References are presented in Section 6.0. Figures, tables, and appendices follow the text in separate sections.

2.0 DOCUMENTATION OF PROJECT BASELINE CONDITION

The NSJB is located in southwestern Colorado and northwestern New Mexico on the northeastern margin of the Colorado Plateau and south of the San Juan Mountains. The NSJB is defined by the outcrop of the Kf.

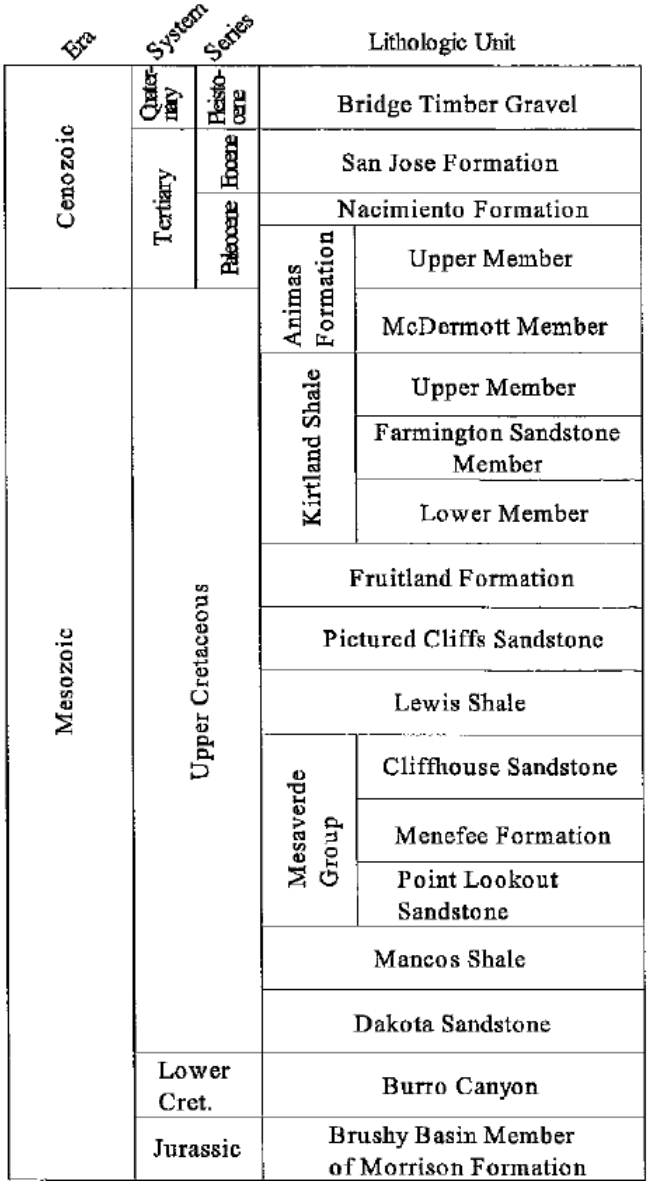
2.1 PROJECT AREA SETTING

The Project Area includes approximately 18 miles of the Kf outcrop starting on the west end at the Archuleta County-La Plata County boundary near Beaver Creek and extends southeast along the Kf outcrop to the SUIT Reservation boundary at Cabezon Canyon. In addition to the Kf outcrop, the Project Area includes a 1.5-mile outcrop zone. This outcrop zone has been defined by the BLM as a 1.5-mile buffer from the Kf-Kk contact (Figure 1).

2.2 GEOLOGY

During the Cretaceous Period, a series of transgressions and regressions of the western interior seaway deposited thick accumulations of beach sands and back barrier marine lagoon sediments; coalbed deposits were intertongued within the beach sand deposits during regressive cycles in the area that is now the San Juan Basin (Riese, et al., 2005). Episodic subsidence of the western interior seaway in conjunction with thrusting along the Cordilleran orogenic belt to the west contributed to the present day structure of the NSJB. Post depositional uplift due to Oligocene volcanic activity to the north and early Miocene uplift of the Colorado Plateau have both contributed to erosion of the San Juan Basin (Riese, et al., 2005). Presently, the NSJB is defined by the outcrop of the Kf and Pictured Cliffs Sandstone (Kpc), which dips at angles up to 50 degrees (°) toward the center of the basin to the south (Tremain, et al., 1994). The lithologic units within the NSJB are depicted in the illustration below (Riese, et al., 2005). The structural dip in the Project Area, as determined from openhole log, mean square dip (MSD) processing portion of the Fosset Gulch Unit 9U#2 Formation Image (FMI) logs, is 16.5° to the southwest (north 214°).

Lithology of the Northern San Juan Basin



Alluvial sands and gravel have been deposited in low-lying areas and valleys. Geology of the Project Area is dominated by three formations: the Kk, Kf, and Kpc. Figure 1 illustrates the geological contacts in the Project Area.

2.2.1 Predominate Lithologic Units in the Northern San Juan Basin

Alluvium and colluvium (Qac) and gravel (Qg) from the Holocene and Pleistocene eras are deposited over the valleys floors and other low-lying areas. A majority of the deposits are located in the fluvial river deposits of the Piedra River, Stollsteimer Creek, and Beaver Creek and their tributaries. The deposits range from a few inches up to 100 feet in thickness (Carroll, et al., 2011).

The Kk is made up of interbedded shale and sandstone from the Upper Cretaceous period. The Kk overlays the Kf on the inner basin side of the NSJB within the Project Area (south-southwest-west). The Kk is approximately 650 feet thick. The Kf-Kk contact is gradational and presumably unconformable. The contact is identified as the boundary between thickly bedded white sandstones (Kk) and olive-green shale (Kk) with coal and carbonaceous shale (Kf) (Carroll, et al., 2011). The Kk contact is often covered at the ground surface.

The Kf is from the Upper Cretaceous period and is comprised of interbedded shale, sandstone, coal, carbonaceous shale, siltstone, and mudstone. Coals define this formation, but are predominately found in the basal portion of the Kf while carbonaceous shale makes up the upper portion of the formation. Coal beds in the Kf are bituminous with net bed thickness ranging from 20 feet to 40 feet in the Project Area while the overall Kf thickness ranges from 90 feet to 193 feet. The Kf overlies the Kpc with the contact located on the outer edge of the NSJB (Carroll, et al., 2011). The Kf is described in further detail in Section 2.2.2.

The Kpc is from the Upper Cretaceous period and is comprised of interbedded sandstone and shale. The Kpc forms the northern boundary of the NSJB which is identified by the steep cliffs of the hogback ridge. The Kpc thickness ranges from 300 feet to 1,100 feet thick (Carroll, et al., 2011).

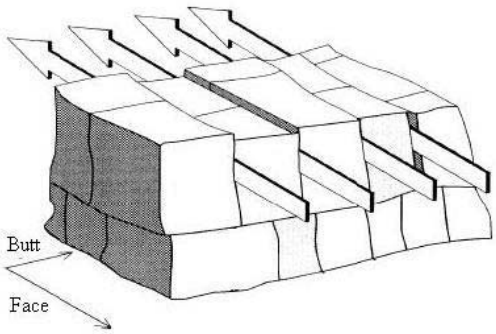
2.2.2 The Fruitland Formation

The Kf was deposited in a swampy coastal plain environment (USFS/BLM, 2006). This depositional environment produced coal beds from which CBM is produced. The Kf is the primary source of CBM in the NSJB and, as such, a detailed discussion of the geological characteristics of the coal beds within the Kf is described below.

2.2.2.1 Cleat Orientation

Cleats are fractures in coal that enhance gas and water flow in coal beds. Face cleats include the earliest formed fractures and other fractures typically terminate at face cleats. Butt cleats have irregular surfaces and are shorter and less continuous than face cleats.

Below is an illustration of typical cleat structures in coal.



Face and Butt cleat in coal structure(Scott,1994)

Cleat strikes have been measured in a variety of drill cores and along outcrops throughout the NSJB of Colorado and New Mexico. In the NSJB, cleats strike predominantly northwest-southeast, parallel to the Kf outcrop within the Project Area, with typically less than 10° variation in strike direction in evaluated cores and outcrops. Several factors contribute to face cleat strike variations including curved cleats, gradual changes in cleat strikes over wide areas, and cleats with different strikes in adjacent coal beds (Tremain, et. al., 1994).

The face cleat orientations measured by the Colorado Geological Survey (CGS) in the Kf outcrop were predominately striking 325° or northwest and parallel with the strike of the Kf outcrop in the Project Area. The butt cleats were predominately orientated with a strike of 84° or southeast (Carroll, et al., 2011) and are poorly developed in the Project Area. Face cleat orientations from the CGS study are depicted on Figure 2.

Petrox ran an FMI log during the drilling of the Fosset Gulch Unit 9U#2 CBM production well. Based on the FMI log, the face cleat strikes are predominately orientated north-northwest, south-southeast. The histogram of face cleat orientation is illustrated on Figure 2. The face cleat strikes in the Fosset Gulch Unit 9U#2 are consistent with those measured at the outcrop by Tremain (Tremain, et al., 1994) and the CGS. The drilling-induced fractures measured in the Fosset Gulch Unit 9U#2 FMI log strike north/northwest-southeast 130°. The drilling-induced fracture orientation follows the maximum horizontal stress and predicts hydraulic fracture direction which would be parallel to the strike of the Kf outcrop. This also predicts the direction of maximum permeability and drainage pattern within the reservoir, which would be north/northwest-south/southeast.

In La Plata County, this strike azimuth is oriented perpendicular to the Kf outcrop creating potential for gas seepage. In Archuleta County, the predominant face cleat azimuth (north/northwest-south/southeast) is oriented parallel to the Kf outcrop due to the change in the strike of the Kf outcrop. The development of natural fractures, fracture orientation, and maximum horizontal stress orientation are the major factors in explaining differences in permeability and observed seepage conditions between the two counties. As stated above, gas and water flow though natural fractures and face cleats. This has been documented for decades within the Kf outcrop in La Plata County where fugitive free gas has manifested into methane seeps. In the Project Area however, methane seepage has not be observed, validating the directional permeability is north/northwest-south/southeast, and surface fractures are resistive and poorly interconnected.

2.2.2.2 Joint/Fracture/Fault Systems

Joints within the Kf tend to be planar to slightly curviplanar with lesser quantities of joints expressing strong curvature or sinuous and branching. The primary joint sets have exposed lengths up to tens of feet, an overall azimuth of approximately 330° and dip 16.5° to the southwest. The secondary joint sets have exposed lengths up to several feet, an overall trend of approximately 70° and dip steeply northwest and southeast. The apertures of all joints varied on average from less than 0.25 inches to 0.5 inches, however, in some circumstances are as much as several inches. Most joint surfaces are coated and stained with a veneer of iron and manganese oxide and are generally open except for rare veins and coatings of calcite and gypsum (Carroll, et al., 2011). Faults within NSJB tend to strike east, northeast, and northwest. The Fosset Gulch

Unit #16-1 well intersected a major fault located along Bull Creek which transects the Project Area northwest-southeast.

Fractures are typically located with fault zones that are tens of feet thick. These fractures tend to be more continuous than face cleats and extend through non-coal interbeds. Though the fractures extend through interbeds, the fractures tend to be closed and, as a result, do not typically act as conduits for fluid and gas flow. (Tremain, et al., 1994).

The primary pathway for gas flow within the Kf is through void spaces in the face cleats and natural fractures, which are parallel to the Kf outcrop within the Project Area. Natural fractures are apparent in the FMI and Dipole Sonic Logs ran in the Fosset Gulch Unit 9U#2 CBM production well. However at the Kf outcrop, natural fractures are poorly developed and most likely resistive as seen on FMI logs, which are healed with void space either filled or not interconnected, limiting the ability of free gas to migrate to the ground surface and manifesting into methane seeps. Furthermore, the azimuth (330°) of the primary joint system is consistent with face cleating orientation and parallel to the strike of the Kf outcrop, thereby further inhibiting permeability and gas flow toward the Kf outcrop. Monitoring activities since 2004 confirm the absence of methane seepage along the Kf outcrop within the Project Area, in spite of free gas observed in the COGCC monitoring wells.

2.2.2.3 Reservoir Characteristics

The overall gas composition in the San Juan Basin is highly variable and primarily controlled by coal rank and basin hydrodynamics. In the north central part of the basin, the gas is chemically dry and enriched in carbon dioxide whereas in the central part of the basin the gas is chemically wet (Scott, 1994). Carbon content of the COGCC monitoring wells within the Project Area ranges from 57.86 percent (%) in the Wagon Gulch monitoring well (816 feet below ground surface) to 75.67% in the Fosset Gulch monitoring well (487 feet below ground surface) (Carroll, 2011). Coal cores from the COGCC monitoring wells had an average maximum temperature (Tmax) value for thermal maturity determination of 461° Celsius (C), falling within a gas produced coal with little to no residual liquid (Longman, 2012). Appendix A includes the COGCC reservoir analytical data.

Based on laboratory analysis of gas composition for the Fosset Gulch 9U#1A CBM production well, the formation contains 94.489% methane (Appendix B). A calculation can be conducted to determine whether the gas is dry or wet. The fraction of methane gas in the sample compared to the total percentage of methane (C_1), ethane (C_2), propane (C_3), butane (C_4), and isopentane (C_5) gases in the sample determines whether the CBM gas is considered dry or wet. The equations below illustrate whether gases are dry or wet.

$$\text{Dry gas} = C_1/C_{1\text{-}5} > 0.98$$

$$\text{Wet gas} = C_1/ C_{1\text{-}5} < 0.90$$

Gas chemistry of the Fosset Gulch 9U#1A CBM production well has a C1/ $C_{1\text{-}5}$ value of 0.99. As a result, the CBM gas within the Fosset Gulch 9U#1A production well is considered a dry gas. This data suggests a correlation with gas compositional data described in Andrew Scott's

findings (Scott, 1994).). In addition, the gas chemistry from three coal horizons within the COGCC Highway 151 Monitoring Well #1 had C1/ C_{1-5} values all within the dry gas range (Souder, Miller & Associates).

The *in-situ* permeability within a coal bed is generally 3 times to 10 times greater in the face cleat direction than the butt cleat directions (Tremain et al., 1994). The *in-situ* permeability calculations and drainage analysis of the Kf coals was conducted by Mansoori and Associates (Mansoori) on behalf of Petrox in September 2005. This simulation study history matched the well performance from the Elm Ridge Pargin Mountain Unit, located adjacent and southwest of the Project Area. Through history matching, utilizing a generalized equation-of-state model (GEM) reservoir simulator, the permeability of the Kf coal in the Project Area was determined to be 0.75 millidarcies (md). The Kf coal beds show a high degree of anisotropy as measured by the sonic Scanner Borehole Anisotropy Analysis and the Stoneley Mobility Analysis Logs. As a result, the anisotropy ratio of 2:1 to 4:1 best fits the no-gas scenario observed at the Kf outcrop. Below is a summary of the history match modeling results illustrating the pressure drop after 20 years of CBM production as a function of distance at 6,230 feet to the Kf outcrop.

GEM Model Results Summary – Case 3 and 4
PARALLEL TO THE OUTCROP

Distance to Kirkland-Fruitland Outcrop	Development Scenario	Permeability Anisotropy Ratio	Pressure Drop at Upper Fruitland Outcrop Boundary
6,230 feet	20 Years at Typical 160 Acre Pattern	0.75 md / 2:1	0.0%
6,230 feet	20 Years at Typical 160 Acre Pattern	0.75 md / 4:1	0.0%
7,210 feet	20 Years Candelaria 10U#3 Lateral	0.75 md / 2:1	0.0%

According to the GEM model, 20 years of CBM production for wells drilled more than 6,230 feet from the outcrop using permeability values ranging from 0.5 md to 1.0 md would also result in the extraction of 0.0% of the CBM gas in place beneath the ground surface at the Kf outcrop. Applying the modeling results to the Candelaria 10U#3 lateral shown above will also have 0.0% pressure drop at the outcrop.

The northeastern portion of the NSJB, which includes the Project Area, has a pressure gradient less than 0.44 pounds per square inch per foot (psi/ft) (Scott, 1994). With this relatively low pressure, CBM is allowed to desorb from coal without the need to dewater the formation. As a result, the Project Area has free gas in the face cleats in its present state. Methane seepage is observed in La Plata County and not Archuleta County, further validating the theory that methane gas is able to follow through permeable face cleats that are perpendicular to the Kf outcrop in the western portion of the NSJB and why methane gas is not observed in the eastern portion of the NSJB (Project Area) as the face cleats are orientated parallel to the Kf outcrop with low permeability.

Based on the Candelaria 10U#3 Diagnostic Fracture Injection Test (DFIT) results and the observed pressure history from the COGCC monitoring wells, the Project Area has a pressure gradient of 0.42 psi/ft and a fracture gradient of 1.05 psi/ft. Due to the presence of free gas producible at this reservoir pressure, the coals are considered oversaturated and will not require dewatering to produce.

2.3 HYDROGEOLOGY

According to the 3M model conducted by Questa Engineering Corporation (Questa, 2000), the Kf and Kpc are unconfined aquifers at their outcrop and transition to being confined several hundred meters down dip and throughout the NSJB. The overlying Kk acts as a confining layer, effectively sealing the Kf from the overlying aquifers of the Animas, Nacimiento, and San Jose formations and quaternary alluvial aquifers associated with the rivers and drainages of the NSJB. The Kf and Kpc are recharged at the outcrop. Groundwater flow direction varies throughout the NSJB; however, in Archuleta County, groundwater flow direction is primarily to the southwest except for a small area in the western part of the county where groundwater flows to the northwest (Kaiser, et al., 1994).

2.3.1 Surface Waters

There are nine drainage transects along the Kf outcrop in the Project Area (Figure 3) including:

- Beaver Creek,
- Squaw Creek,
- Little Squaw Creek,
- Pole Gulch,
- Peterson Gulch,
- Candelaria Ranch,
- Piedra River,
- Stollsteimer Creek, and
- Cabezon Canyon.

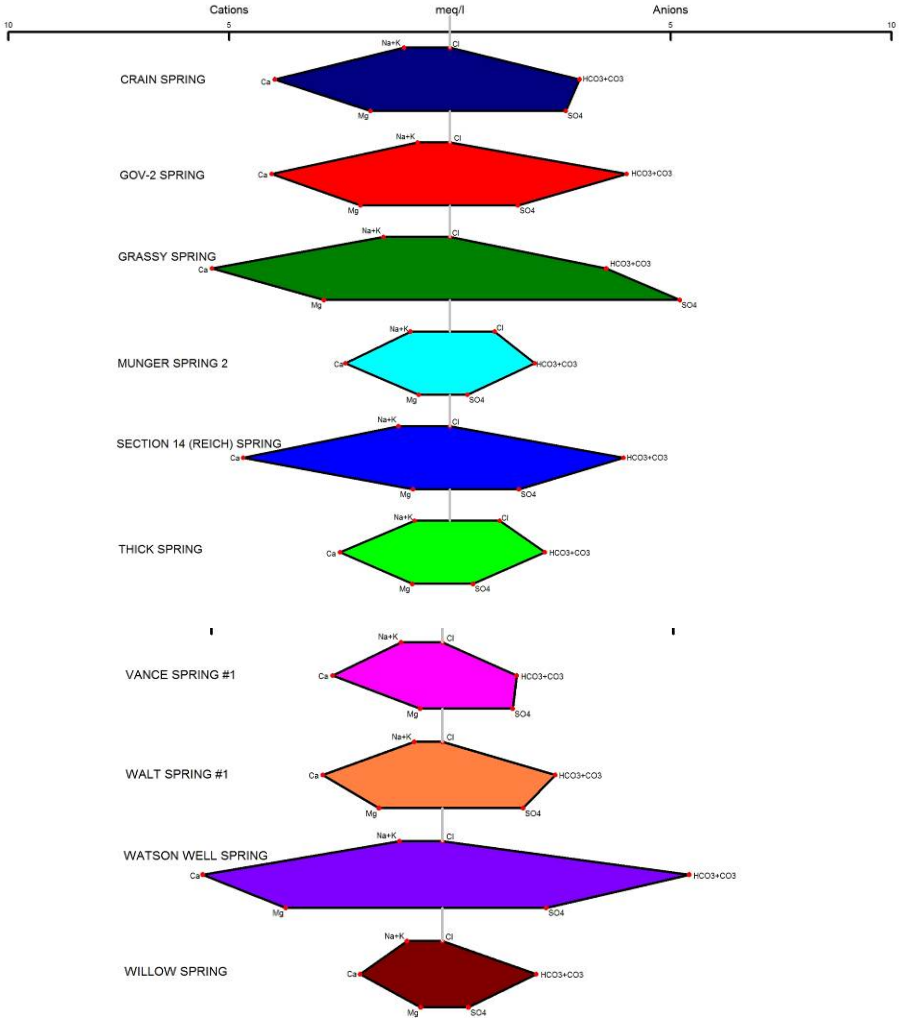
Stream flow and surface water is derived primarily from spring runoff from melting snowpack, which can exceed 100 inches annually (USFS/BLM, 2006). Peak runoff occurs during the months of May, June, and July. Lesser amounts of stream flow are derived from monsoonal thunderstorms, which occur during July, August, and September. Withdrawal of surface water in Archuleta County averaged 47.18 million gallons per day in 1995 and was primarily used for irrigation with minor amounts for public water supply and livestock watering (USFS/BLM, 2006).

In 2013, LTE identified 35 natural springs on or adjacent to the Kf outcrop within the Project Area (Figure 3, Table 1) utilizing the USGS database, Colorado Division of Water Resources (DWR) database, data from the *Isotopic and Geochemical Analysis of Groundwater-Surface Water Interactions at the Fruitland Outcrop: An Addition to the 4M Project* report by the

Mountain State Institute, dated December 10, 2012, and 2013 landowner questionnaires that were sent to all landowners whose property were located within the Kf outcrop. The natural springs listed are only those identified on or adjacent to the Kf outcrop inward from the sources listed above and in no way represents an exhaustive listing of natural springs. If additional natural springs are present, on or adjacent to the Kf outcrop within the Project Area, an evaluation of the inclusion of those natural springs to the annual monitoring program will be conducted on a case-by-case basis

The 35 natural springs in the monitoring program tend to flow in late spring and run dry during the summer months. Historically, the natural springs sampled are calcium bicarbonate waters with the exception of Grassy Spring, which is calcium sulfate in makeup. Table 2 summarizes the historical ion chemistry of the natural spring waters. The 2013 natural spring water ion chemistry is depicted on the stiff diagram below to visually represent the makeup of natural spring waters in the Project Area. Note that not all 35 natural springs were sampled in 2013 due to either property access denial or the natural spring was dry at the time of sampling. A summary of historical sampling status of the natural springs is included in Table 1. Laboratory analytical reports for the 2013 natural spring samples are included in Appendix C.

2013 Natural Springs Stiff Diagram

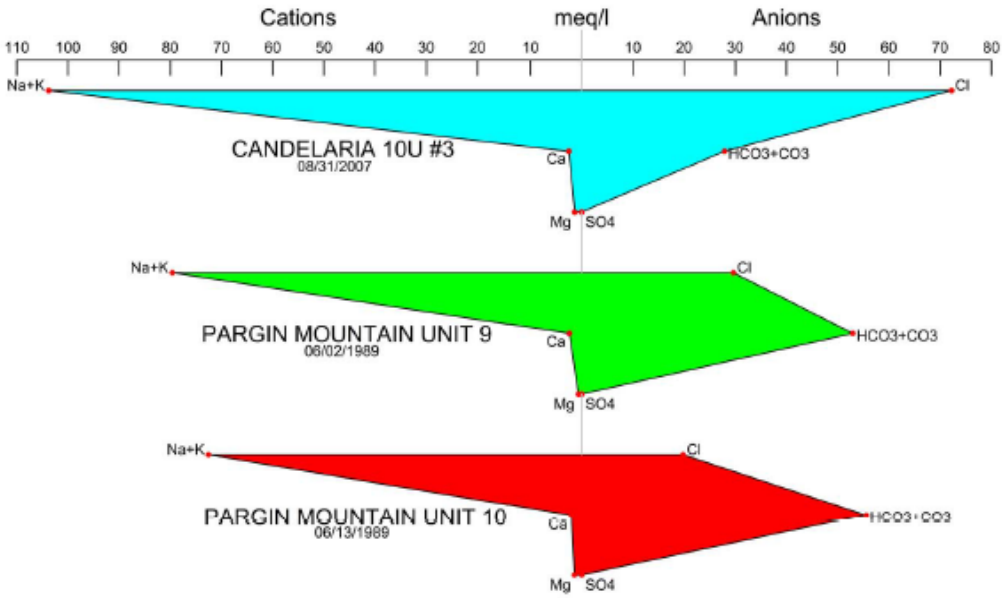


2.3.2 Groundwater and Aquifers

Groundwater can be found in high-yield alluvial aquifers, low-yield shallow bedrock aquifers, and low-yield deep bedrock aquifers. Alluvial aquifers consist primarily of unconsolidated Quaternary age sands and gravels, are thin, and of limited areal extent; however, average well yield is 15 gallons per minute (gpm) and can range up to 25 gpm. The primary shallow bedrock aquifers are the Animas Formation (Ta), with an average well yield of 6 gpm to 7.5 gpm; and the San Jose Formation, with an average well yield of 5 gpm. There are no known water production wells completed in the Nacimiento Formation. Deep bedrock aquifers include the Kf, Farmington Sandstone member of the Kk, the Kpc, the Dakota Sandstone (Kd), and formations of the Mesaverde Group (Kmvu) including the Cliff House Sandstone (Kch) and the Point Lookout Sandstone. The Kf and Kpc aquifers are the primary aquifers used for groundwater consumption; the other deep bedrock aquifers are generally not used for water production due to poor water quality, poor well yields, and significant depths below ground surface (USFS/BLM, 2006).

Water chemistry of the Kf is primarily dominated by sodium chloride and bicarbonate and depleted in calcium and sulfate resulting in a high sodium absorption ratio (SAR). (Riese, et al., 2005). Water samples collected from the Kf during the installation of Candelaria 10U#3, Pargin Mountain Unit 9, and Pargin Mountain Unit 10 are dominated by sodium and potassium cations and chloride and bicarbonate anions. The Candelaria 10U#3 CBM production well has a SAR of 50. The Kf water ion chemistry is depicted on a stiff diagram below to visualize the makeup of formation waters in the Project Area. Appendix D includes laboratory analytical reports for the three CBM production well water samples.

Fruitland Formation Waters Stiff Diagram



2.3.3 Hydraulic Connectivity

There are two primary theories describing the permeability and hydraulic connectivity of the Kf within the NSJB. The first theory of the permeability and hydraulic connectivity of the Kf in the entire basin is a continuous, hydraulically connected basin with permeability provided by cleats (primarily face cleats). Under this theory, recharge occurs at the outcrop of the Kf and Kpc along the northern margin of the basin and discharge occurs primarily at the San Juan River (Riese, et al., 2005).

The second theory of the permeability and hydraulic connectivity of the Kf in the San Juan Basin is that the basin is hydraulically discontinuous with variable permeabilities based on fractures and faulting of strata. Under this theory, recharge at the outcrop of the Kf and Kpc along the northern margin of the basin is discharged at the nearest creek or river and the Kf receives limited recharge from broad alluvial valleys (Riese, et al., 2005).

While the western portion of the NSJB typically produces 50 barrels of water per day (BWPD) to 150 BWPD with gas production, the eastern portion tends to produce 1 BWPD to 15 BWPD when producing gas. The table below summarizes gas production rates and produced water rates for four Petrox CBM production wells in Archuleta County.

Gas and Produced Water Production Test Rates, Archuleta County, Colorado

CBM Production Well Name	Estimated Gas Production (Thousand Cubic Feet Per Day)	Water Production (Barrels per Day)
FGU 9U#1	185	1-2
FGU 9U#4	280	4-6
Candelaria 10U#3 (lateral)	350	15
FGU 16U#1	150	1

The water production rates for the four Fosset Gulch Unit CBM production wells tend to agree with the theory that the Kf is recharged by surface water infiltration of face cleats at the Kf outcrop. Face cleats tend to be parallel to the Kf outcrop in the Project Area, are resistive (sealed), and allow for limited recharge of the aquifer as seen by the limited water production.

The Colorado State Engineer conducted a study of nontributary groundwater aquifers in Colorado. According to Section 1. 37-90-103 (10.5), Colorado Revised Statutes,

> "'Nontributary ground water' means that ground water, located outside the boundaries of any designated ground water basins in existence on January 1, 1985, the withdrawal of which will not, within one hundred years OF CONTINUOUS WITHDRAWAL, deplete the flow of a natural stream, including a natural stream as defined in sections 37-82-101 (2) and 37-92-102 (1) (b), at an annual rate greater than one-tenth of one percent of the annual rate of withdrawal."

As a result of the State Engineer study, the Kf, Point Lookout Sandstone, Menefee, and Kch groundwater aquifers were determined to be nontributary groundwater beneath all or portions of the Project Area (Figure 4). Specifically, the Kf aquifer is nontributary through a majority of the

Project Area that lies within Township 34 North, Range 5 West (DNR, 2010). The remaining portion of the Project Area is considered to be within a tributary groundwater basin as it relates to the Kf. However, as noted above, there is limited water produced with the production of CBM within the Project Area. In addition, the Candelaria 10U#3 CBM production well is completed within the nontributary boundary of the Kf.

2.4 VEGETATION

Elevation of the San Juan Basin in Colorado ranges from a minimum of approximately 5,900 feet above mean sea level (amsl) along the Animas River at the Colorado/New Mexico state line to a maximum of 8,899 feet amsl at Vosburg Pike in La Plata County. Precipitation varies widely and is highly influenced by topography and elevation. Near the Kf outcrop, precipitation ranges from 20 inches to 25 inches per year; near the Colorado/New Mexico state line, precipitation ranges from 10 inches to 15 inches per year. Due to the varying amount of precipitation, vegetation ranges from ponderosa pine and scrub oak-dominated forests near the Kf outcrop to pinion/juniper and sage-dominated vegetation along the Colorado/New Mexico state line (USFS/BLM, 2006).

Aerial color infrared (CIR) imagery maps have been prepared for 3-year cyclical regional reconnaissance surveys to be compliant with the Permit. The regional reconnaissance surveys have been conducted in 2005, 2008, and 2011. LTE has monitored changes in vegetation over the past 10 years, noting changes observed in the CIR imagery and conducting field verification activities to determine whether the changes are due to methane seepage or other causes. LTE has not observed large areas of stressed or dead vegetation associated with methane seepage. Typically, stressed or dead vegetation is caused by drought, insect infestation, or other natural causes.

2.5 PRIVATE LANDS AND SENSITIVE AREAS

Land in the Project Area is primarily rural residential, agricultural, livestock grazing, forest, and unused. Land in western Archuleta County near the Kf outcrop is sparsely populated. Wildlife species present within the Project Area include black bear, wild turkey, elk, and deer.

There are approximately 34,072 acres of land in the NSJB in Archuleta County, of which approximately 29,376 acres are owned by the USFS, 362 acres are owned by the State of Colorado, and 4,334 acres are owned by private landowners. Within the Project Area, approximately 73% of the land is owned by private landowners and 27% is owned by local, state, or federal agencies for public use. Figure 5 depicts private and public landownership within the Project Area.

3.0 MONITORING AND MITIGATION

Monitoring of the Kf outcrop has been in progress since 2004 and is currently conducted using a variety of methods to characterize baseline conditions and identify changes. These data collection systems provide a consistent and repeatable data set with which changes to Kf outcrop conditions can be easily identified should they occur. The current program is being conducted with the approval of the COGCC as a stipulation for the Permit for the Pargin Mountain 10U#3 CBM production well.

Petrox and Elm Ridge have subcontracted LTE to conduct the following monitoring tasks to comply with the Permit:

- Conduct annual surveys of methane flux at the ground surface where surface water transects along the Kf outcrop;
- Measure methane flux at nearby abandoned production wells, specifically the Big Horn-Schomburg #1 abandoned production well;
- Identify and sample natural springs along the Kf outcrop; and
- Field verify suspect methane seeps along the Kf outcrop using scheduled regional reconnaissance methods of aerial fly-over and field verification on a 3-year cycle.

In 2011, abandoned coal mines were surveyed by LTE for the presence or absence of methane and/or coal fires. This task was conducted in response to Decision Point 5 of the ROD. Additionally, COGCC monitoring well data and BLM soil vapor tube (SVT) data were evaluated by LTE. These tasks have been incorporated into the annual monitoring program and are discussed in detail in subsequent sections of this report.

3.1 MONITORING HISTORY

In September 2004, LTE conducted an initial investigation of the Kf outcrop in Archuleta County, which consisted of an aerial fly-over reconnaissance and field inspections of identified suspect areas defined by stressed and dead vegetation. Soil gas in areas where surface water bodies transect the Kf outcrop were investigated.

In 2005, similar data were collected with the addition of CIR aerial imagery acquisition and sampling of natural springs along the Kf outcrop. Although no methane was detected in shallow subsurface soil sample locations, very low concentrations of dissolved methane were detected in several natural springs.

In 2006, additional inspections of surface water in drainage transects of the Kf outcrop, collection of subsurface gas measurements from gas monitoring probes, and soil gas surveys at two abandoned production well sites were included to expand the data set.

Since 2007, equipment capable of measuring the flux of soil gas moving across the soil surface to the atmosphere has been used in conjunction with the above described monitoring to quantify

changes in methane seepage volumes. The increased sensitivity provided by the portable flux meter identified methane at locations where methane had not been detected previously; however, the methane flux values have been low.

In 2011, LTE reviewed and evaluated BLM soil vapor monitoring tube data and COGCC monitoring well pressure data. The BLM collects data from semi-permanent soil vapor monitoring tubes established in the Kf outcrop along the northern and western NSJB rim with the intent of monitoring concentrations of methane, hydrogen sulfide, and oxygen in soils. The COGCC, as part of the 4M project, monitors gas pressures and calculates groundwater levels in four monitoring wells within the Kf outcrop in Archuleta County.

Outcrop monitoring was discussed during the first meeting of the TWG, which was held on September 18, 2012, with Petrox, COGCC, SUIT, BLM, USFS, and LTE. A modified scope of work for monitoring the Kf outcrop was developed out of the comments during the meeting. As a result, the modified monitoring plan includes the following tasks:

- Conduct annual surveys of methane flux at the ground surface where surface water transects the Kf outcrop. Beginning in 2013, grid spacing for the flux survey will be expanded to 400-foot spacings during those years that the regional reconnaissance is not conducted. During regional reconnaissance years (next conducted in 2014), grid spacing will be reduced to the previously conducted 200-foot spacing flux survey;

- Measure methane flux at nearby abandoned production wells, specifically the Big Horn-Schomburg #1 abandoned production well;

- Identify and sample natural springs along the Kf outcrop;

- Field verify suspect methane seeps along the Kf outcrop using scheduled regional reconnaissance methods of aerial fly-over and field verification on a 3-year cycle;

- Conduct abandoned coal mine surveys on a quarterly basis during the first year of CBM production from the Candelaria 10U#3 CBM production well and a re-evaluation of frequency to be discussed during the subsequent TWG meeting;

- Summation and evaluation of the BLM soil vapor monitoring tube data with statistical analysis using the Mann-Kendell test;

- Summation and evaluation of the COGCC monitoring well pressure data with an emphasis on monitoring wells Fosset Gulch MW 34-5-14-1 (API 05-007-06264) and Fosset Gulch MW 34-5-14-2 (API 05-007-06265); and

- Summation and evaluation of annual natural gas and water production data from each Petrox/Elm Ridge CBM production well within the Fosset Gulch Unit.

The full summary of the first TWG meeting can be found in the September 18, 2012, *Technical Working Group Meeting #1 Summary* memorandum, prepared by LTE, which is located in Appendix E.

On December 17, 2012, the TWG convened for a second time to discuss topics related to the NSJB Stakeholder comments related to the 2011 Outcrop Zone Report and associated APD application for the Candelaria 10U#3 production well. The TWG also discussed scheduling for the Candelaria 10U#3 and proposed FGU 9U#3 CBM production wells. The TWG discussed natural springs, coal fires, and the role of the NSJB Stakeholders in the APD process for CBM production wells within the outcrop zone. A full summary of the meeting can be found in the December 17, 2012, *Technical Working Group Meeting #2 Summary* memorandum, prepared by LTE, which is located in Appendix E.

The TWG met for a third time on March 7, 2013. This meeting was convened to discuss topics related to the NSJB Stakeholder comments related to the APD for the FGU 9U#3 CBM production well. The TWG discussed Petrox's revised Fosset Gulch Unit schedule as well as additional monitoring plans. The monitoring plans consisted of the following:

- "Step-wise" monitoring approach will be met by bringing on four CBM production wells within the outcrop zone instead of the proposed 16 CBM production wells discussed in Decision Point 5 of the ROD. This will allow review of data for fewer wells and provide easier correlation with four wells instead of 16;

- Produced water will be monitored during production. If there is an increase of water production reaching the 100 BWPD per well or the water is determined to be fresh (less than 500 milligrams per liter [mg/L] total dissolved solids [TDS]), then the TWG will convene and discuss the data and recommend action items to address potential impacts from withdrawing larger volumes and/or fresh produced water with CBM production; and

- Permeability and drainage patterns will be examined yearly. If permeability is greater than measured in the past or if the drainage pattern varies from past modeling, the TWG will convene to discuss and evaluate the new data.

The full summary of the third TWG meeting can be found in the March 7, 2013, *Technical Working Group Meeting #3 Summary* memorandum, prepared by LTE, which is located in Appendix E.

3.2 DETAILED MAPPING

3.2.1 Property Access

Prior to conducting field activities, land information is obtained from the Archuleta County Assessor's office. Parcel data is cross-referenced with the Kf outcrop geometry to identify owners of parcels located on the Kf outcrop. Much of the outcrop land is federal land with unrestricted access. An attempt to contact private landowners along the Kf outcrop in the Project Area is made prior to the initiation of field activities. In 2013, a questionnaire regarding natural springs for landowners on or adjacent to the outcrop was included with the normal property access letters. LTE utilized information from the questionnaires to determine if additional natural springs were located on or adjacent to the Kf outcrop and if so, whether the landowner would allow LTE to collect a water sample from the natural spring.

3.2.2 Drainage Transects

LTE conducts drainage transects surveys along the Kf outcrop in the Project Area (Figure 6) at the following locations:

- Beaver Creek;
- Squaw Creek;
- Little Squaw Creek;
- Pole Gulch;
- Peterson Gulch (West and East);
- Candelaria Ranch;
- Piedra River;
- Stollsteimer Creek; and
- Cabezon Canyon.

In the past, drainage transect surveys have been limited and/or not conducted at the Candelaria Ranch, Piedra River, and Cabezon Canyon due to property access denial.

3.2.3 Field Mapping

The grids for detailed mapping areas consist of a varying number of squares, ranging in area from 2,500 square feet (ft^2) to 40,000 ft^2. From 2007 to 2012, 200-foot grid spacings were used for drainage transect mapping and 50-foot grid spacings are used for the Big Horn-Schomburg #1 abandoned production well survey (Figure 7). The grid mapping system has proven to be systematic, consistent, repeatable, representative, and successful in delineating the lateral extent of seepage. The TWG met on September 18, 2013, to discuss the Kf outcrop monitoring program. Since methane flux has not been limited over the past six years, the TWG determined that an expansion in grid size and overall reduction in sample collection points was warranted. As a result, grid spacing was expanded to 400-foot spacings for 2013 and subsequent years when regional reconnaissance events are not conducted. During regional reconnaissance years (next conducted in 2014), grid spacing will be reduced to the 200-foot spacing as conducted from 2007 to 2012. This approach will be cost efficient and effective in achieving early methane seepage detection, if it ever becomes present.

Flux measurements are collected at the corner of each grid square. If methane is detected along the outer edges of the mapping area, additional grid points are developed and measured to determine the lateral extent of methane seepage.

Full-color spectrum aerial photographs used as base maps for field use and figures for this report are the latest version; however, they do not necessarily indicate present surface conditions. The geologic contacts depicted on the aerial photographic maps are derived from geologic maps prepared by the CGS and digitized at a scale of 1:25,000. Accuracy of the formation contact is reduced when aerial photographs are viewed at a smaller scale.

LTE conducted detailed flux mapping along six locations where surface water drainages transect the Kf outcrop in the Project Area from July 15 through July 22, 2013. Results of the 2013 mapping event are discussed in Section 4.2.

3.2.4 Flux Measurements

The flux of soil gases moving across the soil surface to the atmosphere are measured using a West Systems, LLC (West Systems) portable gas flux meter. The flux meter has been used to measure soil gas seepage on the Kf outcrop since 2007. The meter measures the flux of methane, hydrogen sulfide, 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 measured. A brief description of the flux meter is summarized below. Information on the flux meter is provided in Appendix F.

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. Captured gases are continuously mixed by a small fan within the accumulation chamber during the measurement process. A pump moves the 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 over time. Any increases in concentrations are measured and recorded automatically. No gas is allowed to escape the system; however, a vacuum is not created during the process. This enables the measurement of natural seep conditions, if present. The result for each gas is reported as a mass flux in units of moles per square meter per day ($mol/m^2 \cdot day$).

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, personnel choose relatively flat surfaces where possible and placed loose soil around the base of the chamber to reduce the potential for gas loss at the base of the chamber. In addition, personnel attempt to minimize ground disturbance 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 was 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 stratigraphic within the Kf. The accuracy of the field meters influences the flux estimation.

The methane sensor within the flux meter unit has a range of 60 parts per million (ppm) to 50,000 parts per million (ppm). The flux meter methane measurement range is 0.0 $mol/m^2 \cdot day$ to 300 $mol/m^2 \cdot day$. Methane flux values below 0.2 $mol/m^2 \cdot day$ are detectable with decreased accuracy. Due to the low accuracy and confidence level of methane flux values below 0.2 $mol/m^2 \cdot day$, the reporting limit set for the flux meter is 0.2 $mol/m^2 \cdot day$. As a result, reporting of methane flux values did not include values below the reporting limit and were not included in

methane flux contours or in the calculation of total methane flux volumes. Supporting flux data are included in Appendix G.

The carbon dioxide sensor has a full-scale range of 0.0 ppm to 20,000 ppm and a flux measurement range of 0.0 mol/m^2·day to 600 mol/m^2·day at an accuracy of ±25%.

The hydrogen sulfide detector has a full-scale range of 0.0 ppm to 20 ppm and a flux measurement range of 0.0025 mol/m^2·day to 0.5 mol/m^2·day at an accuracy of ±25%. The sensor is an electrochemical cell that measures hydrogen sulfide through a chemical oxidation process. The sensing process consumes a small amount of the hydrogen sulfide, which is not returned to the flux meter accumulation chamber. Therefore, the flux meter can underestimate hydrogen sulfide flux by as much as 10%.

During the measurement process, gas concentrations are recorded at 1-second intervals and directly downloaded via a Bluetooth® connection to a portable digital assistant (PDA) integrated with the Trimble GeoXT® global positioning system (GPS) unit (described below). Other measurements recorded include barometric pressure, temperature, date, and time.

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

3.2.5 Global Positioning System Data Management

Each sample location is recorded using a GPS unit. Soil gas sampling grids are created in ArcView® and pre-loaded into the GPS unit so field personnel can quickly and accurately position detection equipment along the project area. Soil gas measurements and other relevant field data are then stored as attributes in the GPS unit along with the associated location data. The data stored in the GPS unit are downloaded for processing and reporting.

The GPS unit location data are collected in the World Geodetic System 1984 (WGS 84) and projected in Colorado State Plane South (feet), North American Datum 1983 (NAD 83) for use in an ArcView® project file. On average, 25 GPS log positions are collected for each point in order to obtain more accurate positioning.

Readings collected with the GPS unit can be located within 1-meter accuracy; however, the terrain along the Kf outcrop can adversely affect GPS unit accuracy. North-facing slopes and heavily wooded areas can distort or block satellite signals. When satellite signals are limited, positioning accuracy decreases. In locations where the GPS unit could not obtain a signal, field personnel note measurement data on their field reference maps. Specifications of the GPS unit are included in Appendix F.

3.3 ABANDONED PRODUCTION WELL SURVEY

In 2005, LTE conducted an initial subsurface soil gas survey and installed a permanent gas monitoring probe in the vicinity of the Big Horn-Schomburg #1 abandoned production well located near the Kf outcrop in the southeast quarter of Section 14U, Township 34 North, Range 5

West (Figure 7). The production well was drilled and abandoned in 1961 and reference information indicates the Kf is close to, or outcrops at, this location (USFS/BLM, 2006). Geologic maps from the FEIS indicate the abandoned production well is located in the transition zone between the Kf and the Kk.

Since 2010, LTE has conducted an annual soil gas flux survey at the Big Horn-Schomburg #1 abandoned production well. LTE personnel collect methane flux points in the same manner as flux surveys conducted for the drainage transects. If methane is detected in soil, the seep area is then delineated in all four directions. Additionally, flux points are collected next to the abandoned production well utilizing the flux meter. A permanent gas monitoring probe exists nearby, which is monitored.

The 2013 abandoned production well survey was conducted on July 15, 2013. Results of the 2013 event are discussed in Section 4.3.

3.4 REGIONAL RECONNAISSANCE

Regional reconnaissance surveys of the Kf outcrop reconnaissance are conducted every three years (2004, 2008, and 2011) to supplement the detailed mapping of drainage transects. The next regional reconnaissance will be conducted in 2014. Reconnaissance includes low altitude, high-resolution CIR aerial imagery to map the vegetation along the outcrop and identify suspect areas for further field investigation. Additionally, CIR imagery is used to assist in the scheduled regional reconnaissance monitoring of the Kf outcrop to identify potential locations of methane seepage in between detailed mapping areas. While the imagery cannot identify specific seeps, it can be useful in identifying areas of dead and/or stressed vegetation that may or may not be attributable to methane and/or coal fires. The regional reconnaissance is primarily utilized to identify potential methane seep areas, but anomalies from coal fires can be identified on the CIR imagery as well.

Suspect areas are defined as areas observed within the CIR image that appear anomalous when compared to the surrounding areas. For example, a light gray area surrounded by bright red areas would be considered a suspect area. The natural features that often produce such suspect areas include areas of dead/stressed vegetation, shadows, rocky outcrops, exposed surface soil, water bodies, and/or coal fires.

Results of the 2011 reconnaissance survey were reported in the 2011 Outcrop Zone Report. New methane seeps and coal fires were not identified in 2011. The next regional reconnaissance survey will be conducted in 2014.

3.4.1 Aerial Color Infrared Imagery

Summertime is selected as it provides the greatest potential for healthy seasonal vegetation conditions with minimal influence from drought and/or senescence. The imagery or photo-mission traverses the Kf outcrop from the boundary of the SUIT Reservation in Archuleta County through La Plata County to the SUIT Reservation boundary. There are two flights at two different elevations and two different resolutions: one with an approximate resolution of 1.5 meters and the other with an approximate resolution of 0.75 meters.

The flight elevations are over rugged terrain with surface elevations ranging between 6,400 feet to 8,400 feet amsl. The interpretation and analysis for the entire outcrop is conducted using the 1.5 meter resolution images since they have been determined to be more useful for identifying suspect areas and required fewer images to rectify and evaluate across the entire Kf outcrop. The 1.5 meter resolution photographs are geo-referenced for the Project Area by creating mosaics forming two large format images.

The accuracy of a geo-rectified base map is proportional to the number of control points available and the time and effort exerted during the rectification process. Digital Ortho Quarter Quads (DOQQs) are used as the reference map and the CIR image is rectified to the DOQQ. Therefore, the accuracy of the CIR base map image is limited but still provides a frame of reference for the field mapping data. In some cases, the CIR image is accurate to within 1 meter of the actual location since a control point is available nearby. In certain portions of the same image, accuracy can be skewed as much as 15 meters due to lack of a control point. When viewing the data presented in this report, note that GPS data are accurate to within 1 meter and the actual position of the feature mapped should be trusted over the position of the features (i.e., trees, buildings, landmarks) observed within the CIR image. Figure 8 illustrates CIR map coverage used to identify areas with anomalous color signatures requiring field verification.

3.4.2 Imagery Review

The images acquired within the Project Area are evaluated by LTE using visual observations. Based on professional experience in evaluating CIR imagery and knowledge gained during previous regional reconnaissance surveys in the Project Area, suspect areas are identified along the Kf outcrop that appear to contain dead or stressed vegetation or areas were vegetation is lacking in an otherwise logical area for vegetation growth. Suspect areas are delineated as polygons and uploaded to the GPS unit for field verification.

3.4.3 Field Inspection and Verification

Upon completion of the imagery review activities, field verification of suspect areas is initiated with the goal of identifying the presence or absence of methane in subsurface soil gas or indications of a near-surface coal fire such as dead vegetation, charred vegetation, excessive heat emanating from the ground, smoke, and/or olfactory observations. A majority of the land intersecting the Kf outcrop in the Project Area is federal land but many of the key suspect areas are located on private lands. Due to private property considerations, not all areas of the outcrop can be inspected since landowners do not grant access to or across their properties.

Suspect area surveys are conducted using traditional subsurface soil gas techniques which include a rod, slide-hammer, plastic tubing perforated at depth, and a multi-gas field meter as described below. A GPS is used to map survey points and record field measurements during the natural springs sampling event.

LTE personnel use a Mine Safety Appliances (MSA) GasPort® multi-gas meter to measure the concentrations of methane, carbon monoxide, hydrogen sulfide, and oxygen in the subsurface soil. Subsurface soil gas measurements are collected by using a hand-driven slide hammer to drive a ½-inch diameter steel rod into the ground to depths ranging from 1 foot below ground

surface (bgs) to 3 feet bgs. Occasionally, advancement of boreholes in consolidated outcrop materials is limited. Where probe refusal occurred, measurements are taken at the depth bored.

The rod is removed from the ground and ¼-inch diameter polyethylene tubing is inserted into the borehole. The tubing is perforated at the bottom 6 inches to allow soil gas to enter the tubing. Once the temporary tubing is in place and the borehole is sealed with native soil, personnel attach the multi-gas meter to the tubing. The multi-gas meter's internal pump pulls gas from the soil, through the tubing, and into the meter's gas sensors.

Maximum concentrations of methane, carbon monoxide, and hydrogen sulfide and the minimum concentration of oxygen are recorded at each sampling location. Data are recorded in a field notebook and on the GPS unit.

The multi-gas meter is capable of detecting methane in concentrations from 0.0% to 100%, oxygen concentrations from 0.0% to 25%, carbon monoxide concentrations from 0.0% to 1,000 ppm, and hydrogen sulfide concentrations from 0.0 ppm to 100 ppm. Specifications for the multi-gas meter are included in Appendix F.

Elevated carbon monoxide concentrations in the subsurface are one indicator of a near-surface coal fire. In the event elevated carbon monoxide is identified during the field verification portion of the regional reconnaissance task, LTE personnel collect additional subsurface soil gas measurements in the area as well as conduct additional investigation actions determined on a case-by-case basis.

3.5 ABANDONED COAL MINE SURVEYS

Abandoned coal mine surveys were implemented in 2011 to comply with Decision Point 5 of the ROD. The purpose of surveying the abandoned coal mines along the Kf outcrop is to monitor mines as a potential preferential pathway for methane seepage and locations of surface and/or near-surface coal fires. The surveys are conducted using traditional subsurface soil gas techniques as described in Section 3.4.3. Field personnel identify each mine entrance and collect subsurface soil gas measurements on a 50-foot grid spacing. Mapping covers a 500-foot radius around the mine entrance. If methane is detected at the edge of the mapping area, additional grid points are mapped to delineate the extent of methane seepage. Subsurface concentrations of methane, carbon monoxide, carbon dioxide, hydrogen sulfide, oxygen, and hydrogen sulfide are recorded on the GPS unit. In addition to subsurface soil gas measurements, field personnel collect near-surface ground temperature readings utilizing thermometer probe, which was inserted into the temporary probe holes to collect subsurface temperature readings. A map of abandoned coal mine survey sites can be found in Figure 9.

Abandoned coal mine surveys have been conducted on an annual basis since 2011. Based on the third TWG meeting, the frequency of surveys will be increased to quarterly once production of CBM in the Fosset Gulch Unit commences. After one year of quarterly monitoring is completed, the TWG will meet to discuss survey results and evaluate the frequency of subsequent surveys. If during the quarterly surveys data suggests inconsistent readings, the TWG will convene to discuss the data and possible additional actions.

The 2013 abandoned coal mine surveys were conducted from July 23 to July 31, 2013. The results of the 2013 event are discussed in Section 4.5. Subsequent quarterly abandoned mine surveys will be reported under separate cover.

3.6 NATURAL SPRING SURVEY

As an action item from the second TWG meeting, LTE prepared a questionnaire for all landowners on the Kf outcrop. The questionnaire asked landowners if they were aware of any natural springs on their property and if so, would they like to have their natural spring sampled. Prior to 2013, LTE had identified 28 natural springs along or near the Kf outcrop. In 2013, LTE received responses from landowners regarding an additional seven natural springs. As a result, these natural springs were included in the 2013 natural spring survey.

At each accessible and flowing natural spring, field personnel collect water samples and monitor for methane near the natural springs using the portable flux meter. Field personnel locate the position of the natural spring using the GPS. An estimated water discharge rate is measured using a graduated cylinder and stopwatch. When possible, water quality measurements, including pH, electrical conductivity (EC), and temperature are collected at each sampled natural spring.

Laboratory analytical water samples are collected at each accessible and flowing natural spring in bottles and containers prepared by the subcontracted analytical laboratories. Each sample bottle is labeled, indicating project and sample identification, and the date and time of sample collection. Samples are delivered directly or shipped to the laboratories under chain-of-custody protocols.

Water samples from the natural springs are collected and analyzed for the following:

- Major cations [dissolved sodium (Na), calcium (Ca), magnesium (Mg), potassium (K), and iron (Fe)] by United States Environmental Protection Agency (EPA) Method 200.7/4500;
- Alkalinity (carbonate/bicarbonate) by EPA Method 2320 B;
- Major anions [chloride (Cl), sulfate (SO_4), bromide (Br), and fluoride (F)] by EPA Method 200.7/4500;
- pH by EPA Method150.1;
- Specific conductance by EPA Method 120.1;
- Nitrate/Nitrite as Nitrogen (N) by EPA Method 353.3;
- Total dissolved solids (TDS) by EPA Method 2540 C;
- Dissolved methane by Method RSK 175; and
- SAR.

Natural spring water samples are collected and then submitted to Four Corners Geoscience, Inc. for analysis of dissolved methane. General water chemistry samples are submitted to Green Analytical Laboratories. Figure 10 depicts the locations of known natural springs within the Kf outcrop in the Project Area.

The 2013 natural springs sampling event was conducted in May 2013. Results are discussed in Section 4.6.

3.7 COGCC MONITORING WELL DATA ANALYSIS

In 2008, the COGCC initiated a Kf reservoir pressure monitoring well program in the Chimney Rock Area of Archuleta County with the cooperation of the USFS. The monitoring wells supplement data produced by an existing monitoring well network in La Plata County and on the SUIT Reservation. The Archuleta County monitoring wells measure formation pressures in the coal seams in the Kf and were installed to establish baseline conditions prior to initiation of CBM development.

There are four monitoring well sites within the Project Area (Figure 11):

- Two wells at Wagon Gulch installed in December 2008;
- Two wells at Fosset Gulch installed in December 2008;
- Two wells at Highway 151 installed in December 2008; and
- One well at Deep Canyon installed in June 2010.

The COGCC measures monitoring well pressures twice daily with permanently installed pressure transducers, data loggers, and telemetry. The data are documented and interpreted by the COGCC in annual reports available for public review.

Results for the 2013 COGCC monitoring well evaluation are included in Section 4.7.

3.8 BLM/USFS SOIL VAPOR TUBE DATA

3.8.1 Data Collection

The BLM has been collecting subsurface methane concentrations from 67 permanent monitoring SVT probes located along eight transects running perpendicular to the Kf outcrop in Archuleta County (Figure 12). SVT data collection began in November 2001 at the Beaver Meadows and Yellow Jacket Pass transects. The first SVT data were collected from the other six transects in August or October 2004. Subsequent measurements have been collected approximately every other month. The most recent SVT data available to LTE at the time of this report were collected from July 2012 through August 2013. SVT data collection at the Candelaria Pasture transect ended in August 2006 when the BLM was denied access to the property.

3.8.2 Statistical Method

Analysis of the BLM SVTs is conducted using the Mann-Kendall test included in the Excel® template application MAKESENS. This template is documented in *Publications on Air Quality, No. 31*, Finnish Meteorological Institute, 2002, by Salmi, Maatta, Anttila, Ruoho-Airola, and Amnell. The template and the documentation were downloaded from the web at http://en.ilmatieteenlaitos.fi/makesens. For this report, LTE tested the hypothesis that the SVT data would demonstrate a monotonic trend (data consistently increases or decreases but does not oscillate in relative value) without considering cyclical (seasonal) fluctuations. Visual examination of the data revealed there is a seasonal fluctuation, with maximum values typically occurring between May and August, and minimum values occurring between October and December. Consequently, the analysis was conducted twice: first using all the available data, and secondly using annual averages to eliminate the effect of seasonal variations. Results of the 2013 analysis are discussed in Section 4.8.

3.9 MITIGATION ALTERNATIVES

The monitoring program outlined above and detailed in previous Kf outcrop monitoring reports (found on the COGCC website) provide early detection of potential methane seepage, coal fires, and/or affected natural springs on or adjacent to the Kf outcrop within the Project Area. Since field crews walk the major drainages annually and traverse large sections of the outcrop as part of the regional reconnaissance, observations of vegetative conditions, excessive heat emanating from the ground, smoke, and olfactory observations that may indicate the presence of a methane seepage and/or coal fire can be detected at the early onset of such impacts. Natural springs are sampled during the spring season when most of the natural springs tend to flow. Specific issues listed in the FEIS and outcomes from the TWG are detailed below.

3.9.1 Produced Water

As required by the FEIS, Petrox will limit water production to less than 100 BWPD per well (USFS/BLM, 2006). This should be achieved with relative ease since Petrox has documented water production from CBM production wells within Archuleta County producing as little as 1.0 BWPD per well up to as much as 15 BWPD per well. By limiting the water production of the CBM production wells, Petrox will mitigate the lowering of the water table within the Kf. As discussed earlier, the dominate coal cleats are oriented parallel with the Kf outcrop and exhibit a high degree of anisotropy, poor butt cleat development east-west orientation, and resistive surface fractures which limits free gas to escape to the ground surface. As stated earlier, at the original bottomhole pressure the coals are over saturated and do not require dewatering. The production of methane gas in the Project Area will only serve to enhance gas extraction and further reduce the potential for methane seepage at the Kf outcrop. The SUIT, in conjunction with the Growth Fund is currently producing gas at the Kf outcrop, which is viewed as beneficial.

As agreed upon in the third TWG meeting, triggers for TWG convening to discuss produced water issues will be either high produced water volumes (greater than (>)100 bbl/day/well), fresh water composition (less than (<)1,000 ppm), or both. Additional triggers will be developed as

CBM production evolves in the Fosset Gulch Unit. Mitigation alternatives will be developed on a case-by-case basis.

3.9.2 Methane Seepage

The two major concerns stated in the NSJB FEIS in the Project Area are surface and/or near-surface coal fires and methane seepage (discussed earlier in this section) at the Kf outcrop. The Kf outcrop has been surveyed for potential methane seepage since 2004.

Based on reservoir characteristics in the Project Area, face cleats of the Kf Formation are parallel with the outcrop in Archuleta County, restricting flow of CBM to the outcrop. As stated in Section 2.2.2.3, the Kf Formation within the Project Area exhibits relatively low pressure, which allows CBM to desorb from coal without the need to dewater the formation. As a result, the Project Area has free gas in the face cleats in its present state. Methane seepage is observed in La Plata County and not Archuleta County, further validating the theory that methane gas is able to follow through permeable face cleats that are perpendicular to the Kf outcrop in the western portion of the NSJB and why methane gas is not observed in the eastern portion of the NSJB (Project Area) as the face cleats are orientated parallel to the Kf outcrop with low permeability. DFIT results further corroborate this theory with a measured pressure gradient of 0.42 psi/ft and a fracture gradient of 1.05 psi/ft. Due to the presence of free gas producible at this reservoir pressure, the coals are considered oversaturated and will not require dewatering to produce groundwater. The absence of methane seepage at the ground surface along the Kf outcrop in Archuleta County further validates the reservoir characteristics.

In the event methane seepage is identified along the Kf outcrop in Archuleta County, reasonable mitigation efforts, such as reduced or suspended gas production, if clearly demonstrated that such efforts will be effective in mitigating adverse impacts to water resources, vegetation, and/or public health and safety due to fugitive methane gas seeping to the ground surface will be implemented. LTE has direct experience in conducting mitigation of active methane seeps to address impacts to vegetation, public health and safety, and from unrecovered resources in La Plata County. If appropriate, Petrox will implement similar measures as necessary to mitigate such impacts, should they occur. The measures may include one or more of the potential options discussed in the *Preliminary Evaluation of Methane Seepage Mitigation Alternatives* report (LTE, 2006).

As agreed upon in the third TWG meeting, triggers for TWG convening to discuss potential/known methane seepage include, but are not limited to, methane seepage identified during drainage transect surveys or regional reconnaissance surveys, changes in reservoir permeability, and changes in drainage pattern. Mitigation alternatives will be developed on a case-by-case basis.

3.9.3 Coal Fires

When assessing coal fires, there are three main potential sources in the Project Area: wildfires, lightning strikes, and spontaneous combustion of coal due to dewatering activities at depth. Currently, no active coal fires exist in Archuleta County or La Plata County north of the SUIT boundary. Data currently suggests that the production of CBM within the outcrop zone would

produce limited water from the Kf, which would limit the creation of an atmosphere conducive for spontaneous combustion to occur. In addition, the depth of the Kf within the Candelaria 10U#3 CBM production well and chemical makeup of gases does not indicate that the Kf has enough oxygen to fuel the coals if it were to be dewatered. The potential for coal fires to occur as a result of Petrox's CBM development within the Project Area appears low at this time and will be continually evaluated through monitoring activities.

Evidence of coal fires have not been observed during the past 10 years of monitoring activities. The treatment of coal fires is both very dangerous and expensive. Near-surface coal fires can be extinguished by an extensive network of injection wells drilled into the affected seam where water, mud, or concrete slurries are used to smother the fire in a conjunction with near-surface excavation activities. In La Plata County, efforts to extinguish active coal fires via injection near the Kf outcrop have been ineffective until recently, when one coal fire was extinguished within the SUIT reservation. Petrox and LTE will look into the SUIT success in extinguishing their coal fire and evaluate the technical feasibility in the event a coal fire ignites along the Kf outcrop in Archuleta County and Petrox is deemed the responsible party.

The TWG will convene if monitoring of the Kf outcrop in the Project Area indicates a potential for surface and/or near-surface coal fires or if coal fires are observed during field activities. Mitigation alternatives will be evaluated on a case-by-case basis.

4.0 MONITOR-AS-YOU-GO RESULTS

This section presents the 2013 monitoring results for the Project Area.

4.1 PROPERTY ACCESS

LTE personnel were denied access to several properties; as a result, no monitoring activities were conducted on these properties during the 2013 monitoring event. The 2013 status of access to parcels is illustrated on Figure 13 and presented in Table 3.

4.2 DRAINAGE TRANSECTS SURVEY

During 2013, LTE conducted inspections from July 15 to July 22, 2013, at the following six locations where surface water drainages transect the Kf outcrop in Archuleta County:

- Beaver Creek (Figure 14);
- Squaw Creek and Little Squaw Creek (Figure 15);
- Pole Gulch (Figure 16);
- Peterson Gulch (Figures 17 and 18);
- Piedra River (Figure 19); and
- Stollsteimer Creek (Figure 20).

4.2.1 Water Surface Inspections

Methane was not observed being discharged as bubbles on the water surface at the six drainage transects inspected during the 2013 monitoring event.

4.2.2 Soil Gas Flux Measurements

Using the flux meter, LTE personnel collected soil gas flux measurements along the six drainage transects during the 2013 monitoring event. Reportable methane flux (greater than 0.2 $mol/m^2 \cdot day$) was not recorded at any of the 174 measurement points. Results of the soil gas flux measurement surveys indicate there are low background levels of methane present at the ground surface along the Kf outcrop in Archuleta County.

4.2.3 Total Methane Volumetric Flux Estimation

There was no reportable methane detected in Archuleta County during the 2013 flux survey and as a result, the total methane volumetric flux is 0.0 thousand cubic feet per day (MCFD).

The methane flux measurements for the seven drainage transects are presented on Figures 14 through 20. Flux data is summarized in Table 4. The flux measurement results for each drainage transect is presented Appendix G.

4.2.4 Historical Methane Flux Data Comparison

From 2007 to 2009, total volumetric methane flux was calculated using all methane flux values recorded in the field, regardless of the technical limitations of the flux meter. However, methane flux values below the reporting limit of 0.2 mol/m^2·day are not considered accurate and/or repeatable by the manufacturer of the flux meter. Therefore, the total volumetric methane flux reported in prior years appears to be inflated with inaccurate data. In 2010, only two methane flux values were detected above the reporting limit. As a result, limited data points with reportable methane flux values cannot be used to accurately calculate total reportable methane volumetric flux. An attempt to calculate the total reportable methane volumetric flux with limited data points would ultimately lead to results that might not reflect the actual methane volumetric flux within Archuleta County.

Reportable methane flux was detected in five locations in 2007 and 2008, and then dropped to three locations in 2009. Reportable methane flux was not recorded in any locations during the 2010 survey. In 2011, only two locations detected reportable methane flux. Every location sampled in 2013 fell below the reportable detection limit, following a non-reportable detection 2012 survey. Limited reportable methane flux values and low historical volumetric methane fluxes detected in Archuleta County appear to be associated with background levels.

4.2.5 Total Carbon Dioxide Volumetric Flux Estimation

As with estimating the total flux of methane at each drainage transect using data collected with the flux meter, LTE interpolated and gridded carbon dioxide flux data along each of the six drainage transect areas, and then contours and processes the data to estimate total flux. Carbon dioxide flux contours and values are included on Figures H1 through H7 in Appendix H.

For a better perspective of the carbon dioxide flux rates, LTE 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 7,000 feet amsl. For carbon dioxide flux, the calculation is as follows:

$$\frac{\text{mol } CO_2}{\text{day}} \times \frac{44.01 \text{ g } CO_2}{\text{mol } CO_2} \times \frac{0.0253 \text{ ft}^3 CO_2}{\text{g } CO_2} = \frac{\text{ft}^3 CO_2}{\text{day}}$$

For example,

$$1.0 \text{ mol/day } CO_2 = 1.11 \text{ CFD } CO_2$$

Notes:
mol – mole CO_2 – carbon dioxide g – gram ft^3 – cubic feet

Due to low concentrations of methane detected along the drainage transects, the carbon dioxide flux values do not appear to correlate with methane concentrations. It appears that carbon dioxide is naturally occurring along the drainage transects and as a result, carbon dioxide data is not discussed for each transect. Carbon dioxide flux data are included in Appendix G.

4.3 ABANDONED PRODUCTION WELL SURVEY

LTE conducted the 2013 Big Horn-Schomburg #1 abandoned production well site survey on July 15, 2013. LTE collected 18 flux measurements with no reportable methane detected. A single reportable methane flux point was detected in 2007, 2009, and 2011. Figure 21 presents the results of the Big Horn-Schomburg #1 abandoned production well survey. The flux measurement results are presented in Table 4. The flux measurement data is included in Appendix G.

4.4 REGIONAL RECONNAISSANCE

The 2011 regional reconnaissance event included CIR aerial photography and imagery review for stressed vegetation, followed by field verification with the collection of subsurface soil gas concentration measurements within identified suspect areas. The 2011 regional reconnaissance included similar CIR imagery review and field verification tasks as conducted in 2005 and 2008.

Methane was not detected at the measurement points in 2011. Generally, poor vegetation health in suspect areas was a function of surface physical conditions, such as poor soil development on coal and rock outcrops and/or steep slopes. Based on field verification activities and the lack of measurable methane, it appears no new methane seeps were identified from the regional reconnaissance activities in 2011.

4.5 ABANDONED COAL MINE SURVEYS

In 2011, LTE identified seven abandoned coal mines along the Kf outcrop. Due to continued property access denial, the Unnamed Abandoned Mine, Cabezon Project mine, and Chimney Rock Coal mine were not surveyed in 2013. Below is a summary of subsurface soil gas surveys for four abandoned coal mines along the Kf outcrop. The abandoned coal mine surveys were conducted from July 23 to July 31, 2013. Figures 22 through 45 illustrate subsurface soil gas and temperature measurements. Subsurface soil gas and temperature measurements are presented in Appendix I.

Methane was not detected at any of the abandoned coal mines with the exception of one measurement point at the Columbine mine at a concentration of 13,000 ppm (48 measurement points with methane in 2011 and one in 2012). Limited carbon monoxide was detected at the abandoned coal mines at concentrations ranging from 1 ppm to 41 ppm. Shallow subsurface temperatures were all below 16° C. During the 2012 flux survey, all methane flux measurements were below the flux meter reporting limit in the vicinity of the Chimney Rock mine.

Carbon monoxide is a by-product of coal combustion. With limited carbon monoxide and low subsurface temperatures, there does not appear to be active combustion/fires in the vicinity of these four coal mines. As additional verification, LTE did not observe other potential indicators of underground coal fires such as dead vegetation, charred ground, or visible smoke or steam during these surveys.

Subsequent quarterly abandoned coal mine surveys will be conducted for one year and re-evaluated by the TWG for effectiveness. Quarterly abandoned coal mine surveys will be reported under separate cover.

4.6 NATURAL SPRINGS SURVEY

4.6.1 Sampling Status

A total of 35 potential natural springs were identified in 2013 on or near the Kf outcrop in Archuleta County. Of the 35 natural springs, 11 natural springs were sampled in 2013. Those natural springs that were not sampled were due to property access denial by landowners or the natural spring was dry at the time of sampling.

The locations of natural springs are presented on Figure 46. A summary of the natural springs sampled in 2013, along with past sampling status, is presented in Table 1.

4.6.2 Field Measurements and Observations

Field observations and measurements of temperature, pH, and EC are collected at the sampled natural springs. The 2013 field observations and measurements for the natural springs, including historical measurements, are summarized in Table 5.

Natural spring discharge rates were calculated by dividing the known volume of a container by the time required to fill the container. The flow rates measured in 2013 are similar to the low flow rates measured during previous monitoring events. Natural spring discharge rates, including historical data, are presented in Table 6.

4.6.3 Natural Spring Sampling and Analysis

The COGCC uses 2 mg/L for methane in domestic water systems as the threshold to identify water for further investigation of the origin of the methane in the water. The COGCC considers water systems containing dissolved methane concentrations above 2 mg/L have an increased risk of desorption from the water and create potentially explosive conditions in confined spaces.

In 2013, dissolved methane was not detected above the laboratory reporting limit for any of the natural spring samples. Laboratory analytical results for dissolved methane in natural spring waters, including historical results, are summarized in Table 7.

All natural springs sampled are calcium bicarbonate waters with the exception of Grassy Spring, which appears to be calcium sulfate in makeup. Section 2.3.1 illustrates the Stiff Diagram utilized to identify the water makeup of the natural springs. Major ion chemistry of the natural springs is summarized in Table 2. Analytical results are presented in Appendix C.

4.6.4 Subsurface Soil Gas Measurements

One set of subsurface soil gas measurements, using traditional subsurface soil gas sampling techniques, was collected at the 11 natural springs in 2013. Methane was not detected in the subsurface at any of the 11 natural spring locations.

4.7 COGCC MONITORING WELL DATA ANALYSIS

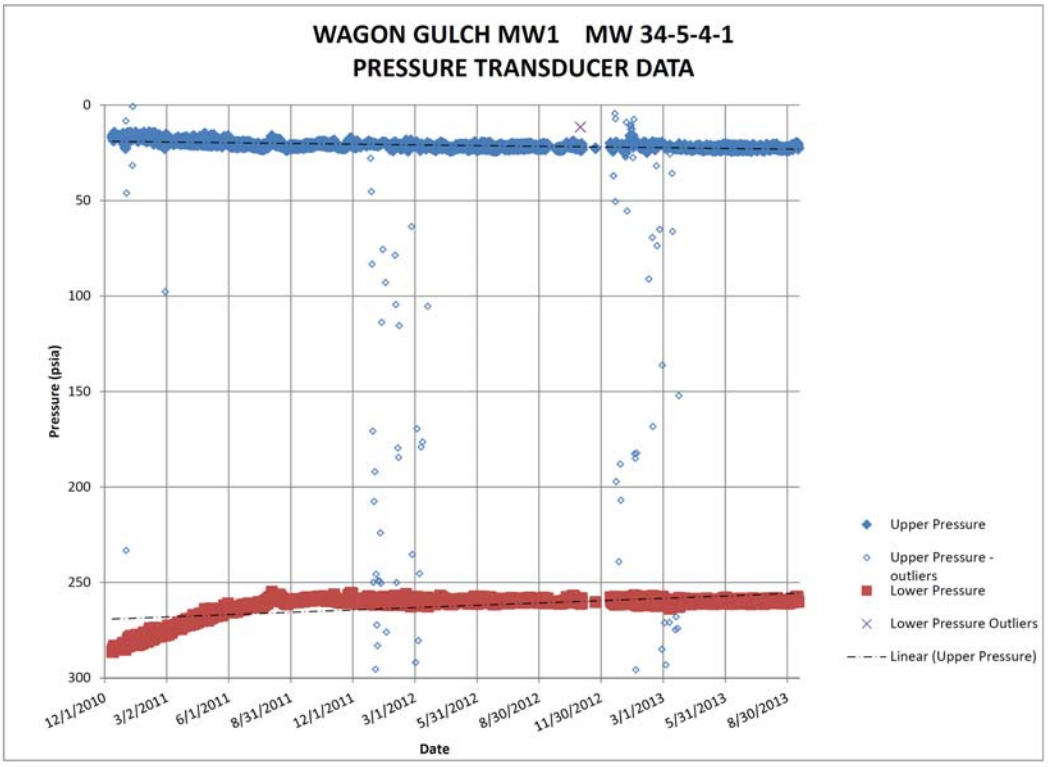
The COGCC provided LTE with twice-daily monitoring well pressure and temperature data from December 2010 through mid-September 2013 for each of the 4M/Archuleta monitoring wells. Historical data have been discussed in several reports on 4M project monitoring posted on the COGCC website. A general analysis of results for each well is discussed in the subsequent sections of this report. In general, all monitoring wells indicate the presence of free gas at the outcrop with no surface methane seeps. The locations of the COGCC monitoring wells are depicted on Figure 11.

4.7.1 Wagon Gulch

Wagon Gulch monitoring wells MW 34-5-4-1 and MW 34-5-4-2, located in Section 4 of Township 34 North, Range 5 West adjacent to the north central part of the Petrox Fosset Gulch Unit, have been monitored since December 2, 2008.

Monitoring well MW 35-5-4-1 did not reach an initial stable pressure for approximately three weeks following installation. From January 2008 through mid-November 2010, wellhead pressures declined following stabilization. At that time, the trend reversed and the wellhead pressure increased slightly through July 2011. From July 2011 to September 2013, the wellhead pressures have remained relatively stable. The graphs below depict upper (wellhead) and lower (bottomhole) transducer data from January 2011 to September 2013. A number of spurious readings in January and February 2011, February and March 2012, and December through March 2013 have been plotted as outliers. The majority of those readings were collected in the early a.m. hours, and the erroneous readings are attributed to overnight freezing of the transducer, which is externally mounted. This transducer is scheduled for replacement with a transducer to be located below the water level. Readings collected in the afternoons are nearly all consistent with expected pressures. Downhole pressures remained stable through 2013. The previous increase in bottomhole pressure from December 2008 to November 2010 indicates a net water level rise in the monitoring well since installation. Between November 2010 and November 2011, water levels decreased by approximately 20 feet and have been relatively stable since that time.

Monitoring well MW 34-5-4-2 was shut in for monitoring on December 4, 2008, but stable pressure transducer readings were not obtained until April 2009. From February 2009 to April 23, 2009, no data were available due to pressure transducer malfunction as a result of freeze damage. At this time, the water level inside the open wellhead was at a height of 2.5 feet above ground level. After the well was shut in following repairs, wellhead pressure buildup returned rapidly. The well has shown a relatively constant wellhead pressure of 47 to 48 pounds per square inch, absolute (psia), and a bottomhole pressure of 375 psia between April and October 2009. In the past 12 months several data gaps were observed, particularly in February and the first half of March 2013, which may also be due to freezing of the transducer. However, all the measured pressures have remained steady with a very slight rise to a range of 48 to 50 psia at the wellhead and a bottomhole pressure of 378 to 380 psia.


WAGON GULCH MW1 MW 34-5-4-1
PRESSURE TRANSDUCER DATA
Pressure (psia)
0
50
100
150
200
250
300
12/1/2010
3/2/2011
6/1/2011
8/31/2011
12/1/2011
3/1/2012
5/31/2012
8/30/2012
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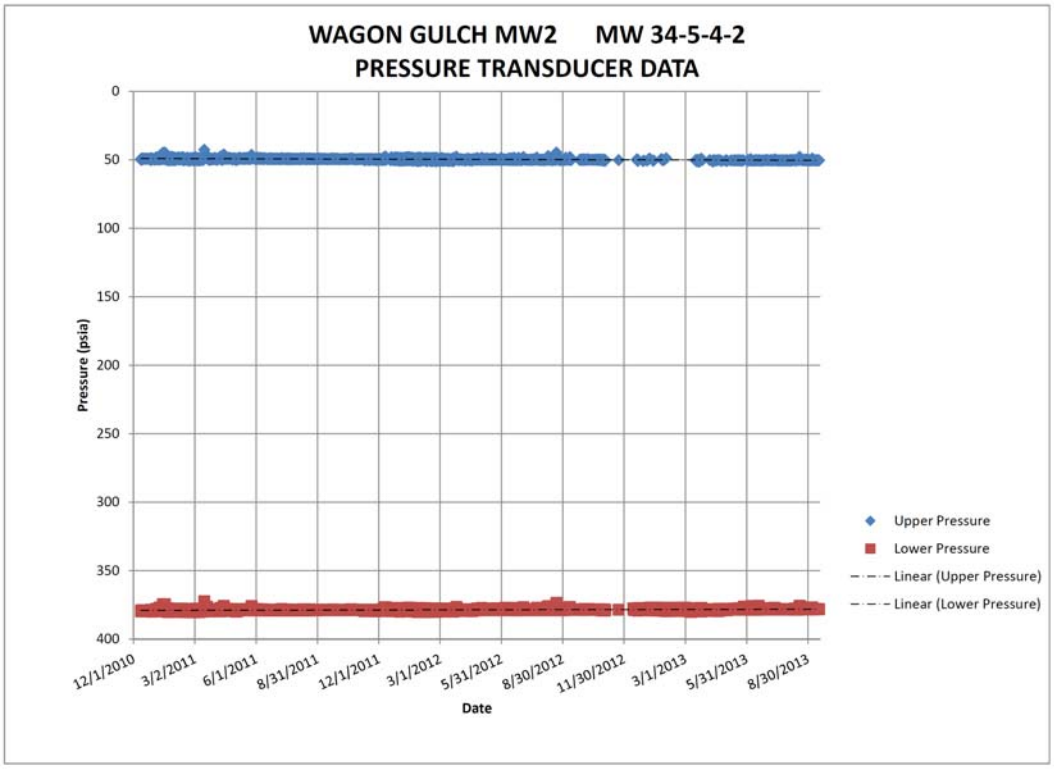
Date
Upper Pressure
Upper Pressure - outliers
Lower Pressure
Lower Pressure Outliers
Linear (Upper Pressure)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PRESSURE TRANSDUCER DATA
Pressure (psia)
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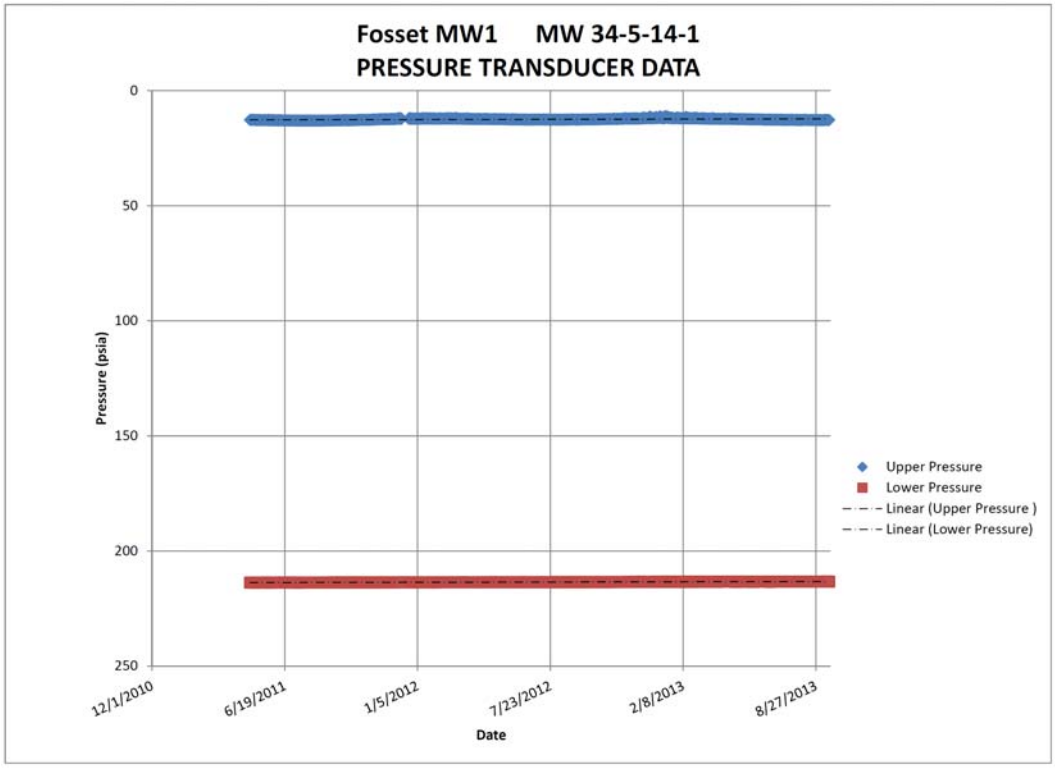
50
100
150
200
250
300
350
400
12/1/2010
3/2/2011
6/1/2011
8/31/2011
12/1/2011
3/1/2012
5/31/2012
8/30/2012
11/30/2012
3/1/2013
5/31/2013
8/30/2013
Date
Upper Pressure
Lower Pressure
Linear (Upper Pressure)
Linear (Lower Pressure)

4.7.2 Fosset Gulch

Fosset Gulch monitoring wells MW 34-5-14-1 and MW 34-5-14-2, located in Section 14 of Township 34 North, Range 5 West adjacent to the south central part of the Petrox Fosset Gulch Unit, have been monitored by the COGCC since December 4, 2008. Historical data provided in COGCC annual reports indicate a relatively constant wellhead pressure in MW 34-5-14-1 until November 2009 when the water level began a gradual decline of about 8 feet until July 2010. The well was vented in August 2010 and water levels nearly recovered to previous levels. Pressure data from January 2011 through September 2013 are presented in the graphs below and exhibit nearly constant wellhead pressures of 12.7 psia and bottomhole pressure of 213 psia.

Monitoring well MW 34-5-14-2 has exhibited a nearly constant bottomhole pressure curve for the entire period of record. Records indicate wellhead pressure drops immediately corresponding to rises in water levels each time the well is vented to the atmosphere. The most recent venting event took place on August 3, 2011. Wellhead pressures for 2012 and 2013 do not indicate that any venting took place this summer or last. From August 2011 to September 2013 the wellhead pressure has gradually increased from approximately 14 psia to 24 psia.


Fosset MW1 MW 34-5-14-1
PRESSURE TRANSDUCER DATA
Pressure (psia)
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50
100
150
200
250
12/1/2010
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1/5/2012
7/23/2012
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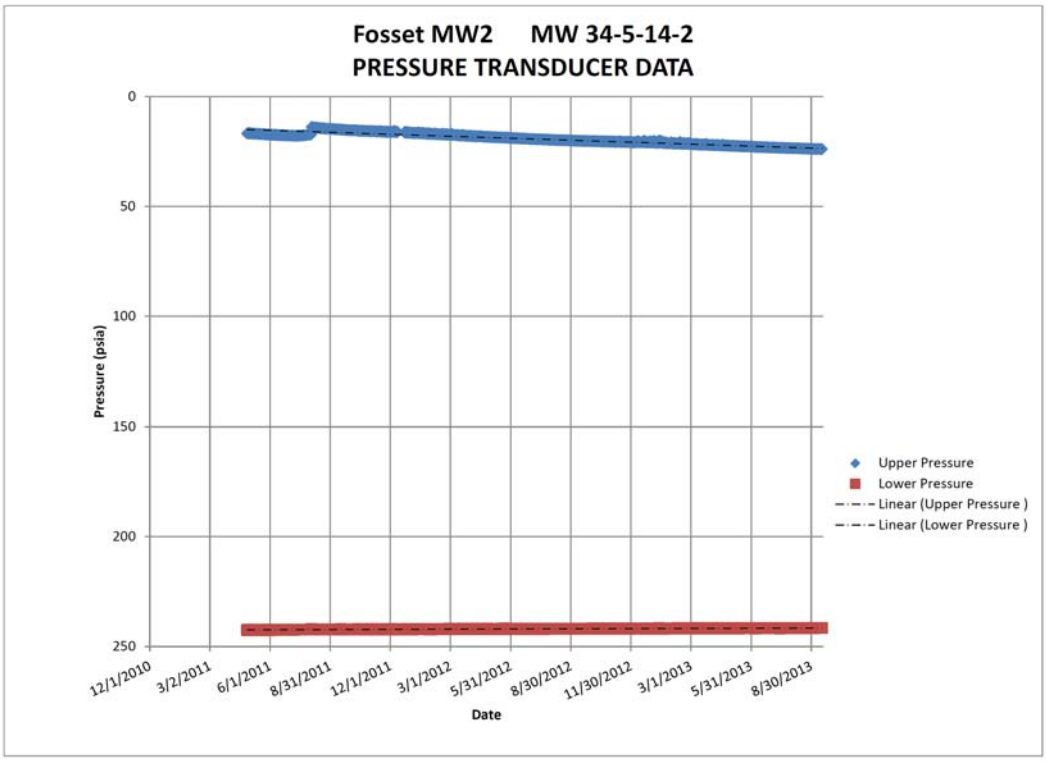
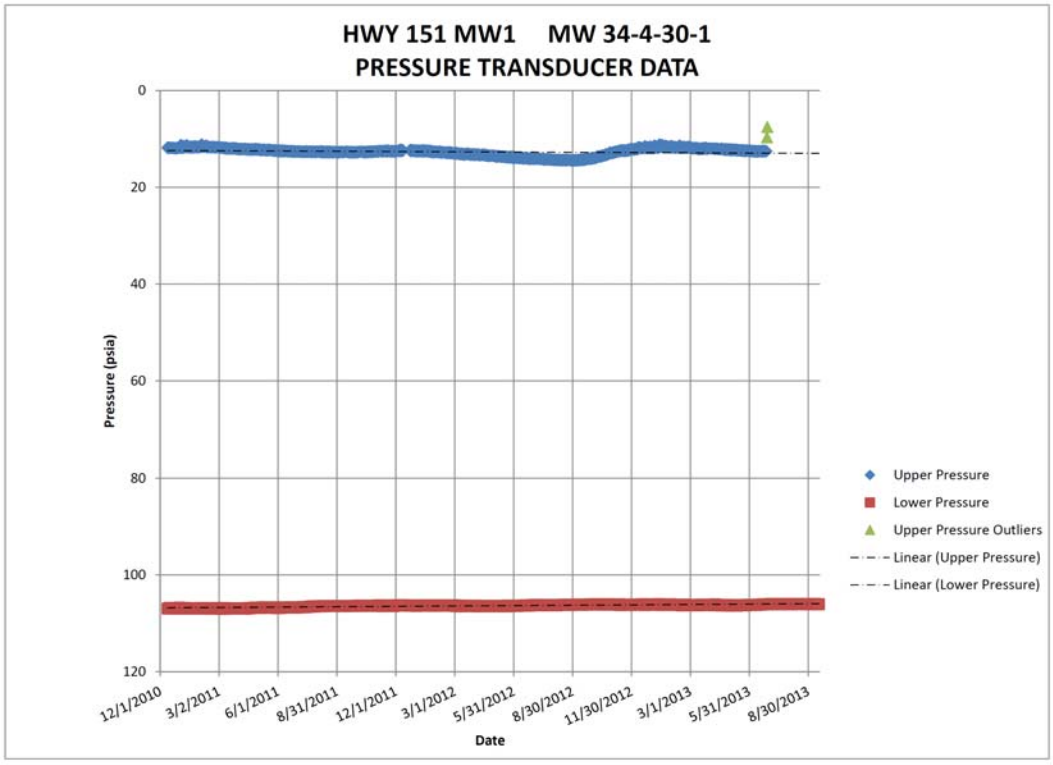
Upper Pressure
Lower Pressure
Linear (Upper Pressure)
Linear (Lower Pressure)

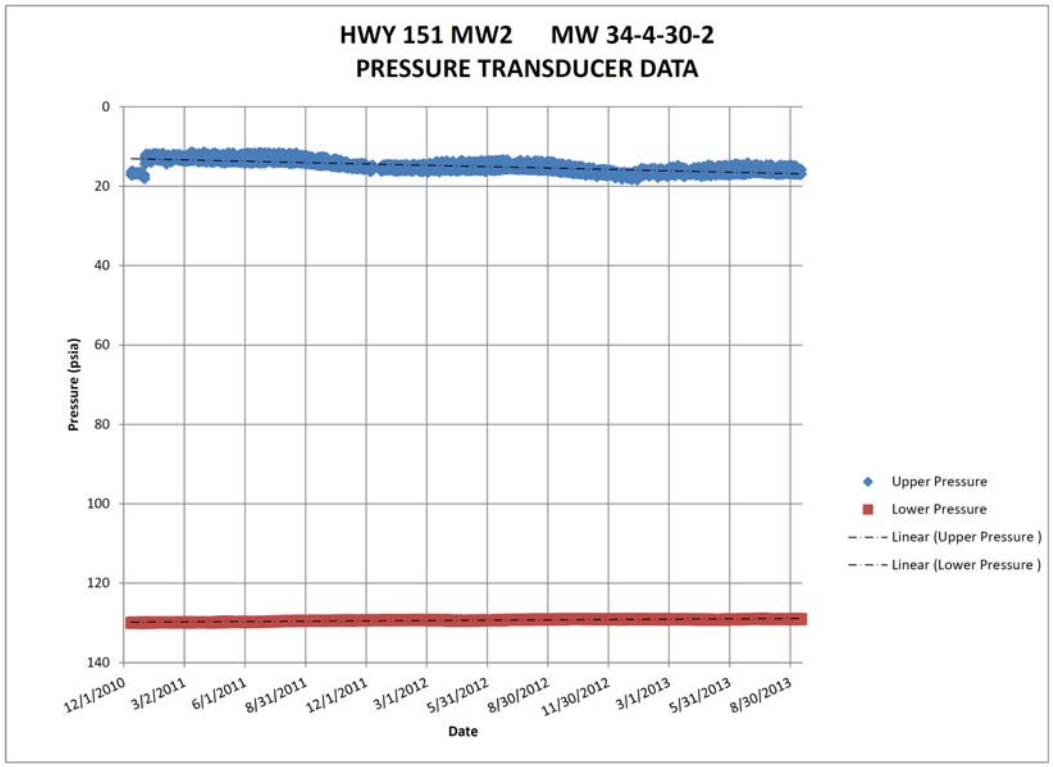

Fosset MW2 MW 34-5-14-2
PRESSURE TRANSDUCER DATA
Pressure (psia)
0
50
100
150
200
250
12/1/2010
3/2/2011
6/1/2011
8/31/2011
12/1/2011
3/1/2012
5/31/2012
8/30/2012
11/30/2012
3/1/2013
5/31/2013
8/30/2013
Date
Upper Pressure
Lower Pressure
Linear (Upper Pressure)
Linear (Lower Pressure)

4.7.3 Highway 151

Monitoring wells MW 34-4-30-1 and MW 34-4-31-2, located in Section 30 of Township 34 North, Range West adjacent to the north end of the Petrox Fosset Gulch Unit, have been monitored since December 3, 2008. A small drop in wellhead pressure was observed on June 2, 2010, corresponding to wellhead venting. Pressure data from January 2011 through September 2013 are displayed in the graphs below. Wellhead pressures in monitoring well MW 34-4-30-1 have displayed some seasonal fluctuation, with lower values observed in winter months and somewhat higher values in summer. Overall the fluctuations range between approximately 11.5 psia and 14.5 psia. The upper transducer readings became erratic in June 2013 and ceased altogether in July 2013. Bottomhole pressures have remained nearly constant at 106 psia for the entire period of record, with a slight decline from 106.9 psia to 106.1 psia between January 2011 and September 2013.

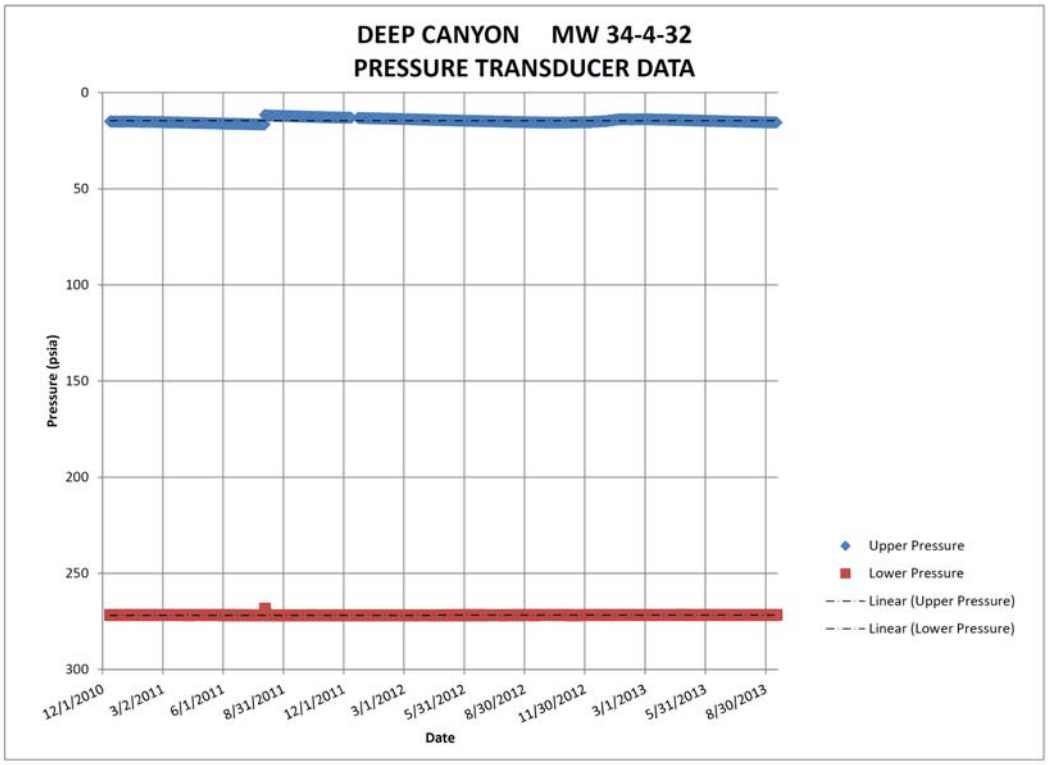
Monitoring well MW 34-4-30-2 displays a relatively flat bottomhole pressure curve. Bottomhole pressures increased gradually from December 2008 to June 2010, and have then decreased very slightly through September 2013, with overall fluctuations of approximately 6 psia. Wellhead pressures have fluctuated downward with each venting event, corresponding to a rise in water level of approximately 8 feet to 12 feet. A similar downward fluctuation was observed on January 1, 2011, with no corresponding intentional venting. An exceptionally cold temperature of -22.7° Fahrenheit was recorded at the wellhead on this occasion. In each case, the wellhead pressures recover gradually over a period of two to four months. Since January 2011, no venting has occurred, but daily fluctuations of 0.5 to 1.5 psia have been observed in the wellhead pressures, with higher pressures observed in the 6 a.m. readings. In addition, seasonal fluctuations of 2 to 4 psia have been observed, with higher values typically observed in March and lower values in September, and a gradual overall upward trend from approximately 12.5 psia in January 2011 to approximately 16.5 psia in January 2013 has been observed.


HWY 151 MW1 MW 34-4-30-1
PRESSURE TRANSDUCER DATA
Pressure (psia)
0
20
40
60
80
100
120
12/1/2010
3/2/2011
6/1/2011
8/31/2011
12/1/2011
3/1/2012
5/31/2012
8/30/2012
11/30/2012
3/1/2013
5/31/2013
8/30/2013
Date
Upper Pressure
Lower Pressure
Upper Pressure Outliers
Linear (Upper Pressure)
Linear (Lower Pressure)


HWY 151 MW2 MW 34-4-30-2
PRESSURE TRANSDUCER DATA
Pressure (psia)
0
20
40
60
80
100
120
140
12/1/2010
3/2/2011
6/1/2011
8/31/2011
12/1/2011
3/1/2012
5/31/2012
8/30/2012
11/30/2012
3/1/2013
5/31/2013
8/30/2013
Date
Upper Pressure
Lower Pressure
Linear (Upper Pressure)
Linear (Lower Pressure)

4.7.4 Deep Canyon

The Deep Canyon monitoring well MW 34-4-32-1 came online in June 2010. The well pressure stabilized six days after the well was shut in, and then displayed a nearly constant bottomhole pressure of 272 psia through September 2013. A change in the bottomhole pressure was observed on August 3, 2011, corresponding to a venting event, with recovery of bottomhole pressure within one day. Wellhead pressures have increased gradually from June 2010 to August 3, 2011, when pressures dropped from 16.5 to 11.5 psia. Wellhead pressures have recovered very slowly over the subsequent 12 months. From October 2012 to February 2013 wellhead pressures fell from approximately 15.5 psia to 14 psia, and then recovered to 15.5 psia in September 2013.



4.7.5 Overall COGCC Monitoring Well Analysis

All COGCC monitoring wells installed within the Kf outcrop as part of the 4M/Archuleta Project Area exhibit free gas. This free gas is not produced by withdrawing water out of the Kf and is able to build pressure back after venting. The COGCC monitoring well data indicate free gas is present at the Kf outcrop at depth. This conclusion is consistent with observations of pressure data for Petrox CBM production wells in the area, gas production without dewatering in existing production wells, and the Mansoori modeling results.

4.8 BLM/USFS SOIL VAPOR TUBE DATA ANALYSIS

SVT data was obtained from the BLM for the period from July 2012 through August 2013, and found that no new methane concentration data had been collected from the transects during that period of time. As a result, statistical analysis of the SVT data could not be conducted for this 2013 Outcrop Zone Report.

Historically, the methane has been detected in the SVTs with no methane flux measured in the vicinity if the SVTs supports the data reported herein demonstrating free gas is present at depth in the Kf outcrop; however, it is not migrating to the surface as a seep.

5.0 OUTCROP EVALUATION

This 2013 outcrop evaluation is based on past work within the Project Area and current conditions documented during the 2013 monitoring event.

5.1 FRUITLAND FORMATION GEOLOGICAL FACTORS

The primary pathway for gas flow within the Kf is through void spaces in the face cleats and joints, which are parallel to the Kf outcrop within the Project Area. Surface faults and fractures have been observed within Project Area, however their void spaces are either filled or not interconnected, limiting the ability of free gas to migrate to the ground surface and manifest into methane seeps. Monitoring activities since 2004 confirm the absence of methane seepage along the Kf outcrop within the Project Area in spite of free gas observed in the COGCC monitoring wells.

Mansoori calculated the best fit permeability to be 0.75 md and the Fosset Gulch Unit 9U#2 openhole log indicated the coal is highly anisotropic (2:1 to 4:1). According to Mansoori's model, 20 years of CBM production using these permeability and anisotropy values with production wells drilled and producing 6,230 feet from the Kf outcrop will have no pressure drop at the outcrop.

It has been documented that the Kf original reservoir pressure formation within the Project Area is slightly under pressured at 0.42 psi/ft, and the coal is over saturated and produces free gas in the CBM production wells and monitoring wells. This free gas does not migrate to the surface due to the following factors:

- The gas flow and drainage area follow the directional permeability which is northwest-southeast parallel to the outcrop;
- The coals exhibit a high degree of anisotropy with poor butt cleat development east-west; and
- The surface fractures are poorly developed, resistive, and not well interconnected.

5.2 FRUITLAND FORMATION HYDROGEOLOGICAL FACTORS

A total of 35 potential natural springs were identified in 2013 on or near the Kf outcrop in Archuleta County. These natural springs tend to flow in late spring and run dry during the summer months. Historically, the natural springs sampled are calcium bicarbonate waters with the exception of Grassy Spring, which is calcium sulfate in makeup and all have low SAR values less than or equal to 1.0. Water chemistry of the Kf coal is primarily dominated by sodium chloride and bicarbonate and depleted in calcium and sulfate. Water samples collected from the Kf during flowback of Candelaria 10U#3, Pargin Mountain Unit 9, and Pargin Mountain Unit 10 are dominated by sodium and potassium cations and chloride and bicarbonate anions and exhibit high SAR values (greater than or equal to 50). Based on the water chemistry data, the natural spring waters appear to be connected to the shallow alluvial sands and not the Kf aquifer.

The Kf aquifer is classified as nontributary through a majority of the Project Area within Township 34 North, Range 5 West. This means the produced water is not subject to permitting. The remaining portion of the Project Area is considered to be within tributary groundwater basins as it relates to the Kf. However, as noted above, there is limited water produced with the production of CBM within the Project Area. In addition, existing Petrox CBM production wells are completed within the nontributary boundary of the Kf. If it is necessary to augment the produced water from CBM production in the Project Area, Petrox will be able to accomplish this with water rights from the Piedra River just south of the existing Petrox CBM production wells.

5.3 BASELINE MONITORING FACTORS

The absence of reportable methane flux values in 2013 and historically low to no total volumetric methane flux along the Kf outcrop in Archuleta County suggests there is little or no methane seepage occurring over the mapped areas. Prior to flux mapping and as documented by the BLM SVTs, subsurface concentrations of methane are low, are generally not flowing (seeping to the surface), and indicative of background conditions and/or free gas trapped in the formation.

Low concentrations of methane detected in the natural springs water samples along the Kf outcrop in Archuleta County suggests that methane is not seeping in those areas and the low values in water at limited natural springs reflect the reduced risk for explosive conditions in a confined area. While we are unable to confirm methane origins at this time, it appears probable that the methane detected is of biogenic origin.

Regional reconnaissance activities for 2011 appear to indicate that no new methane seeps and/or coal fires have developed since the 2008 regional reconnaissance survey. Vegetative indications of methane seepage and/or coal fires have not been observed since 2004, with the initiation of monitoring within the Project Area.

Minor concentrations of subsurface methane at abandoned coal mines appear to indicate limited off-gassing of the mines and not necessarily formations of new methane seeps. This is reaffirmed with overlapping flux measurements taken near and around applicable abandoned coal mines as part of the flux mapping for drainage transects. In addition, it appears at this time that there are no coal fires along the Kf outcrop in Archuleta County due to the lack of other coal fire indicators such as elevated carbon monoxide soil gas concentrations, dead vegetation, charred ground, smoke, or steam. In addition to the absence of any methane seeps within the Project Area, coal fires have also not been observed as a secondary consequence of the regional reconnaissance task.

The COGCC monitoring wells continue to indicate the presence of free gas at depth along the Kf outcrop. The pressure history for those wells will continue to be monitored and reported.

5.4 OVERALL EVALUATION AND SUMMARY

Based on reservoir, geological, and hydrogeological characteristics of the Kf and specifically within the Project Area, the potential for CBM development of federal minerals within the outcrop zone to adversely affect the Project Area appears low with regards to methane seepage and/or coal fires.

Baseline conditions within the Project Area indicate there is no methane seeping to the surface. Conditions have not changed within the Project Area since 2004 despite the presence of free gas at the outcrop. As stated in Decision Point 5 of the ROD, oil and gas producers are allowed to monitor-as-you-go. This approach appears warranted as there are eight years of baseline data in conjunction with monitoring wells, descriptive reservoir openhole logs, a drainage and performance simulation study, and pressure data history. If methane seeps begin to develop and/or coal fires are observed during the production of CBM within the outcrop zone, then the mitigation strategies discussed in this report and the NSJB ROD will be reviewed and implemented where applicable.

LTE concludes the following for the Project Area:

- Based on baseline monitoring starting in 2004, there are no methane seeps or coal fires existing at the Kf outcrop within Archuleta County;
- Free gas is present in the reservoir and at the Kf outcrop as evidenced by gas production in the CBM wells and the COGCC monitoring wells;
- The reservoir geological characteristics of the coal exhibit dominant fractures orientation north/northwest-south/southeast with a structural dip of 16.5° to the southwest. Based on the drilling results from the Fosset Gulch Unit #16-1 well, the major faults appear to run northwest-southeast and follow the direction of the draws and major creek drainages;
- Based on openhole log analysis from the Fosset Gulch Unit 9U#2 CBM production well, the maximum horizontal stress orientation is north/northwest-south/southeast and the minimum horizontal stress is east-west. The CBM production wells will hydraulic fracture perpendicular to minimum horizontal stress in a northwest-southeast direction and will stimulate in a north 130° plane;
- Preferential gas flow and drainage pattern will be in alignment with sigma maximum north/northwest-south/southeast which is the maximum directional permeability parallel to the Kf outcrop;
- The original bottomhole reservoir pressure gradient is 0.42 psi/ft with a fracture gradient of 1.05 psi/ft as determined from DFIT data and pressure data from the COGCC monitoring wells;
- Based on the FMI log, the coals and surrounding beds are highly fractured and are striking north/northwest-south/southeast. Resistive fractures (healed) are present on the logs and at the Kf outcrop;
- Based on the sonic scanner borehole anisotropy and Stoneley mobility analysis logs, the coals exhibit a high degree of intrinsic anisotropy;
- Based on Mansoori's *Evaluation of Coalbed Methane Well Performance and Drainage Area Analysis at Fosset Gulch Unit, San Juan Basin, Colorado* dated September 2005, using reservoir simulation derived from history matching, the "in-situ permeability derived is 0.75 md with a permeability anisotropy ratio of 2:1 to 4:1." The drainage pattern is north-south in line with the natural fracture orientation: Case 3 and 4 represent "Fractures Parallel to Kf outcrop" showing CBM wells drilled

6,230 feet from the outcrop with 20 years of production will result in 0.0% pressure drop at the Kf outcrop. Applying these results to the Candelaria 10U#3 lateral, which is 7,210 feet from the Kf outcrop, there will be no pressure drop at the Kf outcrop after 20 years of production and the drainage pattern along the lateral will be north/northwest-south/southeast; and

- A comparison of water chemistry between the natural springs and Kf coal water, specifically SAR, suggests the waters from the natural springs originate in the alluvial sands and are recharged by surface run-off. This is further supported by the low producing CBM water rates of 1 BWPD to 15 BWPD and the Colorado State Engineer determination the Kf aquifer is classified nontributary.

Based on the monitoring results and evaluation of this report, LTE and Petrox recommend the following:

- Conduct annual surveys of methane flux at the ground surface where surface water transects the Kf outcrop. Beginning in 2013, grid spacing for the flux survey have been expanded to 400-foot spacings during those years that the regional reconnaissance is not conducted. During regional reconnaissance years (next conducted in 2014), grid spacing will be reduced to the previously conducted 200-foot spacing flux survey;

- Measure methane flux at nearby abandoned production wells, specifically the Big Horn-Schomburg #1 abandoned production well;

- Identify and sample natural springs along the Kf outcrop;

- Field verify suspect methane seeps along the Kf outcrop using scheduled regional reconnaissance methods of aerial fly-over and field verification on a 3-year cycle (next event in 2014);

- Conduct abandoned coal mine surveys on a quarterly basis during the first year of CBM production from the Candelaria 10U#3 CBM production well and a re-evaluation of frequency to be discussed during the subsequent TWG meeting. The second quarterly survey is tentatively scheduled for November 2013;

- Summation and evaluation of the BLM SVT data, if available, with statistical analysis using the Mann-Kendell test;

- Summation and evaluation of the COGCC monitoring well pressure data with an emphasis on monitoring wells Fosset Gulch MW 34-5-14-1 (API 05-007-06264) and Fosset Gulch MW 34-5-14-2 (API 05-007-06265);

- Summation and evaluation of annual natural gas and water production data from each Petrox/Elm Ridge CBM production well within the Fosset Gulch Unit; and

- Present this Outcrop Zone Report to the TWG during its second annual review.

In addition to modified monitoring plans developed through the TWG, the following action items were discussed and agreed to:

- No new monitoring wells will be required at this time;
- Petrox will incorporate water chemistry data from new production wells drilled prior to bringing them online per the COGCC COAs. The data will be presented in subsequent outcrop zone reports;
- Petrox will collect and provide initial downhole pressure data for all new drill production wells prior to bringing them online. The data will be used in evaluating reservoir production efficiency and in evaluating the Mansoori modeling efforts. Modeling data will be incorporated into subsequent outcrop zone reports;
- Petrox will evaluate reservoir pressure data from new drill production wells as they occur and conduct periodic model runs similar to the initial Mansoori effort to monitor the actual reservoir behavior in comparison to the initial predictive effort. The frequency of this activity will be dependent on the data available. Results will be presented in subsequent outcrop zone reports when available;
- Petrox will commit to utilizing the Candelaria 10U#4, the FGU 9U#3, or other existing/planned production wells for pressure monitoring for a period of no more the three months following completion of the well. The data will be provided in the outcrop zone report; and
- The outcrop zone reports and subsequent monitoring will be utilized for all APDs for Petrox within the Fosset Gulch Unit.

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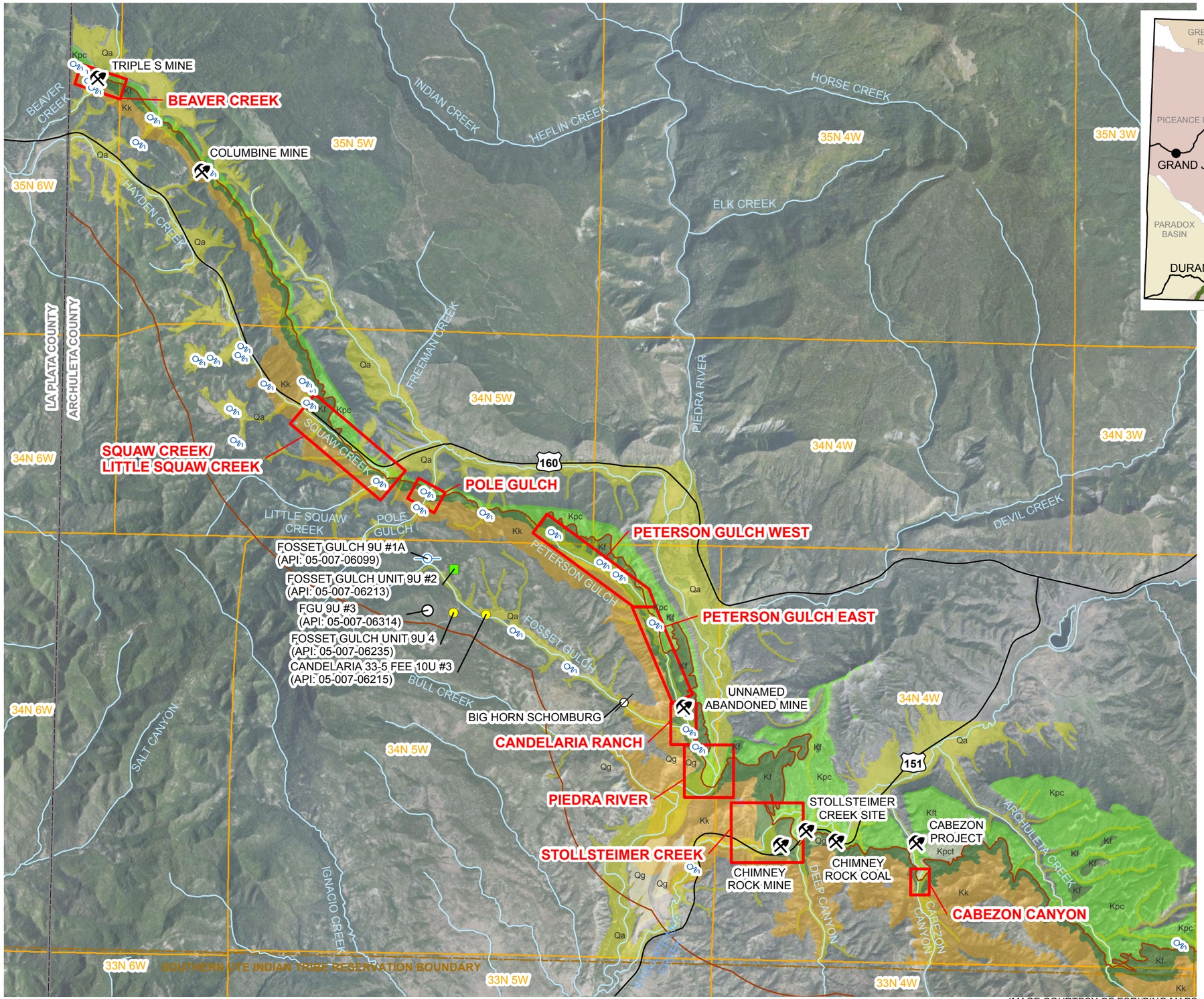
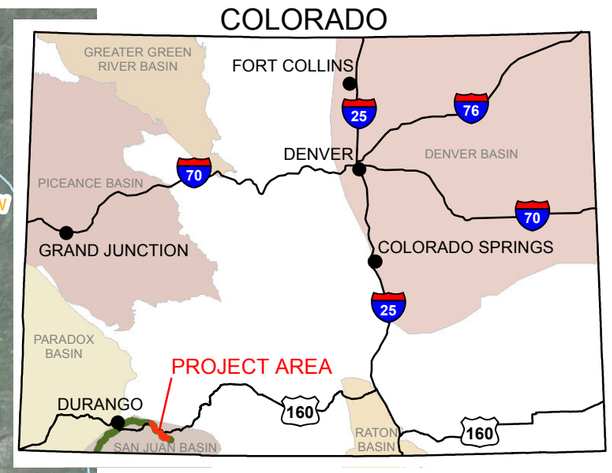
FIGURES





LEGEND

- NATURAL SPRING
- ABANDONED PRODUCTION WELL
- ABANDONED MINE

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- HIGHWAY
- SURFACE WATER
- AREA OF INTEREST
- BUREAU OF LAND MANAGEMENT OUTCROP ZONE
  (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- QUATERNARY GRAVEL (Qg)
- QUATERNARY ALLUVIUM (Qa)
- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION TONGUE (Kpct)
- FRUITLAND FORMATION TONGUE (Kft)
- PICTURED CLIFFS FORMATION (Kpc)

0 1.25 2.5
Miles

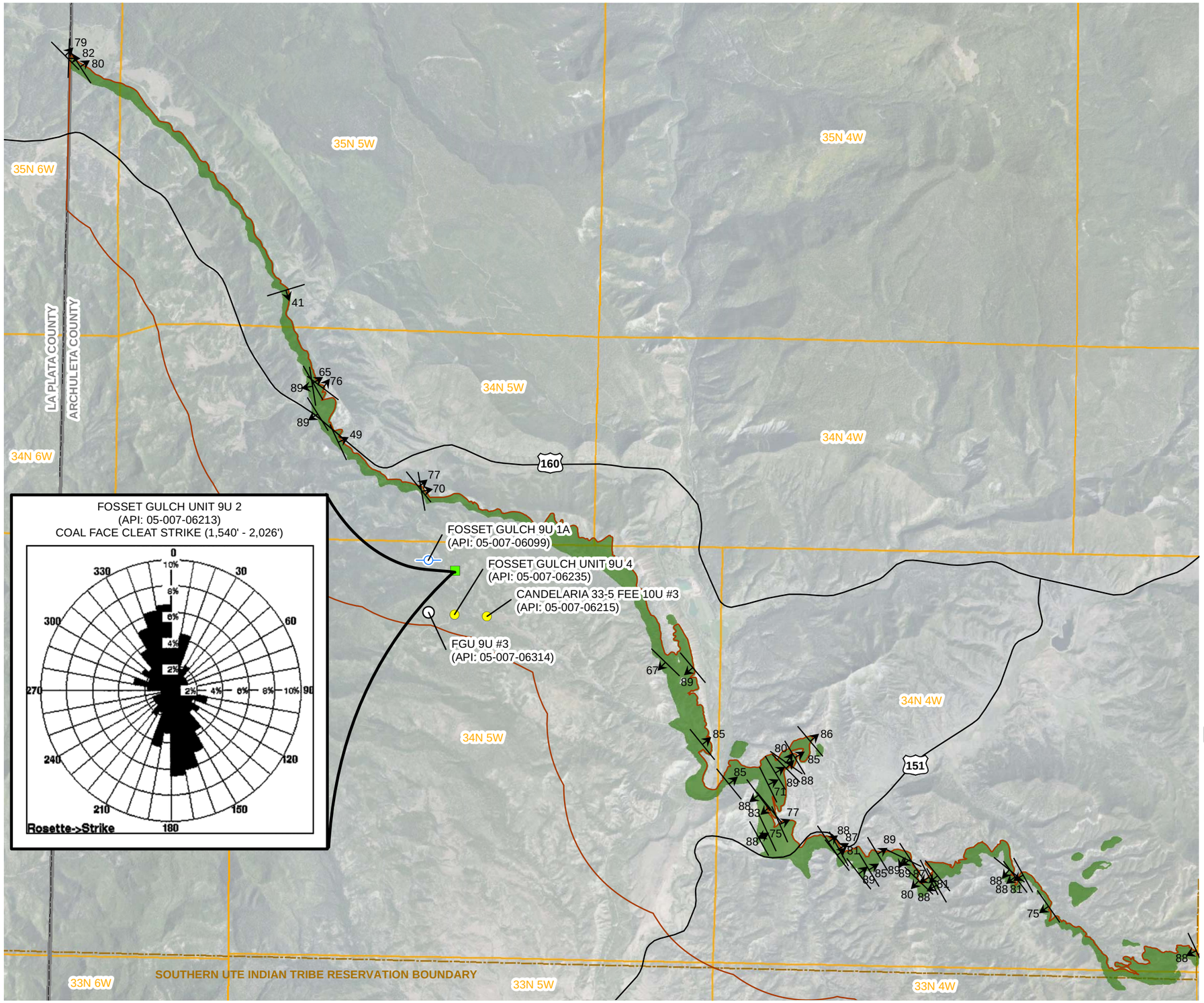
N

IMAGE COURTESY OF ESRI/BING MAPS

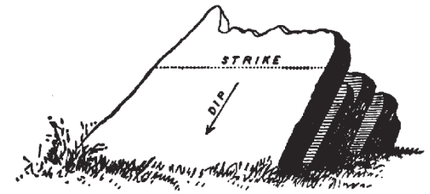
FIGURE 1
PROJECT AREA MAP
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

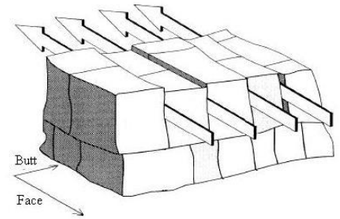
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 01 PROJECT AREA.mxd



FOSSET GULCH UNIT 9U 2
(API: 05-007-06213)
COAL FACE CLEAT STRIKE (1,540' - 2,026')





Face and Butt cleat in coal structure(Scott,1994)

LEGEND

STRIKE AND DIP

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- HIGHWAY
- BUREAU OF LAND MANAGEMENT OUTCROP ZONE
  (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- FRUITLAND FORMATION (Kf)

IMAGE COURTESY OF ESRI/BING MAPS

0 1.25 2.5
Miles

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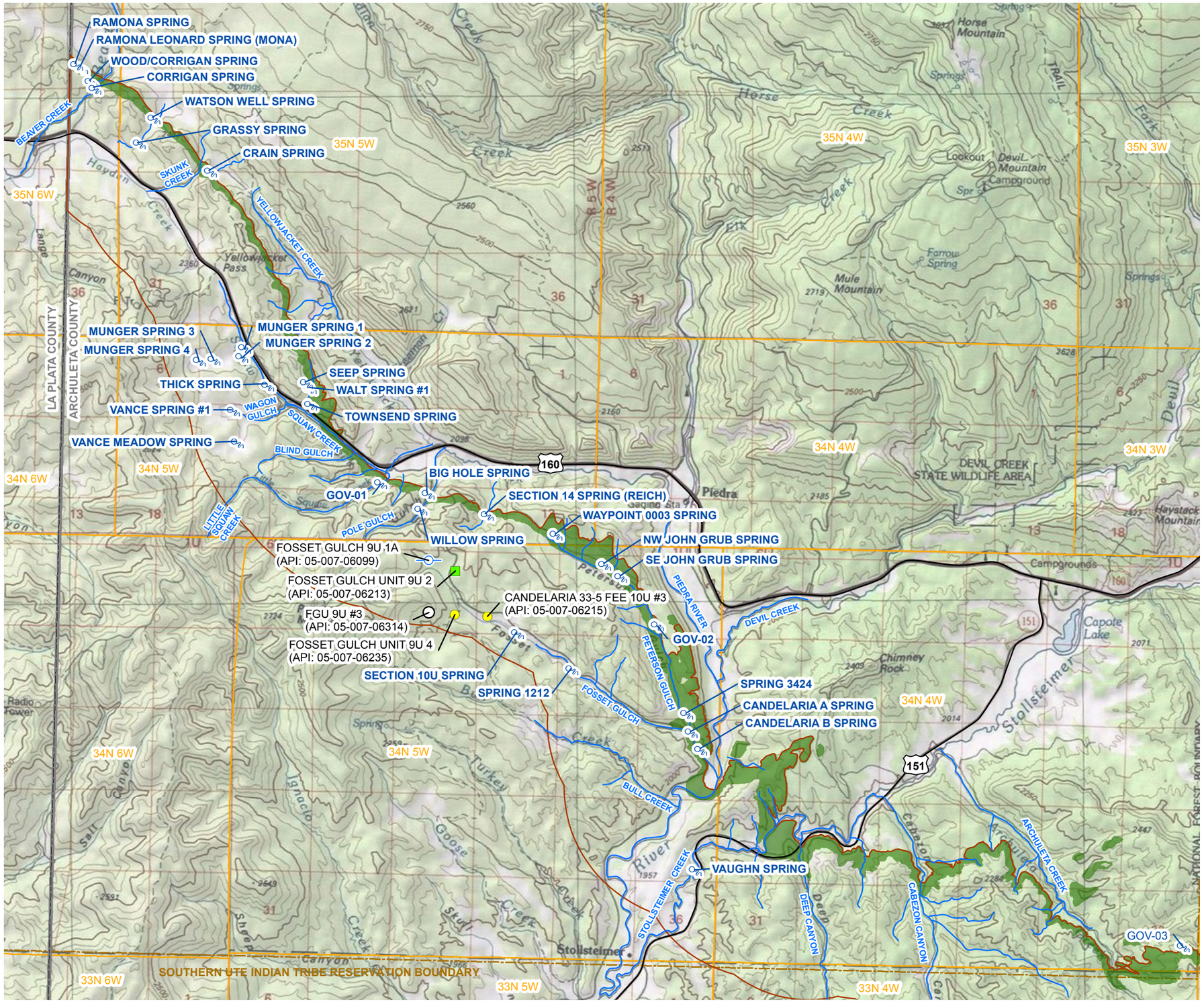
FIGURE 2
COAL FACE CLEAT ORIENTATION MAP
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 02 COAL CLEAT.mxd



LEGEND

- NATURAL SPRING

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- SURFACE WATER
- HIGHWAY
- BUREAU OF LAND MANAGEMENT OUTCROP ZONE
  (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- FRUITLAND FORMATION (Kf)

IMAGE COURTESY OF ESRI/USGS

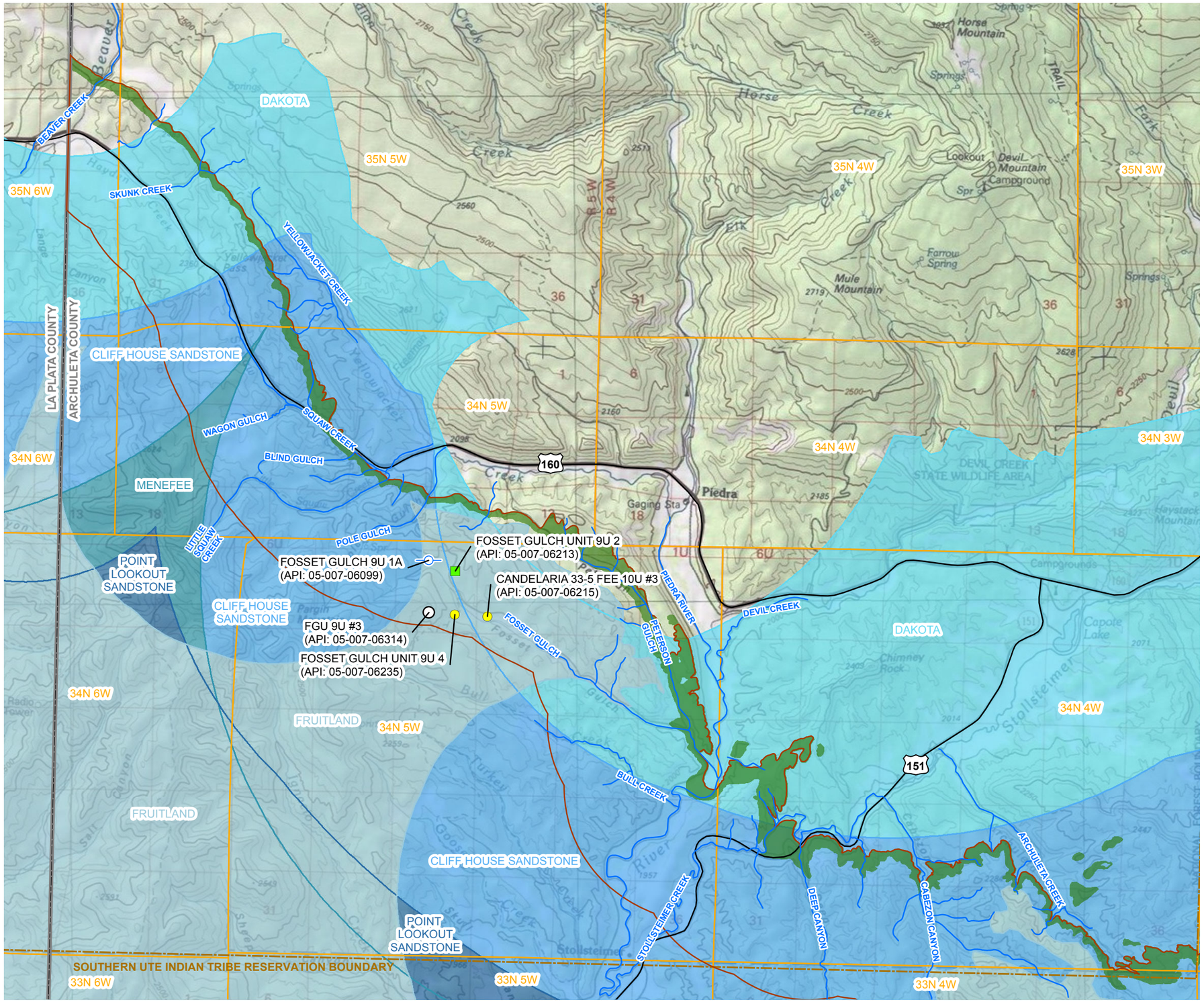
0 1.25 2.5
Miles

N

FIGURE 3
SURFACE WATER MAP
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 03 SURFACE WATERS.mxd



LEGEND

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- HIGHWAY
- SURFACE WATER
- BUREAU OF LAND MANAGEMENT OUTCROP ZONES (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES

NONTRIBUTARY GROUNDWATER FORMATION

- FRUITLAND
- POINT LOOKOUT SANDSTONE
- MENEFEE
- CLIFF HOUSE SANDSTONE
- DAKOTA

NONTRIBUTARY GROUNDWATER AREAS ARE NOT IN ORDER BY FORMATION DEPTH FOR VISUAL REPRESENTATION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- FRUITLAND FORMATION (Kf)

IMAGE COURTESY OF ESRI/USGS

0 1.25 2.5
Miles

N

FIGURE 4
NONTRIBUTARY GROUNDWATERS OF NORTHERN SAN JUAN BASIN
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 04 NONTRIBUTARY.mxd

LA PLATA COUNTY

ARCHULETA COUNTY

160

151

FOSSET GULCH 9U 1A
(API: 05-007-06099)

FOSSET GULCH UNIT 9U 2
(API: 05-007-06213)

CANDELARIA 33-5 FEE 10U #3
(API: 05-007-06215)

FGU 9U #3
(API: 05-007-06314)

FOSSET GULCH UNIT 9U 4
(API: 05-007-06235)

SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY

LEGEND

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- HIGHWAY
- PRIVATE PROPERTY
- PUBLIC PROPERTY
- BUREAU OF LAND MANAGEMENT OUTCROP ZONE
  (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- FRUITLAND FORMATION (Kf)

0 1.25 2.5
Miles

N

FIGURE 5
LAND USAGE MAP
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 05 USAGE.mxd

BEAVER CREEK
SQUAW CREEK/
LITTLE SQUAW CREEK
POLE GULCH
PETERSON GULCH WEST
PETERSON GULCH EAST
CANDELARIA RANCH
PIEDRA RIVER
STOLLSTEIMER CREEK
CABEZON CANYON

FOSSET GULCH 9U 1A
(API: 05-007-06099)
FOSSET GULCH UNIT 9U 2
(API: 05-007-06213)
FGU 9U #3
(API: 05-007-06314)
FOSSET GULCH UNIT 9U 4
(API: 05-007-06235)
CANDELARIA 33-5 FEE 10U #3
(API: 05-007-06215)

BEAVER CREEK
INDIAN CREEK
HEFLIN CREEK
HORSE CREEK
ELK CREEK
HAYDEN CREEK
SQUAW CREEK
FREEMAN CREEK
PIEDRA RIVER
LITTLE SQUAW CREEK
POLE GULCH
DEVIL CREEK
FOSSET GULCH
PETERSON GULCH
BULL CREEK
SALT CANYON
IGNACIO CREEK
STOLLSTEIMER CREEK
DEEP CANYON
CABEZON CANYON
ARCHULETA CREEK

35N 5W
35N 4W
35N 6W
35N 3W
34N 5W
34N 4W
34N 6W
34N 3W
33N 6W
33N 5W
33N 4W

LA PLATA COUNTY
ARCHULETA COUNTY

160
151

SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY

LEGEND

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- HIGHWAY
- SURFACE WATER
- DRAINAGE TRANSECT
- (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- FRUITLAND FORMATION (Kf)

IMAGE COURTESY OF ESRI/BING MAPS

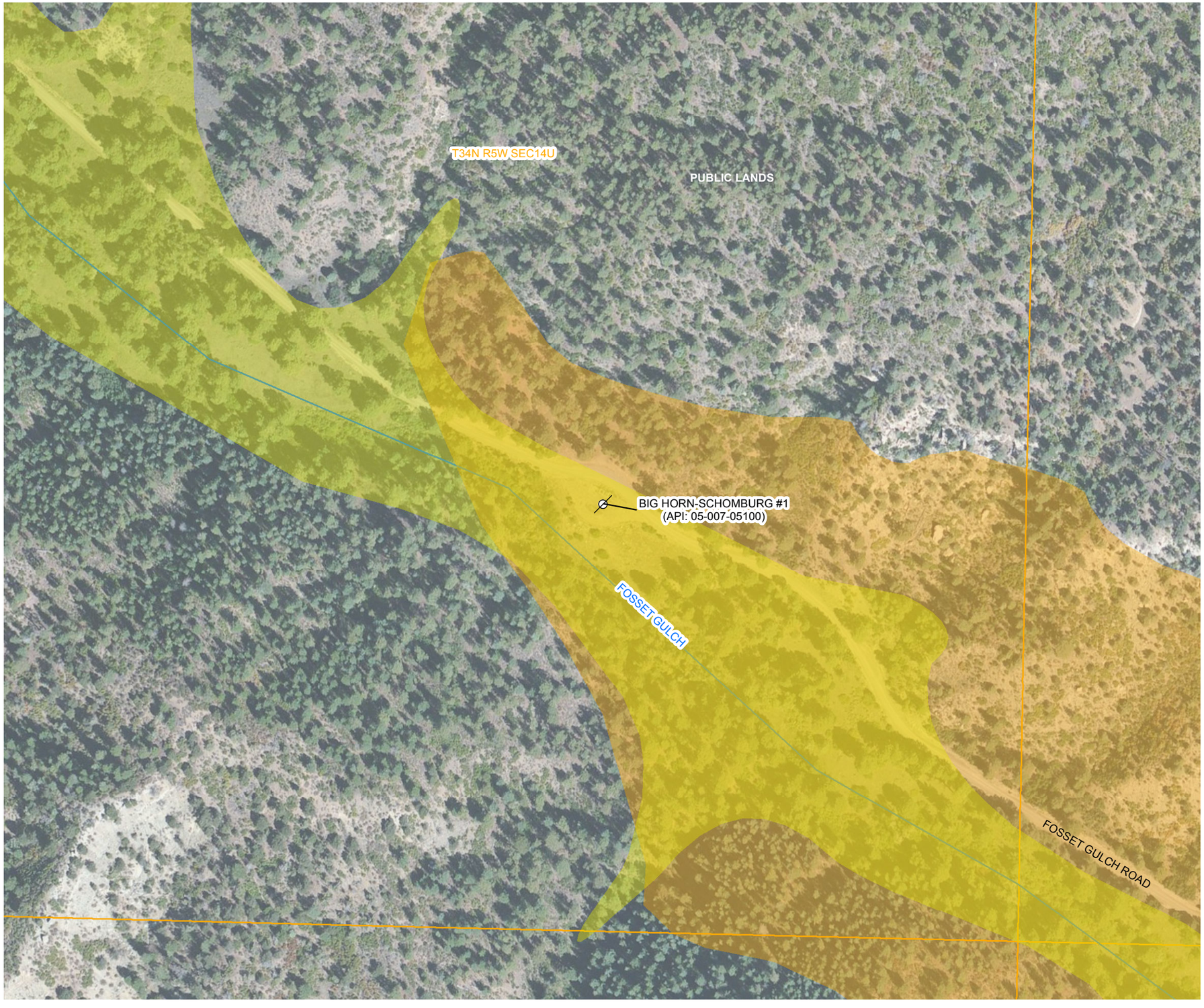
0 1.25 2.5
Miles

N

FIGURE 6
DRAINAGE TRANSECT MAP
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 06 DRAINAGE.mxd



LEGEND

- ABANDONED PRODUCTION WELL
- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- QUATERNARY ALLUVIUM (Qa)
- KIRTLAND FORMATION (Kk)

IMAGE COURTESY OF ESRI/BING MAPS

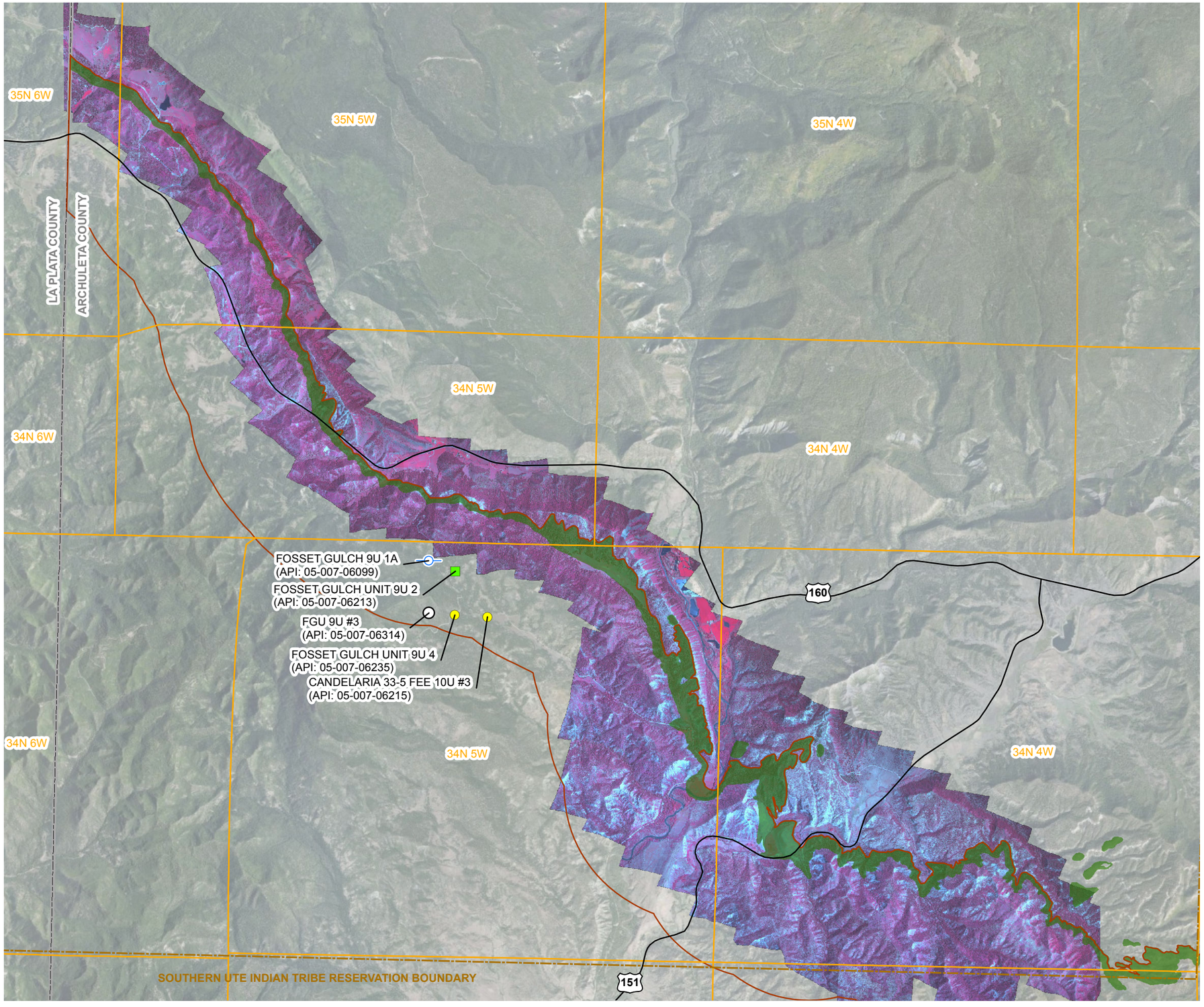
0 200 400
Feet

N

FIGURE 7
BIG HORN-SCHOMBURG #1
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 07 BIG HORN.mxd



LEGEND

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- HIGHWAY
- BUREAU OF LAND MANAGEMENT OUTCROP ZONE
  (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- FRUITLAND FORMATION (Kf)

IMAGE COURTESY OF ESRI/BING MAPS AND
COLOR INFRARED (CIR) IMAGE COURTESY OF AGRO ENGINEERING, 2011

0 1.25 2.5
Miles

N

FIGURE 8
TYPICAL CIR MAP
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 08 CIR.mxd

TRIPLE S MINE
COLUMBINE MINE
BEAVER CREEK
INDIAN CREEK
HEFLIN CREEK
HORSE CREEK
35N 5W
35N 4W
35N 6W
HAYDEN CREEK
ELK CREEK
35N 3W
LA PLATA COUNTY
ARCHULETA COUNTY
SQUAW CREEK
FREEMAN CREEK
34N 5W
PIEDRA RIVER
34N 3W
34N 4W
160
34N 6W
LITTLE SQUAW CREEK
POLE GULCH
DEVIL CREEK
FOSSET GULCH 9U 1A
(API: 05-007-06099)
FOSSET GULCH UNIT 9U 2
(API: 05-007-06213)
FGU 9U #3
(API: 05-007-06314)
FOSSET GULCH UNIT 9U 4
(API: 05-007-06235)
CANDELARIA 33-5 FEE 10U #3
(API: 05-007-06215)
FOSSET GULCH
ARTESIAN GULCH
UNNAMED
ABANDONED MINE
34N 6W
34N 4W
SALT CANYON
BIG HORN-SCHOMBURG #1
(API: 05-007-05100)
34N 5W
BULL CREEK
151
STOLLSTEIMER
CREEK SITE
CABEZON
PROJECT
CHIMNEY
ROCK MINE
CHIMNEY
ROCK COAL
IGNACIO CREEK
STOLLSTEIMER CREEK
DEEP CANYON
CABEZON CANYON
ARCHULETA CREEK
33N 6W
SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
33N 5W
33N 4W

LEGEND

- ABANDONED PRODUCTION WELL
- ABANDONED MINE

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- HIGHWAY
- SURFACE WATER
- BUREAU OF LAND MANAGEMENT OUTCROP ZONE
  (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- FRUITLAND FORMATION (Kf)

IMAGE COURTESY OF ESRI/BING MAPS

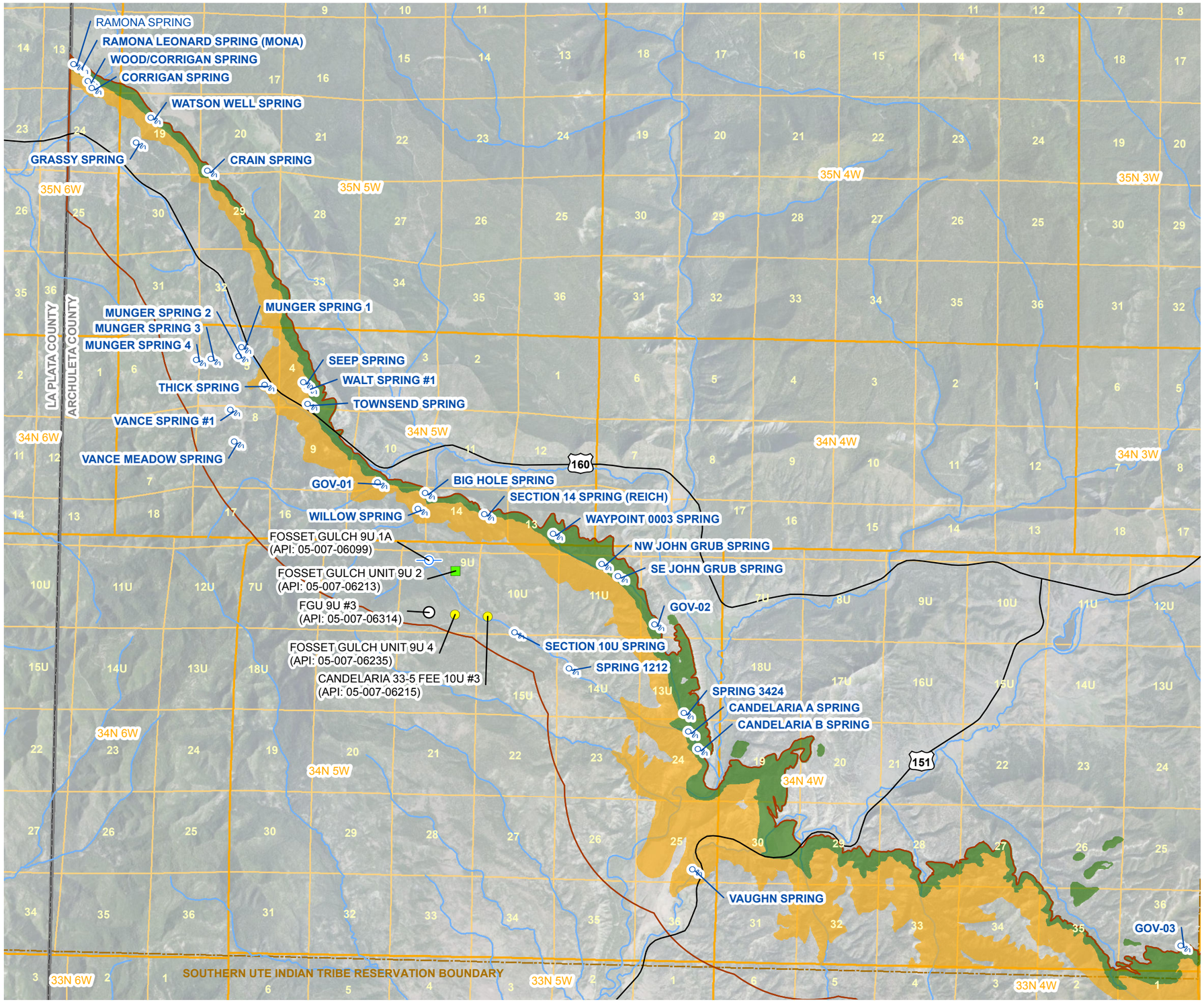
0 1.25 2.5
Miles

N

FIGURE 9
ABANDONED COAL MINE MAP
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 09 MINES.mxd



LEGEND

- NATURAL SPRING

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- HIGHWAY
- SURFACE WATER
- BUREAU OF LAND MANAGEMENT OUTCROP ZONE
  (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- FRUITLAND FORMATION (Kf)
- KIRKLAND FORMATION (Kk)

IMAGE COURTESY OF ESRI/BING MAPS

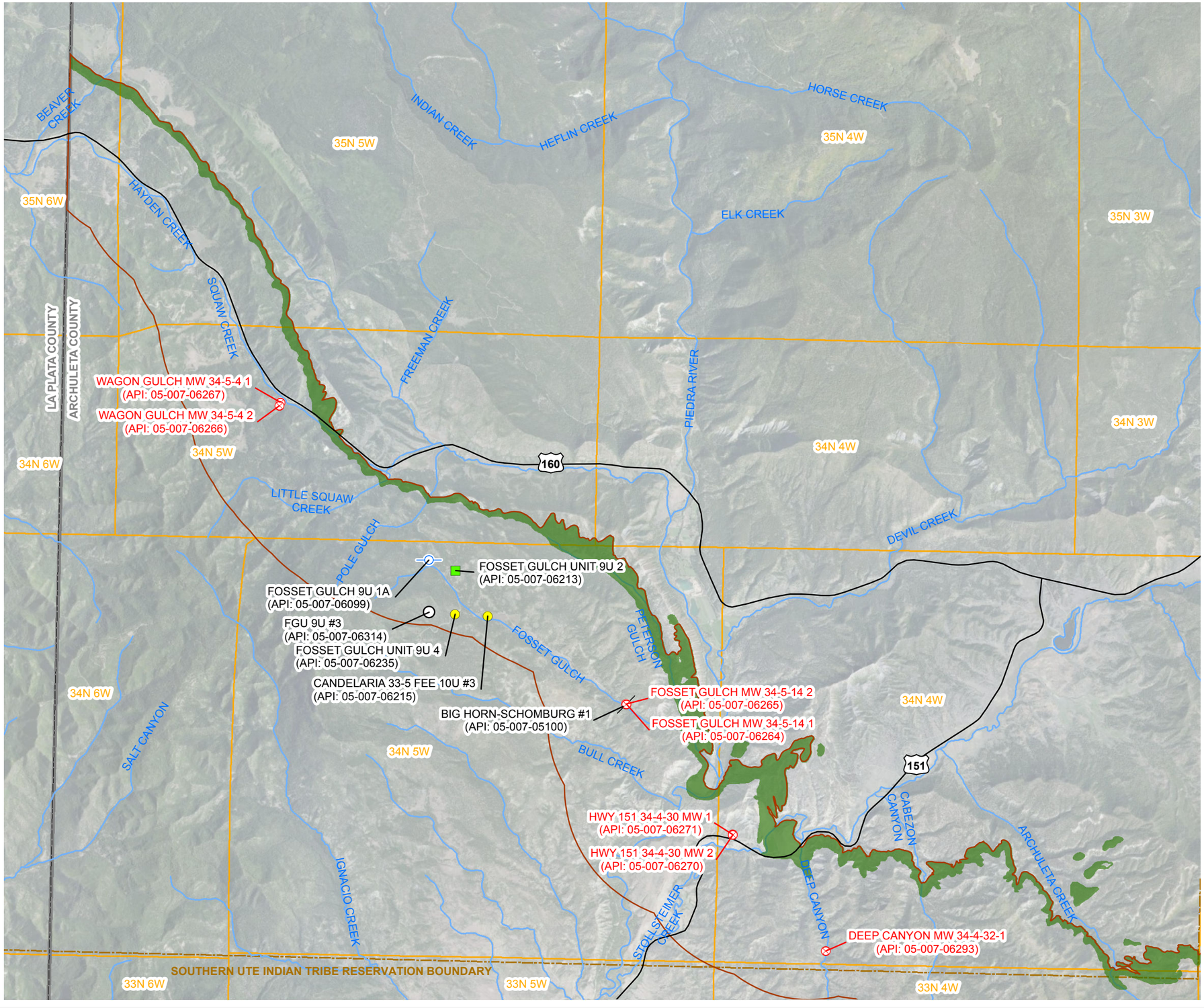
0 6,000 12,000
Feet

N

FIGURE 10
NATURAL SPRINGS MAP
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 10 SPRINGS.mxd



LEGEND

- ABANDONED PRODUCTION WELL
- COLORADO OIL & GAS CONSERVATION COMMISSION WELL

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- HIGHWAY
- SURFACE WATER
- BUREAU OF LAND MANAGEMENT OUTCROP ZONE
  (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- FRUITLAND FORMATION (Kf)

IMAGE COURTESY OF ESRI/BING MAPS

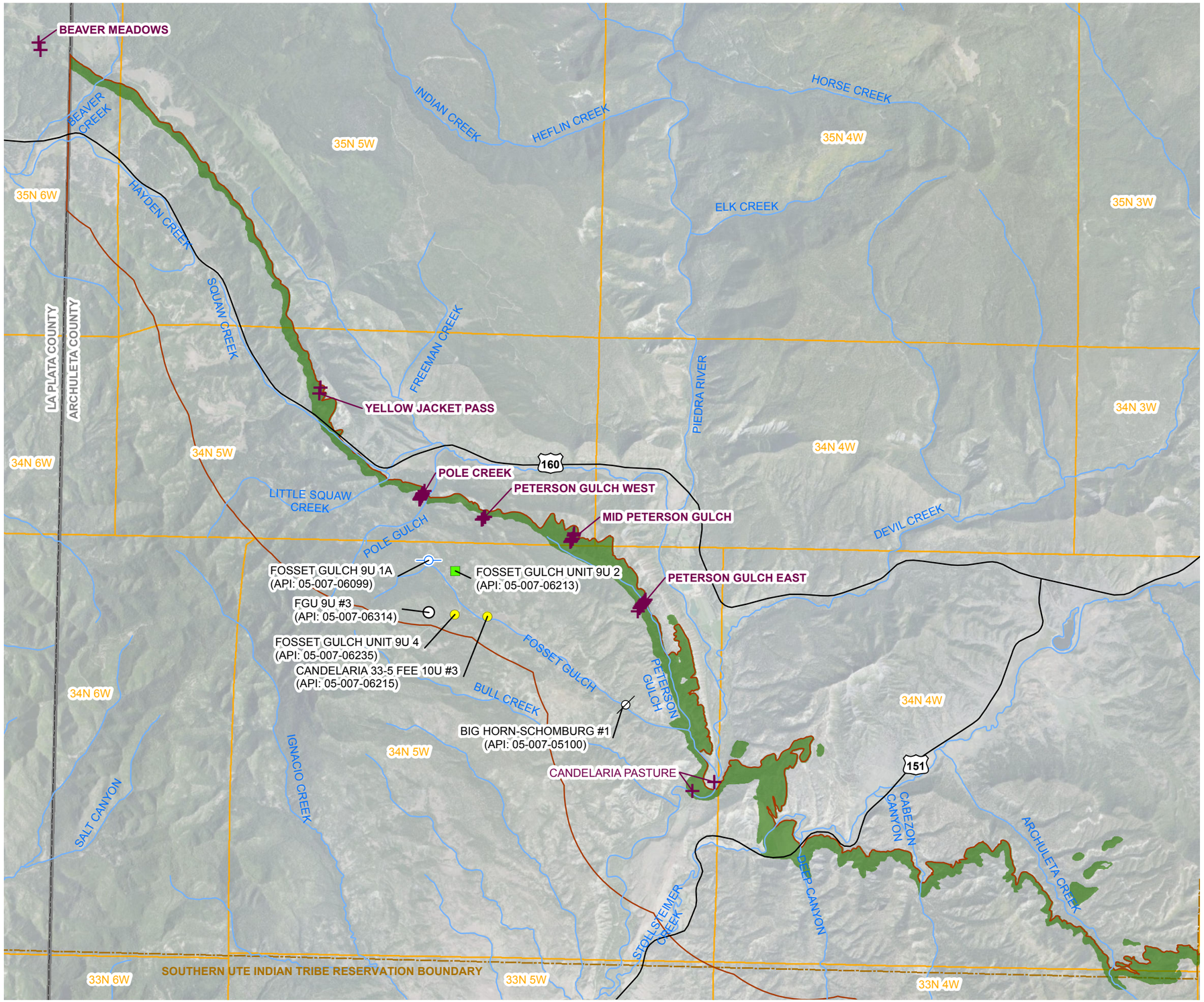
0 1.25 2.5
Miles

N

FIGURE 11
COGCC MONITORING WELLS MAP
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 11 MW.mxd



LEGEND

- ABANDONED PRODUCTION WELL
- SOIL VAPOR TUBE

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- HIGHWAY
- SURFACE WATER
- BUREAU OF LAND MANAGEMENT OUTCROP ZONE
  (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- FRUITLAND FORMATION (Kf)

IMAGE COURTESY OF ESRI/BING MAPS

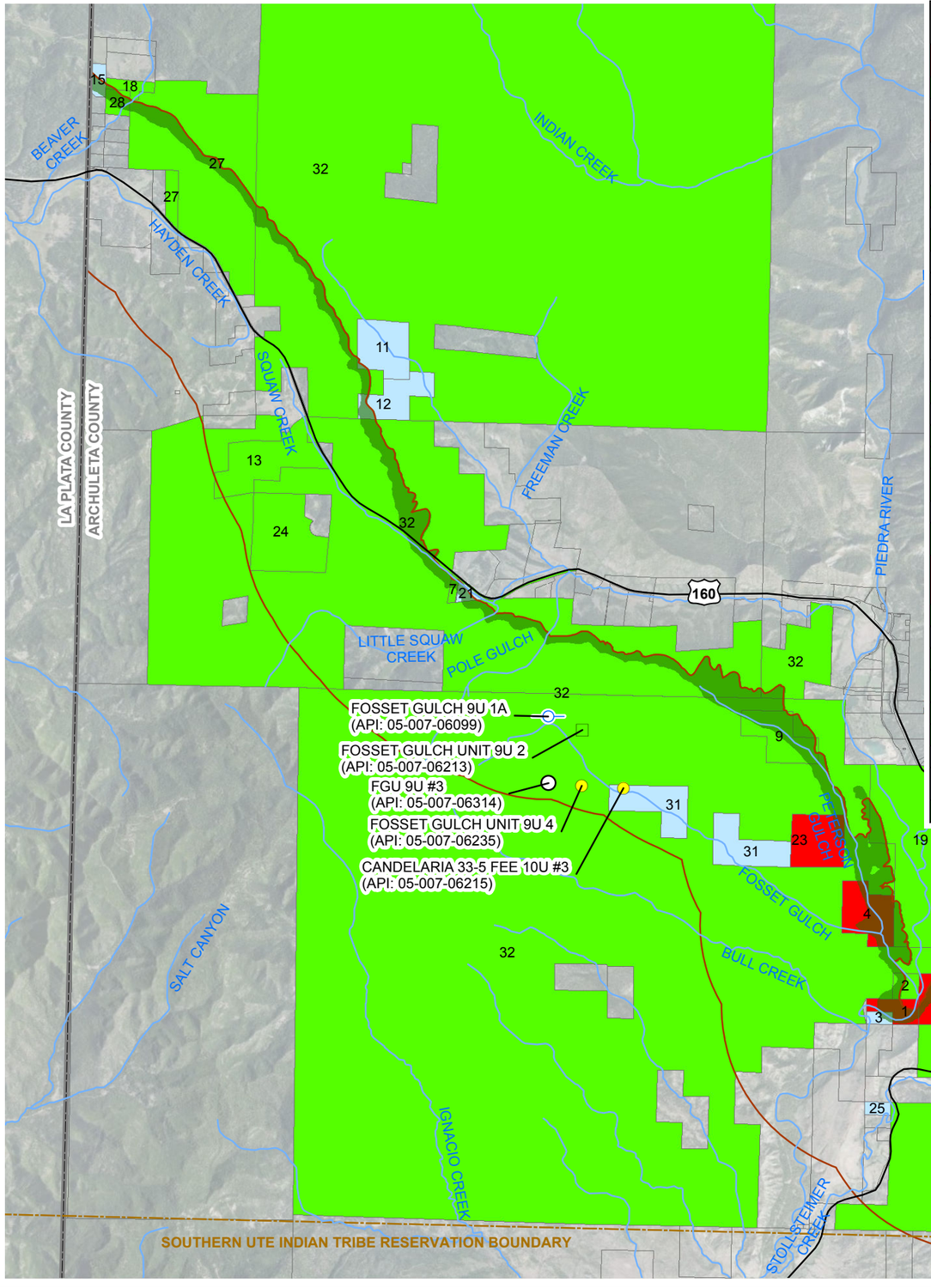
0 1.25 2.5
Miles

N

FIGURE 12
BLM SOIL VAPOR TUBE MAP
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 12 SVT.mxd



MAP ID NUMBER	PARCEL NUMBER	LTE ACCESS	OWNER
1	589724400008	NO	CANDELARIA GILBERT, CANDELARIA ANNETTE H TRUSTEE, & CANDELARIA LEONARD L TRUSTEE
2	589724400007	YES	CANDELARIA LUCY S & GONZALES BERNADETTE M
3	589724400010		CANDELARIA ROGER
4	589713300006	NO	CANDELARIA SUSIE E TRUST
5	589529100026		CAZEDESSUS CAMILLE E JR
6	589528300041		CHENAULT ROBERT G
7	568510300009	YES	EDWARDS DURWOOD
8	589529300027		EF COAL RESOURCES LIMITED PRTN ATTN NEWELL DANIEL K
9	589711200001	YES	GRUBB JOHN W & PAMELA K
10	589528400042		HALLOCK JAMES & NORA
11	568333200011		HIGMAN CATHY
12	568333300012		HIGMAN MICHAEL W
13	568505200020		JEFFREY H MUNGER REVOCABLE TRUST
14	589533200046		LEON EUGENIA, WOZNY THEODORE G, &PALMA GUSTAVO I
15	567913300015		LEONARD RAMONA
16	589530100039	YES	MARTINEZ MEL
17	589528400049		NEUMANN DIANE REVOCABLE TRUST
18	567913400016	YES	PEINADO EMILIO JR, PEINADO KAREN R
19	589712400012	YES	RAFTER T LLC
20	589528400051 & 589528100052	YES	RANCH AT CABEZON CANYON LLC
21	568510300010		TRACY BRYAN H & MARITES G
22	589701400003	YES	UNITED STATES OF AMERICA FOREST SERV DEPT OF AGRICULTURE, ROCKY MOUNTAIN REGION
23	589511200003, 589311300004, & 596116200005	NO	UNITED STATES OF AMERICA T/F SOUTHERN UTE TRIBE
24	568508100020	YES	VANCE WILLIAM S JR
25	589725400015		VAUGHN LARRY C
26	596102100007	YES	VINZANT JAMES H, VINZANT MARK N TRUSTEE, &VINZANT WHITNEY L
27	568319200034 & 568319300003	YES	WATSON DAVID LLOYD & WATSON DALE LLOYD
28	567913400017	YES	WOOD LEE THOMAS, WOOD PEGGY DARLENE
29	589528400053	YES	WOZNY THEODORE G TRUST ACCOUNT
30	589528400043		WRIGHT JEAN PAUL & SUSAN
31	589710300002		YOUNG LORRAINE SHARAN, CANDELARIA LEONARD L TRUSTEE, & CANDELARIA ANNETTE H TRUSTEE
32		YES	PUBLIC LANDS

LEGEND

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL
- HIGHWAY
- SURFACE WATER
- BUREAU OF LAND MANAGEMENT OUTCROP ZONE
  (1.5 MILES INWARD FROM Kf-Kk CONTACT)
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY

2013 PROPERTY ACCESS STATUS

- ACCESS APPROVED
- ACCESS DENIED
- NO RESPONSE

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- FRUITLAND FORMATION (Kf)

0 1.25 2.5
Miles

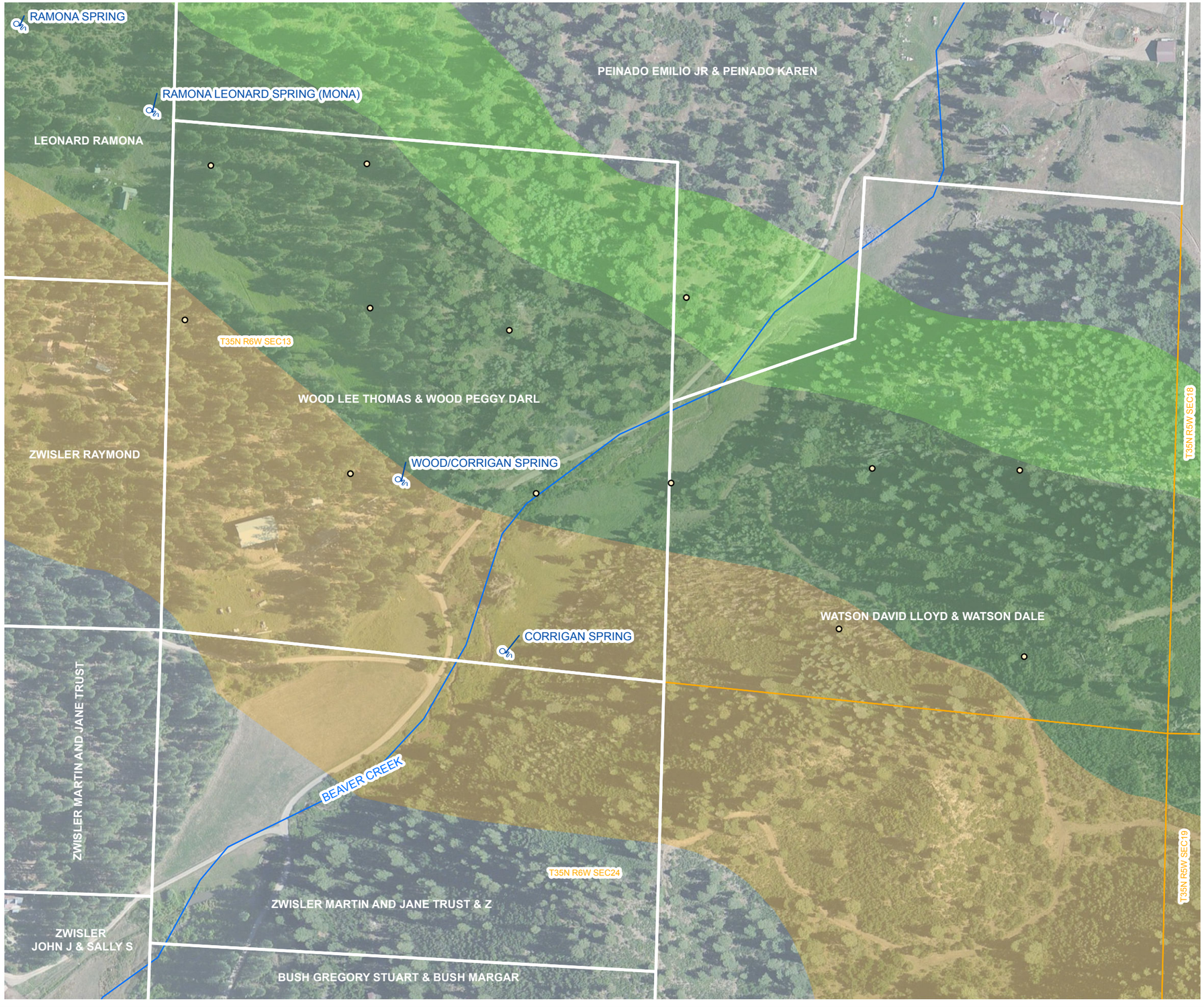
N

IMAGE COURTESY OF ESRI/BING MAPS

FIGURE 13
PROPERTY ACCESS MAP
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 13 ACCESS.mxd



LEGEND

NATURAL SPRING

METHANE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 10.0000
- 10.0001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO 0.2 mol/m^2 • day ARE LABELED

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

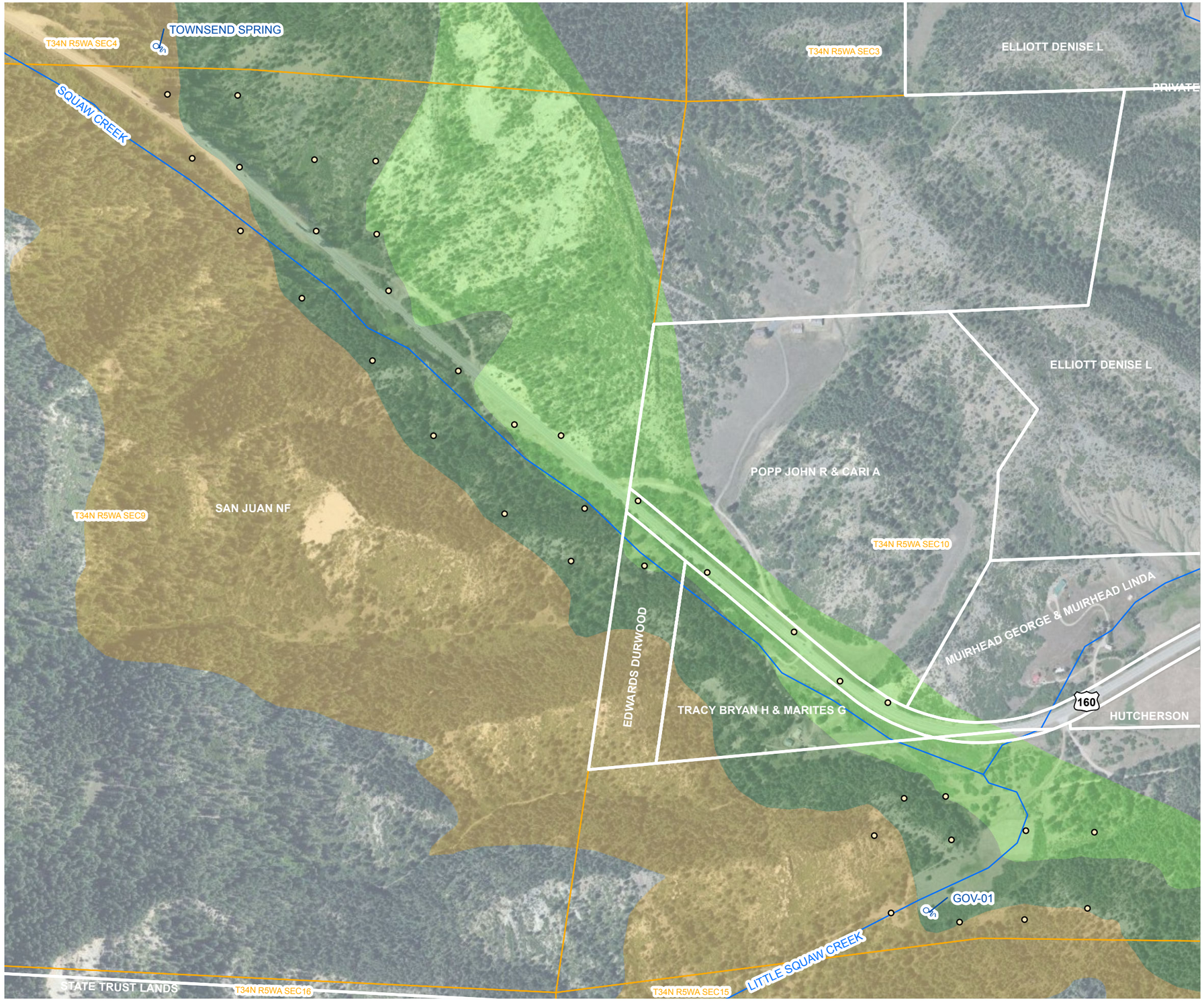
IMAGE COURTESY OF ESRI/BING MAPS

0 250 500
Feet

N

FIGURE 14
METHANE FLUX CONTOURS
BEAVER CREEK
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

METHANE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 10.0000
- 10.0001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO 0.2 mol/m^2 • day ARE LABELED

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

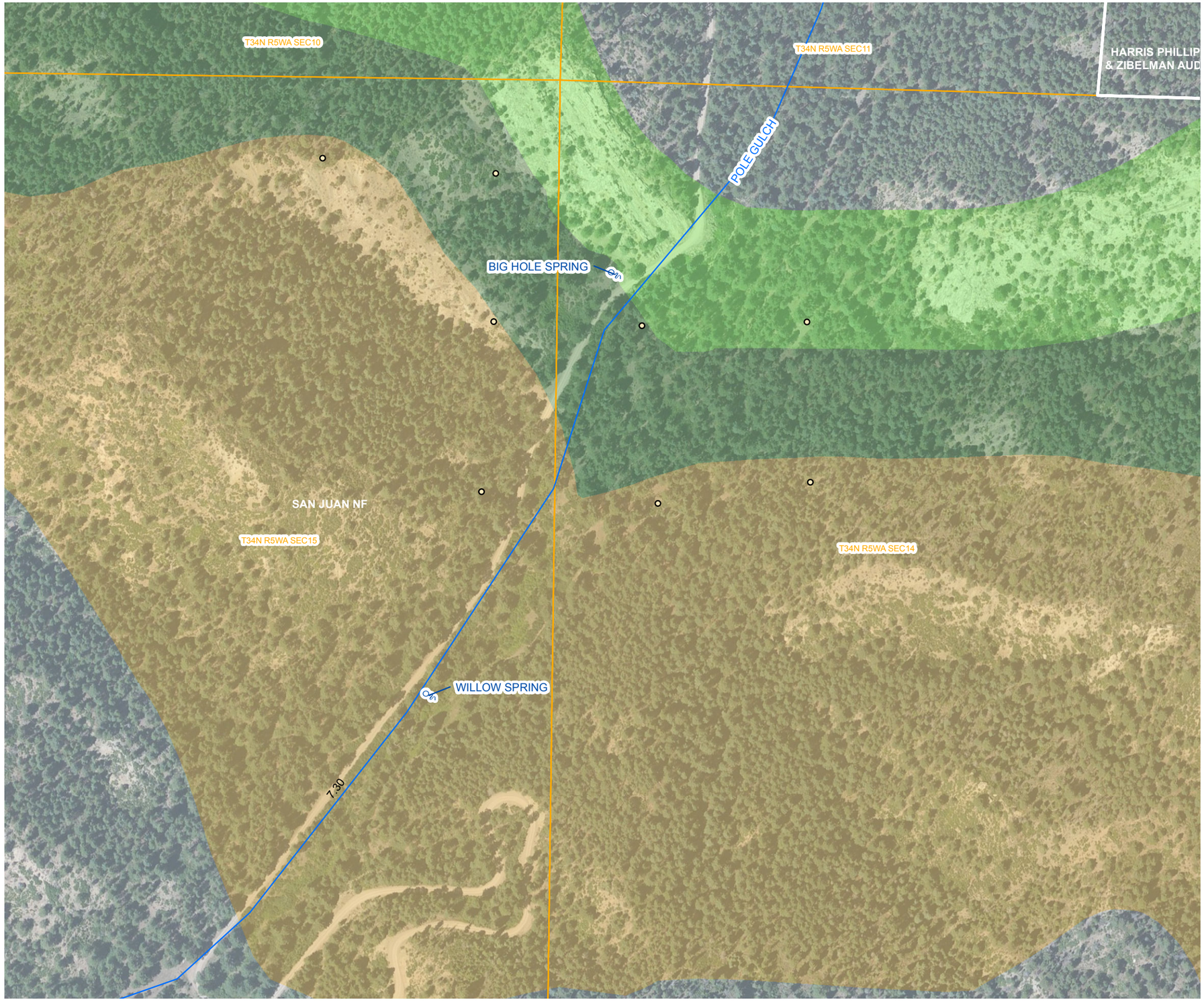
IMAGE COURTESY OF ESRI/BING MAPS

0 600 1,200
Feet

N

FIGURE 15
METHANE FLUX CONTOURS
SQUAW CREEK / LITTLE SQUAW CREEK
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

METHANE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 10.0000
- 10.0001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO 0.2 mol/m^2 • day ARE LABELED

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

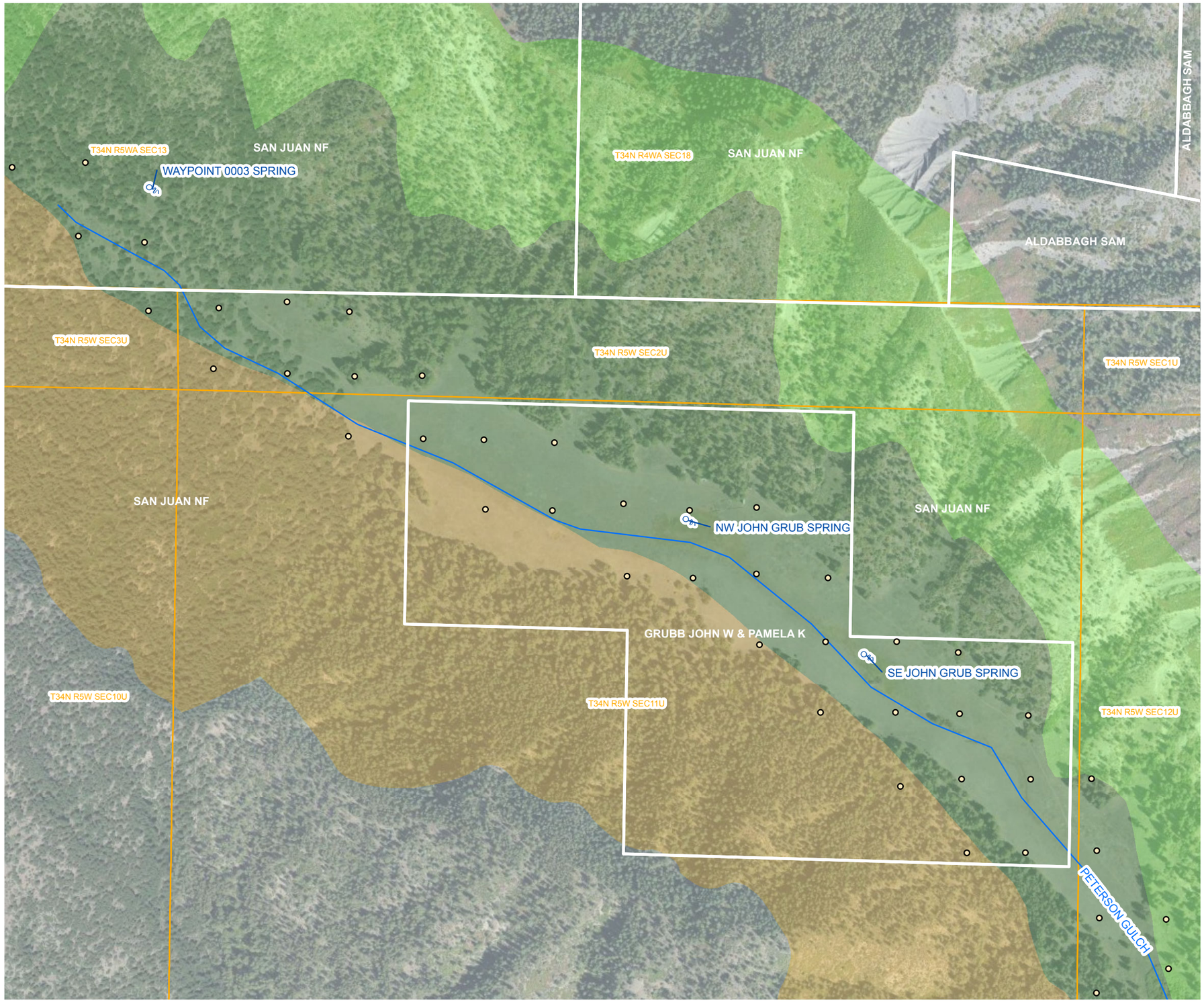
IMAGE COURTESY OF ESRI/BING MAPS

0 250 500
Feet

N

FIGURE 16
METHANE FLUX CONTOURS
POLE GULCH
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

METHANE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 10.0000
- 10.0001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO 0.2 mol/m^2 • day ARE LABELED

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

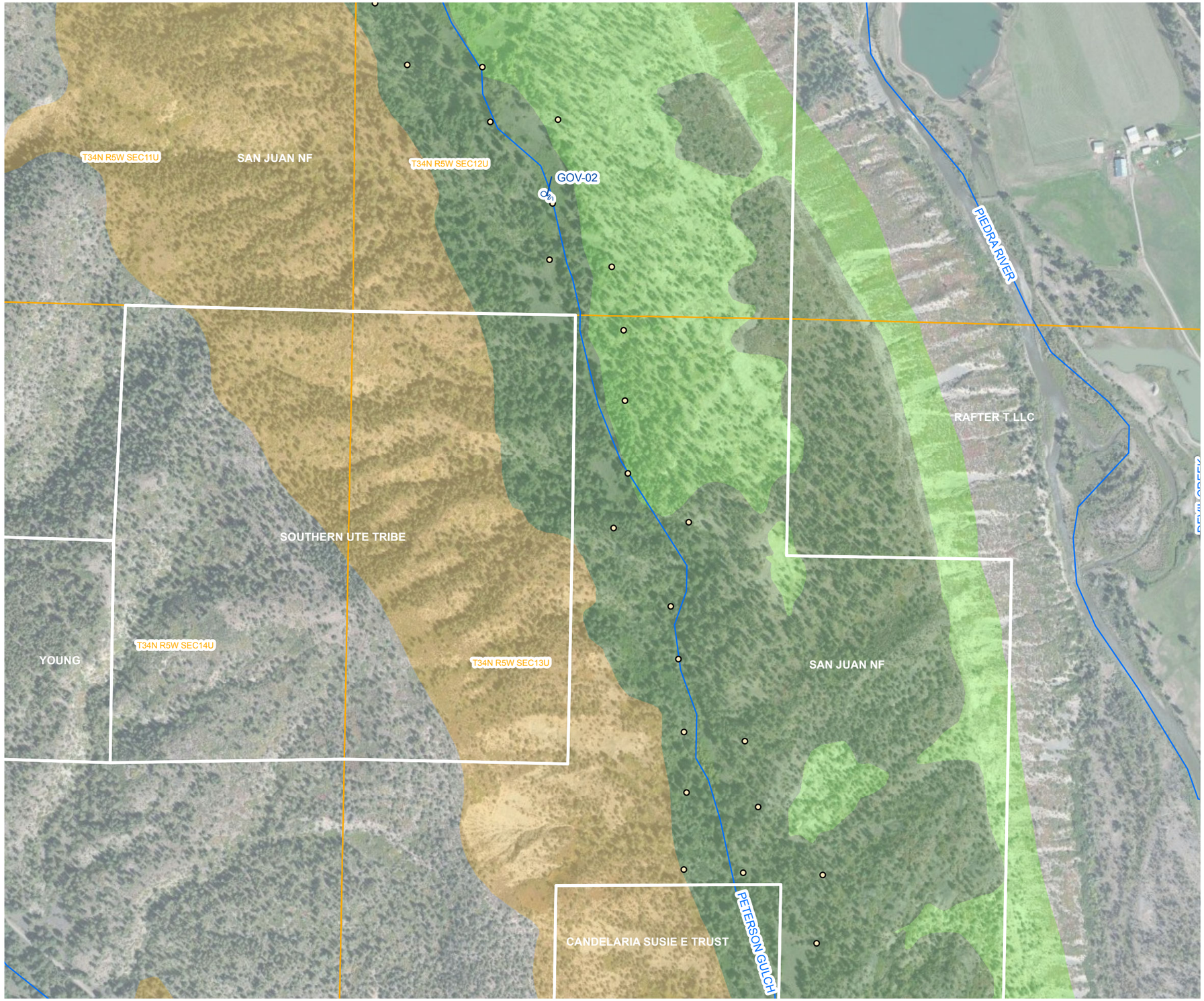
IMAGE COURTESY OF ESRI/BING MAPS

0 600 1,200
Feet

N

FIGURE 17
METHANE FLUX CONTOURS
PETERSON GULCH WEST
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

METHANE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 10.0000
- 10.0001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO 0.2 mol/m^2 • day ARE LABELED

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

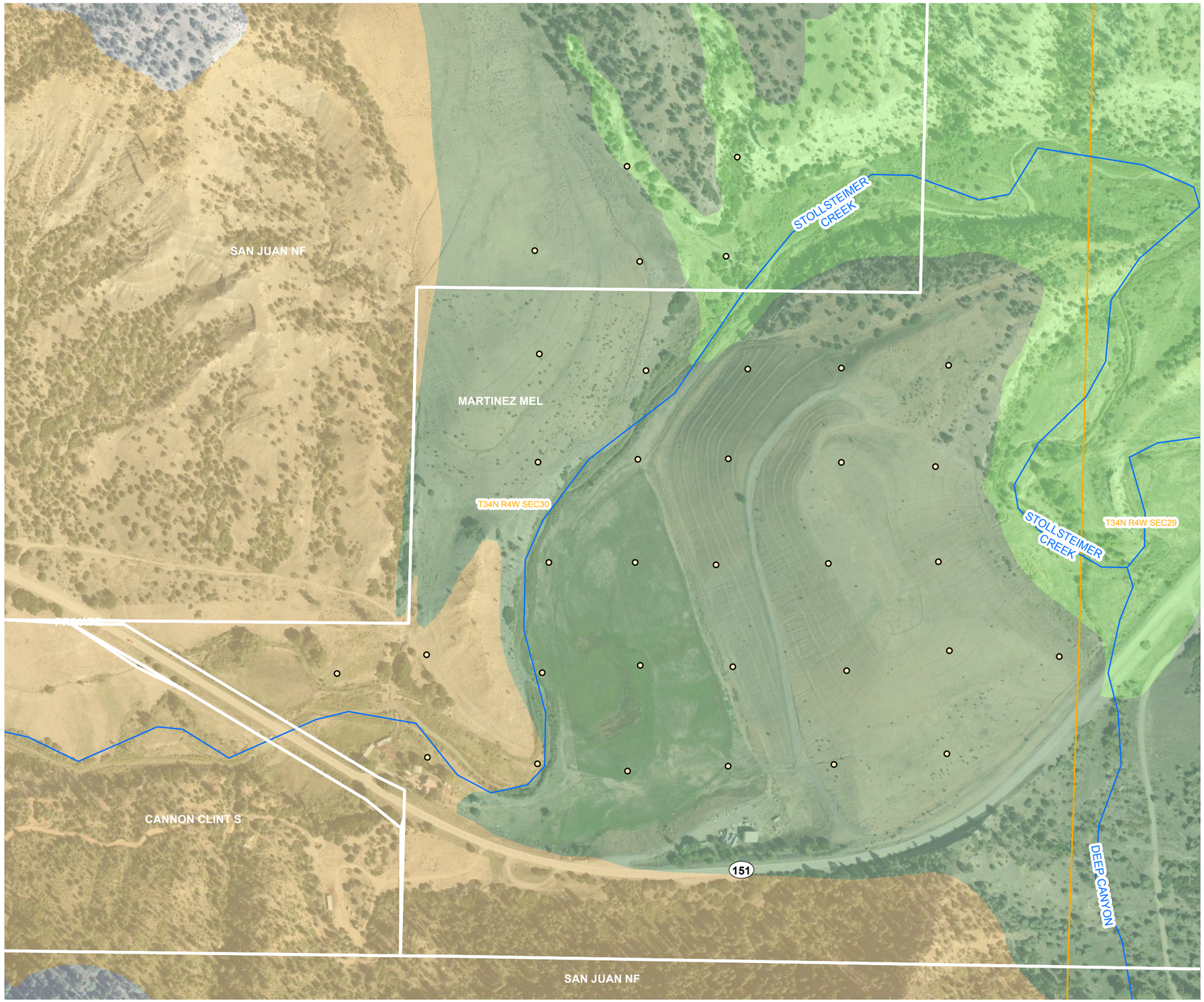
IMAGE COURTESY OF ESRI/BING MAPS

0 600 1,200
Feet

N

FIGURE 18
METHANE FLUX CONTOURS
PETERSON GULCH EAST
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

METHANE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 10.0000
- 10.0001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO 0.2 mol/m^2 • day ARE LABELED

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

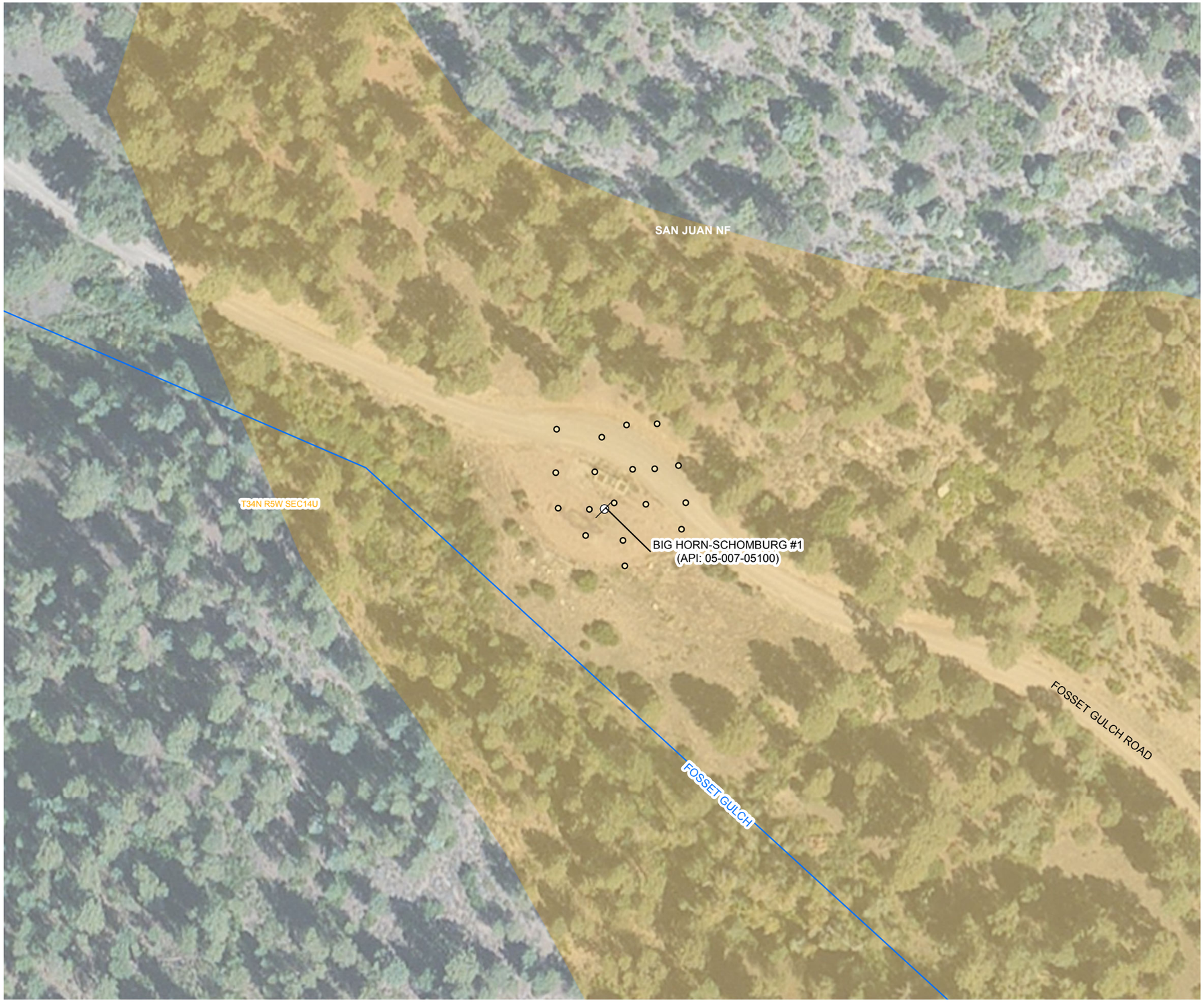
IMAGE COURTESY OF ESRI/BING MAPS

0 400 800
Feet

N

FIGURE 19
METHANE FLUX CONTOURS
STOLLSTEIMER CREEK
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

METHANE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 10.0000
- 10.0001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO 0.2 mol/m^2 • day ARE LABELED

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 80 160
Feet

N

FIGURE 20
METHANE FLUX CONTOURS
BIG HORN-SCHOMBURG #1
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 14 CH4.mxd

LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE METHANE MEASUREMENT

- 0 ppm
- 1 ppm - 500 ppm
- 501 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0 ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

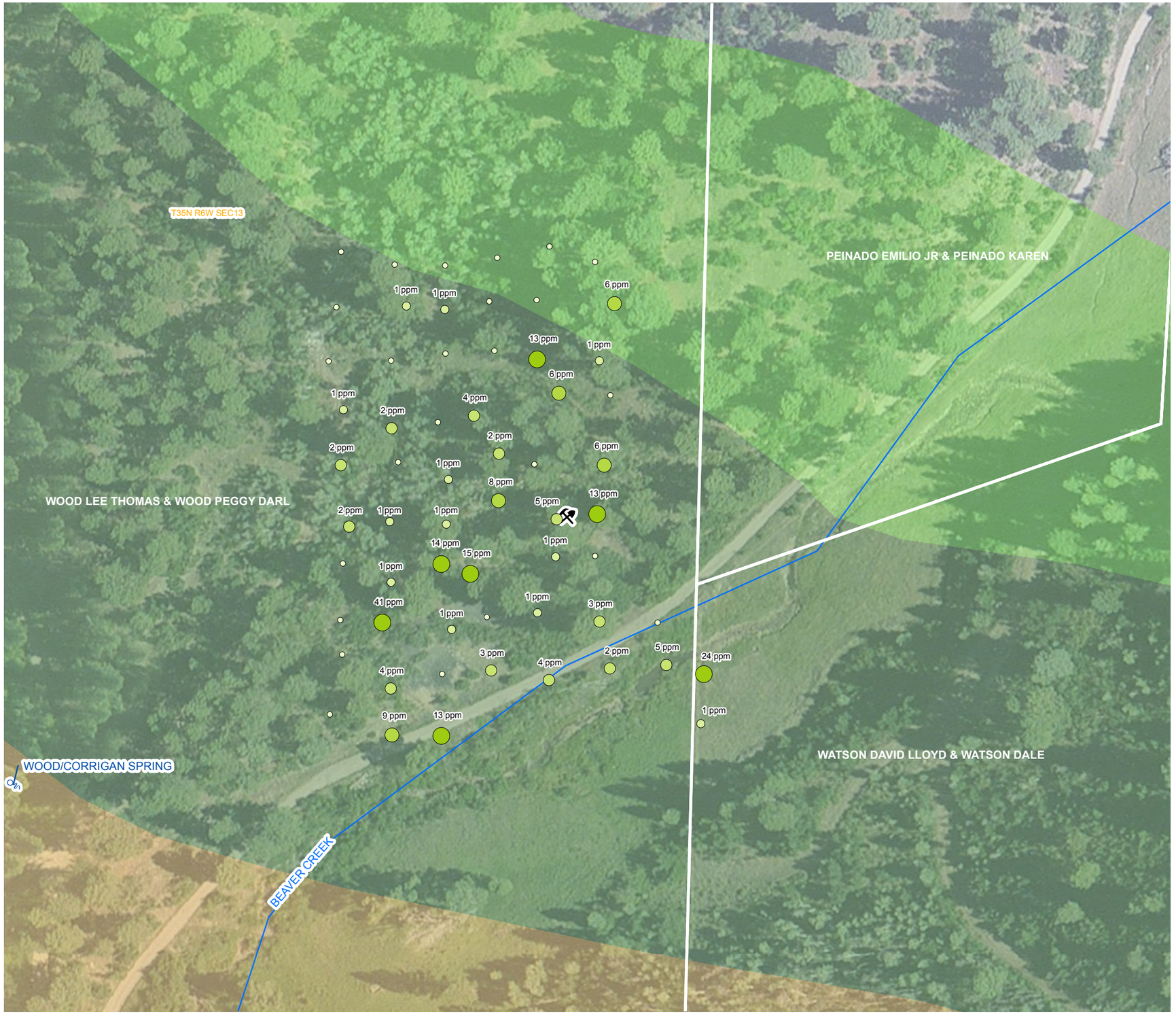
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 21
METHANE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 21 MINES CH4.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE CARBON MONOXIDE MEASUREMENT

- 0 ppm
- 0.1 - 1.0 ppm
- 1.1 - 5.0 ppm
- 5.1 - 10.0 ppm
- 10.1 - 20.0 ppm

ppm: PARTS PER MILLION

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

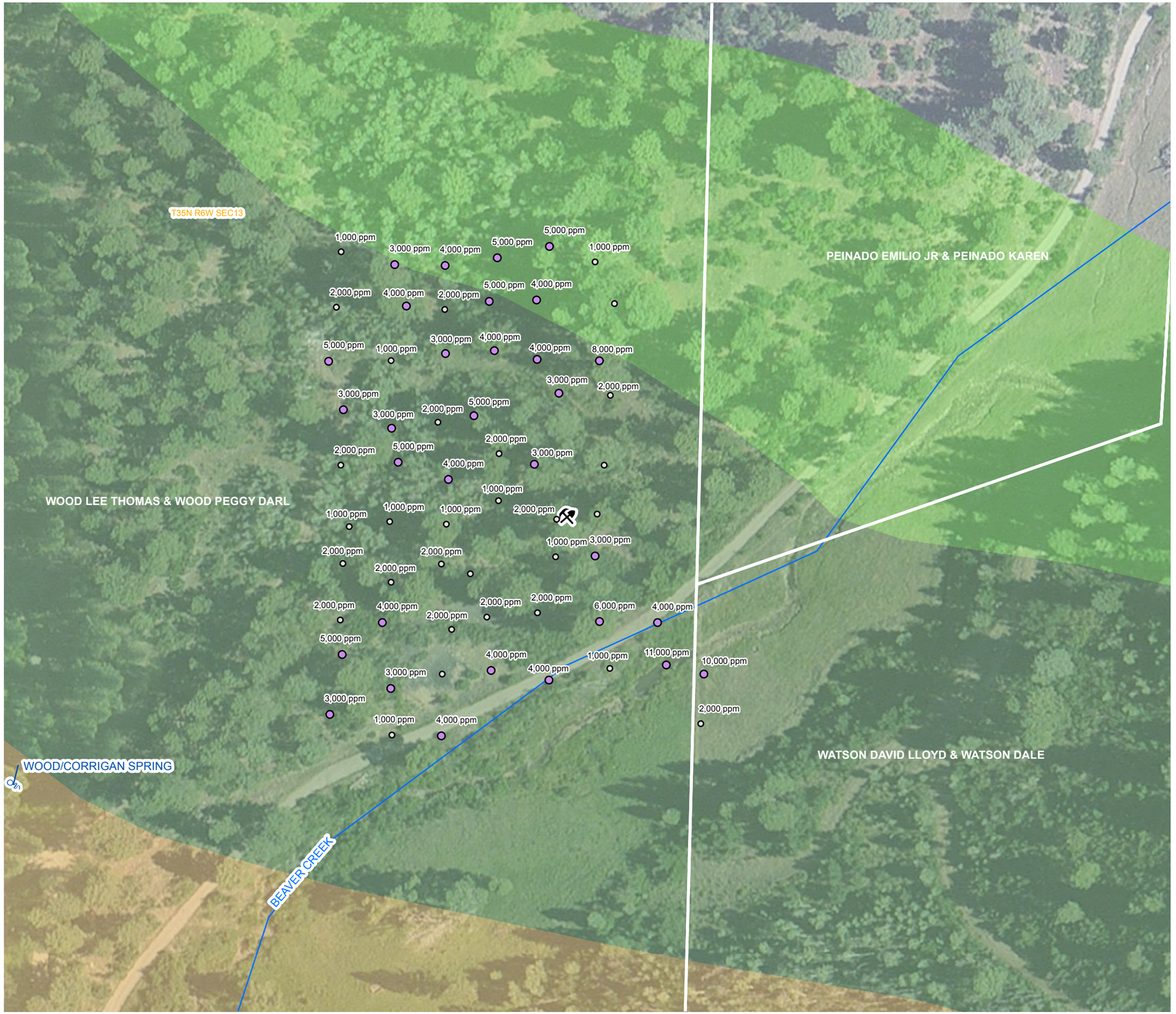
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 22
CARBON MONOXIDE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 22 MINES CO.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBURFACE CARBON DIOXIDE MEASUREMENT

- 0 - 2,500 ppm
- 2,500.1 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50.0%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

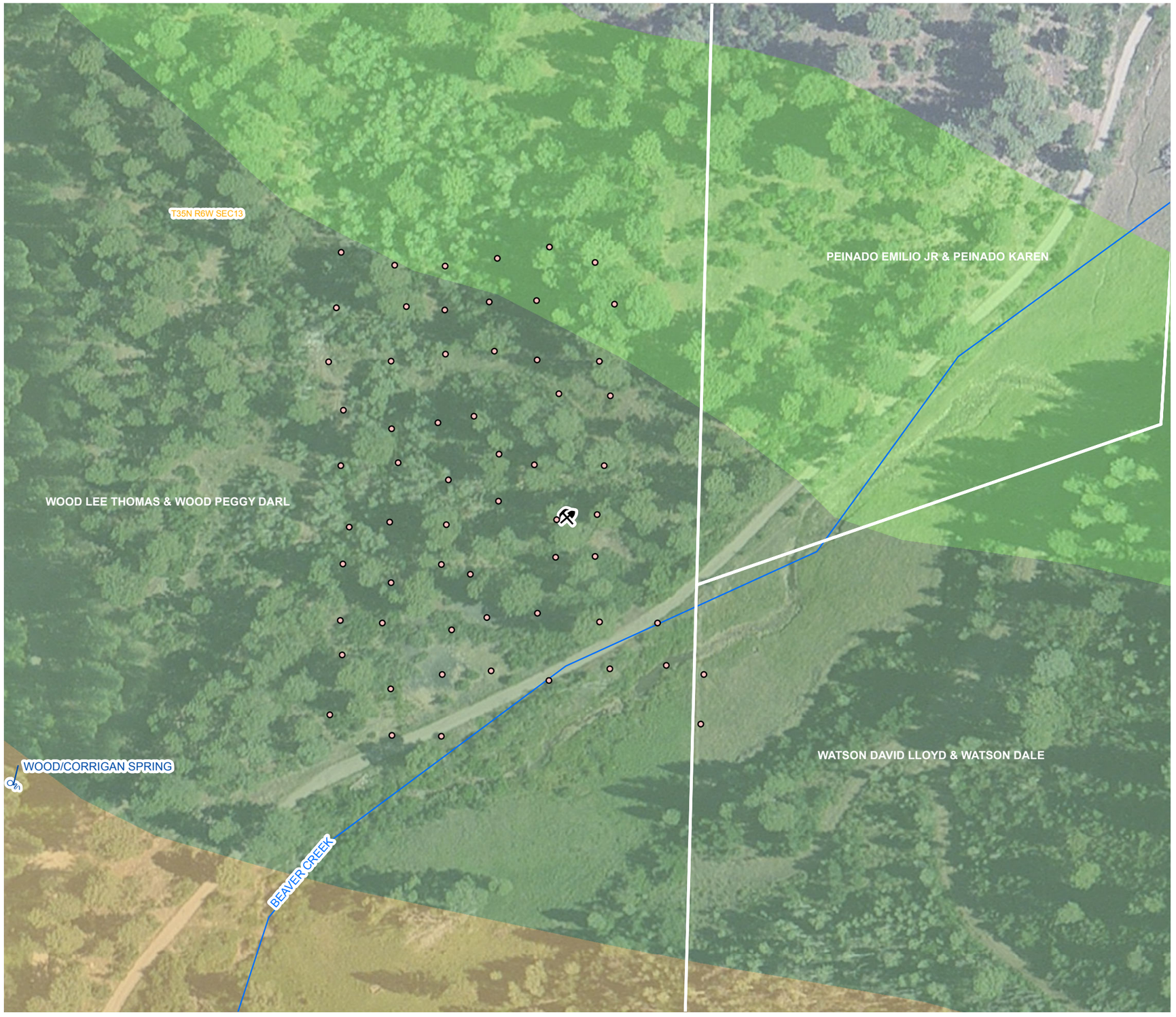
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 23
CARBON DIOXIDE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 23 MINES CO2.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE HYDROGEN SULFIDE MEASUREMENT

- 0 ppm
- 1 - 5 ppm
- 6 - 10 ppm
- 11 - 15 ppm
- 16 - 50 ppm

ppm: PARTS PER MILLION

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

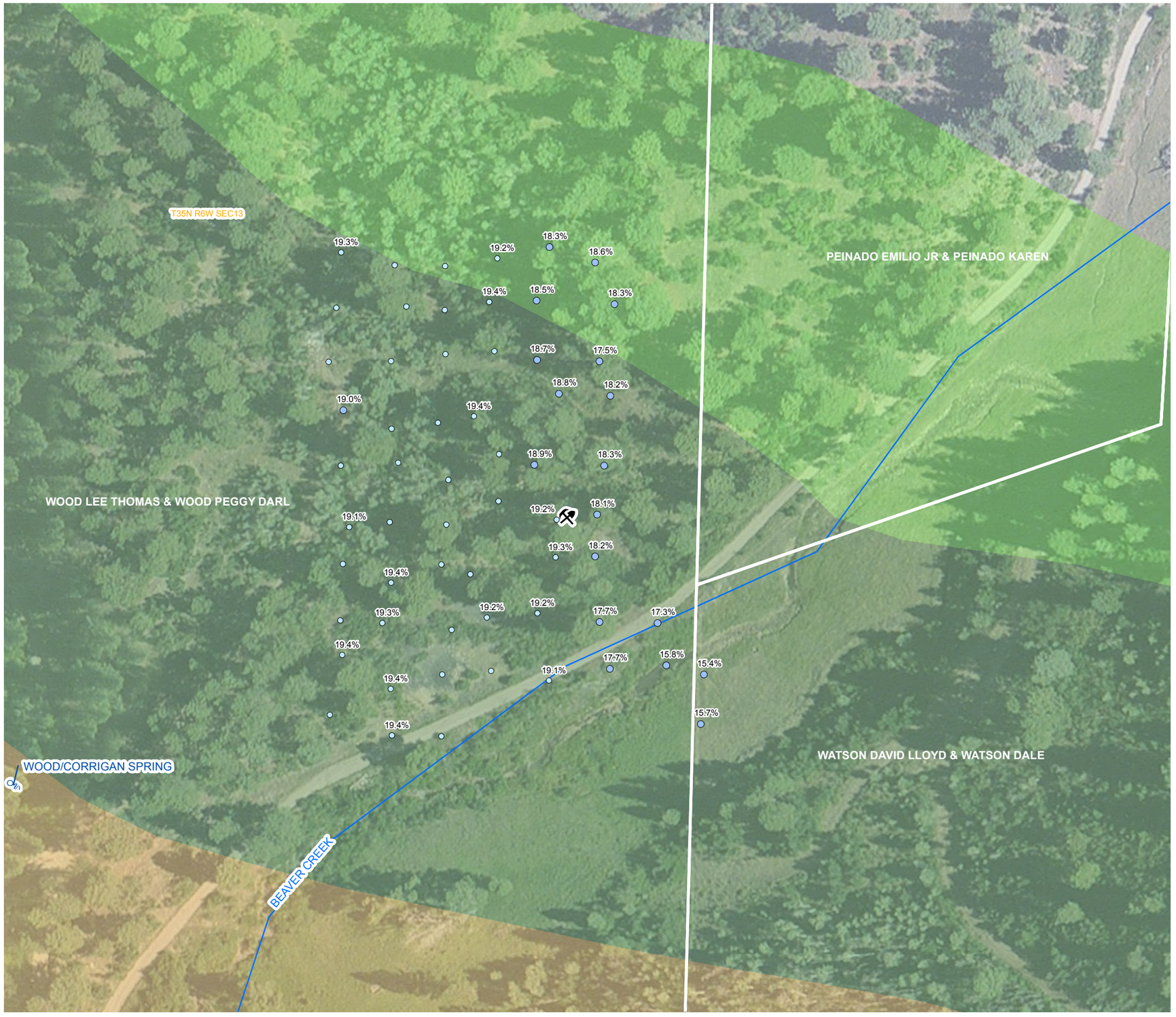
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 24
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 24 MINES H2S.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

Sub_O2_Con

- 0% - 5%
- 6% - 10%
- 11% - 15%
- 16% - 19%
- 20% - 22%

%: PERCENT

ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

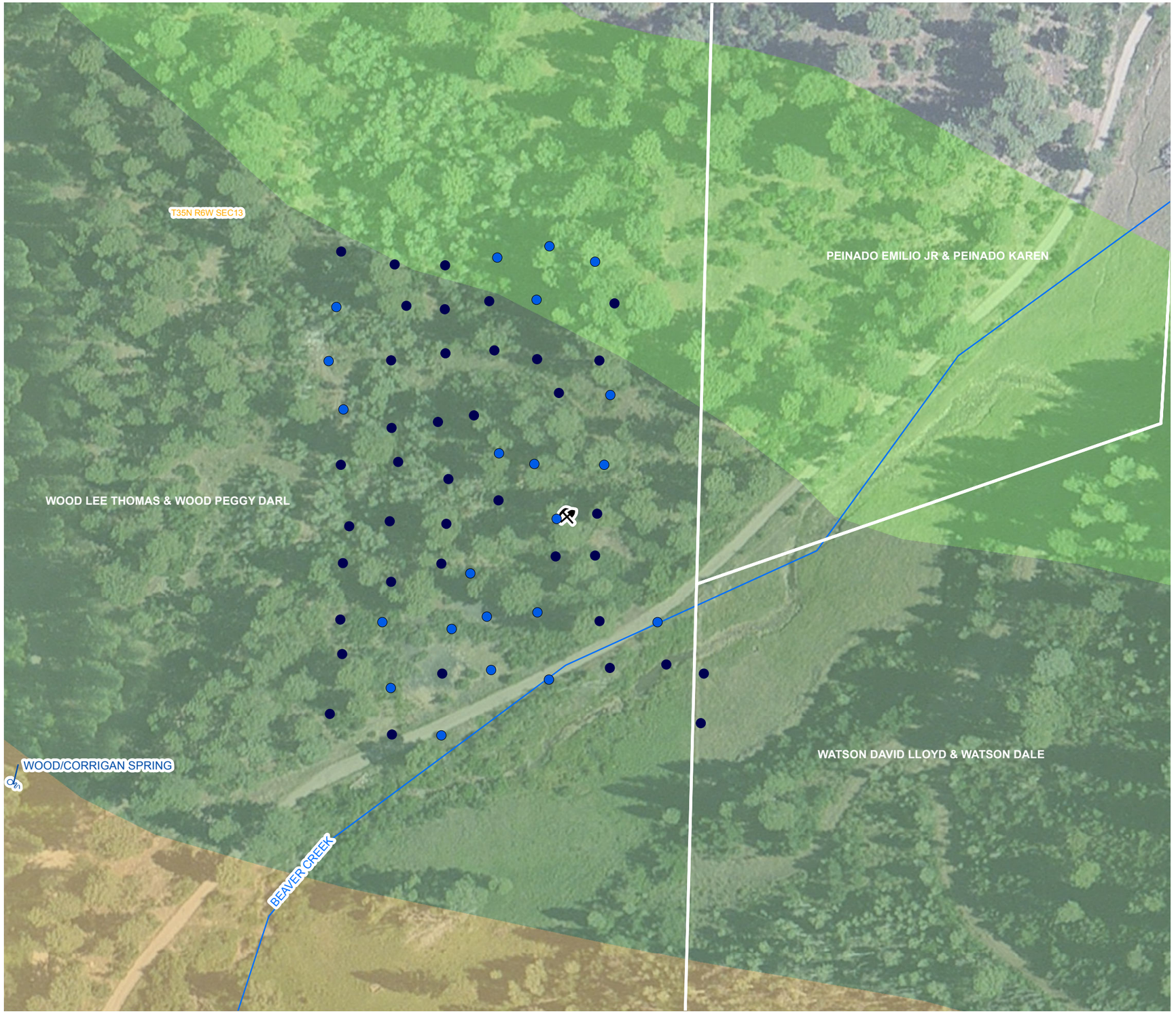
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 25
OXYGEN SOIL GAS MEASUREMENTS
TRIPLE S MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 25 MINES O2.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SURFACE TEMPERATURE

- 0 - 10°C
- 10 - 20°C
- 20 - 30°C
- 30 - 40°C
- 40 - 50°C
- 50 - 60°C
- 60 -70°C

°C: DEGREES CELCIUS

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

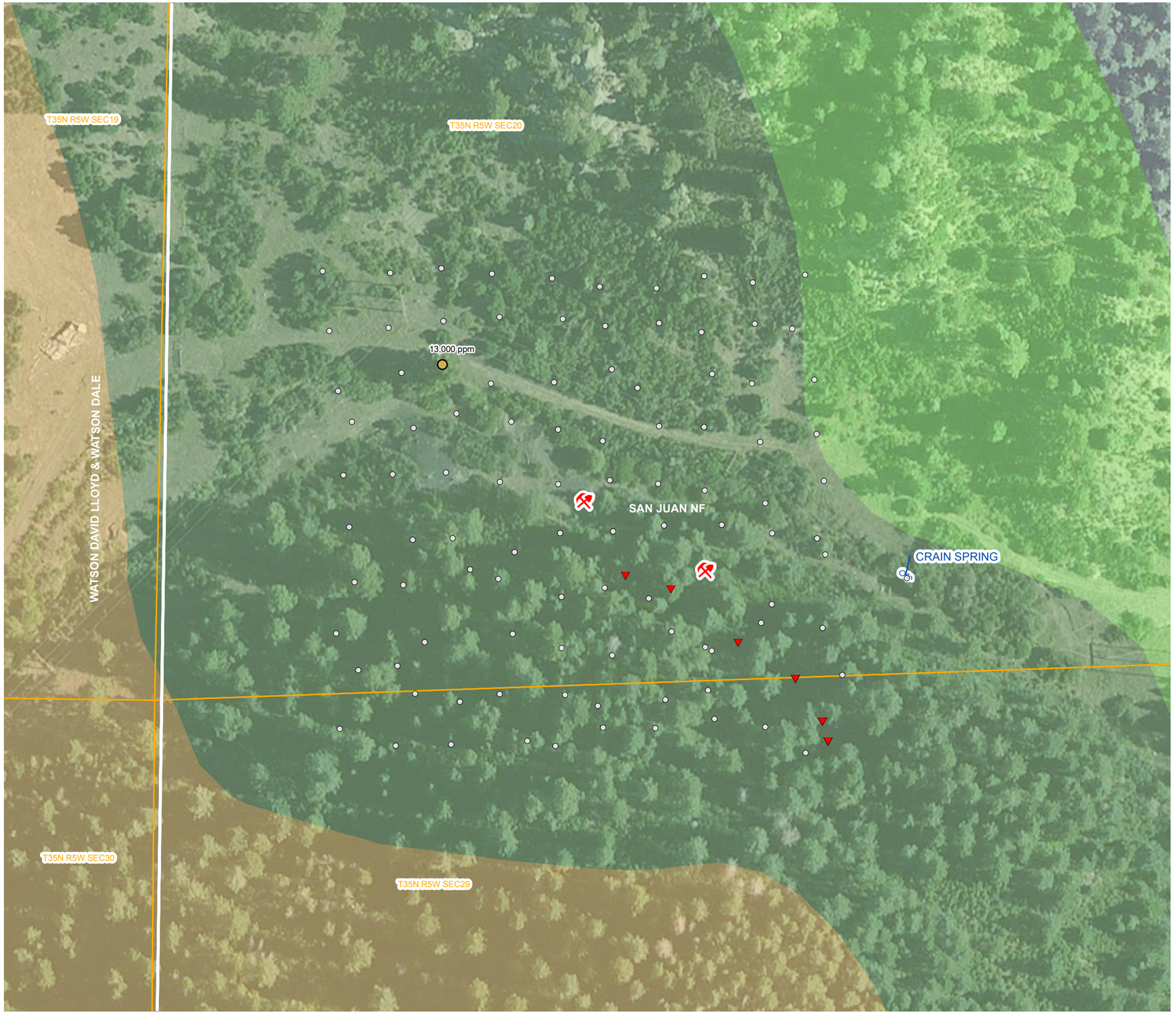
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 26
SURFACE TEMPERATURE MEASUREMENTS
TRIPLE S MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 26 MINES TEMP.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE METHANE MEASUREMENT

- 0 ppm
- 1 ppm - 500 ppm
- 501 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0 ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

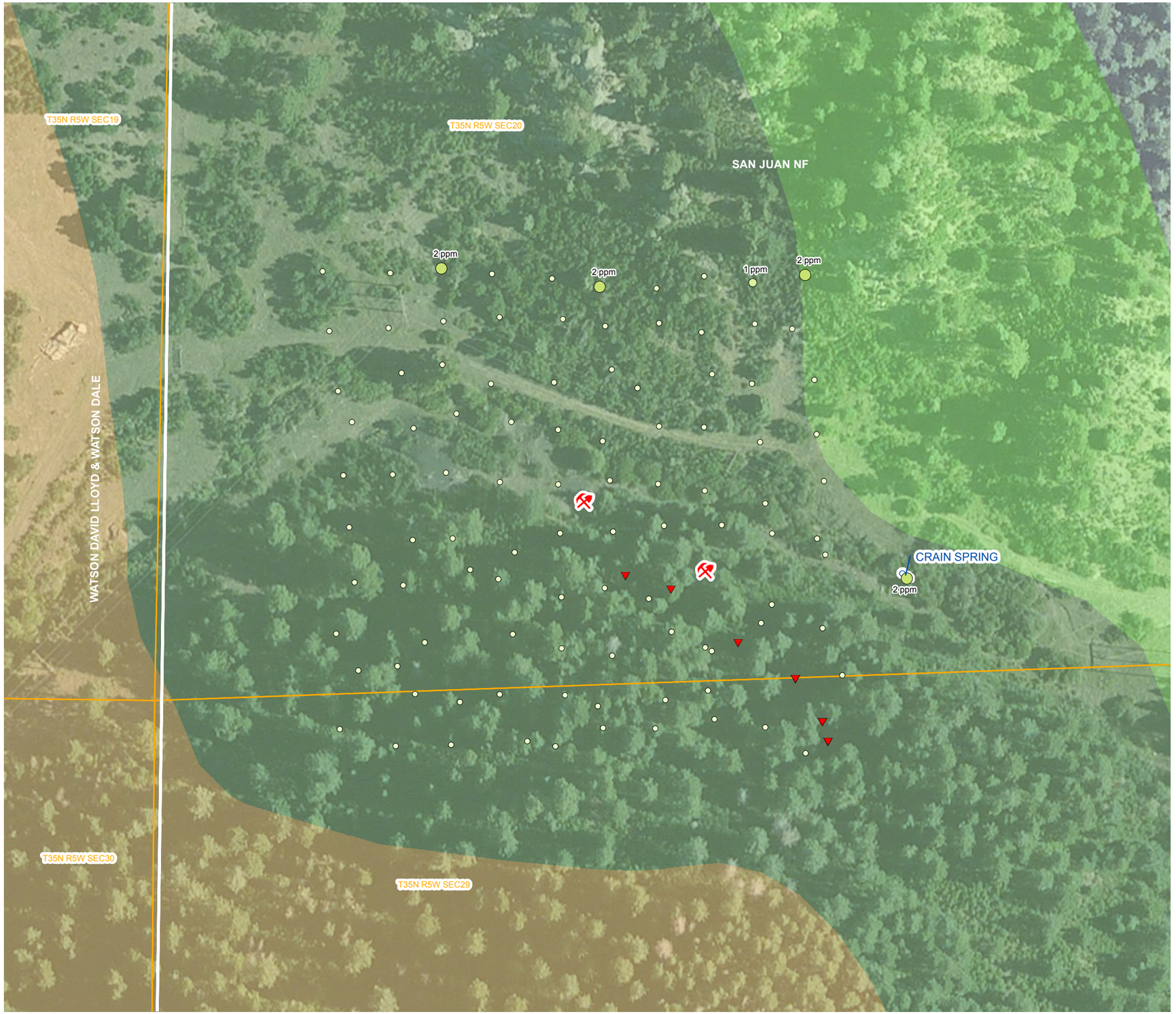
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 27
METHANE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 21 MINES CH4.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE CARBON MONOXIDE MEASUREMENT

- 0 ppm
- 0.1 - 1.0 ppm
- 1.1 - 5.0 ppm
- 5.1 - 10.0 ppm
- 10.1 - 20.0 ppm

ppm: PARTS PER MILLION

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

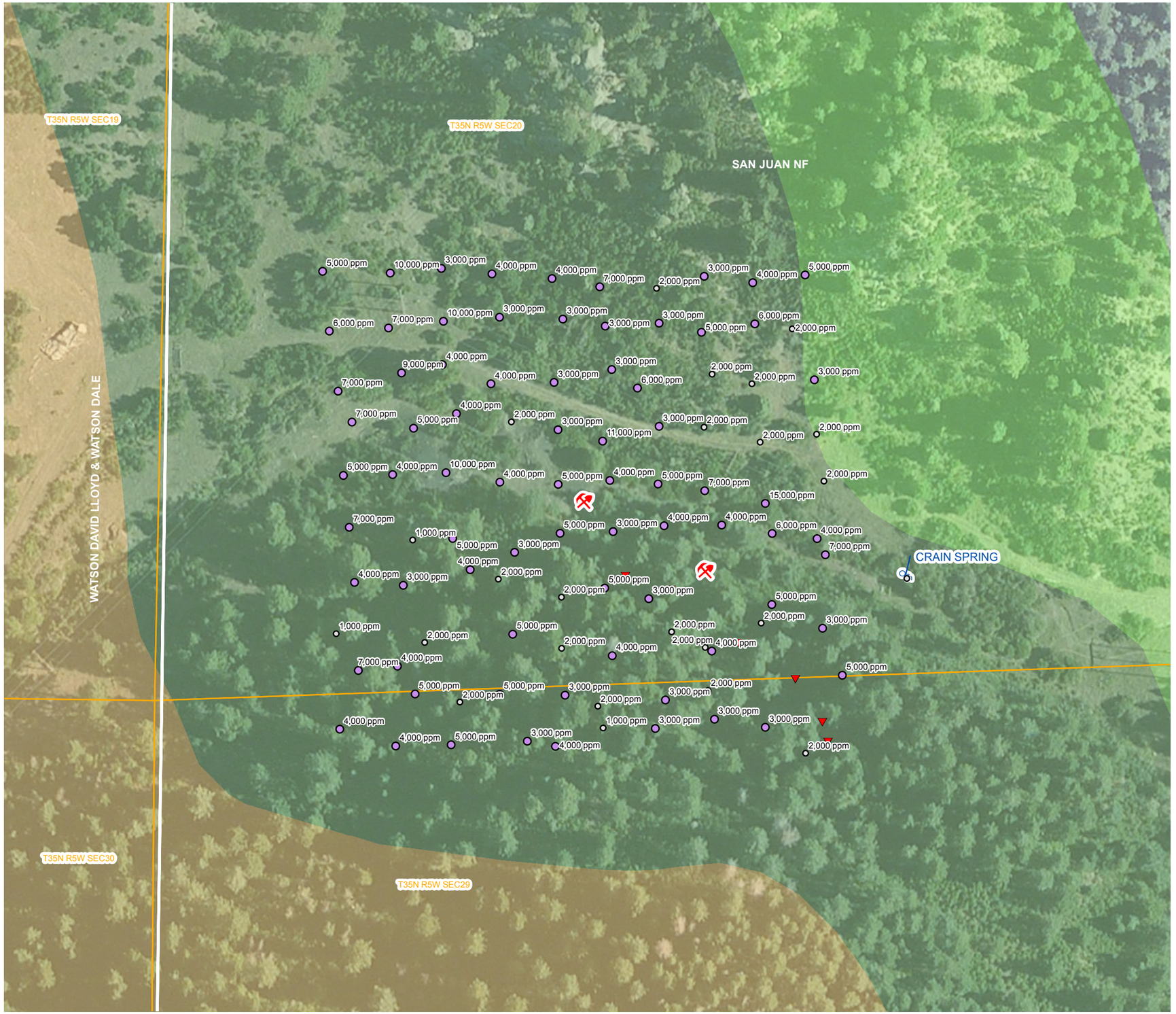
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 28
CARBON MONOXIDE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 22 MINES CO.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBURFACE CARBON DIOXIDE MEASUREMENT

- 0 - 2,500 ppm
- 2,500.1 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50.0%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

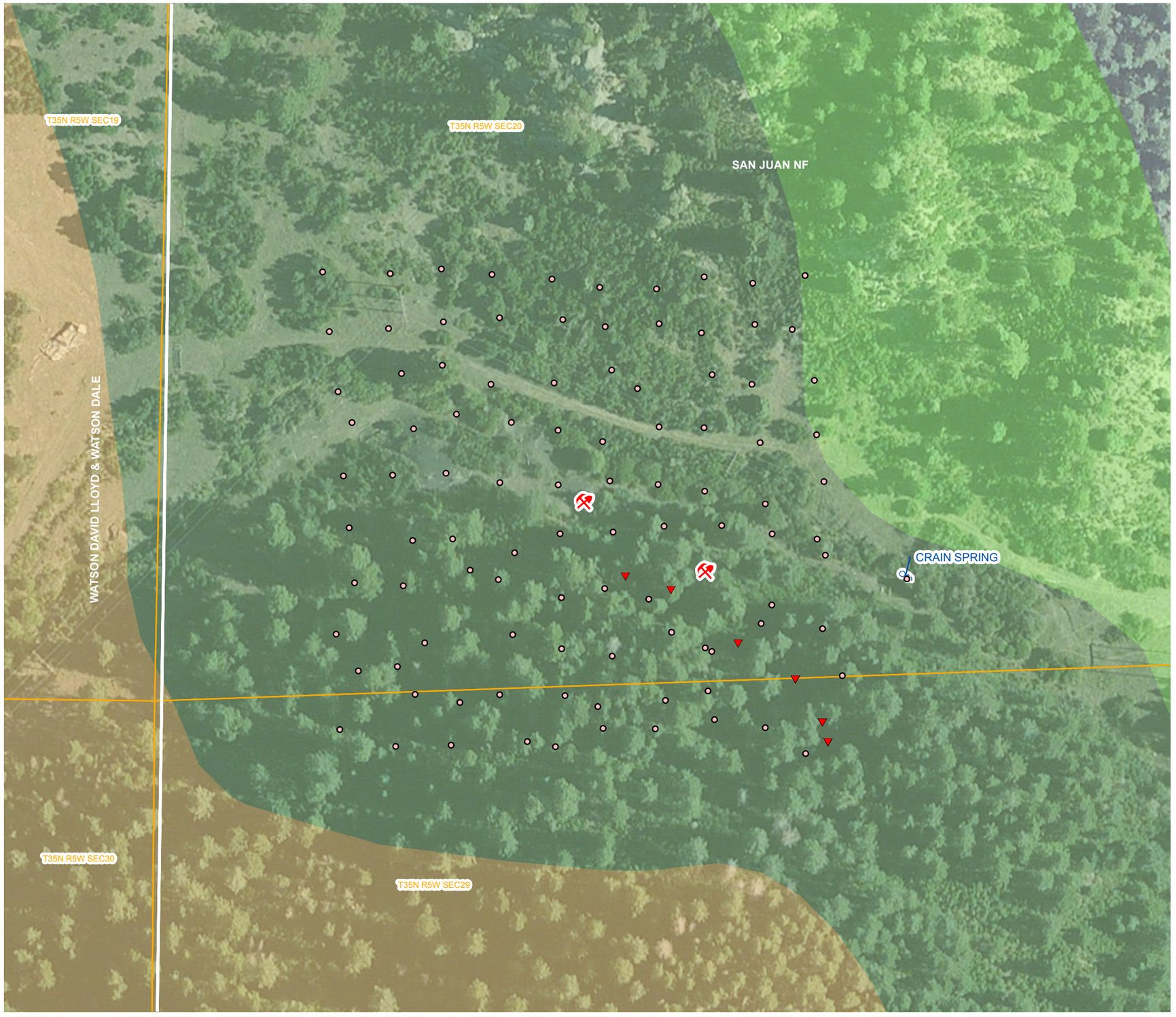
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 29
CARBON DIOXIDE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 23 MINES CO2.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE HYDROGEN SULFIDE MEASUREMENT

- 0 ppm
- 1 - 5 ppm
- 6 - 10 ppm
- 11 - 15 ppm
- 16 - 50 ppm

ppm: PARTS PER MILLION

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

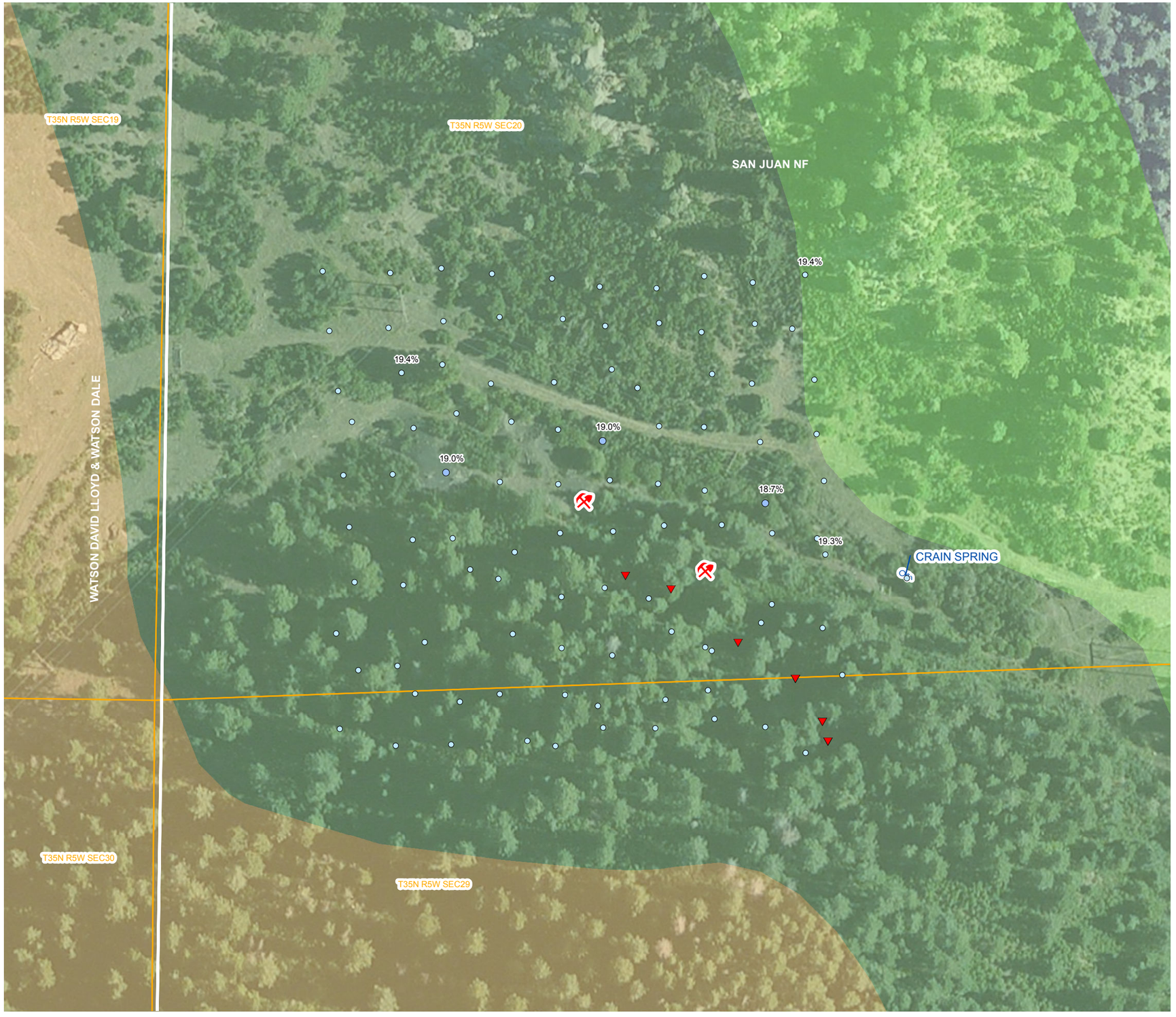
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 30
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 24 MINES H2S.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

Sub_O2_Con

- 0% - 5%
- 6% - 10%
- 11% - 15%
- 16% - 19%
- 20% - 22%

%: PERCENT

ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

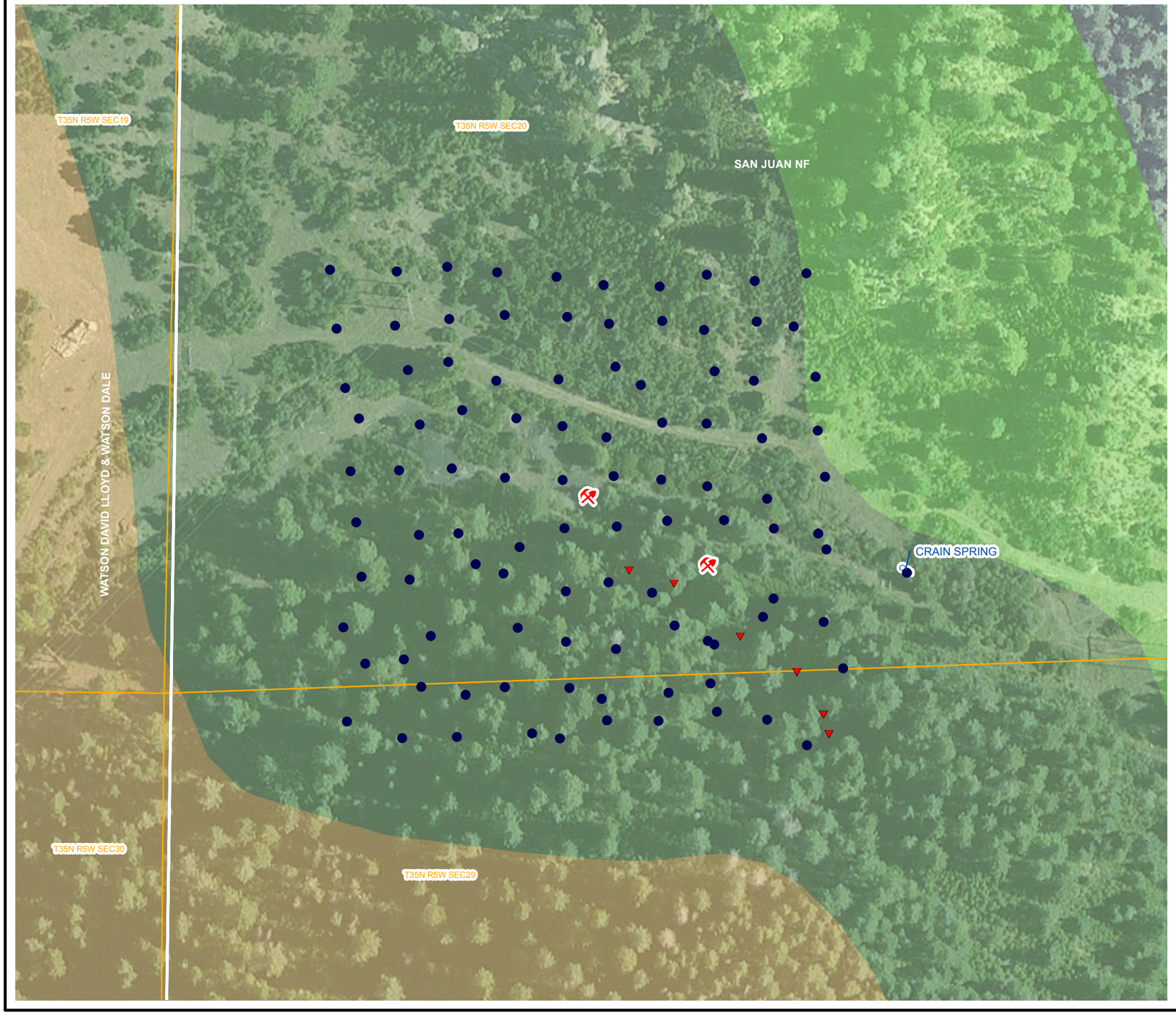
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 31
OXYGEN SOIL GAS MEASUREMENTS
COLUMBINE MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 25 MINES O2.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SURFACE TEMPERATURE

- 0 - 10°C
- 10 - 20°C
- 20 - 30°C
- 30 - 40°C
- 40 - 50°C
- 50 - 60°C
- 60 -70°C

°C: DEGREES CELCIUS

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 32
SURFACE TEMPERATURE MEASUREMENTS
COLUMBINE MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 26 MINES TEMP.mxd

LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE METHANE MEASUREMENT

- 0 ppm
- 1 ppm - 500 ppm
- 501 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0 ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 33
METHANE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 21 MINES CH4.mxd

LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE CARBON MONOXIDE MEASUREMENT

- 0 ppm
- 0.1 - 1.0 ppm
- 1.1 - 5.0 ppm
- 5.1 - 10.0 ppm
- 10.1 - 20.0 ppm

ppm: PARTS PER MILLION

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 34
CARBON MONOXIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 22 MINES CO.mxd

LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBURFACE CARBON DIOXIDE MEASUREMENT

- 0 - 2,500 ppm
- 2,500.1 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50.0%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 35
CARBON DIOXIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 23 MINES CO2.mxd

LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE HYDROGEN SULFIDE MEASUREMENT

- 0 ppm
- 1 - 5 ppm
- 6 - 10 ppm
- 11 - 15 ppm
- 16 - 50 ppm

ppm: PARTS PER MILLION

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 36
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 24 MINES H2S.mxd

LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

Sub_O2_Con

- 0% - 5%
- 6% - 10%
- 11% - 15%
- 16% - 19%
- 20% - 22%

%: PERCENT

ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 37
OXYGEN SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 25 MINES O2.mxd

LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SURFACE TEMPERATURE

- 0 - 10°C
- 10 - 20°C
- 20 - 30°C
- 30 - 40°C
- 40 - 50°C
- 50 - 60°C
- 60 -70°C

°C: DEGREES CELCIUS

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 38
SURFACE TEMPERATURE MEASUREMENTS
CHIMNEY ROCK MINE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 26 MINES TEMP.mxd

LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE METHANE MEASUREMENT

- 0 ppm
- 1 ppm - 500 ppm
- 501 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0 ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 39
METHANE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 21 MINES CH4.mxd

LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE CARBON MONOXIDE MEASUREMENT

- 0 ppm
- 0.1 - 1.0 ppm
- 1.1 - 5.0 ppm
- 5.1 - 10.0 ppm
- 10.1 - 20.0 ppm

ppm: PARTS PER MILLION

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

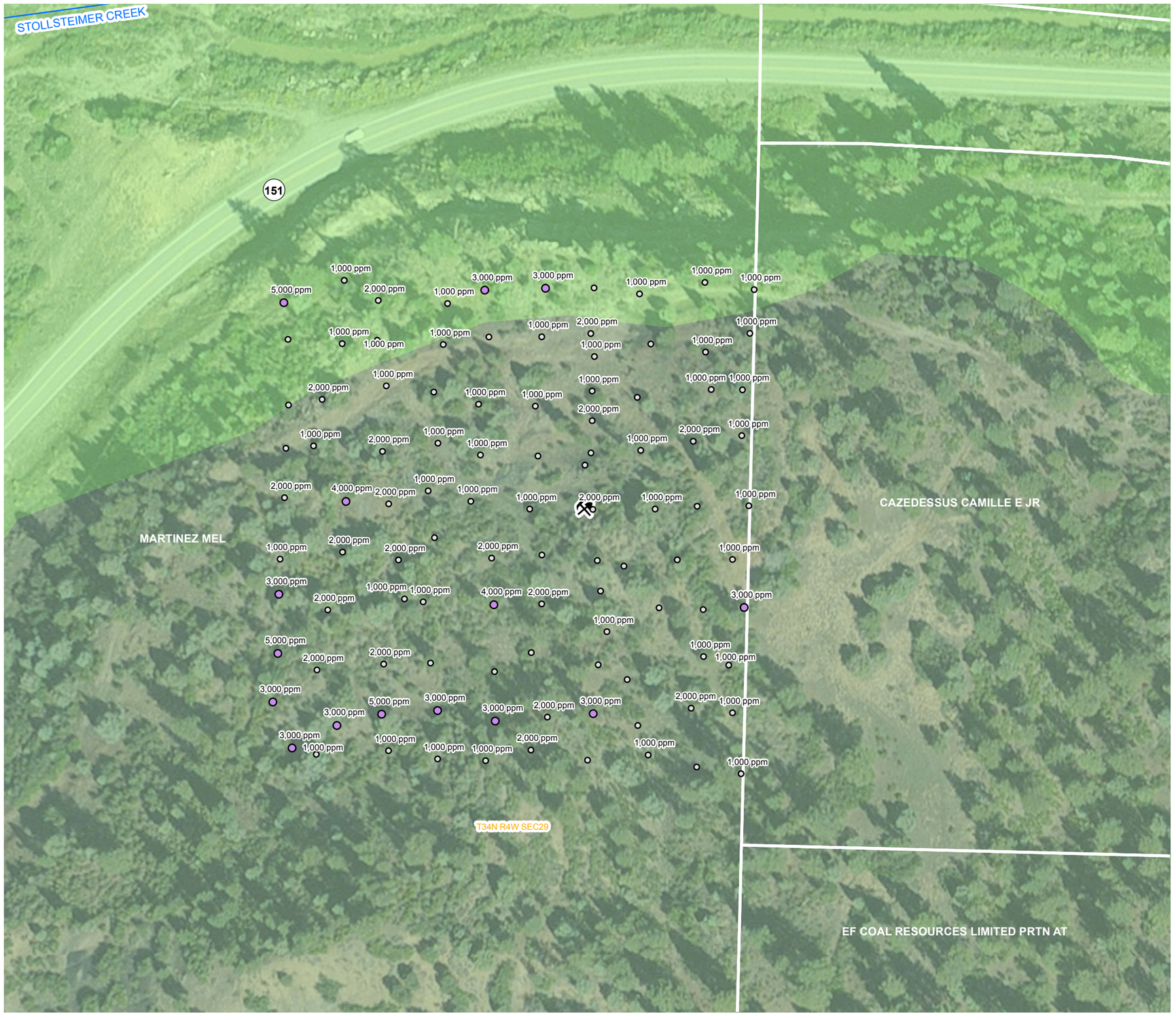
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 40
CARBON MONOXIDE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 22 MINES CO.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBURFACE CARBON DIOXIDE MEASUREMENT

- 0 - 2,500 ppm
- 2,500.1 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50.0%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 41
CARBON DIOXIDE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 23 MINES CO2.mxd

LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SUBSURFACE HYDROGEN SULFIDE MEASUREMENT

- 0 ppm
- 1 - 5 ppm
- 6 - 10 ppm
- 11 - 15 ppm
- 16 - 50 ppm

ppm: PARTS PER MILLION

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

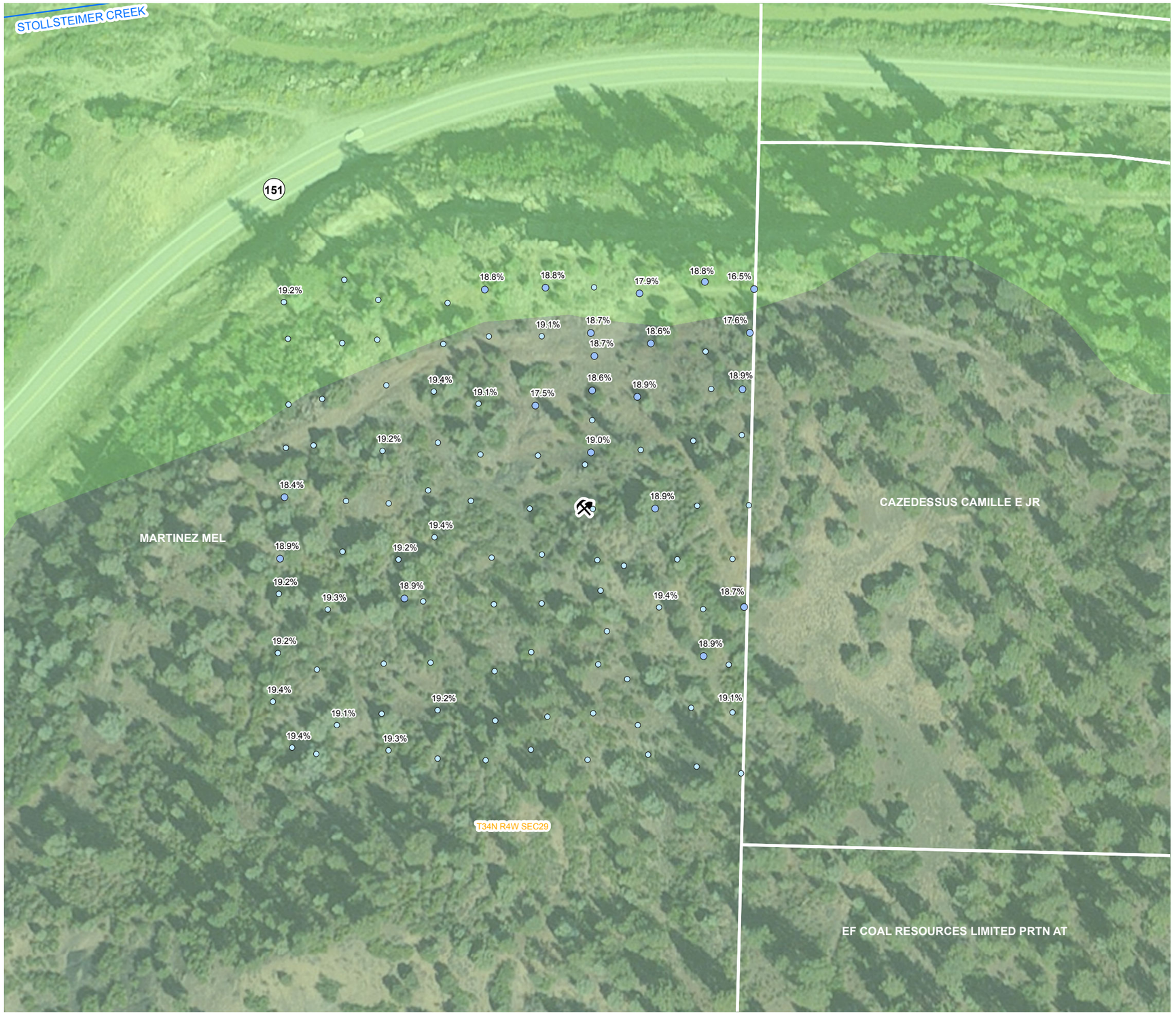
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 42
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 24 MINES H2S.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

Sub_O2_Con

- 0% - 5%
- 6% - 10%
- 11% - 15%
- 16% - 19%
- 20% - 22%

%: PERCENT

ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

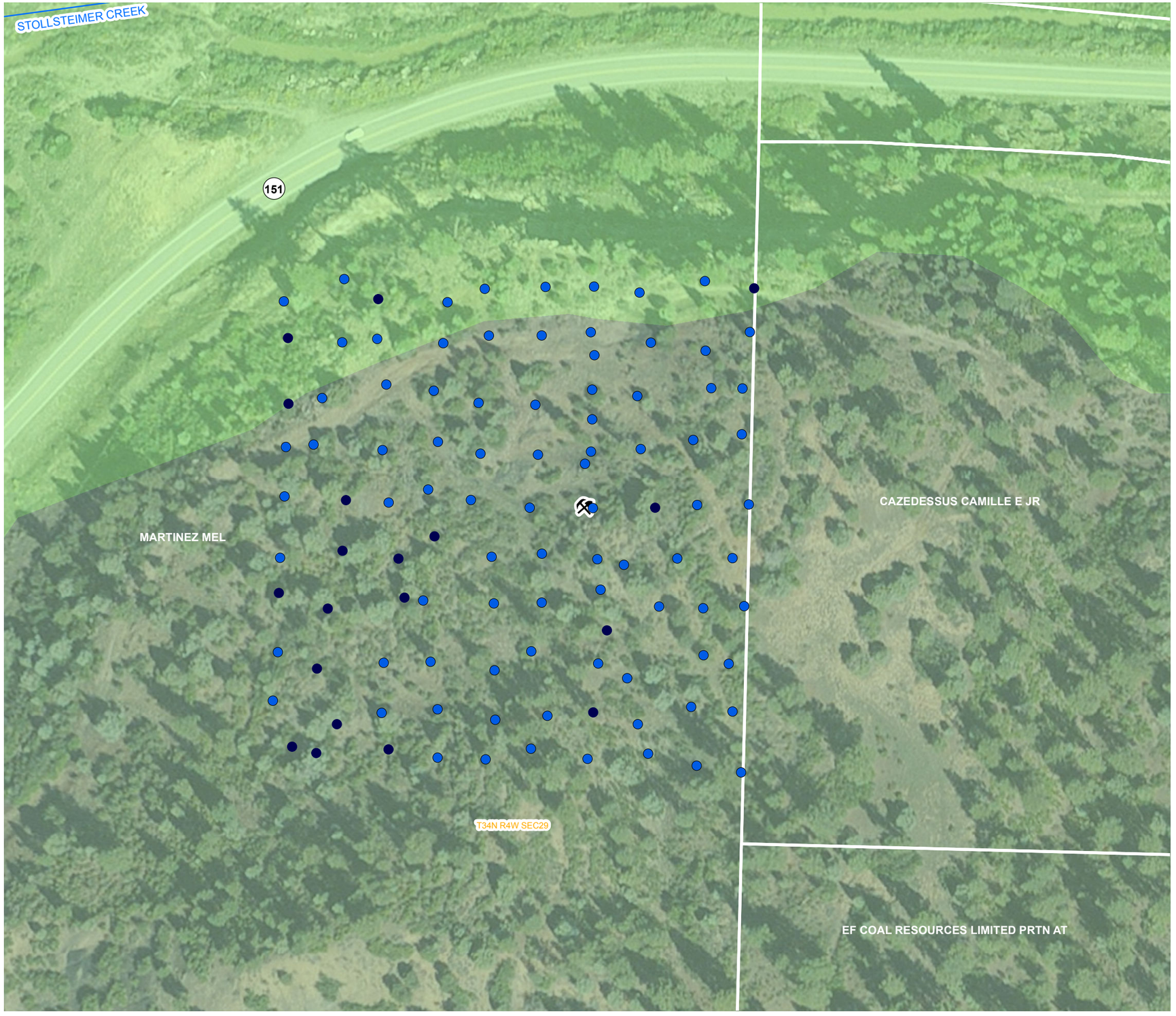
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 43
OXYGEN SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 25 MINES O2.mxd



LEGEND

- MINE ENTRANCE
- COLLAPSED MINE ENTRANCE
- COLLAPSED SHAFT
- NATURAL SPRING

SURFACE TEMPERATURE

- 0 - 10°C
- 10 - 20°C
- 20 - 30°C
- 30 - 40°C
- 40 - 50°C
- 50 - 60°C
- 60 -70°C

°C: DEGREES CELCIUS

- SURFACE WATER
- SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

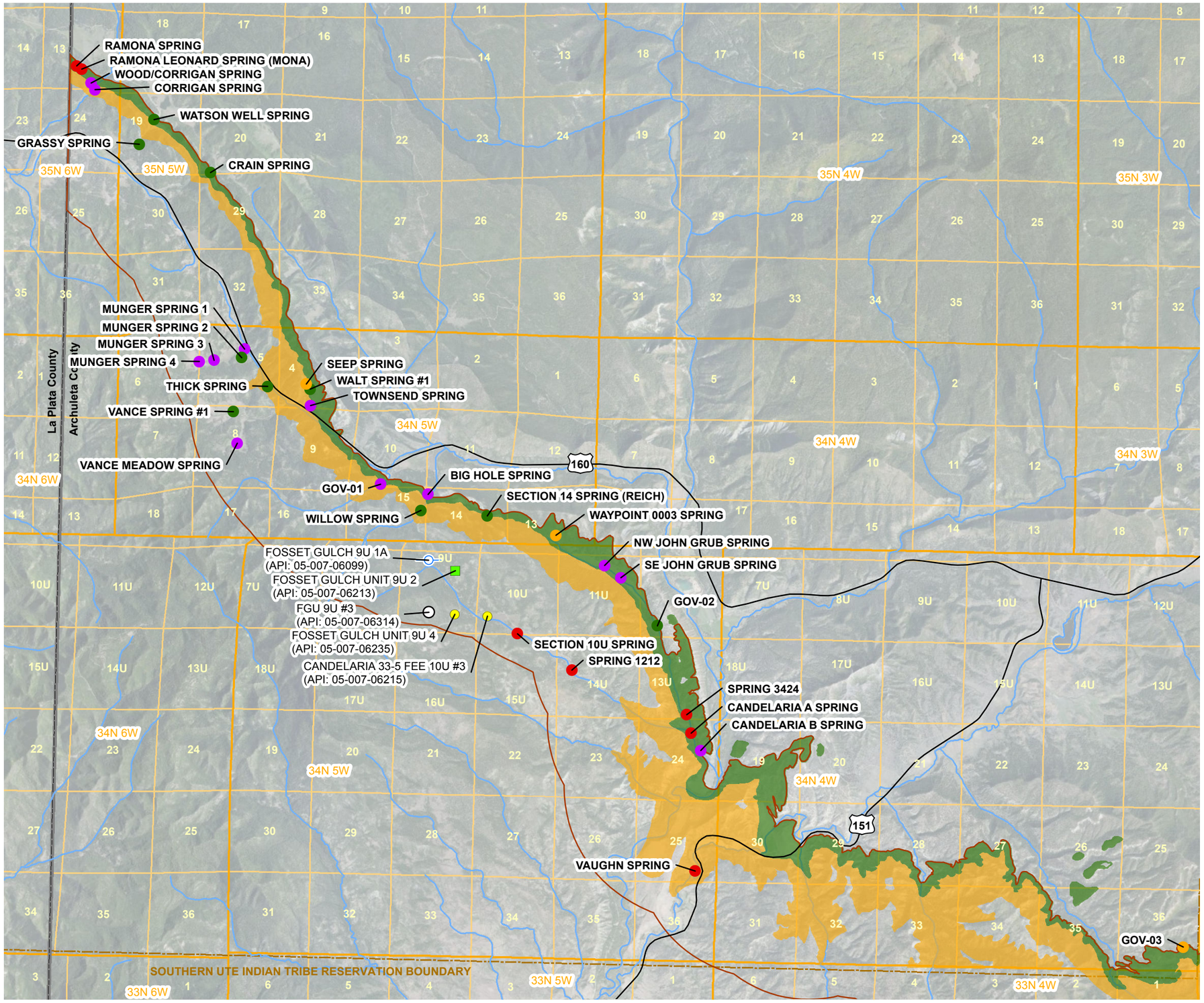
IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet

N

FIGURE 44
SURFACE TEMPERATURE MEASUREMENTS
STOLLSTEIMER CREEK SITE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 26 MINES TEMP.mxd



LEGEND

COALBED METHANE WELLS (PETROX RESOURCES, INC.)

- PRODUCING
- SHUT IN
- WAITING ON INFORMATION
- PROPOSED WELL

2013 NATURAL SPRING STATUS

- SAMPLED
- DRY
- NOT LOCATED
- NO ACCESS/NO SAMPLE COLLECTED
- HIGHWAY
- SURFACE WATER
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES
- SECTION
- FRUITLAND FORMATION (Kf)
- KIRKLAND FORMATION (Kk)
- BUREAU OF LAND MANAGEMENT OUTCROP ZONE

SUBSURFACE METHANE MEASUREMENTS WERE COLLECTED FROM TEMPORARY SOIL PROBES ADVANCED WITH A SLIDE HAMMER AT EACH SAMPLED NATURAL SPRING LOCATION. THE CONCENTRATION OF SUBSURFACE METHANE WAS 0.0 PARTS PER MILLION METHANE FOR ALL MEASUREMENTS TAKEN.

IMAGE COURTESY OF ESRI/BING MAPS

0 1.25 2.5

Miles

N

FIGURE 45
NATURAL SPRINGS STATUS
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_FIG 45 SPRING STATUS.mxd

TABLES

TABLE 1
NATURAL SPRINGS SAMPLING STATUS
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES, INC. AND ELM RIDGE RESOURCES, INC.

NATURAL SPRING	MONTH AND YEAR									
	September 2005	**May/June 2006**	**October 2007**	**October 2008**	**May 2009**	**October 2009**	**July 2010**	**May 2011**	**May 2012**	**May 2013**
Beaver Creek	Not Sampled	Not Sampled	Not Sampled	Sampled	Not Sampled	Not Sampled	Not Sampled	Not Sampled	Not Sampled	Discontinued*
Big Hole Spring	Not Sampled	Sampled	Not Sampled	Dry	Not Located	Not Located	Dry	Dry	Not Sampled	Dry
Candelaria A Spring	Not Sampled	Not Sampled	Not Sampled	No Access	No Access	No Access	No Access	No Access	No Access	No Access
Candelaria B Spring	Not Sampled	Sampled	Not Sampled	No Access	No Access	No Access	No Access	No Access	No Access	Dry
Corrigan Spring	Not Sampled	Not Sampled	Not Sampled	Not Located	Sampled	Dry	Dry	Sampled	Sampled	Dry
Crain Spring	Not Sampled	Sampled	Not Sampled	Sampled	Sampled	Dry	Sampled	No Access	Sampled	Sampled
Gov-1 Spring	--	--	--	--	--	--	--	--	--	Dry
Gov-2 Spring	--	--	--	--	--	--	--	--	--	Sampled
Gov-3 Spring	--	--	--	--	--	--	--	--	--	Not Located
Grassy Spring	Not Sampled	Sampled	Sampled	No Access	No Access	No Access	No Access	No Access	Sampled	Sampled
High Watson Spring	Not Sampled	Not Sampled	Not Sampled	Not Sampled	Not Sampled	Not Sampled	Not Sampled	No Access	Not Sampled	Discontinued**
Miser Spring & Pipeline	Not Sampled	Not Sampled	Not Sampled	No Access	No Access	No Access	No Access	No Access	No Access	Discontinued**
Munger Spring 1	--	--	--	--	--	--	--	--	--	Dry
Munger Spring 2	--	--	--	--	--	--	--	--	--	Sampled
Munger Spring 3	--	--	--	--	--	--	--	--	--	Dry
Munger Spring 4	--	--	--	--	--	--	--	--	--	Dry
NW John Grubb Spring	Sampled	Sampled	Sampled	Sampled	Sampled	Dry	Sampled	Sampled	Sampled	Dry
Ramona Leonard Spring (Mona)	Not Sampled	Sampled	Sampled	Sampled	Sampled	Sampled	No Access	No Access	No Access	No Access
Ramona Spring	Not Sampled	Not Sampled	Not Sampled	Dry	Not Located	Not Located	No Access	No Access	No Access	No Access
SE John Grubb Spring	Sampled	Sampled	Sampled	Sampled	Sampled	Dry	Not Sampled	Sampled	Sampled	Dry
Section 10U Spring	Sampled	Sampled	Not Sampled	No Access	No Access	No Access	No Access	No Access	No Access	No Access
Section 14 (Reich) Spring	Sampled	Sampled	Sampled	Sampled	Sampled	Dry	Sampled	No Access	Not Sampled	Sampled
Seep Spring	Not Sampled	Not Sampled	Not Sampled	Dry	Not Located	Not Located	Not Located	Not Located	Dry	Not Located
Spring 1212	Sampled	Sampled	Not Sampled	No Access	No Access	No Access	No Access	No Access	No Access	No Access
Spring 3424	Sampled	Sampled	Not Sampled	No Access	No Access	No Access	No Access	No Access	No Access	No Access
Thick Spring	Not Sampled	Sampled	Sampled	Not Located	Sampled	Dry	Not Sampled	Sampled	Sampled	Sampled
Townsend Spring	Not Sampled	Not Sampled	Not Sampled	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Vance Meadow Spring	Not Sampled	Sampled	Sampled	Sampled	Sampled	Dry	Dry	Sampled	Sampled	Dry
Vance Spring #1	Not Sampled	Sampled	Sampled	Sampled	Sampled	Sampled	Sampled	Sampled	Sampled	Sampled
Vaughn Spring	Not Sampled	Not Sampled	Not Sampled	No Access	No Access	No Access	No Access	No Access	No Access	No Access
Walt Spring #1	Not Sampled	Sampled	Not Sampled	Dry	Dry	Dry	Dry	Sampled	Dry	Sampled
Watson Well Spring	Not Sampled	Sampled	Not Sampled	Sampled	Sampled	Sampled	Sampled	No Access	Sampled	Sampled
Waypoint 0003 Spring	Not Sampled	NS	Not Sampled	Not Located	Not Located	Not Located	Not Sampled	Not Located	Dry	Not Located
Willow Spring	Not Sampled	Sampled	Sampled	Sampled	Sampled	Dry	Sampled	Sampled	Sampled	Sampled
Wood/Corrigan Spring	Not Sampled	Not Sampled	Not Sampled	Dry	Sampled	Dry	Not Sampled	Sampled	Dry	Dry

Note:
-- denotes not part of the sampling program for that year
* natural spring discontinued from sampling program due to its location in vicinity of Corrigan Spring
**natural spring discontinued from sampling program due to location of spring outside of Kf outcrop and/or BLM outcrop zone
Kf - Fruitland Formation
BLM - Bureau of Land Management

TABLE 2
NATURAL SPRINGS ANALYTICAL RESULTS - MAJOR IONS
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES, INC. AND ELM RIDGE RESOURCES, INC.

Natural Spring	Date	Cations				Anions			
		Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Carbonate (mg/L)	Bicarbonate (mg/L)	Sulfate (mg/L)	Chloride (mg/L)
Beaver Creek	October 2008	35.0	10.7	8.6	1.9	<10	128	33	<10
	May 2009	--	--	--	--	--	--	--	--
	July 2010	--	--	--	--	--	--	--	--
	May/June 2011	--	--	--	--	--	--	--	--
	May 2012	--	--	--	--	--	--	--	--
	May 2013	Discontinued*							
Corrigan Spring	May/June 2011	31.9	7.6	7.2	0.5	<10	64.0	19.0	<10
	May 2012	21.9	5.02	4.23	1.10	<10	290	62	<10
	May 2013	--	--	--	--	--	--	--	--
Crain Spring	October 2008	65.6	18.8	15.2	1.6	<10	214	98	<10
	May 2009	74.7	21.1	19.6	1.4	<10	230	134	<10
	July 2010	68.3	18.3	14.4	1.9	<10	190	76	<10
	May 2011	--	--	--	--	--	--	--	--
	May 2012	--	--	--	--	--	--	--	--
	May 2013	79.5	21.9	22.5	2.55	<10	179	126	<10
Gov-1 Spring	May 2013	--	--	--	--	--	--	--	--
Gov-2 Spring	May 2013	80.9	24.6	16	1.50	<10	244	74.0	<10
Gov-3 Spring	May 2013	--	--	--	--	--	--	--	--
Grassy Spring	May 2012	95.1	27.9	23.8	2.89	12	246	158	<10
	May 2013	108	34.7	32.1	4.25	<10	216	250	<10
Munger Spring 2	May 2013	47.5	8.55	19.6	1.70	<10	117	19.0	36.0
NW John Grub Spring	October 2008	59.1	12.8	<0.5	0.6	<10	187	54	<10
	May 2009	30.9	16	11.3	0.6	<10	117	67	<10
	July 2010	66.1	14	12	0.8	<10	175	71	<10
	May 2011	72.9	18.7	14.5	1.6	<10	230	106	<10
	May 2012	84.7	21.9	16.7	2.27	<10	290	62	<10
	May 2013	--	--	--	--	--	--	--	--
Ramona Leonard Spring	October 2008	138	27.7	9.6	1.6	<10	200	340	<10
	May 2009	120	23.1	8.5	1.3	<10	181	250	<10
	July 2010	--	--	--	--	--	--	--	--
	May 2011	--	--	--	--	--	--	--	--
	May 2012	--	--	--	--	--	--	--	--
	May 2013	--	--	--	--	--	--	--	--
SE John Grub Spring	October 2008	65.3	16.9	14	0.7	<10	214	78	<10
	May 2009	72.2	16.6	14.3	0.6	10	238	57	<10
	July 2010	--	--	--	--	--	--	--	--
	May 2011	56.1	12.6	11.2	1.3	<10	171	60	<10
	May 2012	101	27.8	22	3.79	<10	300	108	<10
	May 2013	--	--	--	--	--	--	--	--
Section 14 (Reich) Spring	October 2008	48.8	6	27	0.6	<10	189	43	<10
	May 2009	62.8	6.7	24.5	1	10	188	61	<10
	July 2010	57.5	6.1	24.7	0.8	<10	169	55	<10
	May 2011	--	--	--	--	--	--	--	--
	May 2012	--	--	--	--	--	--	--	--
	May 2013	93.8	10.2	26.1	1.25	<10	240	75.0	<10
Thick Spring	October 2008	--	--	--	--	--	--	--	--
	May 2009	44.6	8.2	14.4	0.8	<10	124	28	22
	July 2010	--	--	--	--	--	--	--	--
	May 2011	48.7	9.7	15.6	<0.5	<10	136	31	32
	May 2012	51.6	10.5	16.2	1.39	<10	126	23	36
	May 2013	49.9	10.4	17.1	2.22	<10	131	25.0	40.0
Vance Meadow Spring	October 2008	68.3	9	14.4	2.6	<10	244	11	<10
	May 2009	66.7	8.2	14	2.7	<10	236	11	<10
	July 2010	--	--	--	--	--	--	--	--
	May 2011	50.1	6.7	12	2.2	<10	178	<10	<10
	May 2012	47.8	8.49	16.5	2.36	<10	144	27	<10
	May 2013	--	--	--	--	--	--	--	--
Vance Spring #1	October 2008	52.5	6.6	13.1	5.9	<10	182	19	<10
	May 2009	57.8	7.7	14.3	4.2	<10	208	<10	<10
	July 2010	63.4	8.4	14.9	5.8	<10	226	<10	<10
	May/June 2011	36.6	4.8	10.6	7.5	<10	133	16	<10
	May 2012	40.6	5.16	12.2	7.89	<10	125	25	<10
	May 2013	47.6	5.90	13.3	12.3	<10	98.0	73.0	<10
Walt Spring #1	May 2011	43.8	13.6	11.7	0.6	<10	141	65	<10
	May 2012	--	--	--	--	--	--	--	--
	May 2013	52.0	16.7	13.2	1.61	<10	149	84.0	<10
Watson Well Spring	October 2008	109	38.7	25.5	2.4	<10	394	134	<10
	May 2009	86.8	30.7	20.5	1.9	<10	288	94	<10
	July 2010	78.1	26.9	18.1	2.5	12	218	84	<10
	May 2011	--	--	--	--	--	--	--	--
	May 2012	102	39.4	21.4	2.04	<10	348	118	<10
	May 2013	104	41.2	20.0	2.35	<10	326	108	<10
Willow Spring	October 2008	39.3	5.8	16.5	1.4	<10	157	19	<10
	May 2009	34.5	5.1	16.1	1.4	<10	122	18	<10
	July 2010	39.2	5.7	16.3	1.8	<10	131	16	<10
	May 2011	32.7	5.2	14.9	1	<10	129	16	<10
	May 2012	38	5.81	16.9	1.17	<10	132	20	<10
	May 2013	35.7	5.72	17	1.23	<10	124	27.0	<10
Wood Spring	October 2008	--	--	--	--	--	--	--	--
	May 2009	65.7	11.6	10.7	1.6	<10	142	122	<10
	July 2010	--	--	--	--	--	--	--	--
	May 2011	66.9	12.8	10.4	0.8	<10	135	126	<10
	May 2012	21.9	5.02	4.23	1.1	<10	64	19	<10
	May 2013	--	--	--	--	--	--	--	--

Notes:

mg/L - milligrams per liter

-- denotes not sampled/analyzed

< - less than the laboratory reporting limit

* natural spring discontinued from sampling program due to its location in vicinity of Corrigan Spring

TABLE 3
PROPERTY OWNER AND ACCESS INFORMATION
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES, INC. AND ELM RIDGE RESOURCES, INC.

MAP ID NUMBER	PARCEL NUMBER	ACCESS	OWNER	ACCESS TYPE
2	589724400007	YES	CANDELARIA LUCY S & GONZALES BERNADETTE M	METHANE SURVEY
7	568510300009	YES	EDWARDS DURWOOD	METHANE SURVEY
9	589711200001	YES	GRUBB JOHN W & PAMELA K	METHANE AND NATURAL SPRING SURVEY
16	589530100039	YES	MARTINEZ MEL	METHANE SURVEY
18	567913400016	YES	PEINADO EMILIO JR, PEINADO KAREN R	METHANE SURVEY
19	589712400012	YES	RAFTER T LLC	NATURAL SPRING SURVEY
20	589528400051 & 589528100052	YES	RANCH AT CABEZON CANYON LLC	NATURAL SPRING SURVEY
22	589701400003	YES	UNITED STATES OF AMERICA FOREST SERV DEPT OF AGRICULTURE, ROCKY MOUNTAIN REGION	NATURAL SPRING SURVEY
24	568508100020	YES	VANCE WILLIAM S JR	NATURAL SPRING SURVEY
26	596102100007	YES	VINZANT JAMES H, VINZANT MARK N TRUSTEE, &VINZANT WHITNEY I	NATURAL SPRING SURVEY
27	568319200034 & 568319300003	YES	WATSON DAVID LLOYD & WATSON DALE LLOYD	METHANE AND NATURAL SPRING SURVEY
28	567913400017	YES	WOOD LEE THOMAS, WOOD PEGGY DARLENE	METHANE AND NATURAL SPRING SURVEY
29	589528400053	YES	WOZNY THEODORE G TRUST ACCOUNT	METHANE SURVEY
32		YES	PUBLIC LANDS	NATURAL SPRING SURVEY
4	589713300006	NO	CANDELARIA SUSIE E TRUST	METHANE AND NATURAL SPRING SURVEY
1	589724400008	NO	CANDELARIA GILBERT, CANDELARIA ANNETTE H TRUSTEE, & CANDELARIA LEONARD L TRUSTEE	METHANE SURVEY
23	589511200003, 589311300004, & 596116200005	NO	UNITED STATES OF AMERICA T/F SOUTHERN UTE TRIBE	METHANE AND NATURAL SPRING SURVEY
3	589724400010	NO RESPONSE	CANDELARIA ROGER	METHANE SURVEY
5	589529100026	NO RESPONSE	CAZEDESSUS CAMILLE E JR	NATURAL SPRING SURVEY
6	589528300041	NO RESPONSE	CHENAULT ROBERT G	NATURAL SPRING SURVEY
8	589529300027	NO RESPONSE	EF COAL RESOURCES LIMITED PRTN ATTN NEWELL DANIEL K	NATURAL SPRING SURVEY
10	589528400042	NO RESPONSE	HALLOCK JAMES & NORA	NATURAL SPRING SURVEY
11	568333200011	NO RESPONSE	HIGMAN CATHY	NATURAL SPRING SURVEY
12	568333300012	NO RESPONSE	HIGMAN MICHAEL W	NATURAL SPRING SURVEY
13	568505200020	NO RESPONSE	JEFFREY H MUNGER REVOCABLE TRUST	NATURAL SPRING SURVEY
14	589533200046	NO RESPONSE	LEON EUGENIA, WOZNY THEODORE G, &PALMA GUSTAVO I	METHANE SURVEY
15	567913300015	NO RESPONSE	LEONARD RAMONA	NATURAL SPRING SURVEY
17	589528400049	NO RESPONSE	NEUMANN DIANE REVOCABLE TRUST	METHANE SURVEY
21	568510300010	NO RESPONSE	TRACY BRYAN H & MARITES G	METHANE SURVEY
25	589725400015	NO RESPONSE	VAUGHN LARRY C	NATURAL SPRING SURVEY
30	589528400043	NO RESPONSE	WRIGHT JEAN PAUL & SUSAN	METHANE SURVEY
31	589710300002	NO RESPONSE	YOUNG LORRAINE SHARAN, CANDELARIA LEONARD L TRUSTEE, & CANDELARIA ANNETTE H TRUSTEE	NATURAL SPRING SURVEY

Note:
Green indicates property access granted
Red indicates property access denied
White indicates property owner did not respond, which was treated as a denial
Map ID numbers are referenced on Figure 13

TABLE 4
METHANE FLUX DATA
2013 FRUITLAND OUTCROP MONITORING
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES, INC. AND ELM RIDGE RESOURCES, INC.

Mapping Area	Total Number of Methane Flux Points							Number of Sample Points with Methane greater than reporting limit[1]							Maximum Measurable Methane Flux[2] (moles/m^2·day)						Volumetric Methane Flux (MCFD)					
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2007**	**2008**	**2009**	**2010**	**2011**	**2013**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Beaver Creek	14	53	46	48	48	54	13	1	0	0	0	1	0	0	0.2000	0.1579	0.0607	0.0740	**0.5347**	**0.0**	0	0	0	NA	0.0	0.0
Little Squaw Creek	21	77	78	77	76	29	*	2	2	0	0	0	0	0	**0.2300**	**0.2911**	0.0268	0.0852	0.0830	0.0	0.27	0	0	0	0	0
Yellow Jacket Pass/ Squaw Creek	10	208	170	204	205	127	35	0	0	0	0	0	0	0	0.0700	0.0373	0.0970	0.0140	0.1366	0.0	0	0	0	0	0	0
Pole Gulch	10	86	87	85	88	29	8	1	0	1	0	0	0	0	**0.3000**	0.1775	**0.2156**	**0.1089**	0.0117	0.0	0	0.02	0	0	0	0
Peterson Gulch	18	357	331	382	412	263	66	1	0	0	0	0	0	0	**0.2300**	0.1925	0.1733	0.0069	0.1991	0.0	0	0	0	0	0	0
Piedra River	--	--	--	--	--	--	18	--	--	--	--	--	--	0	--	--	--	--	--	0.0	--	--	--	--	--	--
Stollsteimer Creek	11	201	203	176	195	122	34	0	3	2	0	1	0	0	0.1500	**0.3440**	0.3382	0.1493	**0.2997**	**0.0**	0.38	0.50	0	NA	0.0	0.0
TOTAL	**84**	**982**	**915**	**972**	**1024**	**624**	**192**	**5**	**5**	**3**	**0**	**2**	**0**	**0**	--	--	--	--	--		**0.65**	**0.52**	**0**	**NA**	**0.0**	**0.0**
Abandoned Production Well																										
Big Horn-Schomburg #1	5	9	5	9	26	18	18	1	0	1	0	1	0	0	**0.2364**	0.0661	0.0055	0.0852	**0.2122**	**0.0000**	NA	NA	NA	NA	NA	NA

Notes:

moles/m^2·day - moles per meter squared per day
MCFD - thousand cubic feet per day
-- - No data available
> - greater than

[1]Only methane flux values that were greater than the portable flux meter reporting limit of 0.2 moles/m^2·day were used in calculations
Bold indicates methane flux values above the reporting limi
NA - Not applicable due to insufficient data points to calculate volumetric methane flu

TABLE 5
NATURAL SPRINGS FIELD OBSERVATIONS AND MEASUREMENTS
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

ELM RIDGE RESOURCES, INC. AND PETROX RESOURCES, INC.

Natural Spring	2013 Field Observations/ Notes	Date	Water Quality Field Measurements				
			Conductivity (µS/cm)	pH (Units)	ORP (mV)	Temperature (^{0}C)	TDS (ppm)
Beaver Creek	Discontinued*	September 2005	--	--	--	--	--
		May 2006	--	--	--	--	--
		October 2007	286.6	8.00	21	10.0	146.6
		October 2008	303.0	7.40	166.0	5.80	197
		May 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	Discontinued*				
Big Hole Spring	Dry	September 2005	--	--	--	--	--
		May 2006	365.5	7.27	141	11.7	249.1
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		June 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
Candelaria A Spring	Not Sampled due to access	September 2005	--	--	--	--	--
		May 2006	--	--	--	--	--
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		June 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
Candelaria B Spring	Dry	September 2005	--	--	--	--	--
		May 2006	--	--	--	--	--
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		June 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
Corrigan Spring	Sampled	September 2005	--	--	--	--	--
		June 2006	170.3	6.08	122	17.7	109.7
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		May 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	253	6.83	97.4	22.5	126
		May 2012	162.3	6.53	-45.2	11.5	81.2
		May 2013	--	--	--	--	--
Crain Spring	Sampled	September 2005	--	--	--	--	--
		June 2006	570.3	7.5	-115	29.1	375.3
		October 2007	--	--	--	--	--
		October 2008	526.0	7.47	273.00	8.80	342
		May 2009	811	6.87	NM	7.5	--
		October 2009	--	--	--	--	--
		July 2010	482	6.8	--	11.8	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	668	7.7	--	20.5	334
Gov-1 Spring	Dry	May 2013	--	--	--	--	--
Gov-2 Spring	Sampled	May 2013	659	7.0	17.4	10.2	328
Gov-3 Spring	Not Located	May 2013	--	--	--	--	--
Grassy Spring	Sampled	September 2005	--	--	--	--	--
		June 2006	570.3	7.5	-115	29.1	375.3
		October 2007	88.37	8.18	16	8.6	44.32
		October 2008	--	--	--	--	--
		May 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	954	7.0	--	14.3	480

TABLE 5
NATURAL SPRINGS FIELD OBSERVATIONS AND MEASUREMENTS
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ARCHULETA COUNTY, COLORADO

ELM RIDGE RESOURCES, INC. AND PETROX RESOURCES, INC.

Natural Spring	2013 Field Observations/ Notes	Date	Water Quality Field Measurements				
			Conductivity (µS/cm)	pH (Units)	ORP (mV)	Temperature (^{0}C)	TDS (ppm)
High Watson Spring	Discontinued**	September 2005	--	--	--	--	--
		June 2006	--	--	--	--	--
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		May 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	789	7.49	18.1	16.7	392
		May 2013	Discontinued**				
Miser Spring and Pipeline	Discontinued**	September 2005	--	--	--	--	--
		June 2006	--	--	--	--	--
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		June 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	Discontinued**				
Munger Spring 1	Dry	May 2013	--	--	--	--	--
Munger Spring 2	Sampled	May 2013	358	7.4	--	18.9	176
Munger Spring 3	Dry	May 2013	--	--	--	--	--
Munger Spring 4	Dry	May 2013	--	--	--	--	--
NW John Grub Spring	Dry	September 2005	415.8	6.97	--	15.8	282.3
		May 2006	421.7	7.83	108	27	275.9
		October 2007	292.2	7.28	-162	17.1	254.8
		October 2008	425	7.07	-15	15.68	276
		June 2009	339	8.7	--	14.5	--
		October 2009	--	--	--	--	--
		July 2010	441	5.91	--	16.4	--
		May 2011	561	7.08	21.7	21	278
		May 2012	540	6.77	20.3	22	271
		May 2013	--	--	--	--	--
Ramona Leonard Spring (Mona)	Not Sampled due to access	September 2005	--	--	--	--	--
		May 2006	768.4	6.35	107	13.5	522.4
		October 2007	793.5	7.68	42	11.8	413.4
		October 2008	879	6.99	185.6	9.67	571
		May 2009	793	6.97	--	9.1	--
		October 2009	825	7.24	--	10	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
Ramona Spring	Not sampled due to access	September 2005	--	--	--	--	--
		June 2006	--	--	--	--	--
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		May 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
SE John Grub Spring	Dry	September 2005	524.5	7.04	--	15.6	358.5
		May 2006	509.5	7.86	-49	24.4	336.9
		October 2007	980.1	7.29	-68	18.4	513
		October 2008	528	7.18	63.5	12.37	342
		June 2009	542	6.58	12	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	428	7.08	16	23.6	213
		May 2012	341	7.13	-18.1	25.6	170
		May 2013	--	--	--	--	--
Section 10U Spring	Not sampled due to access	September 2005	458.1	7.27	131	10.9	314.7
		May 2006	489.9	7.18	521	20.0	328.2
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		June 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
		September 2005	412.2	7.93	--	20.2	277.5
		May 2006	372.9	7.48	79	13.3	251.5
		October 2007	394.7	7.92	0	10.7	198.7

TABLE 5
NATURAL SPRINGS FIELD OBSERVATIONS AND MEASUREMENTS
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

ELM RIDGE RESOURCES, INC. AND PETROX RESOURCES, INC.

Natural Spring	2013 Field Observations/ Notes	Date	Water Quality Field Measurements				
			Conductivity (µS/cm)	pH (Units)	ORP (mV)	Temperature (^{0}C)	TDS (ppm)
Section 14 (Reich) Spring	Sampled	October 2008	445.0	7.09	45.00	8.61	290
		June 2009	607	6.89	--	9	--
		October 2009	--	--	--	NM	--
		July 2010	404	6.77	--	10.7	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	661	7.3	37.4	8	329
Seep Spring	Not located	September 2005	--	--	--	--	--
		May 2006	--	--	--	--	--
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		May 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
Spring 1212	Not sampled due to access	October 2005	420	6.59	--	9.1	--
		June 2006	356.6	7.29	75	15.3	243.9
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		May 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
Spring 3424	Not Sampled due to access	September 2005	725.2	6.86	71	16.5	504
		May 2006	641.5	7.97	-98	17.3	436.7
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		June 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
Thick Spring	Sampled	September 2005	--	--	--	--	--
		May 2006	325.6	7.80	120	11.7	214.6
		October 2007	376.5	7.74	32	12.9	192.2
		October 2008	--	--	--	--	--
		May 2009	54.6	7.52	--	12.3	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	408	7.01	40	11.4	203
		May 2012	457	6.51	22.6	7.12	229
		May 2013	836	7.1	69.7	12.4	448
Townsend Spring	Dry	September 2005	--	--	--	--	--
		May 2006	--	--	--	--	--
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		May 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
Vance Meadow Spring	Dry	September 2005	--	--	--	--	--
		June 2006	459.9	7.2	-60	16.5	310.9
		October 2007	389.8	7.2	-67	12.2	195.1
		October 2008	476.0	7.9	249.60	8.00	308
		June 2009	455	7.23	--	13.7	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	365	7.24	22.9	16.9	182
		May 2012	360	8.3	33.1	18.1	179
		May 2013	--	--	--	--	--

TABLE 5
NATURAL SPRINGS FIELD OBSERVATIONS AND MEASUREMENTS
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

ELM RIDGE RESOURCES, INC. AND PETROX RESOURCES, INC.

Natural Spring	2013 Field Observations/ Notes	Date	Water Quality Field Measurements				
			Conductivity (µS/cm)	pH (Units)	ORP (mV)	Temperature (^{0}C)	TDS (ppm)
Vance Spring #1	Sampled	September 2005	--	--	--	--	--
		May 2006	404	7.75	-12	11.6	269.6
		October 2007	417.1	7.34	519	9.6	213.2
		October 2008	464.0	7.2	120.30	7.20	302
		May 2009	399	7.88	--	12.8	--
		October 2009	481	7.41	--	6.8	--
		July 2010	421	7.13	--	15.8	--
		May 2011	298	6.72	6	10.7	151
		May 2012	332	6.86	51.2	8.72	166
		May 2013	505	6.9	30.9	15.4	253
Vaughn Spring	Not Sampled due to access	September 2005	--	--	--	--	--
		June 2006	730.7	7.55	521	20.1	509.5
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		June 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
Walt Spring #1	Sampled	September 2005	--	--	--	--	--
		May 2006	524	7.9	86	12.1	345.4
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		May 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	207	7.41	93.2	11.4	155
		May 2012	--	--	--	--	--
		May 2013	512	6.9	92.7	13	242
Watson Well Spring	Sampled	September 2005	--	--	--	--	--
		June 2006	745.5	7.29	34	13.0	507.7
		October 2007	--	--	--	--	--
		October 2008	869.0	6.9	273.20	13.90	565
		May 2009	705	6.9	--	9.9	--
		October 2009	852	6.9	--	13.4	--
		July 2010	570	6.75	--	17.8	--
		May 2011	--	--	--	--	--
		May 2012	836	6.46	9.5	20.3	418
		May 2013	903	7.2	--	10.3	453
Waypoint 0003 Spring	Not Located	September 2005	--	--	--	--	--
		May 2006	--	--	--	--	--
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		June 2009	--	--	--	--	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	--	--	--	--	--
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--
Willow Spring	Sampled	September 2005	--	--	--	--	--
		May 2006	252.9	7.39	122	14.0	178.7
		October 2007	318.3	7.42	508	13.9	161.4
		October 2008	325.0	7.09	243.40	6.60	211
		June 2009	285	7.54	--	10.4	--
		October 2009	--	--	--	--	--
		July 2010	284	6.7	--	12.4	--
		May 2011	277	6.3	116.5	10.4	139
		May 2012	335	6.79	29.5	10.56	167
		May 2013	341	7.2	35.9	14.2	172
Wood/Corrigan Spring	Dry	September 2005	--	--	--	--	--
		June 2006	--	--	--	--	--
		October 2007	--	--	--	--	--
		October 2008	--	--	--	--	--
		May 2009	480	6.96	--	7.5	--
		October 2009	--	--	--	--	--
		July 2010	--	--	--	--	--
		May 2011	476	7.13	279.2	12.1	241
		May 2012	--	--	--	--	--
		May 2013	--	--	--	--	--

Notes:

µS/cm - microSiemens per centimeter
ORP - oxidation reduction potential
mV - millivolts
^{0}C - degrees celsius
TDS - total dissolved solids
ppm - parts per million
-- denotes not measured

* natural spring discontinued from sampling program due to its location in vicinity of Corrigan Spring
**natural spring discontinued from sampling program due to location of spring outside of Kf outcrop and/or BLM outcrop zone

TABLE 6
NATURAL SPRINGS WATER FLOW RATE MEASURMENTS
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

ELM RIDGE RESOURCES, INC. AND PETROX RESOURCES, INC.

NATURAL SPRING	FLOW RATES (Gallons/Minute)									
	September 2005	May/June 2006	October 2007	October 2008	May/June 2009	October 2009	July 2010	May 2011	May 2012	May 2013
Beaver Creek	--	--	7	--	--	--	--	--	--	Discontinued*
Big Hole Spring	--	<1	--	--	--	--	--	--	--	--
Candelaria A Spring	--	--	--	--	--	--	--	--	--	--
Candelaria B Spring	--	--	--	--	--	--	--	--	--	--
Corrigan Spring	--	--	--	--	--	--	--	--	--	--
Crain Spring	--	--	--	0.2	2.66	--	2	--	--	0.04
Gov-1 Spring	--	--	--	--	--	--	--	--	--	--
Gov-2 Spring	--	--	--	--	--	--	--	--	--	0.35
Gov-3 Spring	--	--	--	--	--	--	--	--	--	--
Grassy Spring	--	--	<0.25	--	--	--	--	--	--	0.11
High Watson Spring	--	--	--	--	--	--	--	--	--	Discontinued**
Miser Spring & Pipeline	--	--	--	--	--	--	--	--	--	Discontinued**
Munger Spring 1	--	--	--	--	--	--	--	--	--	--
Munger Spring 2	--	--	--	--	--	--	--	--	--	0.16
Munger Spring 3	--	--	--	--	--	--	--	--	--	--
Munger Spring 4	--	--	--	--	--	--	--	--	--	--
NW John Grub Spring	0.1	<1	<0.5	0.9	--	--	--	--	--	--
Ramona Leonard Spring (Mona)	--	0.6	0.4	0.75	1.3	0.24	--	--	--	--
Ramona Spring	--	--	--	--	--	--	--	--	--	--
SE John Grub Spring	0.25	<1	<0.25	0	--	--	--	--	--	--
Section 10U Spring	0.9	1	--	--	--	--	--	--	--	--
Section 14 (Reich) Spring	--	<1	<0.5	0	1.5	--	1.3	--	--	2.18
Seep Spring	--	--	--	--	--	--	--	--	--	--
Spring 1212	--	5.28	--	--	--	--	--	--	--	--
Spring 3424	1	1	--	--	--	--	--	--	--	--
Thick Spring	--	2	<1	--	--	--	--	0.2	0.15	0.12
Townsend Spring	--			--	--	--	--	--	--	--
Vance Meadow Spring	--	<0.5	<0.5	0	--	--	0.27	0.2	--	--
Vance Spring #1	--	1	<0.5	0	1.9	0.2	--	0.4	0.53	0.14
Vaughn Spring	--	<1	--	--	--	--	--	--	--	--
Walt Spring #1	--	--	<1	--	--	--	--	0.4	--	0.14
Watson Well Spring	--	--	--	--	--	--	--	--	0.88	--
Waypoint 0003 Spring	--	--	--	--	--	--	--	--	--	--
Willow Spring	--	1	<0.25	0.03	0.6	--	0.5	0.3	1.06	0.24
Wood/Corrigan Spring	--	--	--	--	--	--	--	0.3	--	--

Notes:
-- denotes no measurement taken
< - less than designated flow rate
* natural spring discontinued from sampling program due to its location in vicinity of Corrigan Spring
**natural spring discontinued from sampling program due to location of spring outside of Kf outcrop and/or BLM outcrop zone

TABLE 7
NATURAL SPRINGS ANALYTICAL RESULTS - DISSOLVED METHANE
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

ELM RIDGE RESOURCES, INC. AND PETROX RESOURCES, INC.

NATURAL SPRING	METHANE CONCENTRATIONS (mg/L)									
	September 2005	May/June 2006	October 2007	October 2008	May/June 2009	October 2009	July 2010	May 2011	May 2012	May 2013
Beaver Creek	--	NS	<0.02	<0.02	--	--	--	--	--	Discontinued*
Big Hole Spring	--	0.001	--	--	--	--	--	--	--	--
Candelaria A Spring	--	--	--	--	--	--	--	--	--	--
Candelaria B Spring	--	--	--	--	--	--	--	--	--	--
Corrigan Spring	--	<0.001	--	--	<0.02	--	--	<0.02	<0.02	--
Crain Spring	--	0.0067	--	<0.02	<0.02	--	<0.02	--	--	<0.02
Gov-1 Spring	--	--	--	--	--	--	--	--	--	--
Gov-2 Spring	--	--	--	--	--	--	--	--	--	<0.02
Gov-3 Spring	--	--	--	--	--	--	--	--	--	--
Grassy Spring	--	--	<0.02	--	--	--	--	--	--	<0.02
High Watson Spring	--	--	--	--	--	--	--	--	--	Discontinued**
Miser Spring & Pipeline	--	--	--	--	--	--	--	--	--	Discontinued**
Munger Spring 1	--	--	--	--	--	--	--	--	--	--
Munger Spring 2	--	--	--	--	--	--	--	--	--	<0.02
Munger Spring 3	--	--	--	--	--	--	--	--	--	--
Munger Spring 4	--	--	--	--	--	--	--	--	--	--
NW John Grub Spring	0.015	0.0016	0.30	0.03	0.07	--	0.07	0.03	0.27	--
Ramona Leonard Spring (Mona)	<0.0005	<0.001	<0.02	<0.02	<0.02	<0.02	--	--	--	--
Ramona Spring	--					--	--	--	--	--
SE John Grub Spring	<0.0005	0.0025	0.65	<0.02	0.02	--	--	0.023	0.29	--
Section 10U Spring	<0.0005	0.0062	--	--	--	--	--	--	--	--
Section 14 (Reich) Spring	0.0006	<0.001	0.02	0.02	<0.02	--	--	--	--	<0.02
Seep Spring	--	--	--	--	--	--	--	--	--	--
Spring 1212	0.0005	<0.001	--	--	--	--	--	--	--	--
Spring 3424	0.0017	0.023	--	--	--	--	--	--	--	--
Thick Spring	--	<0.001	<0.02	--	<0.02	--	--	<0.02	<0.02	<0.02
Townsend Spring	--	--	--	--	--	--	--	--	--	--
Vance Meadow Spring	--	0.011	0.06	<0.02	<0.02	--	--	<0.02	<0.02	--
Vance Spring #1	--	0.022	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Vaughn Spring	--	0.0037	--	--	--	--	--	--	--	--
Walt Spring #1	--	<0.001	--	--	--	--	--	<0.02	--	<0.02
Watson Well Spring	--	0.016	--	<0.02	<0.02	<0.02	--	--	<0.02	--
Waypoint 0003 Spring	--	--	--	--	--	--	--	--	--	--
Willow Spring	--	<0.001	<0.02	<0.02	<0.02	--	<0.02	--	<0.02	<0.02
Wood/Corrigan Spring	--	--	--	--	--	--	--	--	--	--

Notes:

mg/L - milligrams per liter

'-- denotes a sample was not collected/analyzed

< - indicates not detected above the detection limit

* natural spring discontinued from sampling program due to its location in vicinity of Corrigan Spring

**natural spring discontinued from sampling program due to location of spring outside of Kf outcrop and/or BLM outcrop zone

APPENDIX A

COGCC RESERVOIR ANALYTICAL DATA

Desorbed Gas Content Summary

Sample	Depth	Mass	Lost Gas Time	Lost Gas Fraction	Measured Gas Fraction	Crushed Gas Fraction	Lost Gas Content	Measured Gas Content	Crushed Gas Content	Total Air-Dry Gas Content	Total Dry, Ash-Free Gas Content	Total In-Situ Gas Content
	feet	g	hours	%	%	%	scf/ton	scf/ton	scf/ton	scf/ton	scf/ton	scf/ton
Fruitland Coals												
41680-1	228.30	2,093.0	1.42	5.67	40.14	54.19	5.1	35.9	48.5	89.6	122.8	89.7
41680-2	229.50	2,044.0	1.23	6.26	49.38	44.36	7.3	57.2	51.4	115.9	137.0	115.4
41680-3	271.00	2,129.0	1.45	10.99	68.73	20.28	21.4	133.9	39.5	194.8	252.5	192.8
41680-4	271.95	1,443.0	1.03	5.95	64.09	29.95	12.3	132.6	62.0	206.9	267.3	206.6
41680-5	274.00	2,060.0	1.28	6.63	56.18	37.19	7.6	64.0	42.4	114.0	268.5	113.6
Average	-	-	*1.28*	*7.10*	*55.70*	*37.19*	*10.7*	*84.7*	*48.8*	*144.2*	*209.6*	*143.6*

Diffusivity and Sorption Time Summary

Sample	Top Depth	Bottom Depth	Sorption Time	Diffusivity
	feet	feet	hours	1/us
Fruitland Coals				
41680-1	227.80	228.80	335.0	0.055
41680-2	229.00	230.00	238.2	0.078
41680-3	270.50	271.50	91.6	0.202
41680-4	271.60	272.30	214.3	0.086
41680-5	273.50	274.50	216.9	0.085
Average	-	-	*219.2*	*0.101*

Density Summary

Sample	Top Depth	Bottom Depth	Air-Dry Helium Density	In-Situ Helium Density
	feet	feet	g/cc	g/cc
Fruitland Coals				
41680-1	227.80	228.80	1.433	1.435
41680-2	229.00	230.00	1.339	1.333
41680-3	270.50	271.50	1.518	1.503
41680-4	271.60	272.30	1.429	1.427
41680-5	273.50	274.50	1.751	1.744
Average	-	-	*1.494*	*1.489*

Air-Dry Proximate Analysis Summary

Sample	Top Depth	Bottom Depth	Moisture Holding Capacity	Air-Dry Moisture Content	Air-Dry Ash Content
	feet	feet	wt frac	wt frac	wt frac
41680-1	227.80	228.80	0.01960	0.02087	0.24477
41680-2	229.00	230.00	0.01187	0.00793	0.13990
41680-3	270.50	271.50	0.02004	0.01027	0.21250
41680-4	271.60	272.30	0.01401	0.01260	0.20710
41680-5	273.50	274.50	0.02094	0.01747	0.52107
Average	-	-	*0.01729*	*0.01383*	*0.26507*

In-Situ Proximate Analysis Summary

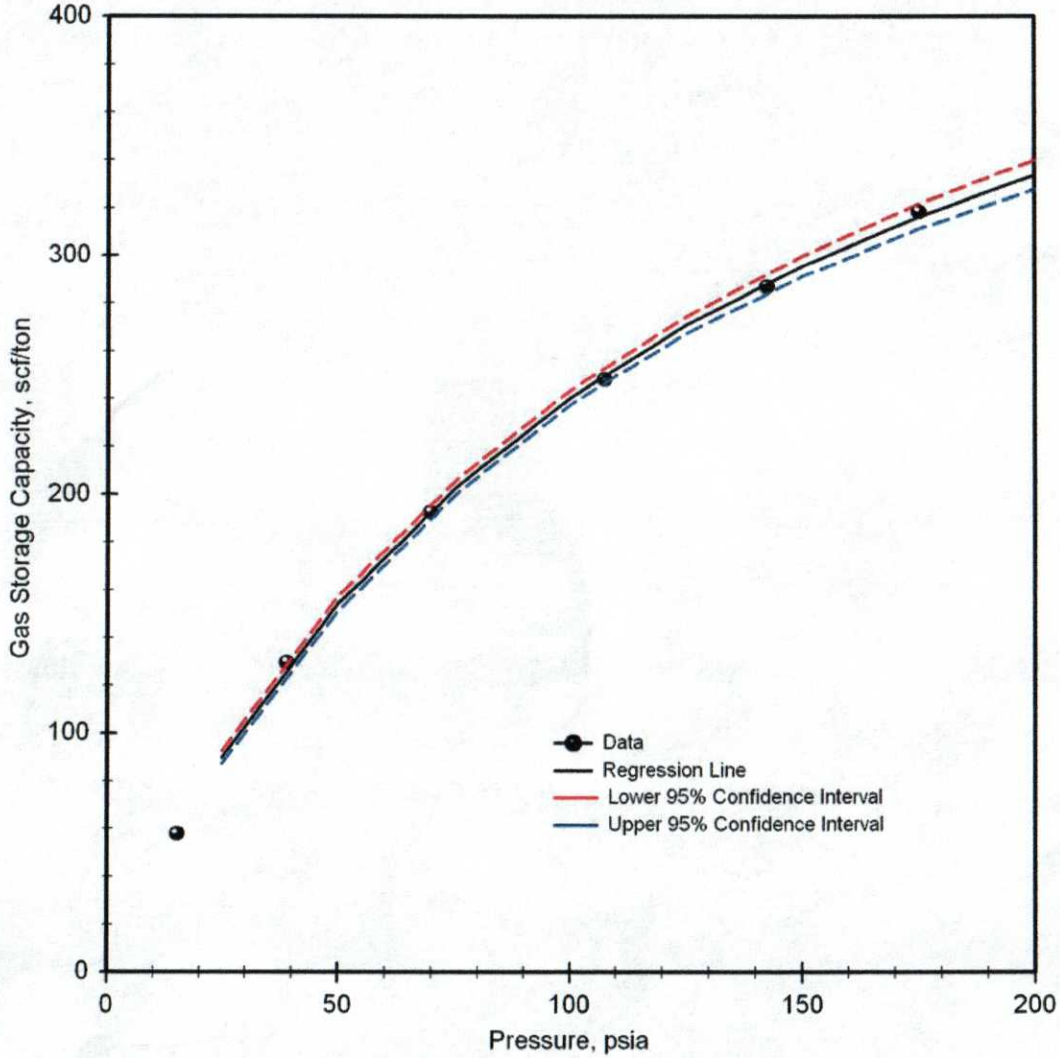
Sample	Top Depth	Bottom Depth	In-Situ Moisture Content	In-Situ Ash Content
	feet	feet	wt frac	wt frac
41680-1	227.80	228.80	0.01960	0.24508
41680-2	229.00	230.00	0.01187	0.13934
41680-3	270.50	271.50	0.02004	0.21040
41680-4	271.60	272.30	0.01401	0.20680
41680-5	273.50	274.50	0.02094	0.51922
Average	-	-	*0.01729*	*0.26417*

Adsorbed Gas Composition Summary

Sample	Top Depth	Bottom Depth	C1	C2	C3+	O2	N2	CO2	H2	Total
	feet	feet	mole frac	mole frac	mole frac	mole frac	mole frac	mole frac	mole frac	mole frac
Fruitland Coals										
41680-2	229.00	230.00	0.9703	0.0029	0.0005	0.0000	0.0000	0.0256	0.0007	1.0000
41680-4	271.60	272.30	0.9512	0.0019	0.0107	0.0000	0.0000	0.0359	0.0003	1.0000
41680-5	273.50	274.50	0.9557	0.0020	0.0003	0.0000	0.0000	0.0365	0.0056	1.0000
Average	-	-	*0.9591*	*0.0023*	*0.0038*	*0.0000*	*0.0000*	*0.0327*	*0.0022*	*1.0000*

Soulder, Miller & Associates, HWY 151 34-4-39 MW#1

Sample 41680-2 Adsorption Isotherm Data



Weatherford
LABORATORIES

Sample 41680-4 Adsorption Isotherm Parameters

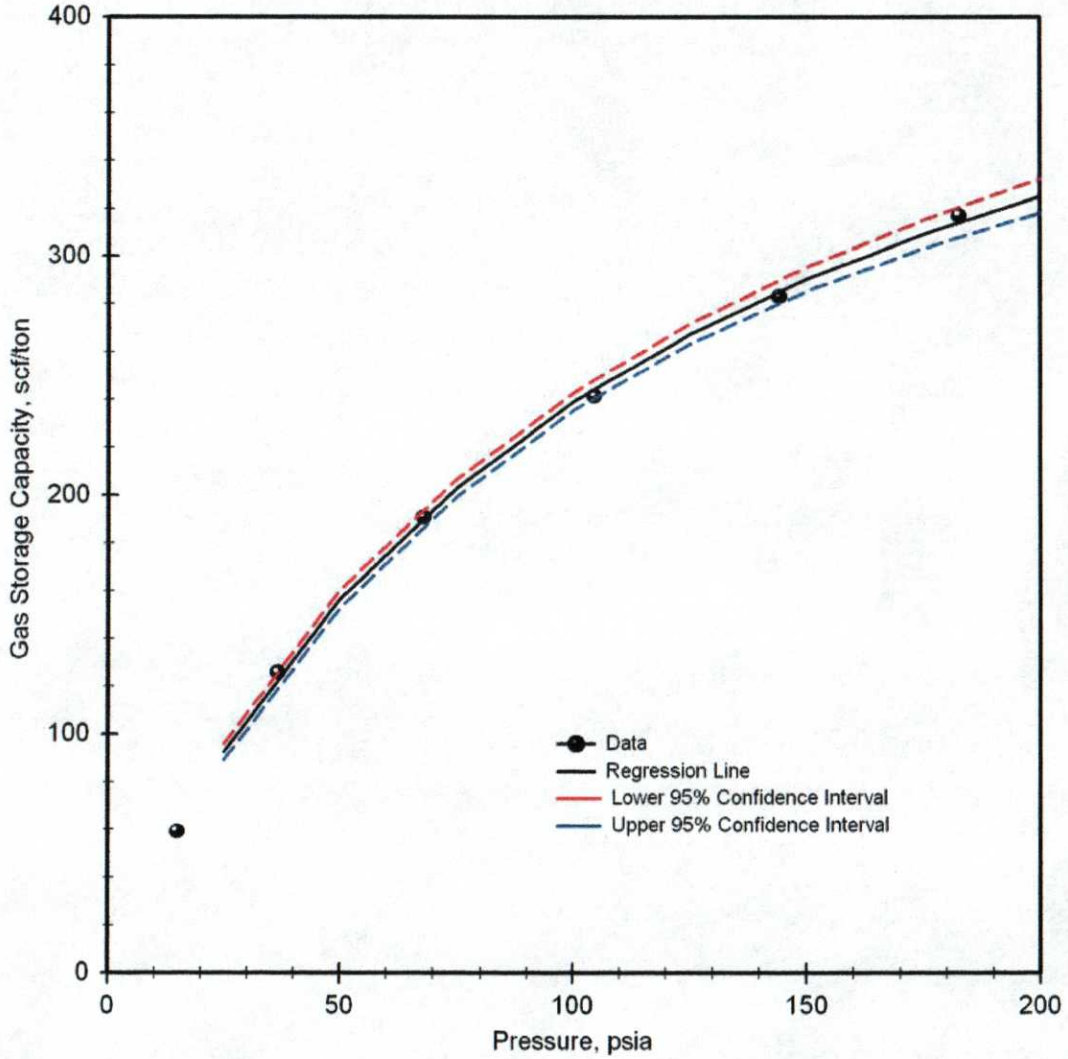
Sample ID	Unit	41680-4
Top Depth	ft	271.60
Bottom Depth	ft	272.30
Isotherm Parameters		
Measurement Gas	-	methane
Measurement Temperature	Deg. F.	60.08
In-Situ Sample Characterization		
Crushed Density	g/cc	1.4268
Moisture Holding Capacity	wt frac	0.0153
Ash Content	wt frac	0.2068
Organic Content	wt frac	0.7716
Sulfur Content	wt frac	0.0063
Langmuir Parameters		
Number of Points	-	6
Regression Coefficient	-	0.99954
Langmuir Storage Capacity, daf	scf/ton	657.02
Langmuir Storage Capacity, In-Situ	scf/ton	506.96
Langmuir Storage Capacity Range, In-Situ	scf/ton	3.40
Langmuir Pressure	psia	112.00
Langmuir Pressure Range	psia	3.02

Sample 41680-4 Adsorption Isotherm Data

Pressure	Storage Capacity, in-situ
psia	scf/ton
14.798	59.370
36.578	126.023
67.650	190.829
104.451	241.719
144.039	283.243
182.599	317.028

Soulder, Miller & Associates, HWY 151 34-4-39 MW#1

Sample 41680-4 Adsorption Isotherm Data



Weatherford LABORATORIES

Sample 41680-2 Adsorption Isotherm Parameters

Sample ID	Unit	41680-2
Top Depth	ft	229.00
Bottom Depth	ft	230.00
Isotherm Parameters		
Measurement Gas	-	methane
Measurement Temperature	Deg. F.	60.08
In-Situ Sample Characterization		
Crushed Density	g/cc	1.3334
Moisture Holding Capacity	wt frac	0.0131
Ash Content	wt frac	0.1393
Organic Content	wt frac	0.8411
Sulfur Content	wt frac	0.0065
Langmuir Parameters		
Number of Points	-	6
Regression Coefficient	-	0.99962
Langmuir Storage Capacity, daf	scf/ton	646.40
Langmuir Storage Capacity, In-Situ	scf/ton	543.66
Langmuir Storage Capacity Range, In-Situ	scf/ton	2.47
Langmuir Pressure	psia	125.97
Langmuir Pressure Range	psia	2.85

Sample 41680-2 Adsorption Isotherm Data

Pressure	Storage Capacity, in-situ
psia	scf/ton
15.056	57.958
38.840	129.783
69.568	192.604
107.294	248.129
142.236	286.951
175.162	318.396

-Monitoring wells-

Chris Carroll
Colorado Geological Survey
1313 Sherman St, Rm 715
Denver, CO 80203

Date: February 25, 2011
Request Number: 28987
Date Received: 2-10-11
Lab Number: M7383
Sample ID: **Hwy 51 270'**

REPORT OF ANALYSIS

Proximate Analysis Method: ASTM D-5142	As Received	Moisture Free	MAF Basis
Moisture, wt%	0.89	******	******
Ash, wt%	28.54	28.80	******
Volatile Matter, wt%	22.45	22.65	31.81
Fixed Carbon, wt%	48.12	48.55	68.19
Total	100.00	100.00	100.00

Ultimate Analysis Method: ASTM D5142/5373			
Moisture, wt%	0.89	******	******
Ash, wt%	28.54	28.80	******
Carbon, wt%	60.55	61.10	85.81
Hydrogen, wt%	3.40	3.43	4.82
Nitrogen, wt%	1.06	1.07	1.50
Sulfur, wt%	5.22	5.26	7.39
Oxygen, wt%	0.34	0.34	0.48
Total	100.00	100.00	100.00

Heating Value, Btu/lb Method: ASTM D-5865	10,630	10,726	15,064

Hydrogen and Oxygen values reported do not include hydrogen and oxygen in the free moisture associated with the sample.

Total Metals Analysis Method: 3052/6020		Reporting limit, mg/kg
Chromium, mg/kg	1.51	0.01
Arsenic, mg/kg	12.4	0.01
Selenium, mg/kg	19.1	0.01
Silver, mg/kg	0.104	0.01
Cadmium, mg/kg	0.221	0.01
Barium, mg/kg	105	0.01
Mercury, mg/kg	0.063	0.01
Lead, mg/kg	24.7	0.01

Monte L. Ellis
Laboratory Manager

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Chris Carroll
Colorado Geological Survey
1313 Sherman St, Rm 715
Denver, CO 80203

Date: February 25, 2011
Request Number: 28987
Date Received: 2-10-11
Lab Number: M7384
Sample ID: **Los Pinos 416'**

REPORT OF ANALYSIS

Proximate Analysis Method: ASTM D-5142	As Received	Moisture Free	MAF Basis
Moisture, wt%	1.26	******	******
Ash, wt%	24.96	25.28	******
Volatile Matter, wt%	27.63	27.98	37.45
Fixed Carbon, wt%	46.15	46.74	62.55
Total	100.00	100.00	100.00

Ultimate Analysis Method: ASTM D5142/5373			
Moisture, wt%	1.26	******	******
Ash, wt%	24.96	25.28	******
Carbon, wt%	62.89	63.69	85.24
Hydrogen, wt%	3.76	3.81	5.10
Nitrogen, wt%	1.24	1.26	1.69
Sulfur, wt%	0.90	0.91	1.21
Oxygen, wt%	4.99	5.05	6.76
Total	100.00	100.00	100.00

Heating Value, Btu/lb Method: ASTM D-5865	10,867	11,005	14,729

Hydrogen and Oxygen values reported do not include hydrogen and oxygen in the free moisture associated with the sample.

Total Metals Analysis Method: 3052/6020		Reporting limit, mg/kg
Chromium, mg/kg	1.58	0.01
Arsenic, mg/kg	1.92	0.01
Selenium, mg/kg	9.26	0.01
Silver, mg/kg	0.073	0.01
Cadmium, mg/kg	0.312	0.01
Barium, mg/kg	111	0.01
Mercury, mg/kg	0.048	0.01
Lead, mg/kg	13.4	0.01

Monte L. Ellis
Laboratory Manager

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Chris Carroll
Colorado Geological Survey
1313 Sherman St, Rm 715
Denver, CO 80203

Date: February 25, 2011
Request Number: 28987
Date Received: 2-10-11
Lab Number: M7385
Sample ID: **Fosset Gulch 487'**

REPORT OF ANALYSIS

Proximate Analysis Method: ASTM D-5142	As Received	Moisture Free	MAF Basis
Moisture, wt%	0.91	******	******
Ash, wt%	14.27	14.40	******
Volatile Matter, wt%	26.89	27.14	31.71
Fixed Carbon, wt%	57.93	58.46	68.29
Total	100.00	100.00	100.00

Ultimate Analysis Method: ASTM D5142/5373			
Moisture, wt%	0.91	******	******
Ash, wt%	14.27	14.40	******
Carbon, wt%	75.67	76.37	89.22
Hydrogen, wt%	4.17	4.20	4.91
Nitrogen, wt%	1.45	1.47	1.71
Sulfur, wt%	0.79	0.79	0.93
Oxygen, wt%	2.74	2.77	3.23
Total	100.00	100.00	100.00

Heating Value, Btu/lb Method: ASTM D-5865	13,203	13,324	15,567

Hydrogen and Oxygen values reported do not include hydrogen and oxygen in the free moisture associated with the sample.

Total Metals Analysis Method: 3052/6020		Reporting limit, mg/kg
Chromium, mg/kg	0.932	0.01
Arsenic, mg/kg	3.32	0.01
Selenium, mg/kg	16.8	0.01
Silver, mg/kg	0.107	0.01
Cadmium, mg/kg	0.148	0.01
Barium, mg/kg	83.7	0.01
Mercury, mg/kg	0.174	0.01
Lead, mg/kg	4.71	0.01

Monte L. Ellis
Laboratory Manager

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Chris Carroll
Colorado Geological Survey
1313 Sherman St, Rm 715
Denver, CO 80203

Date: February 25, 2011
Request Number: 28987
Date Received: 2-10-11
Lab Number: M7386
Sample ID: **Basin Creek 589'**

REPORT OF ANALYSIS

Proximate Analysis Method: ASTM D-5142	As Received	Moisture Free	MAF Basis
Moisture, wt%	1.16	******	******
Ash, wt%	25.27	25.56	******
Volatile Matter, wt%	26.09	26.40	35.46
Fixed Carbon, wt%	47.48	48.04	64.54
Total	100.00	100.00	100.00

Ultimate Analysis Method: ASTM D5142/5373			
Moisture, wt%	1.16	******	******
Ash, wt%	25.27	25.56	******
Carbon, wt%	64.05	64.80	87.06
Hydrogen, wt%	3.65	3.69	4.96
Nitrogen, wt%	1.15	1.17	1.57
Sulfur, wt%	0.49	0.49	0.66
Oxygen, wt%	4.23	4.29	5.75
Total	100.00	100.00	100.00

Heating Value, Btu/lb Method: ASTM D-5865	10,995	11,124	14,943

Hydrogen and Oxygen values reported do not include hydrogen and oxygen in the free moisture associated with the sample.

Total Metals Analysis Method: 3052/6020		Reporting limit, mg/kg
Chromium, mg/kg	1.24	0.01
Arsenic, mg/kg	3.72	0.01
Selenium, mg/kg	21.4	0.01
Silver, mg/kg	0.094	0.01
Cadmium, mg/kg	0.129	0.01
Barium, mg/kg	46.0	0.01
Mercury, mg/kg	0.574	0.01
Lead, mg/kg	13.4	0.01

Monte L. Ellis
Laboratory Manager

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Laramie, WY 82070 Fax: (307) 721-8956

Chris Carroll
Colorado Geological Survey
1313 Sherman St, Rm 715
Denver, CO 80203

Date: February 25, 2011
Request Number: 28987
Date Received: 2-10-11
Lab Number: M7387
Sample ID: **Wagon Gulch 816'**

REPORT OF ANALYSIS

Proximate Analysis Method: ASTM D-5142	As Received	Moisture Free	MAF Basis
Moisture, wt%	1.41	******	******
Ash, wt%	30.68	31.12	******
Volatile Matter, wt%	26.07	26.44	38.38
Fixed Carbon, wt%	41.84	42.44	61.62
Total	100.00	100.00	100.00

Ultimate Analysis Method: ASTM D5142/5373			
Moisture, wt%	1.41	******	******
Ash, wt%	30.68	31.12	******
Carbon, wt%	57.86	58.68	85.19
Hydrogen, wt%	3.51	3.56	5.16
Nitrogen, wt%	1.04	1.06	1.54
Sulfur, wt%	0.59	0.59	0.86
Oxygen, wt%	4.91	4.99	7.25
Total	100.00	100.00	100.00

Heating Value, Btu/lb Method: ASTM D-5865	10,133	10,277	14,919

Hydrogen and Oxygen values reported do not include hydrogen and oxygen in the free moisture associated with the sample.

Total Metals Analysis Method: 3052/6020		Reporting limit, mg/kg
Chromium, mg/kg	1.16	0.01
Arsenic, mg/kg	2.02	0.01
Selenium, mg/kg	11.7	0.01
Silver, mg/kg	0.09	0.01
Cadmium, mg/kg	0.203	0.01
Barium, mg/kg	127	0.01
Mercury, mg/kg	0.034	0.01
Lead, mg/kg	11.4	0.01

Monte L. Ellis
Laboratory Manager

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Laramie, WY 82070 Fax: (307) 721-8956

RESULTS FOR THE COGCC CORE SAMPLES

Several decades ago, the Colorado Oil and Gas Conservation Commission had cores cut in the Fruitland Coal in several places. These cores were eventually housed at the U.S. Geological Survey's Core Research Center where they were available for sampling for this study. The cores form a line about 7 miles long that trends northwest to southeast across Township 34 North, Range 5 West in Archuleta County. The northwesternmost well is the Wagon Gulch 34-5-4 #2 in Section 4 (SW SW) and the middle well is the Fosset Gulch 34-5-14 #2 in Section 14 (SE SE) of the same township. The southeastern well in this line is the Hwy 151 34-4-30 in SW NW Section 30, T34N, R4W. Core depths range from 228 ft in the Hwy 151 well to the southeast to 816 ft in the Wagon Gulch well in Section 4. It is assumed that these are all vertical wells. Four of the samples are organic-rich coals with 33.7 to 78.6% TOC. The other two samples are carbonaceous shales with 0.95 to 2.28% TOC.

The S1 values in these shallow core samples range from 0.44 mg HC/g in the shale from 488 ft in the Section 14 well to 8 in the coal from 529 ft in the same well. Because the cores were not preserved, the S1 value probably has little significance.

The S2 values, which indicate the amount of hydrocarbon that can be generated from the organic matter in a sample, ranged from a very low 1.21 mg HC/g of sample in the shale from Section 4 to 213 mg HC/g in the coal from 761 ft in the northwestern well in Section 4. These are high S2 values and indicate excellent hydrocarbon source potential as would be expected for coals.

The S3 values, which measure the amount of carbon dioxide, are all low ranging from 0.09 in the shale in Section 14 to 1.73 in the high S2 sample from 71 to 2.8 in the Section 4 well to the northwest.

Tmax values for the shallow core samples ranged from 455°C in a coal from the Section 14 middle well to 466°C in the coal sample from 816 ft in the Section 4 well to the northwest. The average Tmax for all six of these samples is 461°C so all have very similar thermal maturities that convert to calculated Ro values of 1.03 to 1.23%. This puts the Fruitland Coal in all three shallow cores in the wet gas window where oil is breaking down to gas with some residual liquid components. These thermal maturities are comparable to those for the Candelaria 1003 well drilled by Petrox, but somewhat cooler than those measured for the Ellison 33-5 and Fossil Gulch 16U-1 coalbed wells.

COGCC monitoring well samples

GeoMark
Petroleum Services Division

Source Rock Analyses

TOC, Rock-Eval and Maturity Testing

USGS Library Number (S098, R950, R951)

Mark W. Longman

February 28, 2012

218 Higgins Street
Humble, TX 77338
832.644.1184

GeoMark Research, Ltd.

9748 Whithorn Drive
Houston, TX 77095
281.856.9333

Client: Mark W. Longman
Field/Well: USGS Library Number (R950, R951, S098)
Geomark ID: RLON-120101
Source Rock Analyses

GeoMark

SOURCE ROCK ANALYSES

GeoMark Research, Ltd.

Mark W. Longman

USGS Library Number (S098, R950, R951).

Sample ID										Source Rock Analyses												
Project / Sample ID	Rock ID	Well Name	County	State	Formation Name	Upper Depth (ft)	Lower Depth (ft)	Median Depth (ft)	Sample Type	Percent Carbonate (wt%)	Leco TOC (wt% HC)	Rock-Eval S1 (mg HC/g)	Rock-Eval S2 (mg HC/g)	Rock-Eval S3 (mg CO2/g)	Tmax (°C)	Measured %Ro (Vitrinite Refl.)	Calculated %Ro (RE TMAX)	Hydrogen Index (S2x100/TOC)	Oxygen Index (S3x100/TOC)	S2/S3 Conc. (mg HC/mg CO2)	S1/TOC Norm. Oil Content	Production Index (S1/(S1+S2)	Experimental Notations
RLON-120101-001	S098					226.00		226.00			66.30	4.50	188.46	1.53	460		1.12	284	2	123	7	0.02	Low Temp S2 Shoulder
RLON-120101-002	S098					276.00		276.00			2.28	1.10	3.40	0.12	466		1.21	149	5	28	48	0.24	Low Temp S2 Shoulder
RLON-120101-003	R950					488.00		488.00			0.95	0.44	1.21	0.09	457		1.07	127	9	13	46	0.27	Low Temp S2 Shoulder
RLON-120101-004	R950					529.00		529.00			59.30	8.90	193.92	1.64	455		1.03	327	3	118	13	0.04	Low Temp S2 Shoulder
RLON-120101-005	R951					761.00		761.00			78.60	4.09	213.12	1.73	462		1.16	271	2	123	5	0.02	Low Temp S2 Shoulder
RLON-120101-006	R951					816.00		816.00			33.70	2.22	75.81	0.54	466		1.23	225	2	140	7	0.03	Low Temp S2 Shoulder

1GeoMark Source Rock Services
218 Higgins Street
Humble, TX 77338
(832) 644.1184
info@ geomarkresearch.com
February 28, 2012

Client: Mark W. Longman
Field/Well: USGS Library Number (R950, R951, S098)
Geomark ID: RLON-120101
Source Rock Analyses

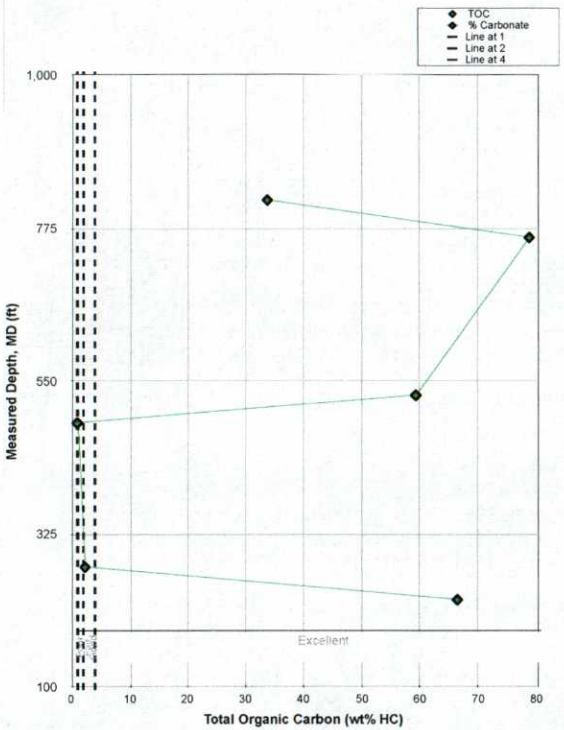
GeoMark

SOURCE ROCK ANALYSES

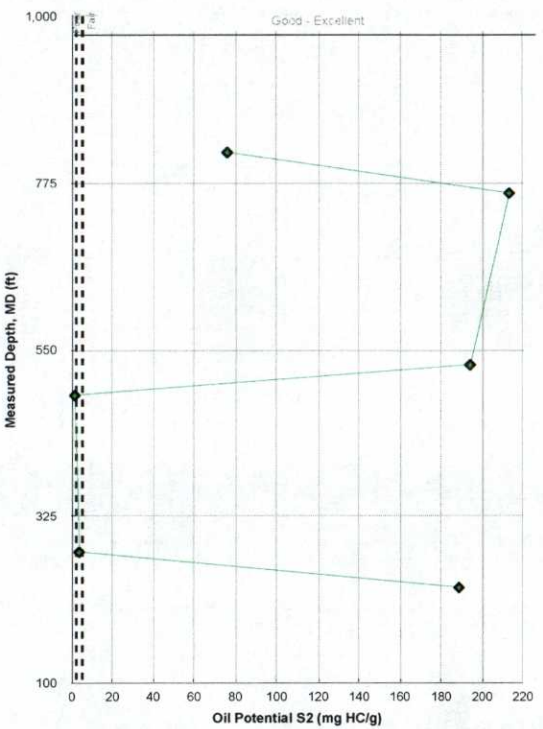
GeoMark Research, Ltd.

Mark W. Longman | USGS Library Number (S098, R950, R951),

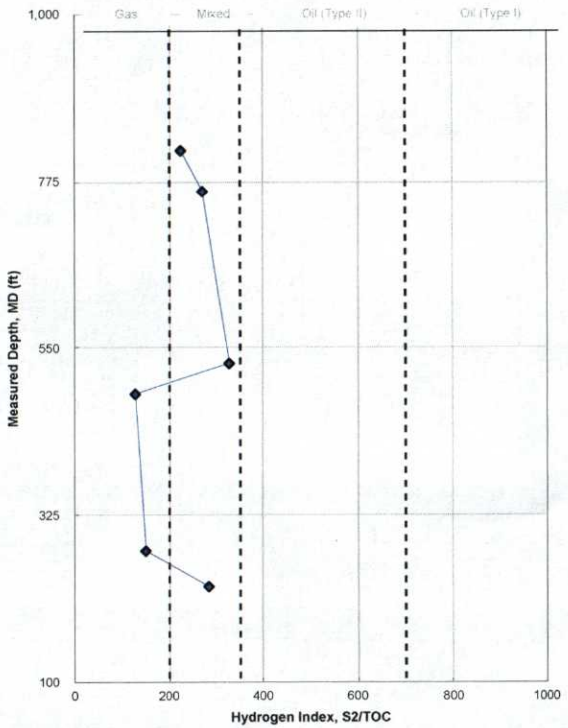
Total Organic Carbon
% Carbonate



Oil Potential, S2



Hydrogen Index, S2/TOC



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Geomark ID: RLON-120101
Source Rock Analyses

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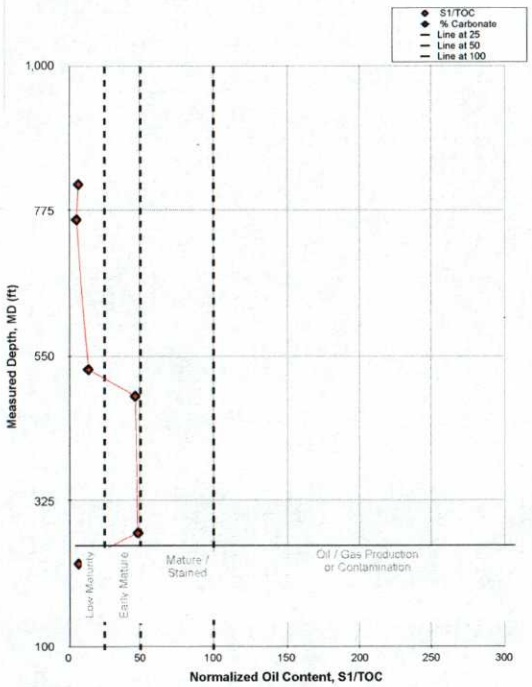
SOURCE ROCK ANALYSES

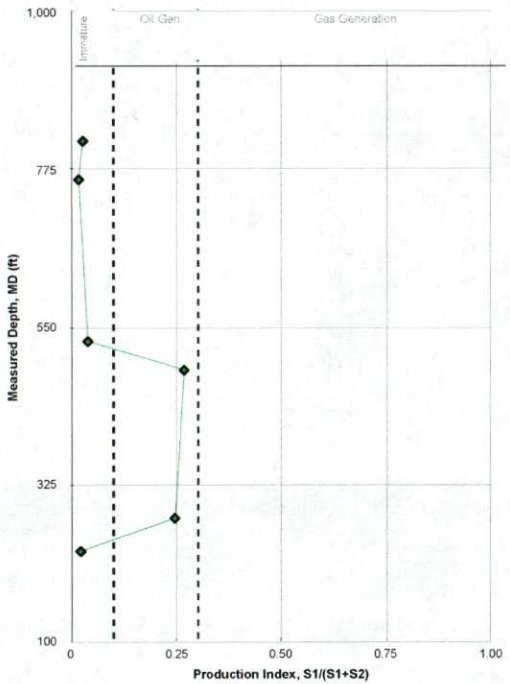
GeoMark Research, Ltd.

Mark W. Longman | USGS Library Number (S098, R950, R951),

Norm. Oil Content, S1/TOC

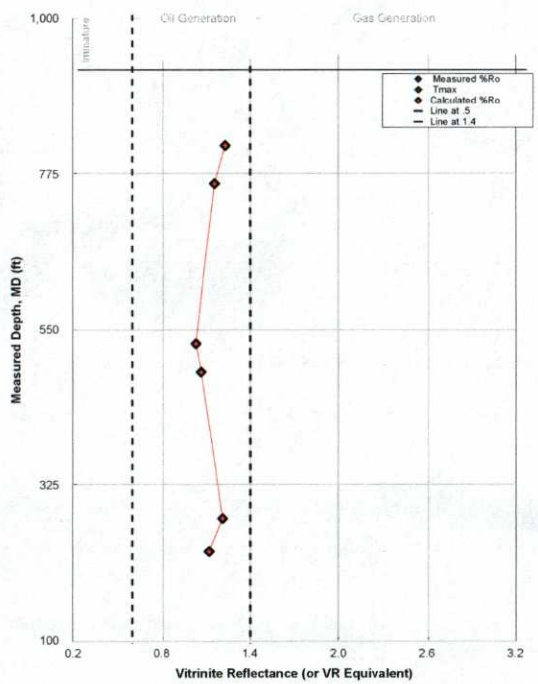


Production Index, S1/(S1+S2)



Maturity Indicators

Tmax (°C)



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Client: Mark W. Longman
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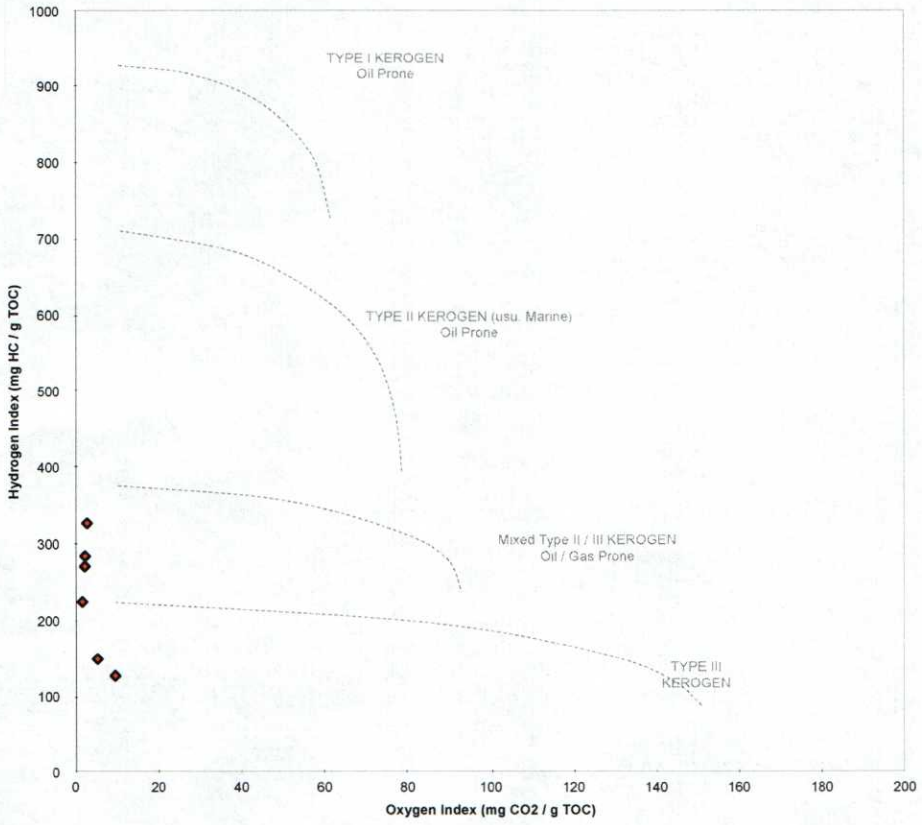
GeoMark

SOURCE ROCK ANALYSES

GeoMark Research, Ltd.

Mark W. Longman	USGS Library Number (S098, R950, R951),

Pseudo Van Krevelen Plot



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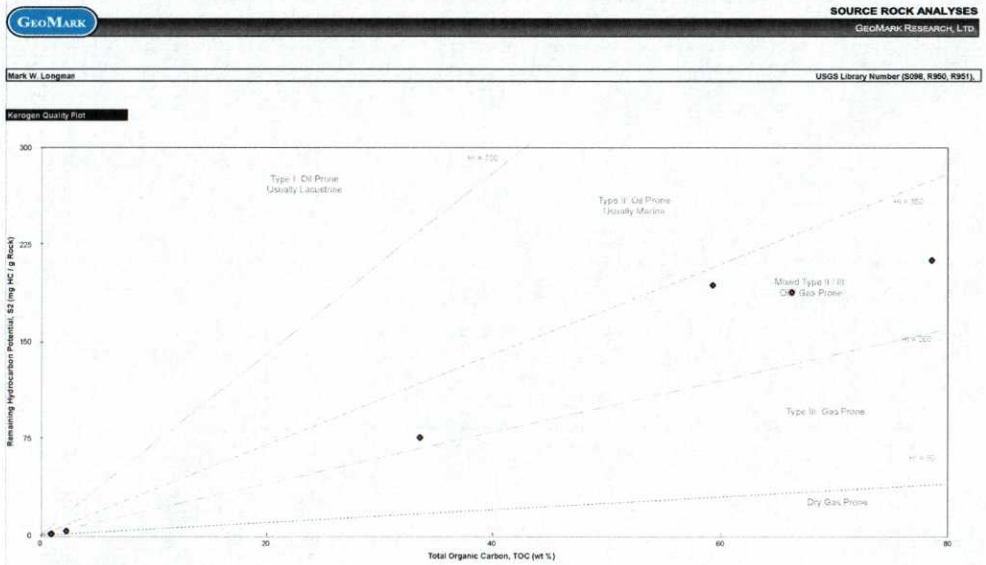

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February 28, 2012

Client: Mark W. Longman
Field/Well: USGS Library Number (R950, R951, S098)
Geomark ID: RLON-120101
Source Rock Analyses

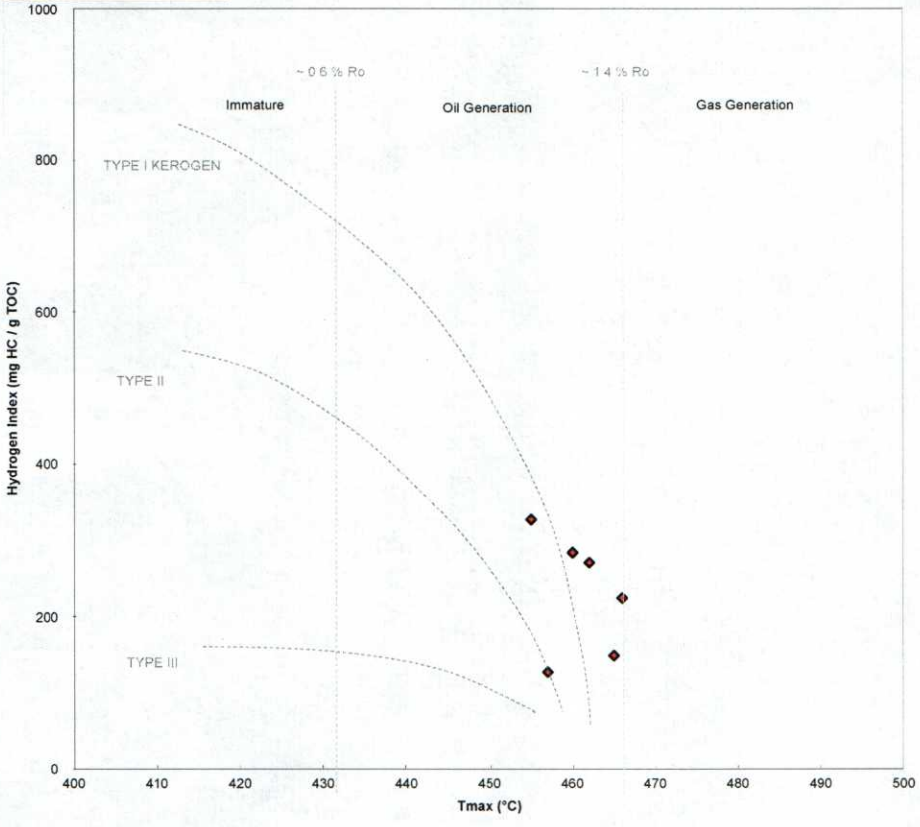
GEOMARK

SOURCE ROCK ANALYSES

GEOMARK RESEARCH, LTD.

Mark W. Longman	USGS Library Number (S098, R950, R951).

Kerogen Type and Maturity



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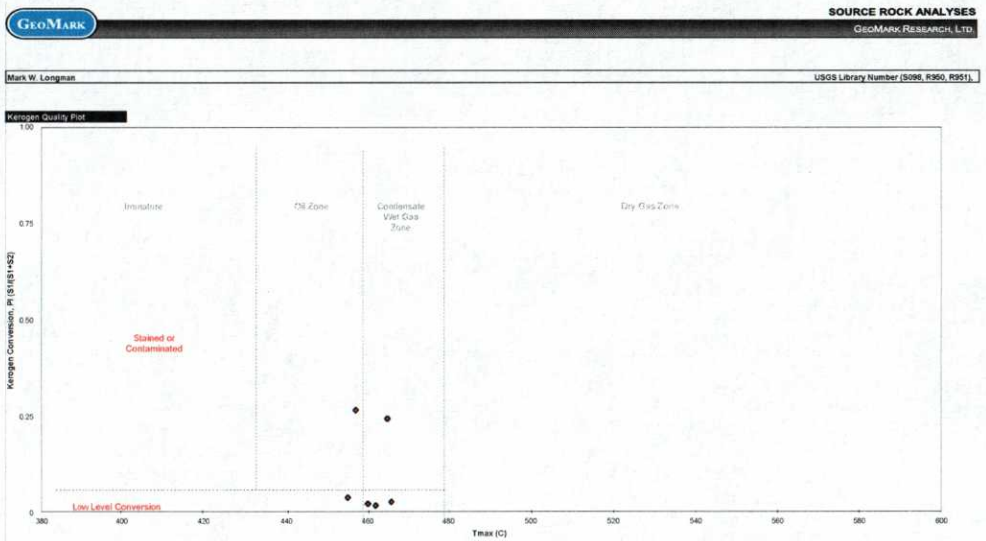
Source Rock Analyses



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February 28, 2012

Client: Mark W. Longman
Field/Well: USGS Library Number (R950, R951, S098)
Geomark ID: RLON-120101
Source Rock Analyses

2GeoMark Source Rock Services
218 Higgins Street
Humble, TX 77338
(832) 644.1184
info@ geomarkresearch.com
February 28, 2012

APPENDIX B

NATURAL GAS COMPOSITION LABORATORY ANALYTICAL REPORTS

GAS ANALYSIS SERVICE

2030 AFTON PLACE
FARMINGTON, N.M. 87401
(505) 325-6622

ANALYSIS NO. PR220001
CUST. NO. 59500 - 10000

WELL/LEASE INFORMATION

CUSTOMER NAME	PETROX RESOURCES INC.	SOURCE	N/A
WELL NAME	PARGIN MOUNTAIN 9U #1A	PRESSURE	135 PSI
COUNTY/ STATE	ARCHULETA CO	SAMPLE TEMP	DEG.F
LOCATION	09U-34N-05W	WELL FLOWING	N
FIELD		DATE SAMPLED	8/17/02
FORMATION	COAL	SAMPLED BY	TOM BERGIN
CUST.STN.NO.		FOREMAN/ENGR.	

REMARKS 625 PSI ON CASING.
BLEW 15 MINUTES
TOOK SAMPLE ON CASING - 135 PSI

ANALYSIS

COMPONENT	MOLE %	GPM**	B.T.U.*	SP.GR *
NITROGEN	0.083	0.0000	0.00	0.0008
CO2	4.477	0.0000	0.00	0.0680
METHANE	94.489	0.0000	956.51	0.5234
ETHANE	0.744	0.1990	13.20	0.0077
PROPANE	0.163	0.0449	4.11	0.0025
I-BUTANE	0.019	0.0062	0.62	0.0004
N-BUTANE	0.013	0.0041	0.43	0.0003
I-PENTANE	0.004	0.0015	0.16	0.0001
N-PENTANE	0.002	0.0007	0.08	0.0000
HEXANE PLUS	0.006	0.0026	0.31	0.0002
TOTAL	100.000	0.2591	975.42	0.6034

* @ 14.730 PSIA DRY & UNCORRECTED FOR COMPRESSIBILITY
** @ 14.730 PSIA & 60 DEG. F.

COMPRESSIBILITY FACTOR (1/Z)	1.0022
BTU/CU.FT (DRY) CORRECTED FOR (1/Z)	977.6
BTU/CU.FT (WET) CORRECTED FOR (1/Z)	960.6
REAL SPECIFIC GRAVITY	0.6047

ANALYSIS RUN AT 14.730 PSIA & 60 DEGREES F

DRY BTU @ 14.650	972.3	CYLINDER #	AZT030
DRY BTU @ 14.696	975.3	CYLINDER PRESSURE	112 PSIG
DRY BTU @ 14.730	977.6	DATE RUN	8/20/02
DRY BTU @ 15.025	997.1	ANALYSIS RUN BY	JANA CARANTA

APPENDIX C

NATURAL SPRINGS LABORATORY ANALYTICAL REPORTS

75 Suttle Street
Durango, CO 81303
970.247.4220 Phone
970.247.4227 Fax
www.greenanalytical.com

11 June 2013

Devin Hencmann
LT Environmental
2243 MAin Ave Suite 3
Durango, CO 81301

RE: Archuletta Springs

Enclosed are the results of analyses for samples received by the laboratory on 05/23/13 17:05.
If you need any further assistance, please feel free to contact me.

Sincerely,

Debbie Zufelt
Reports Manager

All accredited analytes contained in this report are denoted by an asterisk (*). For a complete list of accredited analytes please do not hesitate to contact us via any of the contact information contained in this report. Our NELAP accreditation can be viewed at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Green Analytical Laboratories is NELAP accredited through the Texas Commission on Environmental Quality. Accreditation applies to drinking water and non-potable water matrices for trace metals and a variety of inorganic parameters. Green Analytical Laboratories is also accredited through the Colorado Department of Public Health and Environment and EPA region 8 for trace metals, Cyanide, Fluoride, Nitrate, and Nitrite in drinking water.

Our affiliate laboratory, Cardinal Laboratories, is also NELAP accredited through the Texas Commission on Environmental Quality for a variety of organic constituents in drinking water, non-potable water and solid matrices. Cardinal is also accredited for regulated VOCs, TTHM, and HAA-5 in drinking water

dzufelt@greenanalytical.com p: 970.247.4220 f: 970.247.4227 75 Suttle Street Durango, CO 81303

www.GreenAnalytical.com

LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Crain Spring	1305164-01	Water	05/23/13 14:10	05/23/13 17:05
D-8 Spring	1305164-02	Water	05/23/13 13:38	05/23/13 17:05
Watson Well Spring	1305164-03	Water	05/23/13 13:20	05/23/13 17:05
Munger Spring	1305164-04	Water	05/23/13 11:35	05/23/13 17:05
Grassy Spring	1305164-05	Water	05/23/13 13:00	05/23/13 17:05

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

Crain Spring

1305164-01 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate*	**179**	10.0		mg/L	1	06/03/13	2320 B		ABP
Alkalinity, Carbonate*	<10.0	10.0		mg/L	1	06/03/13	2320 B		ABP
Alkalinity, Hydroxide*	<10.0	10.0		mg/L	1	06/03/13	2320 B		ABP
Alkalinity, Total*	**179**	10.0		mg/L	1	06/03/13	2320 B		ABP
Bromide	**0.121**	0.100		mg/L	1	05/29/13	4500-Br- B		ABP
Chloride	<10.0	10.0	5.00	mg/L	1	05/30/13	4500-Cl- C		ABP
Conductivity*	**547**	10.0		uS/cm	1	05/24/13	2510 B		MJV
Fluoride*	<0.200	0.200	0.0330	mg/L	1	05/31/13	4500-F- C		ABP
Nitrate/Nitrite as N*	**0.048**	0.020	0.014	mg/L	1	06/05/13	EPA353.2		KLM
pH*	**8.07**			pH Units	1	05/24/13	EPA150.1		MJV
Sulfate	**126**	20.0	3.26	mg/L	2	05/25/13	4500-SO42- E		ABP
TDS*	**355**	10.0		mg/L	1	05/29/13	EPA160.1		ABP
Dissolved Metals by ICP									
Calcium*	**79.5**	1.00	0.007	mg/L	1	05/29/13	EPA200.7		JGS
Iron*	**0.096**	0.050	0.004	mg/L	1	05/29/13	EPA200.7		JGS
Magnesium*	**21.9**	1.00	0.021	mg/L	1	05/29/13	EPA200.7		JGS
Potassium*	**2.55**	1.00	0.617	mg/L	1	05/29/13	EPA200.7		JGS
Sodium*	**22.5**	1.00	0.023	mg/L	1	05/29/13	EPA200.7		JGS

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

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www.GreenAnalytical.com

LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

D-8 Spring

1305164-02 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate*	**395**	10.0		mg/L	5	06/03/13	2320 B		ABP
Alkalinity, Carbonate*	**10.0**	10.0		mg/L	5	06/03/13	2320 B		ABP
Alkalinity, Hydroxide*	<10.0	10.0		mg/L	5	06/03/13	2320 B		ABP
Alkalinity, Total*	**405**	10.0		mg/L	5	06/03/13	2320 B		ABP
Bromide	**2.09**	0.500		mg/L	5	05/29/13	4500-Br- B		ABP
Chloride	<10.0	10.0	5.00	mg/L	1	05/30/13	4500-Cl- C		ABP
Conductivity*	**620**	10.0		uS/cm	1	05/24/13	2510 B		MJV
Fluoride*	<0.200	0.200	0.0330	mg/L	1	05/31/13	4500-F- C		ABP
Nitrate/Nitrite as N*	**0.050**	0.020	0.014	mg/L	1	06/05/13	EPA353.2		KLM
pH*	**8.32**			pH Units	1	05/24/13	EPA150.1		MJV
Sulfate	**28.0**	10.0	1.63	mg/L	1	05/25/13	4500-SO42- E		ABP
TDS*	**365**	10.0		mg/L	1	05/29/13	EPA160.1		ABP
Dissolved Metals by ICP									
Calcium*	**89.3**	1.00	0.007	mg/L	1	05/29/13	EPA200.7		JGS
Iron*	<0.050	0.050	0.004	mg/L	1	05/29/13	EPA200.7		JGS
Magnesium*	**38.1**	1.00	0.021	mg/L	1	05/29/13	EPA200.7		JGS
Potassium*	**1.95**	1.00	0.617	mg/L	1	05/29/13	EPA200.7		JGS
Sodium*	**21.2**	1.00	0.023	mg/L	1	05/29/13	EPA200.7		JGS

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

Green Analytical Laboratories
dzufelt@greenanalytical.com p: 970.247.4220 f: 970.247.4227 75 Suttle Street Durango, CO 81303
www.GreenAnalytical.com

LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

Watson Well Spring

1305164-03 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate*	**326**	10.0		mg/L	2	06/03/13	2320 B		ABP
Alkalinity, Carbonate*	<10.0	10.0		mg/L	2	06/03/13	2320 B		ABP
Alkalinity, Hydroxide*	<10.0	10.0		mg/L	2	06/03/13	2320 B		ABP
Alkalinity, Total*	**326**	10.0		mg/L	2	06/03/13	2320 B		ABP
Bromide	**2.14**	0.500		mg/L	5	05/29/13	4500-Br- B		ABP
Chloride	<10.0	10.0	5.00	mg/L	1	05/30/13	4500-Cl- C		ABP
Conductivity*	**717**	10.0		uS/cm	1	05/24/13	2510 B		MJV
Fluoride*	<0.200	0.200	0.0330	mg/L	1	05/31/13	4500-F- C		ABP
Nitrate/Nitrite as N*	**8.37**	0.060	0.042	mg/L	3	06/05/13	EPA353.2		KLM
pH*	**8.01**			pH Units	1	05/24/13	EPA150.1		MJV
Sulfate	**108**	20.0	3.26	mg/L	2	05/25/13	4500-SO42- E		ABP
TDS*	**485**	10.0		mg/L	1	05/29/13	EPA160.1		ABP
Dissolved Metals by ICP									
Calcium*	**104**	1.00	0.007	mg/L	1	05/29/13	EPA200.7		JGS
Iron*	<0.050	0.050	0.004	mg/L	1	05/29/13	EPA200.7		JGS
Magnesium*	**41.2**	1.00	0.021	mg/L	1	05/29/13	EPA200.7		JGS
Potassium*	**2.35**	1.00	0.617	mg/L	1	05/29/13	EPA200.7		JGS
Sodium*	**20.0**	1.00	0.023	mg/L	1	05/29/13	EPA200.7		JGS

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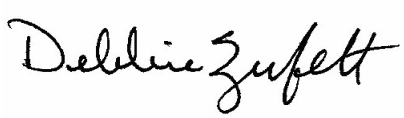

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www.GreenAnalytical.com

LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

Munger Spring

1305164-04 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate*	**117**	10.0		mg/L	1	06/03/13	2320 B		ABP
Alkalinity, Carbonate*	<10.0	10.0		mg/L	1	06/03/13	2320 B		ABP
Alkalinity, Hydroxide*	<10.0	10.0		mg/L	1	06/03/13	2320 B		ABP
Alkalinity, Total*	**117**	10.0		mg/L	1	06/03/13	2320 B		ABP
Bromide	**0.288**	0.100		mg/L	1	05/29/13	4500-Br- B		ABP
Chloride	**36.0**	10.0	5.00	mg/L	1	05/30/13	4500-Cl- C		ABP
Conductivity*	**367**	10.0		uS/cm	1	05/24/13	2510 B		MJV
Fluoride*	<0.200	0.200	0.0330	mg/L	1	05/31/13	4500-F- C		ABP
Nitrate/Nitrite as N*	**0.073**	0.020	0.014	mg/L	1	06/05/13	EPA353.2		KLM
pH*	**7.73**			pH Units	1	05/24/13	EPA150.1		MJV
Sulfate	**19.0**	10.0	1.63	mg/L	1	05/25/13	4500-SO42- E		ABP
TDS*	**210**	10.0		mg/L	1	05/29/13	EPA160.1		ABP
Dissolved Metals by ICP									
Calcium*	**47.5**	1.00	0.007	mg/L	1	05/29/13	EPA200.7		JGS
Iron*	<0.050	0.050	0.004	mg/L	1	05/29/13	EPA200.7		JGS
Magnesium*	**8.55**	1.00	0.021	mg/L	1	05/29/13	EPA200.7		JGS
Potassium*	**1.70**	1.00	0.617	mg/L	1	05/29/13	EPA200.7		JGS
Sodium*	**19.6**	1.00	0.023	mg/L	1	05/29/13	EPA200.7		JGS

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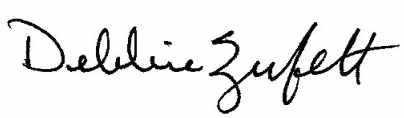

Debbie Zufelt, Reports Manager

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

Grassy Spring

1305164-05 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate*	**216**	10.0		mg/L	2	06/03/13	2320 B		ABP
Alkalinity, Carbonate*	<10.0	10.0		mg/L	2	06/03/13	2320 B		ABP
Alkalinity, Hydroxide*	<10.0	10.0		mg/L	2	06/03/13	2320 B		ABP
Alkalinity, Total*	**220**	10.0		mg/L	2	06/03/13	2320 B		ABP
Bromide	**0.652**	0.100		mg/L	1	05/29/13	4500-Br- B		ABP
Chloride	<10.0	10.0	5.00	mg/L	1	05/30/13	4500-Cl- C		ABP
Conductivity*	**767**	10.0		uS/cm	1	05/24/13	2510 B		MJV
Fluoride*	<0.200	0.200	0.0330	mg/L	1	05/31/13	4500-F- C		ABP
Nitrate/Nitrite as N*	**1.60**	0.020	0.014	mg/L	1	06/05/13	EPA353.2		KLM
pH*	**7.69**			pH Units	1	05/24/13	EPA150.1		MJV
Sulfate	**250**	50.0	8.15	mg/L	5	05/25/13	4500-SO42- E		ABP
TDS*	**615**	10.0		mg/L	1	05/29/13	EPA160.1		ABP
Dissolved Metals by ICP									
Calcium*	**108**	1.00	0.007	mg/L	1	05/29/13	EPA200.7		JGS
Iron*	<0.050	0.050	0.004	mg/L	1	05/29/13	EPA200.7		JGS
Magnesium*	**34.7**	1.00	0.021	mg/L	1	05/29/13	EPA200.7		JGS
Potassium*	**4.25**	1.00	0.617	mg/L	1	05/29/13	EPA200.7		JGS
Sodium*	**32.1**	1.00	0.023	mg/L	1	05/29/13	EPA200.7		JGS

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305189 - General Prep - Wet Chem										
Blank (B305189-BLK1)				Prepared & Analyzed: 05/25/13						
Sulfate	ND	10.0	mg/L							
LCS (B305189-BS1)				Prepared & Analyzed: 05/25/13						
Sulfate	50.0	10.0	mg/L	50.0		100	85-115			
LCS Dup (B305189-BSD1)				Prepared & Analyzed: 05/25/13						
Sulfate	53.0	10.0	mg/L	50.0		106	85-115	5.83	20	
Matrix Spike (B305189-MS1)		**Source: 1305164-04**		Prepared & Analyzed: 05/25/13						
Sulfate	69.0	10.0	mg/L	50.0	19.0	100	80-120			
Matrix Spike (B305189-MS2)		**Source: 1305165-01**		Prepared & Analyzed: 05/25/13						
Sulfate	59.0	10.0	mg/L	50.0	ND	118	80-120			
Batch B305208 - General Prep - Wet Chem										
Blank (B305208-BLK1)				Prepared & Analyzed: 05/29/13						
Bromide	ND	0.100	mg/L							
LCS (B305208-BS1)				Prepared & Analyzed: 05/29/13						
Bromide	0.549	0.100	mg/L	0.600		91.5	85-115			
LCS Dup (B305208-BSD1)				Prepared & Analyzed: 05/29/13						
Bromide	0.642	0.100	mg/L	0.600		107	85-115	15.6	20	
Matrix Spike (B305208-MS1)		**Source: 1305088-02**		Prepared & Analyzed: 05/29/13						
Bromide	4.52	0.500	mg/L	3.00	1.63	96.3	80-120			

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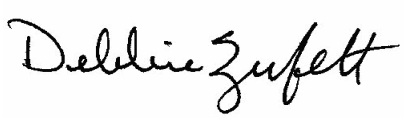

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305208 - General Prep - Wet Chem										
Matrix Spike (B305208-MS2)		**Source: 1305164-05**		Prepared & Analyzed: 05/29/13						
Bromide	1.17	0.100	mg/L	0.600	0.652	86.9	80-120			
Batch B305220 - General Prep - Wet Chem										
Duplicate (B305220-DUP1)		**Source: 1305164-01**		Prepared & Analyzed: 05/24/13						
Conductivity	564	10.0	uS/cm		547			3.06	20	
Reference (B305220-SRM1)				Prepared & Analyzed: 05/24/13						
Conductivity	1410		uS/cm	1450		97.2	94-106			
Batch B305225 - General Prep - Wet Chem										
Duplicate (B305225-DUP1)		**Source: 1305164-01**		Prepared & Analyzed: 05/24/13						
pH	8.14		pH Units		8.07			0.864	20	
Reference (B305225-SRM1)				Prepared & Analyzed: 05/24/13						
pH	9.02		pH Units	9.05		99.7	90-110			
Batch B305233 - General Prep - Wet Chem										
Blank (B305233-BLK1)				Prepared & Analyzed: 05/30/13						
Chloride	ND	10.0	mg/L							
LCS (B305233-BS1)				Prepared & Analyzed: 05/30/13						
Chloride	98.0	10.0	mg/L	100		98.0	85-115			

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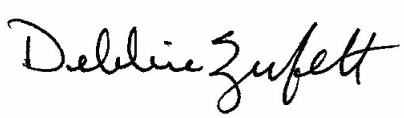

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305233 - General Prep - Wet Chem										
LCS Dup (B305233-BSD1)				Prepared & Analyzed: 05/30/13						
Chloride	104	10.0	mg/L	100		104	85-115	5.94	20	
Matrix Spike (B305233-MS1)		**Source: 1305115-01**		Prepared & Analyzed: 05/30/13						
Chloride	102	10.0	mg/L	100	ND	102	80-120			
Matrix Spike (B305233-MS2)		**Source: 1305156-01**		Prepared & Analyzed: 05/30/13						
Chloride	183	10.0	mg/L	100	85.0	98.0	80-120			
Batch B305234 - General Prep - Wet Chem										
Blank (B305234-BLK1)				Prepared & Analyzed: 05/30/13						
Chloride	ND	10.0	mg/L							
LCS (B305234-BS1)				Prepared & Analyzed: 05/30/13						
Chloride	101	10.0	mg/L	100		101	85-115			
LCS Dup (B305234-BSD1)				Prepared & Analyzed: 05/30/13						
Chloride	98.0	10.0	mg/L	100		98.0	85-115	3.02	20	
Matrix Spike (B305234-MS1)		**Source: 1305164-04**		Prepared & Analyzed: 05/30/13						
Chloride	133	10.0	mg/L	100	36.0	97.0	80-120			
Batch B305235 - General Prep - Wet Chem										
Blank (B305235-BLK1)				Prepared & Analyzed: 05/31/13						
Fluoride	ND	0.200	mg/L							

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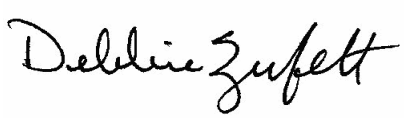

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305235 - General Prep - Wet Chem										
LCS (B305235-BS1)				Prepared & Analyzed: 05/31/13						
Fluoride	0.986	0.200	mg/L	1.00		98.6	85-115			
LCS Dup (B305235-BSD1)				Prepared & Analyzed: 05/31/13						
Fluoride	1.02	0.200	mg/L	1.00		102	85-115	3.39	20	
Matrix Spike (B305235-MS1)		**Source: 1305114-03**		Prepared & Analyzed: 05/31/13						
Fluoride	1.26	0.200	mg/L	1.00	0.249	102	80-120			
Matrix Spike (B305235-MS2)		**Source: 1305158-01**		Prepared & Analyzed: 05/31/13						
Fluoride	1.30	0.200	mg/L	1.00	0.281	102	80-120			
Batch B305240 - General Prep - Wet Chem										
Blank (B305240-BLK1)				Prepared & Analyzed: 05/29/13						
TDS	ND	10.0	mg/L							
Duplicate (B305240-DUP2)		**Source: 1305164-05**		Prepared & Analyzed: 05/29/13						
TDS	555	10.0	mg/L		615			10.3	20	
Reference (B305240-SRM1)				Prepared & Analyzed: 05/29/13						
TDS	2930	10.0	mg/L	2860		102	85-115			
Batch B306012 - General Prep - Wet Chem										
Blank (B306012-BLK1)				Prepared & Analyzed: 06/03/13						
Alkalinity, Total	ND	10.0	mg/L							

Green Analytical Laboratories

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B306012 - General Prep - Wet Chem										
LCS (B306012-BS1)				Prepared & Analyzed: 06/03/13						
Alkalinity, Total	98.0	10.0	mg/L	100		98.0	85-115			
LCS Dup (B306012-BSD1)				Prepared & Analyzed: 06/03/13						
Alkalinity, Total	96.0	10.0	mg/L	100		96.0	85-115	2.06	20	
Matrix Spike (B306012-MS1)		**Source: 1305164-05**		Prepared & Analyzed: 06/03/13						
Alkalinity, Total	412	10.0	mg/L	200	220	96.0	70-130			
Batch B306039 - General Prep - Wet Chem										
Blank (B306039-BLK1)				Prepared: 06/04/13 Analyzed: 06/05/13						
Nitrate/Nitrite as N	ND	0.020	mg/L							
LCS (B306039-BS1)				Prepared: 06/04/13 Analyzed: 06/05/13						
Nitrate/Nitrite as N	0.519	0.020	mg/L	0.500		104	85-115			
LCS Dup (B306039-BSD1)				Prepared: 06/04/13 Analyzed: 06/05/13						
Nitrate/Nitrite as N	0.505	0.020	mg/L	0.500		101	85-115	2.73	20	
Matrix Spike (B306039-MS1)		**Source: 1305138-02**		Prepared: 06/04/13 Analyzed: 06/05/13						
Nitrate/Nitrite as N	0.810	0.020	mg/L	0.500	0.279	106	80-120			

Green Analytical Laboratories

Debbie Zufelt

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

Dissolved Metals by ICP - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305202 - Dissolved Metals, E200.7/E200.8										
Blank (B305202-BLK1)				Prepared & Analyzed: 05/29/13						
Calcium	ND	1.00	mg/L							
Iron	ND	0.050	mg/L							
Magnesium	ND	1.00	mg/L							
Potassium	ND	1.00	mg/L							
Sodium	ND	1.00	mg/L							
LCS (B305202-BS1)				Prepared & Analyzed: 05/29/13						
Calcium	5.08	1.00	mg/L	5.00		102	85-115			
Iron	5.19	0.050	mg/L	5.00		104	85-115			
Magnesium	26.2	1.00	mg/L	25.0		105	85-115			
Potassium	9.59	1.00	mg/L	10.0		95.9	85-115			
Sodium	8.02	1.00	mg/L	8.10		99.1	85-115			
LCS Dup (B305202-BSD1)				Prepared & Analyzed: 05/29/13						
Calcium	5.13	1.00	mg/L	5.00		103	85-115	1.01	20	
Iron	5.24	0.050	mg/L	5.00		105	85-115	0.971	20	
Magnesium	26.5	1.00	mg/L	25.0		106	85-115	1.06	20	
Potassium	9.71	1.00	mg/L	10.0		97.1	85-115	1.16	20	
Sodium	8.10	1.00	mg/L	8.10		100	85-115	0.928	20	
Matrix Spike (B305202-MS1)	**Source: 1305164-01**			Prepared & Analyzed: 05/29/13						
Calcium	75.5	1.00	mg/L	5.00	79.5	NR	75-125			M3
Iron	5.27	0.050	mg/L	5.00	0.096	104	75-125			
Magnesium	45.0	1.00	mg/L	25.0	21.9	92.2	75-125			
Potassium	12.1	1.00	mg/L	10.0	2.55	95.1	75-125			
Sodium	28.2	1.00	mg/L	8.10	22.5	69.8	75-125			M2

Green Analytical Laboratories

Debbie Zufelt

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/11/13 15:23

Notes and Definitions

M3	Matrix spike recovery did not meet acceptance criteria. Accuracy of the spike is reduced since the analyte concentration in the sample is disproportionate to spike level.
M2	Matrix spike recovery was below laboratory acceptance criteria. Recovery possibly affected by a matrix interference in the sample. The method blank spike recovery was acceptable.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
	*Results reported on as received basis unless designated as dry.
RPD	Relative Percent Difference
LCS	Laboratory Control Sample (Blank Spike)
RL	Report Limit
MDL	Method Detection Limit

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

GREEN ANALYTICAL LABORATORIES

CHAIN OF CUSTODY RECORD

Page 1 of 1

Client: LT Environmental
Contact: Devin Hencmann
Address: 2243 Main Ave Suite 3
Phone Number: 970 385-1056
FAX Number: dhencmann@ltenv.com

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
3) Designate Sample Reject Disposition.
PO#
Project Name: Archuleta Springs
Samplers Signature:

Table 1. – Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) _____

FOR GAL USE ONLY
GAL JOB # 1305-164

Lab Name: Green Analytical Laboratories (970) 247-4220 FAX (970) 247-4227
Address: 75 Suttle Street, Durango, CO 81303

	Sample ID	Collection: Date	Collection: Time	Misc: Collected by: (Init.)	Misc: Matrix Type From Table 1	Misc: No. of Containers	Misc: Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	Preservative(s): HNO3	Preservative(s): HCL	Preservative(s): H2SO4	Preservative(s): NAOH	Preservative(s): Other (Specify)	Analyses Required: See attached	Comments
01	1. Crain spring	5/23/13	1410	DH	2	3	N	1	1	~~1~~	1			X	#18 11.5°C on ice
02	2. D-8 Spring	5/23/13	1338	DH	2	3	N	1	1		1			X	
03	3. Watson Well spring	5/23/13	1320	DH	2	3	N	1	1		1			X	
~~04~~	~~4. Munger spring 1~~	~~5/23/13~~	~~1100~~	~~DH~~	~~2~~	~~3~~	~~N~~	~~1~~	~~1~~	~~1~~	~~1~~			~~X~~	
04	5. Munger spring 2	5/23/13	1135	DH	2	3	N	1	1		1			X	
05	6. Grassy spring	5/23/13	1300	DH	2	3	N	1	1		1			X	
	7.														
	8.														
	9.														
	10.														

Relinquished by:	Date: 5/23/13	Time: 1705	Received by: Dulcinea Zufelt	Date: 05-23-13	Time: 1705
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

Project Information

LTE
5/9/2013

LT Environmental
2243 MAin Ave Suite 3
Durango, CO 81301
Laboratory PM: Debbie Zufelt
Phone:(970) 385-1096
Fax:-

Project Name:	Archuletta Springs	**Invoice To:**	LT Environmental
Project Number:	[none]	**Invoice Bid:**	(list pricing)
Client PM:	Ashley Ager	**Invoice Manager:**	Julie Linn
Comments:			

Analysis	Comment
Iron Dissolved by ICP	
Alkalinity, Carbonate	
Alkalinity, Hydroxide	
Alkalinity, Total	
Bromide	
Calcium Dissolved by ICP	
Chloride	
Alkalinity, Bicarbonate	
Fluoride	
Sulfate	
Magnesium Dissolved by ICP	
Nitrate/Nitrite as N	
pH	
Potassium Dissolved by ICP	
Sodium Dissolved by ICP	
Solids, Total Dissolved (TDS)	
Conductivity	

15 Sites

Monday for p/u

↳ poly Un 500

poly HNO_3 250 no acid

poly H_2SO_4 125

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Durango, CO 81303
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970.247.4227 Fax
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03 June 2013

Devin Hencmann
LT Environmental
2243 MAin Ave Suite 3
Durango, CO 81301

RE: Archuletta Springs

Enclosed are the results of analyses for samples received by the laboratory on 05/16/13 08:35.
If you need any further assistance, please feel free to contact me.

Sincerely,

Debbie Zufelt
Reports Manager

All accredited analytes contained in this report are denoted by an asterisk (*). For a complete list of accredited analytes please do not hesitate to contact us via any of the contact information contained in this report. Our NELAP accreditation can be viewed at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Green Analytical Laboratories is NELAP accredited through the Texas Commission on Environmental Quality. Accreditation applies to drinking water and non-potable water matrices for trace metals and a variety of inorganic parameters. Green Analytical Laboratories is also accredited through the Colorado Department of Public Health and Environment and EPA region 8 for trace metals, Cyanide, Fluoride, Nitrate, and Nitrite in drinking water.

Our affiliate laboratory, Cardinal Laboratories, is also NELAP accredited through the Texas Commission on Environmental Quality for a variety of organic constituents in drinking water, non-potable water and solid matrices. Cardinal is also accredited for regulated VOCs, TTHM, and HAA-5 in drinking water

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:38

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Vance Spring #1	1305104-01	Water	05/15/13 15:50	05/16/13 08:35

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:38

Vance Spring #1

1305104-01 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate*	**98.0**	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Carbonate*	<10.0	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Hydroxide*	<10.0	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Total*	**98.0**	10.0		mg/L	1	05/20/13	2320 B		ABP
Bromide	**1.21**	0.500		mg/L	5	05/29/13	4500-Br- B		ABP
Chloride	<10.0	10.0	5.00	mg/L	1	05/21/13	4500-Cl- C		ABP
Conductivity*	**341**	10.0		uS/cm	1	05/16/13	2510 B		MJV
Fluoride*	<0.200	0.200	0.0330	mg/L	1	05/22/13	4500-F- C		ABP
Nitrate/Nitrite as N*	<0.020	0.020	0.014	mg/L	1	05/31/13	EPA353.2		KLM
pH*	**7.53**			pH Units	1	05/16/13	EPA150.1		MJV
Sulfate	**73.0**	10.0	1.63	mg/L	1	05/25/13	4500-SO42- E	Q1	ABP
TDS*	**195**	10.0		mg/L	1	05/20/13	EPA160.1	Q1	ABP
Dissolved Metals by ICP									
Calcium*	**47.6**	1.00	0.007	mg/L	1	05/17/13	EPA200.7		JLM
Iron*	**0.165**	0.050	0.004	mg/L	1	05/17/13	EPA200.7		JLM
Magnesium*	**5.90**	1.00	0.021	mg/L	1	05/17/13	EPA200.7		JLM
Potassium*	**12.3**	1.00	0.617	mg/L	1	05/17/13	EPA200.7		JLM
Sodium*	**13.3**	1.00	0.023	mg/L	1	05/17/13	EPA200.7		JLM

Green Analytical Laboratories

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:38

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305141 - General Prep - Wet Chem										
Duplicate (B305141-DUP1)		**Source: 1305104-01**		Prepared & Analyzed: 05/16/13						
Conductivity	369	10.0	uS/cm		341			7.89	20	
Reference (B305141-SRM1)				Prepared & Analyzed: 05/16/13						
Conductivity	1430		uS/cm	1450		98.8	94-106			
Batch B305147 - General Prep - Wet Chem										
Duplicate (B305147-DUP1)		**Source: 1305104-01**		Prepared & Analyzed: 05/16/13						
pH	7.46		pH Units		7.53			0.934	20	
Reference (B305147-SRM1)				Prepared & Analyzed: 05/16/13						
pH	8.84		pH Units	9.13		96.8	90-110			
Batch B305151 - General Prep - Wet Chem										
Blank (B305151-BLK1)				Prepared & Analyzed: 05/21/13						
Chloride	ND	10.0	mg/L							
LCS (B305151-BS1)				Prepared & Analyzed: 05/21/13						
Chloride	101	10.0	mg/L	100		101	85-115			
LCS Dup (B305151-BSD1)				Prepared & Analyzed: 05/21/13						
Chloride	99.0	10.0	mg/L	100		99.0	85-115	2.00	20	
Batch B305155 - General Prep - Wet Chem										
Blank (B305155-BLK1)				Prepared & Analyzed: 05/20/13						
Alkalinity, Total	ND	10.0	mg/L							

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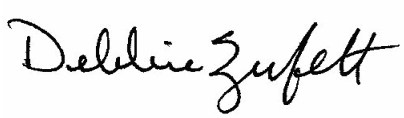

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:38

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305155 - General Prep - Wet Chem										
LCS (B305155-BS1)				Prepared & Analyzed: 05/20/13						
Alkalinity, Total	99.0	10.0	mg/L	100		99.0	85-115			
LCS Dup (B305155-BSD1)				Prepared & Analyzed: 05/20/13						
Alkalinity, Total	100	10.0	mg/L	100		100	85-115	1.01	20	
Batch B305170 - General Prep - Wet Chem										
Blank (B305170-BLK1)				Prepared & Analyzed: 05/22/13						
Fluoride	ND	0.200	mg/L							
LCS (B305170-BS1)				Prepared & Analyzed: 05/22/13						
Fluoride	1.02	0.200	mg/L	1.00		102	85-115			
LCS Dup (B305170-BSD1)				Prepared & Analyzed: 05/22/13						
Fluoride	1.07	0.200	mg/L	1.00		107	85-115	5.26	20	
Batch B305186 - General Prep - Wet Chem										
Blank (B305186-BLK1)				Prepared & Analyzed: 05/20/13						
TDS	ND	10.0	mg/L							
Duplicate (B305186-DUP1)		**Source: 1305088-01**		Prepared & Analyzed: 05/20/13						
TDS	215	10.0	mg/L		210			2.35	20	
Reference (B305186-SRM1)				Prepared & Analyzed: 05/20/13						
TDS	2840	10.0	mg/L	2860		99.3	85-115			

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:38

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305188 - General Prep - Wet Chem										
Blank (B305188-BLK1)				Prepared & Analyzed: 05/25/13						
Sulfate	ND	10.0	mg/L							
LCS (B305188-BS1)				Prepared & Analyzed: 05/25/13						
Sulfate	54.0	10.0	mg/L	50.0		108	85-115			
LCS Dup (B305188-BSD1)				Prepared & Analyzed: 05/25/13						
Sulfate	53.0	10.0	mg/L	50.0		106	85-115	1.87	20	
Batch B305208 - General Prep - Wet Chem										
Blank (B305208-BLK1)				Prepared & Analyzed: 05/29/13						
Bromide	ND	0.100	mg/L							
LCS (B305208-BS1)				Prepared & Analyzed: 05/29/13						
Bromide	0.549	0.100	mg/L	0.600		91.5	85-115			
LCS Dup (B305208-BSD1)				Prepared & Analyzed: 05/29/13						
Bromide	0.642	0.100	mg/L	0.600		107	85-115	15.6	20	
Batch B306001 - General Prep - Wet Chem										
Blank (B306001-BLK1)				Prepared & Analyzed: 05/31/13						
Nitrate/Nitrite as N	ND	0.020	mg/L							
LCS (B306001-BS1)				Prepared & Analyzed: 05/31/13						
Nitrate/Nitrite as N	0.492	0.020	mg/L	0.500		98.4	85-115			

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:38

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B306001 - General Prep - Wet Chem										
LCS Dup (B306001-BSD1)				Prepared & Analyzed: 05/31/13						
Nitrate/Nitrite as N	0.490	0.020	mg/L	0.500		98.0	85-115	0.407	20	

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:38

Dissolved Metals by ICP - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305104 - Dissolved Metals, E200.7/E200.8										
Blank (B305104-BLK1)				Prepared: 05/16/13 Analyzed: 05/17/13						
Calcium	ND	1.00	mg/L							
Iron	ND	0.050	mg/L							
Magnesium	ND	1.00	mg/L							
Potassium	ND	1.00	mg/L							
Sodium	ND	1.00	mg/L							
LCS (B305104-BS1)				Prepared: 05/16/13 Analyzed: 05/17/13						
Calcium	5.18	1.00	mg/L	5.00		104	85-115			
Iron	5.34	0.050	mg/L	5.00		107	85-115			
Magnesium	27.0	1.00	mg/L	25.0		108	85-115			
Potassium	10.6	1.00	mg/L	10.0		106	85-115			
Sodium	8.37	1.00	mg/L	8.10		103	85-115			
LCS Dup (B305104-BSD1)				Prepared: 05/16/13 Analyzed: 05/17/13						
Calcium	5.05	1.00	mg/L	5.00		101	85-115	2.63	20	
Iron	5.19	0.050	mg/L	5.00		104	85-115	2.92	20	
Magnesium	26.3	1.00	mg/L	25.0		105	85-115	2.69	20	
Potassium	10.3	1.00	mg/L	10.0		103	85-115	2.74	20	
Sodium	8.17	1.00	mg/L	8.10		101	85-115	2.52	20	

Green Analytical Laboratories

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:38

Notes and Definitions

Q1	Sample received outside of acceptable temperature range for analyses requiring cold storage.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
	*Results reported on as received basis unless designated as dry.
RPD	Relative Percent Difference
LCS	Laboratory Control Sample (Blank Spike)
RL	Report Limit
MDL	Method Detection Limit

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

M

CHAIN OF CUSTODY RECORD

Page 1 of 1

Client: LT Environmental
Contact: Devin Hencmann
Address: 2243 Main Ave S#3
Durango CO 81301
Phone Number: 970.385-1096
FAX Number: dhencmann@ltenv.com

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
3) Designate Sample Reject Disposition.
PO#

Table 1. – Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) _____

FOR GAL USE ONLY
GAL JOB # 1305-104

Project Name: Archuleta Springs
Samplers Signature:

Lab Name: Green Analytical Laboratories (970) 247-4220 FAX (970) 247-4227
Address: 75 Suttle Street, Durango, CO 81303

Sample ID	Collection: Date	Collection: Time	Misc: Collected by: (Init.)	Misc: Matrix Type From Table 1	Misc: No. of Containers	Misc: Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	Preservative(s): HNO3	Preservative(s): HCL	Preservative(s): H2SO4	Preservative(s): NAOH	Preservative(s): Other (Specify)	Analyses Required: See Attached	Comments
1. Vance Spring #1	5/15/13	1550	DH	2	3	N	1	1		1			X	
2.														
3.														
4.														
5.														
6.														
7.														
8.														
9.														
10.														

#18
7.8°c
on ice

Comments
run w/qualif.

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
	5/16/13	835		05-16-13	0835
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

Project Information

LTE
5/9/2013

LT Environmental

2243 MAin Ave Suite 3
Durango, CO 81301
Phone:(970) 385-1096
Fax:-
Laboratory PM: **Debbie Zufelt**

Project Name:	Archuletta Springs	**Invoice To:**	LT Environmental
Project Number:	[none]	**Invoice Bid:**	(list pricing)
Client PM:	Ashley Ager	**Invoice Manager:**	Julie Linn
Comments:			

Analysis	Comment
Iron Dissolved by ICP	
Alkalinity, Carbonate	
Alkalinity, Hydroxide	
Alkalinity, Total	
Bromide	
Calcium Dissolved by ICP	
Chloride	
Alkalinity, Bicarbonate	
Fluoride	
Sulfate	
Magnesium Dissolved by ICP	
Nitrate/Nitrite as N	
pH	
Potassium Dissolved by ICP	
Sodium Dissolved by ICP	
Solids, Total Dissolved (TDS)	
Conductivity	

15 Sites

Monday for p/u

↳ poly Un 500

poly HNO_3 250 no acid

poly H_2SO_4 125

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Durango, CO 81303
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970.247.4227 Fax
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03 June 2013

Devin Hencmann
LT Environmental
2243 MAin Ave Suite 3
Durango, CO 81301

RE: Archuletta Springs

Enclosed are the results of analyses for samples received by the laboratory on 05/14/13 17:07.
If you need any further assistance, please feel free to contact me.

Sincerely,

Debbie Zufelt
Reports Manager

All accredited analytes contained in this report are denoted by an asterisk (*). For a complete list of accredited analytes please do not hesitate to contact us via any of the contact information contained in this report. Our NELAP accreditation can be viewed at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Green Analytical Laboratories is NELAP accredited through the Texas Commission on Environmental Quality. Accreditation applies to drinking water and non-potable water matrices for trace metals and a variety of inorganic parameters. Green Analytical Laboratories is also accredited through the Colorado Department of Public Health and Environment and EPA region 8 for trace metals, Cyanide, Fluoride, Nitrate, and Nitrite in drinking water.

Our affiliate laboratory, Cardinal Laboratories, is also NELAP accredited through the Texas Commission on Environmental Quality for a variety of organic constituents in drinking water, non-potable water and solid matrices. Cardinal is also accredited for regulated VOCs, TTHM, and HAA-5 in drinking water

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:32

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Gov-02	1305094-01	Water	05/14/13 11:45	05/14/13 17:07
Section 14 Spring (REICH)	1305094-02	Water	05/14/13 13:15	05/14/13 17:07

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:32

Gov-02

1305094-01 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate*	**244**	10.0		mg/L	2	05/20/13	2320 B		ABP
Alkalinity, Carbonate*	<10.0	10.0		mg/L	2	05/20/13	2320 B		ABP
Alkalinity, Hydroxide*	<10.0	10.0		mg/L	2	05/20/13	2320 B		ABP
Alkalinity, Total*	**244**	10.0		mg/L	2	05/20/13	2320 B		ABP
Bromide	**0.409**	0.100		mg/L	1	05/29/13	4500-Br- B		ABP
Chloride	<10.0	10.0	5.00	mg/L	1	05/21/13	4500-Cl- C		ABP
Conductivity*	**520**	10.0		uS/cm	1	05/15/13	2510 B		MJV
Fluoride*	**0.288**	0.200	0.0330	mg/L	1	05/22/13	4500-F- C		ABP
Nitrate/Nitrite as N*	<0.020	0.020	0.014	mg/L	1	05/31/13	EPA353.2		KLM
pH*	**8.30**			pH Units	1	05/15/13	EPA150.1		MJV
Sulfate	**74.0**	10.0	1.63	mg/L	1	05/25/13	4500-SO42- E		ABP
TDS*	**335**	10.0		mg/L	1	05/20/13	EPA160.1		ABP
Dissolved Metals by ICP									
Calcium*	**80.9**	1.00	0.007	mg/L	1	05/17/13	EPA200.7		JLM
Iron*	<0.050	0.050	0.004	mg/L	1	05/17/13	EPA200.7		JLM
Magnesium*	**24.6**	1.00	0.021	mg/L	1	05/17/13	EPA200.7		JLM
Potassium*	**1.50**	1.00	0.617	mg/L	1	05/17/13	EPA200.7		JLM
Sodium*	**16.0**	1.00	0.023	mg/L	1	05/17/13	EPA200.7		JLM

Green Analytical Laboratories

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:32

Section 14 Spring (REICH)

1305094-02 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate*	**240**	10.0		mg/L	2	05/20/13	2320 B		ABP
Alkalinity, Carbonate*	<10.0	10.0		mg/L	2	05/20/13	2320 B		ABP
Alkalinity, Hydroxide*	<10.0	10.0		mg/L	2	05/20/13	2320 B		ABP
Alkalinity, Total*	**240**	10.0		mg/L	2	05/20/13	2320 B		ABP
Bromide	**0.447**	0.100		mg/L	1	05/29/13	4500-Br- B		ABP
Chloride	<10.0	10.0	5.00	mg/L	1	05/21/13	4500-Cl- C		ABP
Conductivity*	**516**	10.0		uS/cm	1	05/15/13	2510 B		MJV
Fluoride*	**0.401**	0.200	0.0330	mg/L	1	05/22/13	4500-F- C		ABP
Nitrate/Nitrite as N*	<0.020	0.020	0.014	mg/L	1	05/31/13	EPA353.2		KLM
pH*	**8.19**			pH Units	1	05/15/13	EPA150.1		MJV
Sulfate	**75.0**	10.0	1.63	mg/L	1	05/25/13	4500-SO42- E		ABP
TDS*	**335**	10.0		mg/L	1	05/20/13	EPA160.1		ABP
Dissolved Metals by ICP									
Calcium*	**93.8**	1.00	0.007	mg/L	1	05/17/13	EPA200.7		JLM
Iron*	<0.050	0.050	0.004	mg/L	1	05/17/13	EPA200.7		JLM
Magnesium*	**10.2**	1.00	0.021	mg/L	1	05/17/13	EPA200.7		JLM
Potassium*	**1.25**	1.00	0.617	mg/L	1	05/17/13	EPA200.7		JLM
Sodium*	**26.1**	1.00	0.023	mg/L	1	05/17/13	EPA200.7		JLM

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:32

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305140 - General Prep - Wet Chem										
Duplicate (B305140-DUP1)	**Source: 1305094-01**			Prepared & Analyzed: 05/15/13						
Conductivity	527	10.0	uS/cm		520			1.34	20	
Reference (B305140-SRM1)				Prepared & Analyzed: 05/15/13						
Conductivity	1460		uS/cm	1450		101	94-106			
Batch B305146 - General Prep - Wet Chem										
Duplicate (B305146-DUP1)	**Source: 1305094-01**			Prepared & Analyzed: 05/15/13						
pH	8.21		pH Units		8.30			1.09	20	
Reference (B305146-SRM1)				Prepared & Analyzed: 05/15/13						
pH	8.84		pH Units	9.13		96.8	90-110			
Batch B305151 - General Prep - Wet Chem										
Blank (B305151-BLK1)				Prepared & Analyzed: 05/21/13						
Chloride	ND	10.0	mg/L							
LCS (B305151-BS1)				Prepared & Analyzed: 05/21/13						
Chloride	101	10.0	mg/L	100		101	85-115			
LCS Dup (B305151-BSD1)				Prepared & Analyzed: 05/21/13						
Chloride	99.0	10.0	mg/L	100		99.0	85-115	2.00	20	
Batch B305155 - General Prep - Wet Chem										
Blank (B305155-BLK1)				Prepared & Analyzed: 05/20/13						
Alkalinity, Total	ND	10.0	mg/L							

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:32

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305155 - General Prep - Wet Chem										
LCS (B305155-BS1)				Prepared & Analyzed: 05/20/13						
Alkalinity, Total	99.0	10.0	mg/L	100		99.0	85-115			
LCS Dup (B305155-BSD1)				Prepared & Analyzed: 05/20/13						
Alkalinity, Total	100	10.0	mg/L	100		100	85-115	1.01	20	
Batch B305170 - General Prep - Wet Chem										
Blank (B305170-BLK1)				Prepared & Analyzed: 05/22/13						
Fluoride	ND	0.200	mg/L							
LCS (B305170-BS1)				Prepared & Analyzed: 05/22/13						
Fluoride	1.02	0.200	mg/L	1.00		102	85-115			
LCS Dup (B305170-BSD1)				Prepared & Analyzed: 05/22/13						
Fluoride	1.07	0.200	mg/L	1.00		107	85-115	5.26	20	
Batch B305186 - General Prep - Wet Chem										
Blank (B305186-BLK1)				Prepared & Analyzed: 05/20/13						
TDS	ND	10.0	mg/L							
Duplicate (B305186-DUP1)		**Source: 1305088-01**		Prepared & Analyzed: 05/20/13						
TDS	215	10.0	mg/L		210			2.35	20	
Reference (B305186-SRM1)				Prepared & Analyzed: 05/20/13						
TDS	2840	10.0	mg/L	2860		99.3	85-115			

Green Analytical Laboratories

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:32

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305188 - General Prep - Wet Chem										
Blank (B305188-BLK1)				Prepared & Analyzed: 05/25/13						
Sulfate	ND	10.0	mg/L							
LCS (B305188-BS1)				Prepared & Analyzed: 05/25/13						
Sulfate	54.0	10.0	mg/L	50.0		108	85-115			
LCS Dup (B305188-BSD1)				Prepared & Analyzed: 05/25/13						
Sulfate	53.0	10.0	mg/L	50.0		106	85-115	1.87	20	
Batch B305208 - General Prep - Wet Chem										
Blank (B305208-BLK1)				Prepared & Analyzed: 05/29/13						
Bromide	ND	0.100	mg/L							
LCS (B305208-BS1)				Prepared & Analyzed: 05/29/13						
Bromide	0.549	0.100	mg/L	0.600		91.5	85-115			
LCS Dup (B305208-BSD1)				Prepared & Analyzed: 05/29/13						
Bromide	0.642	0.100	mg/L	0.600		107	85-115	15.6	20	
Batch B306001 - General Prep - Wet Chem										
Blank (B306001-BLK1)				Prepared & Analyzed: 05/31/13						
Nitrate/Nitrite as N	ND	0.020	mg/L							
LCS (B306001-BS1)				Prepared & Analyzed: 05/31/13						
Nitrate/Nitrite as N	0.492	0.020	mg/L	0.500		98.4	85-115			

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:32

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B306001 - General Prep - Wet Chem										
LCS Dup (B306001-BSD1)				Prepared & Analyzed: 05/31/13						
Nitrate/Nitrite as N	0.490	0.020	mg/L	0.500		98.0	85-115	0.407	20	

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:32

Dissolved Metals by ICP - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305104 - Dissolved Metals, E200.7/E200.8										
Blank (B305104-BLK1)				Prepared: 05/16/13 Analyzed: 05/17/13						
Calcium	ND	1.00	mg/L							
Iron	ND	0.050	mg/L							
Magnesium	ND	1.00	mg/L							
Potassium	ND	1.00	mg/L							
Sodium	ND	1.00	mg/L							
LCS (B305104-BS1)				Prepared: 05/16/13 Analyzed: 05/17/13						
Calcium	5.18	1.00	mg/L	5.00		104	85-115			
Iron	5.34	0.050	mg/L	5.00		107	85-115			
Magnesium	27.0	1.00	mg/L	25.0		108	85-115			
Potassium	10.6	1.00	mg/L	10.0		106	85-115			
Sodium	8.37	1.00	mg/L	8.10		103	85-115			
LCS Dup (B305104-BSD1)				Prepared: 05/16/13 Analyzed: 05/17/13						
Calcium	5.05	1.00	mg/L	5.00		101	85-115	2.63	20	
Iron	5.19	0.050	mg/L	5.00		104	85-115	2.92	20	
Magnesium	26.3	1.00	mg/L	25.0		105	85-115	2.69	20	
Potassium	10.3	1.00	mg/L	10.0		103	85-115	2.74	20	
Sodium	8.17	1.00	mg/L	8.10		101	85-115	2.52	20	

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	06/03/13 15:32

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
	*Results reported on as received basis unless designated as dry.
RPD	Relative Percent Difference
LCS	Laboratory Control Sample (Blank Spike)
RL	Report Limit
MDL	Method Detection Limit

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

GREEN ANALYTICAL LABORATORIES

CHAIN OF CUSTODY RECORD

Page 1 of 1

Client: LT Environmental
Contact: Devin Hencmann
Address: 2243 Main Ave Suite 3
Durango CO 81301
Phone Number: 970-385-1096
FAX Number: dhencmann@ltenv.com

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
3) Designate Sample Reject Disposition.
PO#

Project Name: Archuleta Springs

Samplers Signature:

Table 1. – Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) _____

FOR GAL USE ONLY
GAL JOB # 1305-094

Lab Name: Green Analytical Laboratories (970) 247-4220 FAX (970) 247-4227
Address: 75 Suttle Street, Durango, CO 81303

	Sample ID	Collection: Date	Collection: Time	Misc: Collected by: (Init.)	Misc: Matrix Type From Table 1	Misc: No. of Containers	Misc: Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	Preservative(s): HNO3	Preservative(s): HCL	Preservative(s): H2SO4	Preservative(s): NAOH	Preservative(s): Other (Specify)	Analyses Required: See Attached	Comments
01	1. GOV-02	5/14/13	11:45	DH	2	3	N	1	1	~~3~~	1			X	#18 13.9°C on ice
02	2. Section 14 Spring Creek 3	5/14/13	13:15	DH	2	3	N	1	1	~~3~~	1			X	
	3.									~~DA~~					
	4.														
	5.														
	6.														
	7.														
	8.														
	9.														
	10.														

Relinquished by:		Date: 5/14/13	Time: 1707	Received by:		Date: 05-14-13	Time: 1707
Relinquished by:		Date:	Time:	Received by:		Date:	Time:

* Sample Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

Project Information

LTE
5/9/2013

LT Environmental
2243 MAin Ave Suite 3
Durango, CO 81301
Laboratory PM: **Debbie Zufelt**

Phone:(970) 385-1096
Fax:-

Project Name:	Archuletta Springs	**Invoice To:**	LT Environmental
Project Number:	[none]	**Invoice Bid:**	(list pricing)
Client PM:	Ashley Ager	**Invoice Manager:**	Julie Linn
Comments:			

Analysis	Comment
Iron Dissolved by ICP	
Alkalinity, Carbonate	
Alkalinity, Hydroxide	
Alkalinity, Total	
Bromide	
Calcium Dissolved by ICP	
Chloride	
Alkalinity, Bicarbonate	
Fluoride	
Sulfate	
Magnesium Dissolved by ICP	
Nitrate/Nitrite as N	
pH	
Potassium Dissolved by ICP	
Sodium Dissolved by ICP	
Solids, Total Dissolved (TDS)	
Conductivity	

15 Sites

Monday for p/u

↳ poly Un 500

poly HNO_3 250 no acid

poly H_2SO_4 125

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29 May 2013

Devin Hencmann
LT Environmental
2243 MAin Ave Suite 3
Durango, CO 81301

RE: Archuletta Springs

Enclosed are the results of analyses for samples received by the laboratory on 05/13/13 16:10.
If you need any further assistance, please feel free to contact me.

Sincerely,

Debbie Zufelt
Reports Manager

All accredited analytes contained in this report are denoted by an asterisk (*). For a complete list of accredited analytes please do not hesitate to contact us via any of the contact information contained in this report. Our NELAP accreditation can be viewed at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Green Analytical Laboratories is NELAP accredited through the Texas Commission on Environmental Quality. Accreditation applies to drinking water and non-potable water matrices for trace metals and a variety of inorganic parameters. Green Analytical Laboratories is also accredited through the Colorado Department of Public Health and Environment and EPA region 8 for trace metals, Cyanide, Fluoride, Nitrate, and Nitrite in drinking water.

Our affiliate laboratory, Cardinal Laboratories, is also NELAP accredited through the Texas Commission on Environmental Quality for a variety of organic constituents in drinking water, non-potable water and solid matrices. Cardinal is also accredited for regulated VOCs, TTHM, and HAA-5 in drinking water

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	05/29/13 17:09

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Thick Spring	1305088-01	Water	05/13/13 11:30	05/13/13 16:10
Walt Spring #1	1305088-02	Water	05/13/13 12:45	05/13/13 16:10
Willow Springs	1305088-03	Water	05/13/13 14:20	05/13/13 16:10

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	05/29/13 17:09

Thick Spring

1305088-01 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate*	**131**	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Carbonate*	<10.0	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Hydroxide*	<10.0	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Total*	**131**	10.0		mg/L	1	05/20/13	2320 B		ABP
Bromide	**0.549**	0.100		mg/L	1	05/29/13	4500-Br- B		ABP
Chloride	**40.0**	10.0	5.00	mg/L	1	05/21/13	4500-Cl- C		ABP
Conductivity*	**375**	10.0		uS/cm	1	05/13/13	2510 B		MJV
Fluoride*	<0.200	0.200	0.0330	mg/L	1	05/22/13	4500-F- C		ABP
Nitrate/Nitrite as N*	**0.043**	0.020	0.014	mg/L	1	05/22/13	EPA353.2		KLM
pH*	**7.12**			pH Units	1	05/13/13	EPA150.1		MJV
Sulfate	**25.0**	10.0	1.63	mg/L	1	05/25/13	4500-SO42- E		ABP
TDS*	**210**	10.0		mg/L	1	05/20/13	EPA160.1		ABP
Dissolved Metals by ICP									
Calcium*	**49.9**	1.00	0.007	mg/L	1	05/16/13	EPA200.7		JLM
Iron*	<0.050	0.050	0.004	mg/L	1	05/16/13	EPA200.7		JLM
Magnesium*	**10.4**	1.00	0.021	mg/L	1	05/16/13	EPA200.7		JLM
Potassium*	**2.22**	1.00	0.617	mg/L	1	05/16/13	EPA200.7		JLM
Sodium*	**17.1**	1.00	0.023	mg/L	1	05/16/13	EPA200.7		JLM

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	05/29/13 17:09

Walt Spring #1

1305088-02 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate*	**149**	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Carbonate*	<10.0	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Hydroxide*	<10.0	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Total*	**149**	10.0		mg/L	1	05/20/13	2320 B		ABP
Bromide	**1.63**	0.500		mg/L	5	05/29/13	4500-Br- B		ABP
Chloride	<10.0	10.0	5.00	mg/L	1	05/21/13	4500-Cl- C		ABP
Conductivity*	**382**	10.0		uS/cm	1	05/13/13	2510 B		MJV
Fluoride*	<0.200	0.200	0.0330	mg/L	1	05/22/13	4500-F- C		ABP
Nitrate/Nitrite as N*	<0.020	0.020	0.014	mg/L	1	05/22/13	EPA353.2		KLM
pH*	**7.12**			pH Units	1	05/13/13	EPA150.1		MJV
Sulfate	**84.0**	20.0	3.26	mg/L	2	05/25/13	4500-SO42- E		ABP
TDS*	**240**	10.0		mg/L	1	05/20/13	EPA160.1		ABP
Dissolved Metals by ICP									
Calcium*	**52.0**	1.00	0.007	mg/L	1	05/16/13	EPA200.7		JLM
Iron*	<0.050	0.050	0.004	mg/L	1	05/16/13	EPA200.7		JLM
Magnesium*	**16.7**	1.00	0.021	mg/L	1	05/16/13	EPA200.7		JLM
Potassium*	**1.61**	1.00	0.617	mg/L	1	05/16/13	EPA200.7		JLM
Sodium*	**13.2**	1.00	0.023	mg/L	1	05/16/13	EPA200.7		JLM

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	05/29/13 17:09

Willow Springs

1305088-03 (Water)

Analyte	Result	RL	MDL	Units	Dilution	Analyzed	Method	Notes	Analyst
General Chemistry									
Alkalinity, Bicarbonate*	**124**	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Carbonate*	<10.0	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Hydroxide*	<10.0	10.0		mg/L	1	05/20/13	2320 B		ABP
Alkalinity, Total*	**124**	10.0		mg/L	1	05/20/13	2320 B		ABP
Bromide	<0.100	0.100		mg/L	1	05/29/13	4500-Br- B		ABP
Chloride	<10.0	10.0	5.00	mg/L	1	05/21/13	4500-Cl- C		ABP
Conductivity*	**272**	10.0		uS/cm	1	05/13/13	2510 B		MJV
Fluoride*	**0.311**	0.200	0.0330	mg/L	1	05/22/13	4500-F- C		ABP
Nitrate/Nitrite as N*	<0.020	0.020	0.014	mg/L	1	05/22/13	EPA353.2		KLM
pH*	**7.40**			pH Units	1	05/13/13	EPA150.1		MJV
Sulfate	**27.0**	10.0	1.63	mg/L	1	05/25/13	4500-SO42- E		ABP
TDS*	**125**	10.0		mg/L	1	05/20/13	EPA160.1		ABP
Dissolved Metals by ICP									
Calcium*	**35.7**	1.00	0.007	mg/L	1	05/16/13	EPA200.7		JLM
Iron*	<0.050	0.050	0.004	mg/L	1	05/16/13	EPA200.7		JLM
Magnesium*	**5.72**	1.00	0.021	mg/L	1	05/16/13	EPA200.7		JLM
Potassium*	**1.23**	1.00	0.617	mg/L	1	05/16/13	EPA200.7		JLM
Sodium*	**17.0**	1.00	0.023	mg/L	1	05/16/13	EPA200.7		JLM

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	05/29/13 17:09

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305138 - General Prep - Wet Chem										
Duplicate (B305138-DUP1)		**Source: 1305078-01**		Prepared & Analyzed: 05/13/13						
Conductivity	24800	10.0	uS/cm		25000			0.482	20	
Reference (B305138-SRM1)				Prepared & Analyzed: 05/13/13						
Conductivity	1420		uS/cm	1450		98.1	94-106			
Batch B305144 - General Prep - Wet Chem										
Duplicate (B305144-DUP1)		**Source: 1305078-01**		Prepared & Analyzed: 05/13/13						
pH	7.76		pH Units		7.71			0.646	20	
Reference (B305144-SRM1)				Prepared & Analyzed: 05/13/13						
pH	8.90		pH Units	9.13		97.5	90-110			
Batch B305151 - General Prep - Wet Chem										
Blank (B305151-BLK1)				Prepared & Analyzed: 05/21/13						
Chloride	ND	10.0	mg/L							
LCS (B305151-BS1)				Prepared & Analyzed: 05/21/13						
Chloride	101	10.0	mg/L	100		101	85-115			
LCS Dup (B305151-BSD1)				Prepared & Analyzed: 05/21/13						
Chloride	99.0	10.0	mg/L	100		99.0	85-115	2.00	20	
Batch B305155 - General Prep - Wet Chem										
Blank (B305155-BLK1)				Prepared & Analyzed: 05/20/13						
Alkalinity, Total	ND	10.0	mg/L							

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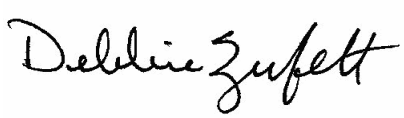

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	05/29/13 17:09

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305155 - General Prep - Wet Chem										
LCS (B305155-BS1)				Prepared & Analyzed: 05/20/13						
Alkalinity, Total	99.0	10.0	mg/L	100		99.0	85-115			
LCS Dup (B305155-BSD1)				Prepared & Analyzed: 05/20/13						
Alkalinity, Total	100	10.0	mg/L	100		100	85-115	1.01	20	
Batch B305170 - General Prep - Wet Chem										
Blank (B305170-BLK1)				Prepared & Analyzed: 05/22/13						
Fluoride	ND	0.200	mg/L							
LCS (B305170-BS1)				Prepared & Analyzed: 05/22/13						
Fluoride	1.02	0.200	mg/L	1.00		102	85-115			
LCS Dup (B305170-BSD1)				Prepared & Analyzed: 05/22/13						
Fluoride	1.07	0.200	mg/L	1.00		107	85-115	5.26	20	
Batch B305172 - General Prep - Wet Chem										
Blank (B305172-BLK1)				Prepared & Analyzed: 05/22/13						
Nitrate/Nitrite as N	ND	0.020	mg/L							
LCS (B305172-BS1)				Prepared & Analyzed: 05/22/13						
Nitrate/Nitrite as N	0.499	0.020	mg/L	0.500		99.8	85-115			
LCS Dup (B305172-BSD1)				Prepared & Analyzed: 05/22/13						
Nitrate/Nitrite as N	0.479	0.020	mg/L	0.500		95.8	85-115	4.09	20	

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

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LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	05/29/13 17:09

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305186 - General Prep - Wet Chem										
Blank (B305186-BLK1)				Prepared & Analyzed: 05/20/13						
TDS	ND	10.0	mg/L							
Duplicate (B305186-DUP1)	**Source: 1305088-01**			Prepared & Analyzed: 05/20/13						
TDS	215	10.0	mg/L		210			2.35	20	
Reference (B305186-SRM1)				Prepared & Analyzed: 05/20/13						
TDS	2840	10.0	mg/L	2860		99.3	85-115			
Batch B305188 - General Prep - Wet Chem										
Blank (B305188-BLK1)				Prepared & Analyzed: 05/25/13						
Sulfate	ND	10.0	mg/L							
LCS (B305188-BS1)				Prepared & Analyzed: 05/25/13						
Sulfate	54.0	10.0	mg/L	50.0		108	85-115			
LCS Dup (B305188-BSD1)				Prepared & Analyzed: 05/25/13						
Sulfate	53.0	10.0	mg/L	50.0		106	85-115	1.87	20	
Batch B305208 - General Prep - Wet Chem										
Blank (B305208-BLK1)				Prepared & Analyzed: 05/29/13						
Bromide	ND	0.100	mg/L							
LCS (B305208-BS1)				Prepared & Analyzed: 05/29/13						
Bromide	0.549	0.100	mg/L	0.600		91.5	85-115			

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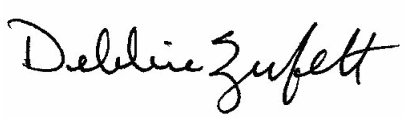

Debbie Zufelt, Reports Manager

dzufelt@greenanalytical.com p: 970.247.4220 f: 970.247.4227 75 Suttle Street Durango, CO 81303

www.GreenAnalytical.com

LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	05/29/13 17:09

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305208 - General Prep - Wet Chem										
LCS Dup (B305208-BSD1)				Prepared & Analyzed: 05/29/13						
Bromide	0.642	0.100	mg/L	0.600		107	85-115	15.6	20	

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

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www.GreenAnalytical.com

LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	05/29/13 17:09

Dissolved Metals by ICP - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B305103 - Dissolved Metals, E200.7/E200.8										
Blank (B305103-BLK1)				Prepared & Analyzed: 05/16/13						
Calcium	ND	1.00	mg/L							
Iron	ND	0.050	mg/L							
Magnesium	ND	1.00	mg/L							
Potassium	ND	1.00	mg/L							
Sodium	ND	1.00	mg/L							
LCS (B305103-BS1)				Prepared & Analyzed: 05/16/13						
Calcium	4.54	1.00	mg/L	5.00		90.8	85-115			
Iron	4.62	0.050	mg/L	5.00		92.3	85-115			
Magnesium	23.5	1.00	mg/L	25.0		94.1	85-115			
Potassium	9.08	1.00	mg/L	10.0		90.8	85-115			
Sodium	7.31	1.00	mg/L	8.10		90.2	85-115			
LCS Dup (B305103-BSD1)				Prepared & Analyzed: 05/16/13						
Calcium	5.30	1.00	mg/L	5.00		106	85-115	15.5	20	
Iron	5.40	0.050	mg/L	5.00		108	85-115	15.6	20	
Magnesium	27.6	1.00	mg/L	25.0		111	85-115	16.1	20	
Potassium	10.7	1.00	mg/L	10.0		107	85-115	16.8	20	
Sodium	8.49	1.00	mg/L	8.10		105	85-115	15.0	20	

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

dzufelt@greenanalytical.com p: 970.247.4220 f: 970.247.4227 75 Suttle Street Durango, CO 81303

www.GreenAnalytical.com

LT Environmental	Project: Archuletta Springs	
2243 MAin Ave Suite 3	Project Name / Number: [none]	**Reported:**
Durango CO, 81301	Project Manager: Devin Hencmann	05/29/13 17:09

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
	*Results reported on as received basis unless designated as dry.
RPD	Relative Percent Difference
LCS	Laboratory Control Sample (Blank Spike)
RL	Report Limit
MDL	Method Detection Limit

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

GREEN GAL Analytical Laboratories

CHAIN OF CUSTODY RECORD

Page 1 of 1

Client: LT Environmental
Contact: Devin Hencmann
Address: 2243 Main Ave Ste 3
Durango CO 81301
Phone Number: 970·385·1096
~~FAX Number~~ Email: dhencmann@ltenv.com

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
3) Designate Sample Reject Disposition.
PO#
Project Name: Archuleta Springs
Samplers Signature:

Table 1. – Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) _____

FOR GAL USE ONLY
GAL JOB # 1305-088

Lab Name: Green Analytical Laboratories (970) 247-4220 FAX (970) 247-4227
Address: 75 Suttle Street, Durango, CO 81303

	Sample ID	Collection: Date	Collection: Time	Misc: Collected by: (Init.)	Misc: Matrix Type From Table 1	Misc: No. of Containers	Misc: Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	Preservative(s): HNO3	Preservative(s): HCL	Preservative(s): H2SO4	Preservative(s): NAOH	Preservative(s): Other (Specify)	Analyses Required: See Attached	Comments
01	1. Thick Spring	5/13/13	11:30	DH	2	3	N	1	1		1			✓	See Attached
02	2. Walt Spring #P	5/13/13	12:45	DH	2	3	N	1	1		1			✓	
03	3. Willow Springs	5/13/13	14:20	DH	2	3	N	1	1		1			✓	
	4.														
	5.														
	6.														
	7.														
	8.														
	9.														
	10.														

#15
12.8°c
on ice

Relinquished by:	Date: 16:10 → 5-13-13	Time:	Received by: Debbie Zufelt	Date: 05-13-13	Time: 1610
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

Project Information

LT Environmental
2243 MAin Ave Suite 3
Durango, CO 81301
Laboratory PM: **Debbie Zufelt**
Phone:(970) 385-1096
Fax:-

LTE
5/9/2013

Project Name:	Archuletta Springs	**Invoice To:**	LT Environmental
Project Number:	[none]	**Invoice Bid:**	(list pricing)
Client PM:	Ashley Ager	**Invoice Manager:**	Julie Linn
Comments:			

Analysis	Comment
Iron Dissolved by ICP	
Alkalinity, Carbonate	
Alkalinity, Hydroxide	
Alkalinity, Total	
Bromide	
Calcium Dissolved by ICP	
Chloride	
Alkalinity, Bicarbonate	
Fluoride	
Sulfate	
Magnesium Dissolved by ICP	
Nitrate/Nitrite as N	
pH	
Potassium Dissolved by ICP	
Sodium Dissolved by ICP	
Solids, Total Dissolved (TDS)	
Conductivity	

15 Sites

Monday for p/u

↳ poly Un 500

poly HNO_3 250 no acid

poly H_2SO_4 125

Four Corners Geoscience,Inc.
P.O. Box 4224
Durango, CO 81302

Methane Analysis Report

Client

L T Environmental,Inc.
2243 Main Avenue Suite 3
Durango,CO 81301
Sam LaRue
970-619-0936

Project Name:	Archuleta County Spring Sampling
Project Number:	19113001
Report Date:	6/5/2013
Sampled By:	Devin Henemann

Analysis:	Lynn Fechter			**Results:**	
FCGeo #	**Sample Date**	**Sample Time (Hrs)**	**Site ID-Location**	***CH4 (mg/L)***	***Limit (mg/L)***
052313-LB3	5/23/2013	1410	Crain Spring	<0.02	0.02
052313-LB4	5/23/2013	1338	D-8 Spring	<0.02	0.02
052313-LB5	5/23/2013	1320	Watson Well spring	<0.02	0.02
052313-LB6	5/23/2013	1135	Munger Spring 2	<0.02	0.02
052313-LB7	5/23/2013	1300	Grassy Spring	<0.02	0.02
052313-BLK3	5/23/2013	NA	LAB BLANK	<0.02	0.02
052313-BLK4	5/23/2013	NA	LAB BLANK	<0.02	0.02
052313-BLK5	5/23/2013	NA	LAB BLANK	<0.02	0.02
052313-BLK6	5/23/2013	NA	LAB BLANK	<0.02	0.02
052313-BLK7	5/23/2013	NA	LAB BLANK	<0.02	0.02

Date Samples delivered to FCGEO analysis by Lynn Fechter
Analyses were conducted on SRI gas chromatograph w/ FID within 24 hours of delivery.
Conducted Methane analysis per protocol and method established
by BLM San Juan Resource Area 1993 and USGS method.
Laboratory calibration quality control conducted the same day as sample runs.
Blanks and duplicated runs conducted for each sample set.
No field blanks received at FCGeo Lab
ND- None Detected

Lynn M. Fechter, B.S. Geology

Four Corners Geoscience,Inc.
P.O. Box 4224
Durango, CO 81302

Methane Analysis Report

Client

L T Environmental,Inc.
2243 Main Avenue Suite 3
Durango,CO 81301

Project Name:	Archuleta County	
Project Number	19113001	
Report Date:	5/22/2013	
Sampled By:	Devin Hencmann	Brook Herb

Analysis:	Lynn Fechter			**Results:**	
FCGeo #	**Sample Date**	**Sample Time *(Hrs)***	**Site ID-Location**	***CH4 (mg/L)***	***Limit (mg/L)***
051313-LB1	5/13/2013	11:30	Thick Spring	<0.02	0.02
051313-LB2	5/13/2013	1245	Walt Spring #1	<0.02	0.02
051313-LB3	5/13/2013	1420	Willow Spring	<0.02	0.02
051413-LB1	5/14/2013	1145	GOV-02	<0.02	0.02
051413-LB2	5/14/2013	1315	Sec 14 Spring Reich	<0.02	0.02
051513-LB1	5/15/2013	15:50	Vance Spring #1	<0.02	0.02
051313-LB1		NA	LAB BLANK	<0.02	0.02
051313-LB2		NA	LAB BLANK	<0.02	0.02
051313-LB3		NA	LAB BLANK	<0.02	0.02
051413-LB1		NA	LAB BLANK	<0.02	0.02
051413-LB2		NA	LAB BLANK	<0.02	0.02
051513-LB3		NA	LAB BLANK	<0.02	0.02

Samples delivered to FCGEO by LTE Geologist-analysis by Lynn Fechter
Analyses conducted-SRI gas chromatograph within 24 hours of delivery.
Conducted Methane analysis per protocol and method established
by BLM San Juan Resource Area 1993 and USGS method.
Laboratory calibration quality control conducted for project.
Lab blanks-(duplicated runs if received from techs.

Lynn M. Fechter, B.S. Geology

APPENDIX D

CBM PRODUCTION WELL WATER LABORATORY ANALYTICAL REPORTS

TO: TOM
FROM: Mike
as discussed
Thanks

Green Analytical Laboratories, Inc.
75 Suttle Street
Durango, CO 81303

GAL I.D.: **708-177-01**
Date Received: 08/31/07
Date Reported: 09/12/07
QC Batches:

Petrox Resources, Inc.
55 Valley Court
Durango, CO 81301
Attention: Mike Clark

PROJECT NAME:
PROJECT NUMBER:
SAMPLE I.D.: Candelaria 10U #3

Sample Date: 08/31/07
Sample Matrix: Water

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS
Alkalinity as CaCO3	2320B	10	1700	1	mg/L
Bicarbonate as CaCO3	2320B	10	1700	1	mg/L
Carbonate as CaCO3	2320B	10	<10	1	mg/L
Hydroxide as CaCO3	2320B	10	<10	1	mg/L
Calcium, dissolved	200.7	0.5	49.9	1	mg/L
Chloride	4500Cl	10	2560	1	mg/L
Conductivity	2510B	1.0	10500	1	uS/cm
Iron, total	200.7	0.05	8.68	1	mg/L
Magnesium, dissolved	200.7	0.5	16.3	1	mg/L
pH	150.1	NA	7.88	NA	SU
Potassium, dissolved	200.7	0.5	94.3	1	mg/L
Resistivity	Calc.	NA	95	1	ohm/cm
Sodium, dissolved	200.7	0.5	2330	1	mg/L
Specific Gravity	Hydrometer	NA	1.002	NA	
Sulfate	4500SO4	10	<10	1	mg/L
TDS	2540C	10	6010	1	mg/L
Hardness, as CaCO3	Calc.	10	192	1	mg/L
CAB	Calc.	NA	3.60		%

John Green, Laboratory Director

Pargin Mnt 9, 10, 11
Water Analysis

api_county_code	api_seq_num	twp	range	sec	meridian	qtrqtr	Name	DATE	DUP	BA (mg/L)	CA (mg/L)	CL (mg/L)	CO3 (mg/L)
007	06137	34N	5W	34	M	NESE	PARGIN MOUNTAIN UNIT 9	06/02/89	1		48	1050	0
007	06138	34N	5W	34	M	NWNE	PARGIN MOUNTAIN UNIT 10	01/02/00	1			702	
007	06138	34N	5W	34	M	NWNE	PARGIN MOUNTAIN UNIT 10	06/13/89	0		40	702	0

FE (mg/L)	HCO3 (mg/L)	K (mg/L)	MG (mg/L)	NA (mg/L)	pH (PH UNITS)	RESISTIVITY (ohm-m)	SO4 (mg/L)	TDS (mg/L)	TDS, Calc (mg/L)	lat	long	utm_x	utm_y
	3230	1	8	1830	7.19	1.64	0		6170	37.14528	-107.374	289181	4113423
	3392								5820	37.15243	-107.376	288986	4114221
	3392	13	17	1660	7.17	1.66	0		5820	37.15243	-107.376	288986	4114221

APPENDIX E

TWG MEETING MEMOS

MEMORANDUM

DATE: September 18, 2012 / Revised November 29, 2012

TO: Technical Working Group (TWG)

FROM: LT Environmental, Inc. (LTE)

SUBJECT: Technical Working Group Meeting #1 Summary

TECHNICAL WORKING GROUP MEETING #1

Meeting #1 represents the first TWG to discuss, evaluate, and assess Petrox Resources, Inc. (Petrox) and Elm Ridge Resources, Inc. (Elm Ridge) 2011 Outcrop Zone Report, which was developed in response to Decision Point 5 of the Record of Decision from the Northern San Juan Basin (NSJB) Final Environmental Impact Statement (FEIS), prepared by the Bureau of Land Management (BLM) and the United States Forest Service (USFS). Below is a list of action items that were agreed to at the end of meeting #1.

Outcrop Monitoring Plan

LTE will propose a modified outcrop monitoring plan based on the work conducted over the past 8 years. The plan will include:

- Annual methane gas seep monitoring in the major drainages using a modified grid spacing and grid extent;
- Regional reconnaissance every three years using infrared imagery and field verification;
- Annual natural spring sampling; and
- Quarterly mine surveys once Fosset Gulch Unit production begins for the first year followed by annual surveys unless results suggest otherwise.

Annual Reporting

LTE will prepare an annual Outcrop Zone Report to include the following components:

- Format in accordance with the April 2012 report;
- Annual outcrop monitoring results;
- Evaluation and analysis of new data and changes within the Project Area; and
- Gas and water production data from all Petrox coalbed methane (CBM) wells within the Fosset Gulch Unit.

Other Items of Discussion

The other key points of discussion during the meeting were as follows:

- No new monitoring wells will be required at this time;

- Petrox will incorporate water chemistry data from new production wells drilled prior to bringing them online per the COGCC conditions of approval. The data will be presented in the 2012 Outcrop Zone Report;
- Petrox will collect and provide initial downhole pressure data for all new drill production wells prior to bringing them online. The data will be used in evaluating reservoir production efficiency and in evaluating the Mansoori modeling efforts;
- The Outcrop Zone Report, dated April 2012, will be revised to include the edits to the executive summary, the coal desorption data, the 100 bwpd per well on page 2-9, and the specific edits in the last paragraph of the executive summary pertaining to mitigation as described by Pam Leschak (BLM) and Karen Spray (COGCC);
- Petrox will evaluate reservoir pressure data from new drills as they occur and conduct periodic model runs similar to the initial Mansoori effort to monitor the actual reservoir behavior in comparison to the initial predictive effort. The frequency of this activity will be dependent on the data available. Results will be presented in the Outcrop Zone Report when available;
- Petrox will commit to utilizing a new CBM production well such as the 10U#4 or the ~~16U#1~~ 9U#3 (revised by DRM on 11/29/2012) or an existing well for pressure monitoring for a period of no more the 3 months following completion of the well. The data will be provided to the TWG for review and evaluation. In addition, the data and TWG conclusions will be incorporated into the Outcrop Zone Report; and
- The Outcrop Zone Report and subsequent monitoring will be utilized for all Applications for Permits to Drill (APDs) within the Fosset Gulch Unit for Petrox.

MEMORANDUM

DATE: December 17, 2012

TO: Technical Working Group (TWG)

FROM: LT Environmental, Inc. (LTE)

SUBJECT: Technical Working Group Meeting #2 Summary

TECHNICAL WORKING GROUP MEETING #2

Attendees

Mike Clark – Petrox Resources, Inc. (Petrox)
Walt Brown – United States Forest Service (USFS)
John Pecor – United States Bureau of Land Management (BLM)
Pam Leschak – BLM
Kyle Siesser – Southern Ute Indian Tribe (SUIT)
Karen Spray – Colorado Oil and Gas Conservation Commission (COGCC)
Ivan Geroy – USFS
Daniel Moir – LTE

Mark Weems with the COGCC and Richard Rymerson with the BLM could not attend the meeting. Archuleta County was invited to have a representative attend the meeting; however, no representative for Archuleta County attended the meeting.

Meeting #2 represents the second meeting of the TWG to discuss, evaluate, and assess Petrox Resources, Inc. (Petrox) and Elm Ridge Resources, Inc. (Elm Ridge) coalbed methane (CBM) production wells within the mile and a half outcrop zone related to the Fruitland Formation (Kf) outcrop in Archuleta County, Colorado. The mile and a half outcrop zone was developed in the Record of Decision (ROD) for the Northern San Juan Basin (NSJB) Final Environmental Impact Statement (FEIS).

This meeting was convened to discuss topics related to the NSJB Stakeholder comments related to the 2011 Outcrop Zone Report and associated APD application for the 10U#3 production well. The TWG also discussed scheduling for the 10U#3 and proposed 9U#3 CBM wells. Below is a summary of topics and action items discussed during the second meeting of the TWG.

NSJB Stakeholder Comments

The TWG discussed comments from the NSJB Stakeholders regarding the 10U#3 APD and associated 2011 Outcrop Zone Report. The three main issues are listed below with TWG comments for each issue:

1. Natural Spring Sampling – The NSJB Stakeholders had issues with the quantity of natural spring samples collected compared to the known 28 natural springs identified in the 2011 Outcrop Zone Report. In addition, Mrs. Munger identified several natural springs on her property that have not been sampled to date.

TWG Comments

- In general, natural springs are sampled to compare water chemistry of the springs with the Kf aquifer water. This is used to identify whether natural spring water has communication with the Kf aquifer. Based on natural springs analytical data for the past nine years, the natural springs along the Kf outcrop in Archuleta County have different water chemistry than the Kf aquifer. The natural springs along the Kf outcrop in Archuleta County appear to be fed by snow pack runoff and are not fed by Kf aquifer discharge to the ground surface;
- LTE emphasizes sampling those natural springs that are on or adjacent to the Kf outcrop. In general, those natural springs that are not sampled annually are either dry at the time of sampling or property access was denied. LTE and Petrox have never denied sampling anyone's natural spring; and in consultation with the TWG, will sample springs/water sources in the outcrop zone upon landholder request if there is some potential that the spring/water source could be impacted by gas field production.
- LTE has utilized the United States Geological Survey (USGS) topographic maps and the Colorado Division of Water Resources (DWR) database to identify natural springs along the Kf outcrop in Archuleta County. LTE will conduct another inventory of natural springs along the Kf outcrop in Archuleta County prior to the 2013 Kf outcrop monitoring event utilizing existing resources as well as natural spring information from the *Isotopic and Geochemical Analysis of Groundwater-Surface Water Interactions at the Fruitland Outcrop: An Addition to the 4M Project* report by the Mountain State Institute, dated December 10, 2012; and
- To address landowners that have natural springs on their property that are not included in the previously identified resources, LTE will prepare a questionnaire for landowners that will accompany the 2013 property access letter. The questionnaire will ask if the landowner has natural springs on their property and if so, would they like to have it inspected by LTE field crew during the annual natural spring sampling event. Natural springs identified through the questionnaire or through landowner inquiries will be dealt with on a case-by-case based on natural spring proximity to the Kf outcrop. This will help address those landowners that have natural springs that have not been sampled in the past.

2. Coal fires along the Kf outcrop in Archuleta County – the NSJB Stakeholders are concerned about coal fires, specifically the potential for coal fires near homes and Highway 160.

TWG Comments

- There are currently no active coal fires in Archuleta County. There are currently no active coal fires in La Plata County above the SUIT boundary;

- There are three main causes for surface and near-surface coal fires: 1) lightning strikes to exposed coal that ignites and burns; 2) wildfires that ignite exposed coal; and 3) dewatering of coal where oxygen is present and spontaneous combustion conditions ignite coal and burn;

- Petrox is not responsible for naturally occurring events that would ignite the Kf outcrop such as lightning strikes or wildfires;

- Data currently suggests that the production of CBM wells within the outcrop zone would not dewater the Kf enough to create a spontaneous combustion atmosphere. In addition, the depth to the Kf in the Fosset Gulch area and chemical makeup of gases do not indicate that the Kf has enough oxygen to fuel the coals if it were to be dewatered;

- Monitoring of abandoned coal mines will be conducted by LTE for four consecutive quarters once Fosset Gulch Unit production begins. After the fourth quarterly monitoring event is conducted, the TWG will evaluate the data and determine monitoring frequency moving forward;

- The TWG will continually evaluate the potential for coal fires based on Petrox CBM productions and modify monitoring as needed; and

- Coal fires are possible to extinguish/mitigate and the SUIT have successfully extinguished one coal fire on their reservation within the last year. Petrox and LTE would look into the SUIT success in extinguishing their coal fire and evaluate the technical feasibility in the event a coal fire ignites along the Kf outcrop in Archuleta and Petrox is deemed the responsible party.

3. NSJB Stakeholder role in APD process for CBM production wells within the outcrop zone – There is a confusion of what role the NSJB Stakeholders play in the APD approval process for CBM production wells within the mile and half outcrop zone in Archuleta County.

TWG Comments

- NSJB Stakeholders meetings are for information sharing between regulators, industry, and landowners/stakeholders. It is a time for the NSJB Stakeholders to ask questions, share concerns, and make suggestions to regulatory decision makers;

- LTE's 2011 Outcrop Zone Report was prepared based on the Record of Decision (ROD) for the NSJB FEIS in order to have an APD approved by the BLM/USFS. ; and

- The roles and responsibilities of the NSJB Stakeholders Group and the TWG need to be clarified. The USFS, BLM, and LTE will explain the process in more detail at the next Stakeholders Group Meeting.

10U#3 and 9U#3 Schedules

- Petrox is awaiting their injection permit from the EPA for Petrox's produced water injection well to be approved prior to putting the 10U#3 online. Petrox is anticipating approval in February/March 2013;
- The USFS is currently reviewing Petrox's SUPO for the 9U#3, which Petrox was informed during the TWG meeting that a decision on the SUPO and APD should be given by the first week of March 2013. Petrox has tentatively scheduled drilling the 9U#3 (Federal lease) in May 2013. SUPO and APD approval in March, 2013, is necessary for Petrox to give adequate notice to the drilling company to have a drill rig available for the May 2013 drilling schedule, which is essential to keep the downhole pressure data collection schedule on track;
- Petrox will drill the 9U#3 in May 2013 and begin collecting downhole pressure data for three months (August 2013, September 2013, and October 2013), as agreed upon during the first TWG meeting in September 2012, assuming that the Fosset Gulch unit has been producing for approximately six months prior to data collection. Once the three months of downhole pressure data is collected, Petrox will put the 9U#3 online and begin producing CBM; and
- Downhole pressure data collected from the 9U#3 in 2013 will be reviewed and discussed by the TWG during the TWG meeting at the end of 2013, or sooner if results warrant.

Other Items of Discussion

- The next NSJB Stakeholder meeting is scheduled for January 17, 2012. LTE and Petrox will be at the meeting to address Stakeholder concerns and questions. In addition, LTE and the USFS will present a power point to the Stakeholders to explain the process and clear up confusions.
- The 2012 Outcrop Zone Report, prepared by LTE, will be revised to include more information regarding the natural springs and coal fires.
- LTE will bring three hard copies and several compact disc (CD) copies of the 2012 Outcrop Zone Report for the NSJB Stakeholders to take as needed. This will hopefully help those that have troubles printing the report or accessing it through the ftp site that has been provided by LTE.

MEMORANDUM

DATE: March 7, 2013

TO: Technical Working Group (TWG)

FROM: LT Environmental, Inc. (LTE)

SUBJECT: Technical Working Group Meeting #3 Summary

TECHNICAL WORKING GROUP MEETING #3

Attendees

Mike Clark – Petrox Resources, Inc. (Petrox)
Walt Brown – United States Forest Service (USFS)
John Pecor – United States Bureau of Land Management (BLM)
Pam Leschak – BLM
Kyle Siesser – Southern Ute Indian Tribe (SUIT)
Ivan Geroy – USFS
Daniel Moir – LTE

Karen Spray and Mark Weems with the Colorado Oil and Gas Conservation Commission (COGCC) and Brad Dodd with the BLM could not attend the meeting. Archuleta County was invited to have a representative attend the meeting (provided the representative meets technical qualifications for the TWG); however, no representative for Archuleta County attended the meeting.

This meeting represents the third meeting of the TWG to discuss, evaluate, and assess Petrox Resources, Inc. (Petrox) and Elm Ridge Resources, Inc. (Elm Ridge) coalbed methane (CBM) development within the Fruitland Formation (Kf) outcrop zone in Archuleta County, Colorado. The mile and a half outcrop zone was developed in the Record of Decision (ROD) for the Northern San Juan Basin (NSJB) Final Environmental Impact Statement (FEIS).

This meeting was convened to discuss topics related to the NSJB Stakeholder comments related Application for Permit to Drill (APD) for the 9U#3 CBM production well. Below is a summary of topics and action items discussed during the meeting.

Revised Fosset Gulch Unit Schedules

Below is a revised tentative schedule for the Project Area, specifically for the 10U#3 and the 9U#3 CBM production wells:

- Petrox is awaiting approval of their Underground Injection Control (UIC) permit from the EPA for a produced water injection well prior to putting the 10U#3 online. Petrox is anticipating UIC approval in April 2013;
- The USFS is currently reviewing Petrox's Surface Use Plan of Operations (SUPO) for the 9U#3. Petrox was informed by the USFS during the second TWG meeting that the approval of the SUPO should be given by the first week of March 2013. According to the USFS, the approval of the APD for the 9U#3 is also anticipated for the first week of March 2013. Petrox has tentatively scheduled drilling the 9U#3 (Federal lease) in May 2013. SUPO and APD approval in March 2013 is necessary for Petrox to give adequate notice to the drilling company to have a drill rig available for the May 2013 drilling schedule and to keep the downhole pressure data collection schedule on track;
- Petrox will drill the 9U#3 in May 2013, pending APD and SUPO approval, and begin collecting downhole pressure data for three months (August - October 2013) as agreed upon during the first TWG meeting in September 2012. The Fosset Gulch unit it anticipated to begin production in April 2013, pending EPA UIC approval. Assuming production begins in April 2013, there will be approximately three to five months of production prior to downhole pressure data collection from the 9U#3, approximately one month less than discussed during the second TWG meeting in December 2012. Once the three months of downhole pressure data are collected, Petrox will put the 9U#3 online and begin producing CBM. The deadline to bring the 9U#3 online is December 1, 2013, due to forest access restrictions imposed by the USFS; and
- Downhole pressure data collected from the 9U#3 in 2013 will be reviewed and utilized for history matching, confirming permeability, and modeling to revise, if necessary, drainage patterns for the Project. Data and models will be discussed by the TWG during the meeting planned at the end of 2013.

Additional Monitoring Plans

The outcrop monitoring plan is discussed in detail in the 2012 Outcrop Zone Report as well as potential mitigation options if methane seepage and/or coal fires are identified along the Kf outcrop. Below is a summary of additional monitoring actions/trigger mechanisms that will take place for the Fosset Gulch Unit:

- "Step-wise" monitoring approach will be met by bringing on four CBM production wells within the outcrop zone instead of the proposed 16 CBM production wells discussed in Decision Point 5 of the ROD. This will allow review of data for fewer wells and provide easier correlation with four wells instead of sixteen;

- Produced water will be monitored during production. If there is an increase of water production reaching the 100 barrels of water per day (bbl/day) per well or the water is determined to be fresh (less than 500 mg/L total dissolved solids (TDS)), then the TWG will convene and discuss the data and recommend action items to address potential impacts from withdrawing larger volumes and/or fresh produced water with CBM production; and
- Permeability and drainage patterns will be examined yearly. If permeability is greater than measured in the past or if the drainage pattern varies from past modeling, the TWG will convene to discuss and evaluate the new data.

Other Items Discussed

- Petrox does not plan to drill another CBM production well within the outcrop zone in the near future;
- If another APD is submitted to the BLM for a CBM production well within the outcrop zone, the following steps will occur:
    1. Outcrop Zone Report will be updated;
    2. TWG will convene and discuss Outcrop Zone report, plans for new CBM production well, and schedule;
    3. TWG will prepare recommendations to the BLM;
    4. TWG recommendations would be distributed to NSJB Stakeholders; and
    5. BLM would decide on APD application.
- LTE is preparing a questionnaire for landowners along the Kf outcrop to identify any natural springs on their property. If natural springs are present, LTE would review locations on a case-by-case basis to determine if the natural spring is on or near the Kf outcrop and if sampling the natural spring is necessary.

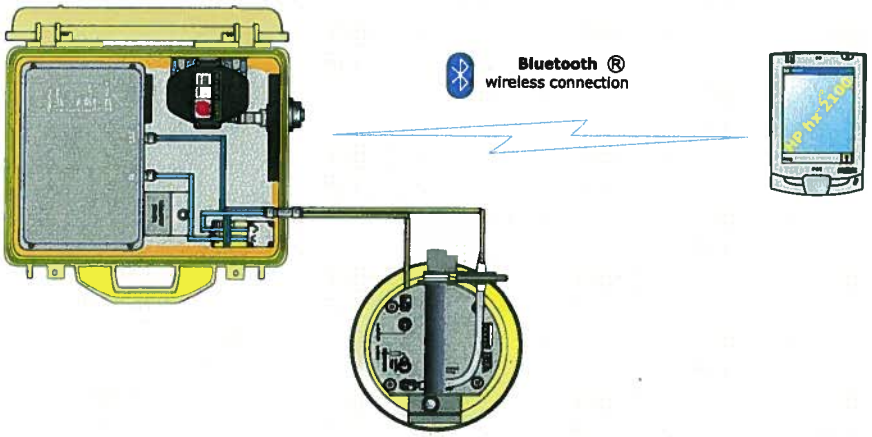
APPENDIX F

EQUIPMENT SPECIFICATIONS

WEST Systems portable soil flux meter

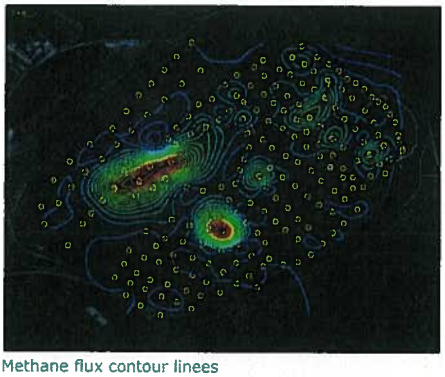
for Carbon dioxide, Methane and Hydrogen sulfide fluxes

The WEST Systems Fluxmeter is a portable instrument for the measurement of soil gas diffuse degassing phenomena that uses the accumulation chamber method.



This method studied for soil respiration in agronomy (Parkinson) and for soil degassing in volcanic areas (R. Cioni et al.), has been designed by WEST Systems to obtain a portable instrument that allows the performance of measurements with very good accuracy in a short time. The instrument allows a wide range evaluation of the amount of soil gas flux and can be utilized for the evaluation of biogas degassing (landfills), for the survey of non visible degassing phenomena in volcanic and geothermal areas as well as soil respiration rate in agronomy. In the picture below, the results of the degassing survey of a landfill.

Portable fluxmeter



Methane flux contour linees

a group of researchers during a flux mapping fieldwork, using the WS-LI820 flux meter

Courtesy of United States Geological Survey

WEST Systems

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Portable soil flux meter

Common physical characteristics:
Total Weight = 8.3 Kg/16 lbs. to be carried on the back using the backpack-like support vest. The field operator will also have to carry one of the accumulation chambers and the palmtop:

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, 2.6 A/h battery. The instrument comes with two interchangeable batteries.

Accumulation Chamber specifications:
- Accumulation chamber A diameter : 200 mm / Height: 100 mm / weight: 1.5 Kg/3.3 lbs
- Accumulation chamber B diameter : 200 mm / Height: 200mm / weight : 2.2 Kg /4.84 lbs

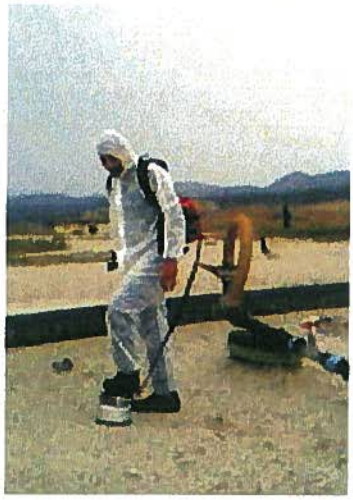
Palm top computer: PocketPC Color Display based on Windows Mobile operating system.
- PalmTop with cables, 0.3 Kg/0.7 lbs.
- Size 125mm (4.8") x 82mm (3.2") * 25 mm (1").

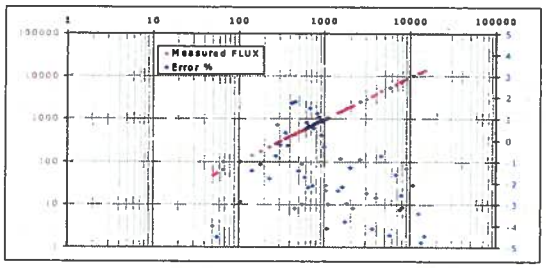
Software The instrument is supplied with a custom software, FluxManager, which allows recording and visualization of the increase in concentration of the target gas in the accumulation chamber, and then the flux calculations. The obtained measurements can be saved on the palmtop computer and then transferred to a desktop PC with a USB connection or using a SD card.

The instrument is supplied complete with:
- backpack-like support vest
- Carrying case for transport and storage
- 2 batteries NiMH 14.4 Volts 2.6 A/h and 1 NiMH battery charger Accumulation chamber A and B
- Palmtop Pocket PC
- User Manual, in English
- FLUX Manager Software for Windows Mobile, in English

The standard flux meter configuration is supplied with a single gas detector, normally the carbon dioxide detector. The fluxmeter can host two sensors by the way special releases, based on specific customer request, it can be supplied with a maximum of 3 sensors.

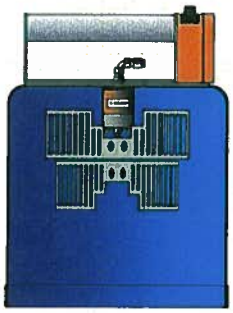
Finally we improved the connection between the instrument and the palmtop that now is based on BlueTooth wireless embedded device.





The measured carbon dioxide flux vs imposed flux (grams m^{-2} day^{-1});
The error % vs imposed flux (in blue).

The instrument is extremely versatile and allows measurement of flux in 2/4 minutes. In the picture: Soil bio-gas flux monitoring in a landfil.



Accumulation Chamber Type B

The accumulation chambers

In the normal use of instrument only the chamber B is used. To extend the instrument sensitivity to very low fluxes the accumulation chamber A is supplied.

	Type A	Type B
net area m^2	0.0314	
net volume m^3	0.003	0.006

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CO_2 - LI820

LI820 based Carbon dioxide fluxmeter

The CO_2 Fluxmeter is equipped with the LICOR LI-820 the most accurate and reliable portable carbon dioxide detector. The LI-820 is a double beam infrared sensor compensated for temperature variation in the range from -10 to 45°C and for atmospheric pressure variation in the range 660-1060 HPa. Accuracy 2% repeatability ±5ppm. The full scale range can be set to 1000 , 2000, 5000 or 20000 ppmV of carbon dioxide. The characteristics of precision refer to the sensor set to a full scale range of 20000 ppmV. If a very high sensitivity is required, the detector can be set to 1000 or 2000 ppm full scale value to measure with very high precision fluxes in the range from 0 to 10 moles m^{-2} day^{-1}

CO_2 FLUX Measurement range:
from 0 up 600 moles m^{-2} day^{-1}

The accuracy depends on the measured flux:

0 to 0.5 moles m^{-2} day^{-1}	25% (Acc.ch.A)
0.5 to 1 moles m^{-2} day^{-1}	15% (Acc.ch.A or B)
1 to 150 moles m^{-2} day^{-1}	10% (Acc.ch.B)
150 to 300 moles m^{-2} day^{-1}	10% (Acc.ch.B)
300 to 600 moles m^{-2} day^{-1}	20% (Acc.ch.B)

WS-DRAGER CO_2

WS-DRAGER: CO_2 Flux measurement:

A double beam infrared sensor compensated for temperature variation in the range from -20 to 65°C. Accuracy 3%. The full scale value can be set from 2,000 to 300,000 ppm of carbon dioxide. Carbon Dioxide flux measurement range from 0.5 to 1500 moles/m^2 per day.

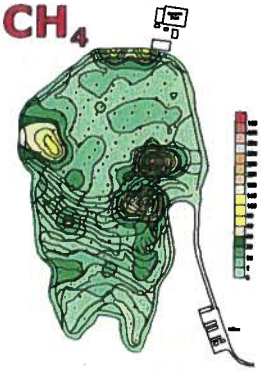
The precision depends on the measured flux:

range:0.5 – 5 moles/m^2 per day 25% (Acc. chamber A)

5-350 moles/m^2/day 10% (Acc. chamber B)

350-600 moles/ m^2/day 25% (Acc. chamber B)

600-1500 moles/ m^2/day 25% (Acc.Ch.B / F.S.=10%)



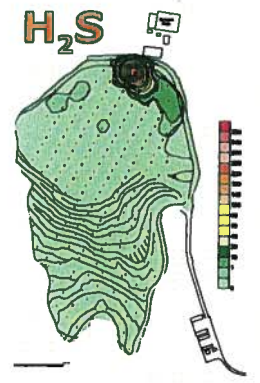
WS-HC CH^4

Methane fluxmeter

The methane sensor is an IR spectrometer. The full-scale range is 50000ppm, accuracy of 5% of reading, and repeatability is 2% of span. Detection limit 60 ppm, resolution 22 ppm. The detector was designed to measure the not controlled emissions of landfill, but it can be used to detect methane emission from coal or wherever the 0.2 moles/m^2/day detection limit is acceptable.

Methane Flux measurement range
from 0.2 up 300 moles m^{-2} day^{-1}
The fluxmeter is provided with 2 accumulation chambers and the accuracy depends on the measured flux:

0.2 to 10 moles m^{-2} day^{-1}	25% (Acc.Ch.A)
10 to 150 moles m^{-2} day^{-1}	15% (Acc.Ch.A)
150 to 300 moles m^{-2} day^{-1}	20% (Acc.Ch.B)



H_2S - WEST

Hydrogen sulfide

The hydrogen sulphide detector is a electrochemical cell with the following specifications:
The full-scale range is 20ppm, with a precision of 3% of reading, and the repeatability is 1.5% of span with a zero offset of 0.3%.

H_2S Flux measurement range: from 0.0025 to 0.5 moles/m^2 per day.
The precision depends on the measured flux:
0.0025 – 0.05 moles/m^2 per day ±25% (Acc. Chamber A)
0.05 – 0.5 moles/m^2 per day ±10% (Acc. Chamber B)

NOTE: The hydrogen sulphide flux evaluation can be affected by the presence of large quantities of water in both liquid and vapour phases.

We thanks to N.Lima et al. for the maps.

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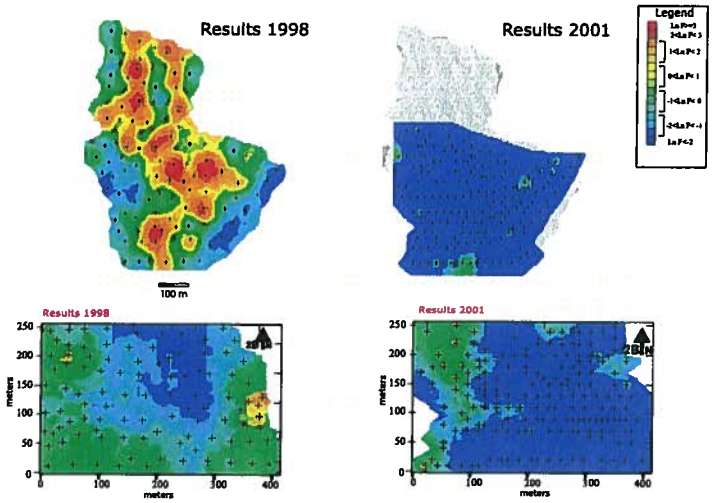
Application on a landfill: mapping the biogas non controlled emissions.

The figure shows the compare between the results of the measurement regime of a land/fill undertaken in 1998 and 2001: the mapping performed in 1998 gave clear indications of the areas which required intervention to improve the cover and the capture system.
The interventions were performed only where necessary with a significant economic savings.
The measurement regime of 2001 indicates without any doubt that the intervensions were efficient and state-of-the-art.



The obtained results:

- Minor atmospheric emissions;
- Higher quantity and better quality of biogas for cogeneration;
- Optimisation of management costs.

Continuous soil flux monitoring

WEST Systems produces a soil gas station for the continuous monitoring of carbon dioxide and hydrogen sulfide flux, soil temperature , soil water content, soil pressure gradient, soil heat flux and meteorological parameters.
For more information contact your local representative, visit our web site or e-mail to: g.virgili@westsystems.com

Local sales representative

H.Q.

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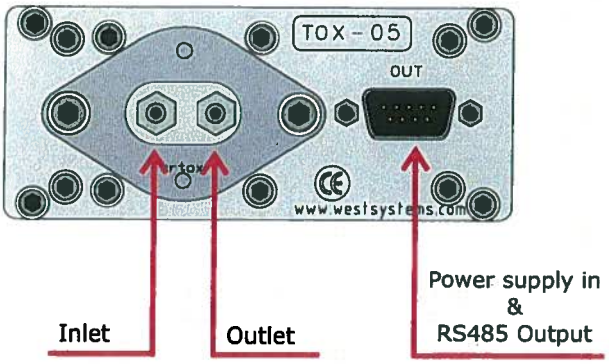
Hydrogen Sulfide Detector



Pin	Signal
1	Gnd
2	+VDC
3	Gnd
4	RS485-B
5	RS485-A
6	Gnd
7	+12V
8	Gnd
9	RS485-B

Legenda
Gnd: Ground reference for power supply and RS485
+VDC: 10-28 Volts Power supply input
RS485-A: Digital signal output A
RS485-B: Digital signal output B

Sensor specifications
Ambient conditions:
Air temperature -40°C to 65 °C
Air pressure 700 hPa to 1300 hPa
Air RH 5% - 95% non condensating.
Expected sensor life > 24 months.
Chemical cell order code: WEST H2S-BH
Detector order code: WEST TOX-05-H2S-BH
Factory calibration : 20 ppm
RMS Noise <= 0.02 ppm
Zero Offset <= 0.2 ppm
Max Overrange >= 200 ppm

The chemical cell reaction is:

$$H_2S + 2O_2 = H_2SO_4$$

the gas sample specific consuption is very low:

2.5×10^{-10} moles/Sec per ppm

Due to this consuption the H2S flux is methodically understimated by a -10% with the AccumulationChamber A and by a -5% when using the accumulation chamber B. Then we advise to use the accumulation chamber B except when the flux is very very low.

Appendix M

WS-HC detector

WS-HC Hydrocarbon Flux measurement:
The HydroCarbon detector is based on a double beam infrared spectrometer able to detect methane, hexane , propane and other molecules with HC linkages. The instrument comes calibrated for the methane. *The instrument requires a frequent **zero base-line** calibration that will be done using atmospheric air. The calibration requires 20 second.*

Detector specifications:

Accuracy 5%

Repeatibility 2%

Resolution 22 ppm (Methane equivalent)

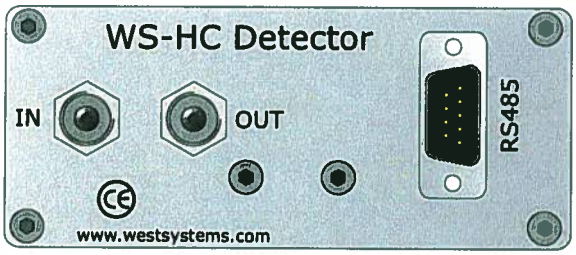
Full scale range is 50000 ppm of methane.

Detection limit 60 ppm.

Methane flux measurement range from 0.1 to 150 moles/m^2 per day.
The precision depends on the measured flux:

```
range 0.1  5      moles/ m^2 per day ±25%
      5 - 150     moles/ m^2 per day ±10%
```

The measurement of very low fluxes (< 0.1 moles/m^2/day) is possible but the error will increase due to the low detector sensitivity.



RS485 Connector DB9 Male panel

Pin 1	**Gnd**
Pin 2	**+Power supply**
Pin 3	**Gnd**
Pin 4	**RS485 B**
Pin 5	**RS485 A**
Pin 6	**Gnd**
Pin 7	**+Power supply**
Pin 8	**Gnd**
Pin 9	**RS485 B**

The gas fittings can be used with rilsan 6x4 mm tubes or silicon 5x3.2 tubes. Please respect inlet and outlet ports.

LI-820 Specifications

CO_2 Specifications

Measurement Range: 0-1000 ppm, 0-2000 ppm with 14 cm bench; 0-5000 ppm, 0-20000 ppm with 5 cm bench

Accuracy: < 2.5% of reading with 14 cm bench; 4% of reading with 5 cm bench

Calibration Drift

[1]Zero Drift: < 0.15 ppm / °C

[2]Span Drift at 370 ppm: < 0.03% / °C

[3]Total Drift at 370 ppm: <0.4 ppm / °C

RMS Noise at 370 ppm with 1 sec Signal Filtering: < 1 ppm

[1] Zero drift is the change with temperature at 0 concentration
[2] Span drift is the change after re-zeroing following a temperature change
[3] Total drift is the change with temperature without re-zeroing or re-spanning

Measurement Principle: Non-Dispersive Infrared

Traceability: Traceable gases to WMO standards from 0-3000 ppm. Traceable gases to EPA protocol gases from 3000 to 20000 ppm

Pressure Compensation Range: 15 kPa-115 kPa

Maximum Gas Flow Rate: 1 liter/minute

Output Signals: Two Analog Voltage (0-2.5 V or 0-5 V) and Two Current (4-20 mA)
Digital: TTL (0-5 V) or Open Collector

DAC Resolution: 14-bits across user-specified range

Source Life: 18000 hours

Power Requirements: Input Voltage 12-30 VDC
1.2A @ 12V (14 W) maximum during warm-up with heaters on
0.3 A @ 12 V (3.6 W) average after warm-up with heaters on

Supply Operating Range: 12-30 VDC

Operating Temperature Range: -20 to 45 °C

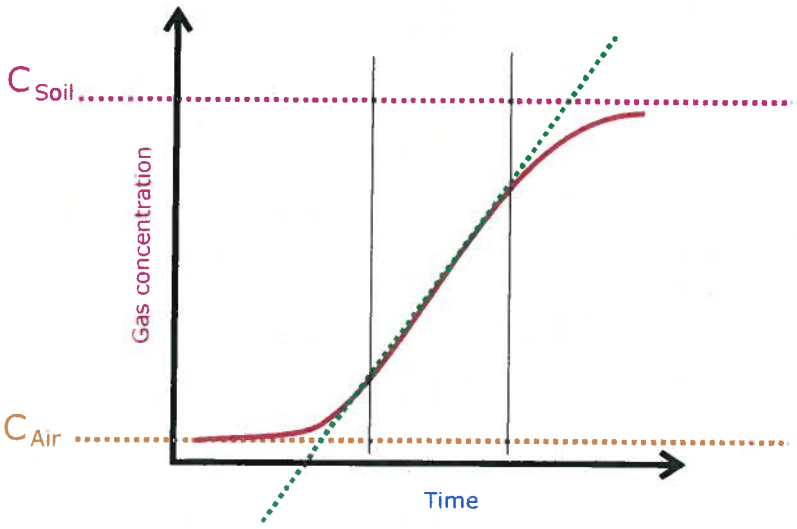
Relative Humidity Range: 0 to 95% RH, Non-Condensing

Dimensions: 8.75" x 6" x 3" (22.23 x 15.25 x 7.62 cm)

Weight: 2.2 lbs (1 kg)

Quantifying the flux

How explained in the chapter 3 the flux is proportional to the concentration increase ratio ppm/sec. The proportionality factor depends on the chamber volume/surface ratio as well as the barometric pressure and the air temperature inside the accumulation chamber.



There are two methods to carry out the field work, in both cases for each measurement you have to record the type of accumulation chamber used, the barometric pressure, and the air temperature.
The variation of few mBar of the pressure and or few degrees of temperature do not affect the evaluation of flux very much, then you can use a mean value for both parameters. Of course that depends on the accuracy you want to reach for the evaluation of flux.
The instrument measures the barometric pressure, using the embedded pressure sensor of the LICOR, with a good accuracy. A platinum Pt100 or a thermo-couple thermometer can be used to measure the air temperature as well as the soil temperature.

Choosing the flux measurement unit

The first measurements made, 10 years ago, with the accumulation chamber was expressed in cm/sec which is a speed, the speed of carbon dioxide flowing out from the soil. During the last ten years several units have been used by volcanologist and by geochemistry researchers. The most common unit is grams/squaremeter per day, but using the same instrument for two gas species to express the flux using this unit means to have two different conversion factors. Actually we use the unit **moles/squaremeter per day** that has two advantages: A single conversion factor for every gas specie and an easy conversion of the flux in grams/sm per day simply multiplying the result expressed in moles/sm per day for the molecular weight of the target gas.

From the [tools][settings] menu you can set the accumulation chamber factor in the "A.c.K." field.

If this factor is set to 1 the instrument will give you results expressed in ppm/sec, that's simply the slope of the curve in the selected interval.

If you set the A.c.K to a value different from 1 the instrument will give you the results expressed in moles per square meter per day.

Please see next page.

Quantifying the flux

Method 1: Measuring the slope

Set the Accumulation Chamber factor to 1 in order to have the flux measurement expressed in the slope unit "ppm/sec" and translate it in the desired unit with a post processing.
Using this method you can focus only on the accumulation chamber interfacing with the soil, the flux curve shape and the other aspects of the measurement, putting off choosing the correct accumulation chamber factor.

Method 2: Measuring the flux directly in moles/sm/day.

To get the results directly in moles/sm/day you have to set the Accumulation Chamber factor to the correct value, taking it from the tables.
For each measurement, if there are variations in the air temperature, or of the barometric pressure, or if you changed the accumulation chamber you have to select the [tools][settings] menu and put the correct accumulation chamber factor in the "A.c.K." field. This operation can be "critical". In any case on the saved files you'll find the results of flux evaluation expressed in both units , the raw ppm/sec and the moles/sm/day computed with the A.c.K. you set.

The accumulation chamber factors

Here following the formula used to compute the A.c.K.:

$$K = \frac{86400 \cdot P}{10^6 \cdot R \cdot T_k} \cdot \frac{V}{A}$$

Where

- **P** is the barometric pressure expressed in mBar (HPa)
- **R** is the gas constant 0.08314510 bar $L\,K^{-1}\,mol^{-1}$
- $\mathbf{T_k}$ is the air temperature expressed in Kelvin degree
- **V** is the chamber net volume in cubic meters
- **A** is the chamber inlet net area in square meters.

The dimensions of the A.c.K. are

$$K = \frac{moles \cdot meter^{-2} \cdot day^{-1}}{ppm \cdot sec^{-1}}$$

In the table the conversion factors vs temperaure and barometric pressure for the Accumulation Chamber Type A and B are reported.

An example:

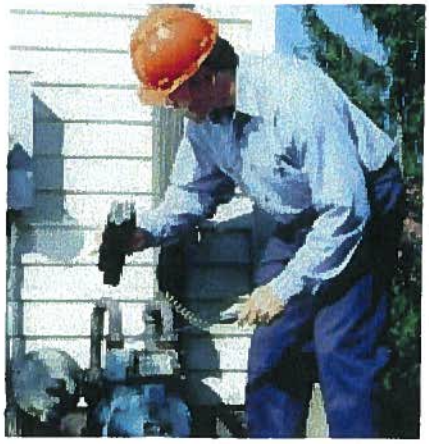
You're using the accumulation chamber B, the slope of the flux curve is 2.5 ppm/sec, the barometric pressure is 1008 mBar (HPa) and the air temperature is 22 °C.
From the table B get the value that correspond to the barometric pressure and temperature. In this case I get the value computed for 25°C and 1013 mBar : 0.696.

Then the flux is: 2.5 x 0.696= 1.74 moles per square meter per day.

Gasport® Gas Tester

MSA

The Gasport Gas Tester is designed for gas utility workers to detect methane and certain toxic gases. It is a reliable, simple, versatile tool to help your service technicians get the job done quickly! With multiple ranges and sensing capabilities built into one rugged housing, the Gasport Tester simplifies your work by reducing the number of meters you have to carry on the job.



Applications

The Gasport Tester's poison-tolerant methane sensor provides three measurement ranges for your daily service needs:

- Open air, safety sampling
- Small, in-home leak detection
- Street/outdoor service line leak detection

Features and Benefits

- **Proven in field use–rugged and reliable**
  Less costly to maintain, less time in repair
- **Multiple functions in one instrument**
  No need to buy, carry & maintain multiple instruments
- **New, poison-tolerant combustible gas sensor**
  Reduces meter ownership costs
- **User-selectable, "silent" operation mode**
  Reduces customer disturbances and worries
- **Fast warm up time**
  Fastest warm up time in industry saves time
- **Can monitor up to four gases at a time**
  Fewer instruments to carry
- **Show all gas concentrations simultaneously**
  Eliminates guesswork on what reading is displayed
- **Autoranging methane sensor**
  Automatically switches between 0-5% and 5-100% methane ranges
- **Gas readings recorded for later retrieval**
  Can double check readings after job is done
- **Simple manual or automated calibration options**
  Reduces training time and helps ensure accuracy
- **Intrinsically safe**
  Meets safety standards for work in hazardous areas
- **Lifetime warranty on case and electronics**
  Reduced maintenance and lifetime costs

Specifications

Gas	Range	Resolution
Methane	0–5000 ppm	50 ppm
Methane	0–100% LEL or 0–5% CH_4	1 % LEL or 0.1% CH_4
Methane	5–100% CH_4	1% CH_4
Oxygen	0–25%	0.1%
Carbon Monoxide	0–1000 ppm	1 ppm
Hydrogen Sulfide	0–100 ppm	1 ppm

Battery types: NiCd and Alkaline
Case material: Impact resistant, stainless-steel-fiber-filled polycarbonate
Operating temperature: normal -10 to 40°C; extended -20 to 50°C
Operating humidity: Continuous: 15-95% RH, non-condensing
Intermittent duty: 5-95% RH, non condensing
Warm up time: Less than 20 seconds to initial readings
Datalog capacity: 12 hours
Input: 3 clearly marked, metal domed keys
Warranty: Case and Electronics: Lifetime
Sensors and consumable parts: 1 year

The answer for gas utilities' gas detection needs

Gasport® Gas Tester

Ordering Information

Battery Chargers

Part No.	Description
494716	Omega 120 VAC 50/60Hz
495965	Omega 220 VAC 50/60Hz
801759	Omega 110/220 VAC, Five Unit, 50/60Hz
800525	Omega 8 - 24VDC for vehicle use

Battery Packs

Part No.	Description
496990	Standard NiCd Rechargeable
800526	Alkaline, Type C
711041	Alkaline, with Thumbscrews
800527	Heavy Duty NiCd Rechargeable

Sensors

Part No.	Description
813693	Combustible Gas
480566	O_2
812389	CO
812390	H_2S

Protective Boots

Part No.	Description
804955	Black, for NiCd Battery Packs
802806	Orange, for NiCd Battery Packs
806751	Black, for Alkaline Battery Packs
806750	Orange, for Alkaline Battery Packs
806749	Black, for HD NiCd Battery Packs
806748	Orange, for HD NiCd Battery Packs
812833	Yellow Soft Carrying Case with Harness
711022	Black padded Vinyl Carrying Case with Harness

Sampling Equipment

Part No.	Description
800332	Probe - 1 ft., plastic
800333	Probe - 3 ft., plastic
803561	Probe - 3 ft., plastic (holes 2" from end) (bar hole probe)
803962	Probe - 3 ft., plastic (holes 2" from handle) (solid probe)
803848	Probe - Hot Gas Sampler
710465	Sampling Line - 5 ft., coiled
497333	Sampling Line - 10 ft.
497334	Sampling Line - 15 ft.
497335	Sampling Line - 25 ft.

Sampling Accessories

Part No.	Description
801582	Replacement Filter, Probe, pkg. of 10
801291	External Filter Holder
014318	Charcoal Filter
711039	Line Scrubber Filter Holder
711059	Line Scrubber Replacement Cartridges, Box of 12
808935	Dust Filter, Pump Module
802897	Water Trap (Teflon) Filter, Pump Module

Calibration Check Equipment

Part No.	Description
477149	Calibration Kit Model RP with 0.25 lpm Regulator
491041	Calibration Gas - methane, 2.5%
473180	Calibration Gas - 300 ppm CO
813718	Calibration Gas - methane, 2.5% oxygen, 15%60 ppm CO
813720	Calibration Gas - methane, 2.5% oxygen, 15%300 ppm CO 10 ppm H_2S
710288	Gasmiser™ Demand Regulator 0 - 3.0 lpm

Accessories

Part No.	Description
804679	Data Docking Module Kit. Includes the Data Docking Module, MSA Link Software and Instruction Manual

Approvals

The Gasport Gas Tester has been designed to meet intrinsic safety testing requirements in certain hazardous atmospheres.

The Gasport Gas Tester is approved by MET (an OSHA Nationally Recognized Testing Laboratory [NRTL]) for use in Class I, Division I, Groups A, B, C, D; Class II, Division I, Groups E, F, G; and Class III Hazardous locations. Gaspor tGas Testers sold in Canada are approved by CSA for use in Class I, Division I, Groups A, B, C, and D locations.

Contact MSA at 1-800-MSA-2222 for more information or with questions regarding the status of approvals.

Gasport Gas Tester Kits

	LEL Display	O_2	CO	H_2S	Alarms Always	Alarms Optional	Leak Detect Page	Peak	Alkaline Battery	NiCd Battery	5ft Coiled Line	1ft Probe	Part No.
4-Gas, Selectable, NiCd	•	•	•	•		•	•	•		•	•	•	711489
4-Gas, Selectable, Alkaline	•	•	•	•		•	•	•	•		•	•	711490
3-Gas, Selectable, NiCd	•	•	•			•	•	•		•	•	•	711493
3-Gas, Selectable, Alkaline	•	•	•			•	•	•	•		•	•	711494
2-Gas, Selectable, NiCd	•		•			•	•	•		•	•	•	711495
2-Gas, Selectable, Alkaline	•		•			•	•	•	•		•	•	711496
4-Gas, Alarms On, NiCd	•	•	•	•	•		•	•		•	•	•	711491
4-Gas, Alarms On, Alkaline	•	•	•	•	•		•	•	•		•	•	711492

Assemble-to-Order (ATO) System: You Make the Choices

The ATO System makes it easy to "custom order" the Gasport Gas Tester, configured exactly the way you want it. You can choose from an extensive line of base instrument components and accessories. To obtain a copy of the "ATO System and Price Information for the Gasport Gas Tester," call toll-free 1-800-MSA-2222, and request Bulletin 0804-28. **To obtain a copy of the ATO via FAX, call MSA QuickLit Information Service at 1-800-672-9010. At the prompt, request QuickLit Document #2345 (ATO for Gasport Gas Tester).**

ID 08-04-27-MC / May 2000

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www.MSAnet.com

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1-800-MSA-2222

MSA International
Phone (412) 967-3354
FAX (412) 967-3451

Offices and representatives worldwide
For further information:

MSA

GeoXT

The total GPS platform for all your GIS field requirements

The GeoXT™ handheld, from the GeoExplorer® series, is an essential tool for maintaining your GIS. It's all you need to collect location data, keep existing GIS information up to date, and even mobilize your GIS.

The unique GeoExplorer series combines a Trimble® GPS receiver with a rugged field-ready handheld computer running the Microsoft® Windows Mobile™ 2003 software for Pocket PCs. Plus there's an internal battery that easily lasts for a whole day of GPS operation. The result is tightly integrated, tough, and incredibly powerful.

High-accuracy Integrated GPS

The GeoXT is optimized to provide the reliable, high-accuracy location data you need. Advanced features like EVEREST™ multipath rejection technology let you work under canopy, in urban canyons, or anywhere where accuracy is crucial.

Need submeter accuracy in real-time? Use corrections from a satellite-based augmentation system (SBAS) like WAAS[1] or EGNOS[2]. Want to get that extra edge in precision? Collect data with Trimble's TerraSync™ or GPScorrect™ software, and then postprocess back in the office.

Because the GPS receiver and antenna are built into the handheld computer, it's never been easier to use GPS in your application. The system is more than just cable-free: it's a totally integrated solution.

Optimized productivity

Take advantage of the power and flexibility of Windows Mobile software for Pocket PCs by choosing from the most comprehensive range of field software available—whether off-the-shelf or purpose-built. Whatever your needs, Windows Mobile lets you choose a software solution to match your workflow.

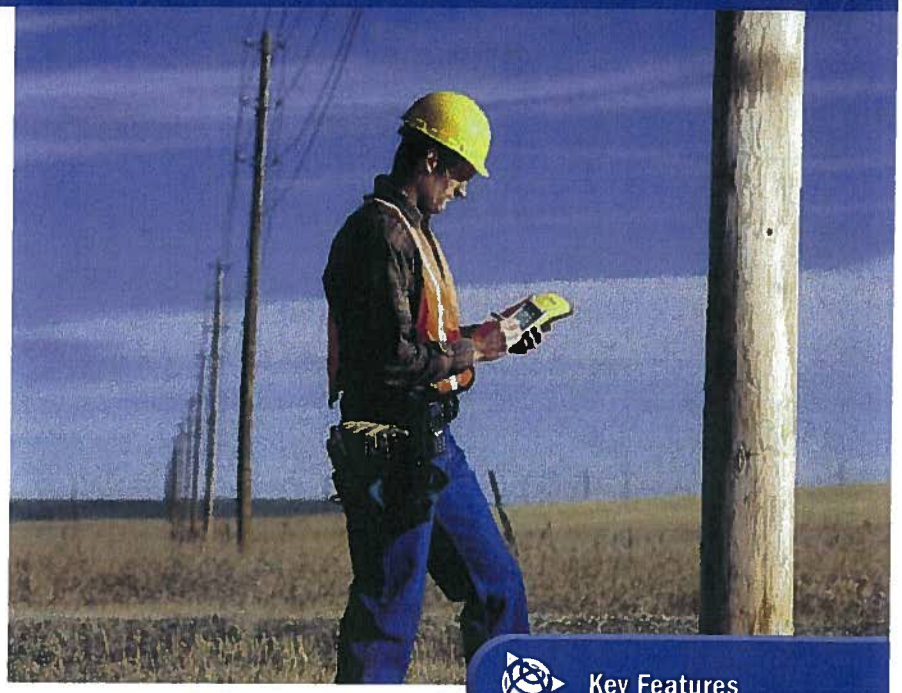
Windows Mobile includes familiar Microsoft productivity tools, including Pocket Word, Pocket Excel, and Pocket Outlook®. Pocket Outlook lets you synchronize e-mails, contacts, appointments, and data with your office computer, so whether you're in the office or in the field, you're always up to date.

Go wireless with integrated Bluetooth®* for connection to other Bluetooth-enabled devices, including cell phones and PCs. You also have the option to use the USB support module to connect to a desktop computer, or use the optional serial clip for cabled connections in the field.

Receive a free copy of Microsoft Streets & Trips** 2004 software with your GeoXT handheld, and take advantage of comprehensive map and travel information for easy navigation and route planning.

All the memory you need

There's plenty of storage space in the GeoXT for all your GIS data. The fast processor and large memory mean even big graphics files load quickly—and they're crisp and crystal-clear on the advanced TFT outdoor color screen.



Key Features

- High-performance submeter GPS with integrated WAAS/EGNOS
- Windows Mobile 2003 software for Pocket PCs, allowing maximum flexibility in software choice
- Rugged handheld with all-day battery
- Advanced color TFT display with backlight
- Integrated Bluetooth for wireless connectivity

From data collection to data maintenance, to mobile GIS and beyond ... the GeoXT is the handheld of choice.

* *Bluetooth type approvals are country specific. GeoExplorer series handhelds are approved for use with Bluetooth in the USA. For a complete list of other countries with Bluetooth approval please refer to: www.trimble.com/geo_bluetooth.html.*

** *Microsoft Streets & Trips 2004 software available in US/Canada; Microsoft AutoRoute® 2004 in Europe.*

Trimble.

GeoXT

The total GPS platform for all your GIS field requirements

Standard features

System
- Microsoft Windows Mobile 2003 software for Pocket PCs
- 206 MHz Intel StrongARM processor
- 512 MB non-volatile Flash data storage
- Outdoor color display
- Ergonomic cable-free handheld
- Rugged and water-resistant design
- All-day internally rechargeable battery
- Bluetooth wireless

GPS
- Submeter accuracy
- Integrated WAAS[1]/EGNOS[2]
- RTCM real-time correction support
- NMEA and TSIP protocol support
- EVEREST multipath rejection technology

Software
- GPS Controller for control of integrated GPS and in-field mission planning
- GPS Connector for connecting integrated GPS to external ports
- File Explorer, Internet Explorer, Pocket Outlook (Inbox, Calendar, Contacts, Tasks, Notes), Sprite Pocket Backup, Transcriber, Pocket Word, Pocket Excel, Pictures, Windows® Media Player, Bluetooth File Transfer, Calculator, ActiveSync®
- Microsoft Streets & Trips/AutoRoute 2004 software

Accessories
- Support module with power supply and USB data cable
- Getting Started Guide
- Companion CD includes Outlook 2002 and ActiveSync 3.7.1
- Hand strap
- Pouch
- Stylus

Optional Features

Software
- TerraSync
- GPScorrect for ESRI® ArcPad®
- GPS Pathfinder® Tools Software Development Kit (SDK)
- GPS Pathfinder Office
- Trimble GPS Analyst extension for ArcGIS®

Accessories
- Serial clip for field data and power input
- Vehicle power adaptor[3]
- Portable power kit[3]
- Hurricane antenna
- External patch antenna
- Pole-mountable ground plane
- Baseball cap with antenna sleeve
- Beacon-on-a-Belt (BoB™) differential correction receiver[3]
- Hard carry case
- Null modem cable[3]
- Backpack kit

Specifications subject to change without notice.

Technical specifications

Physical

Size	21.5 cm × 9.9 cm × 7.7 cm (8.5 in × 3.9 in × 3.0 in)
Weight	0.72 kg (1.59 lb) with battery
Processor	206 MHz Intel StrongARM SA-1110
Memory	64 MB RAM and 512 MB internal Flash disk
Power	
Low (no GPS)	0.6 Watts
Normal (with GPS)	1.4 Watts
High (with GPS, backlight, and Bluetooth)	2.5 Watts
Battery	Internal lithium-ion, rapidly rechargeable in unit, 21 Watt-hours

Environmental

Temperature	
Operating	-10 °C to +50 °C (14 °F to 122 °F)
Storage	-20 °C to +70 °C (-4 °F to 158 °F)
Humidity	99% non-condensing
Casing	Wind-driven rain and dust-resistant per IP 54 standard Slip-resistant grip, shock- and vibration-resistant

Input/output

Communications	Bluetooth for wireless connectivity USB via support module, serial via optional DE9 serial clip adaptor
Bluetooth	
Certification	Bluetooth type approvals are country specific. GeoExplorer series handhelds are approved for use with Bluetooth in the USA. For a complete list of other countries with Bluetooth approval please refer to www.trimble.com/geoxt_ts.asp.
Profiles	
Both client and host support	Serial Port, File Transfer (using OBEX)
Client support only	Dial-Up Networking, Lan Access
Host support only	Basic Imaging, Object Push
Display	Advanced outdoor TFT, 240 × 320 pixel, 65,536 colors, with backlight
Audio	Microphone and half duplex speaker, record and playback utilities
Interface	Anti-glare coated touch screen, Soft Input Panel (SIP) virtual keyboard 2 hardware control keys plus 4 programmable permanent touch buttons Handwriting recognition software, Audio system events, warnings, and notifications

GPS

Channels	12
Integrated real-time	WAAS[1] or EGNOS[2]
Update rate	1 Hz
Time to first fix	30 sec (typical)
Protocols	NMEA (GGA, VTG, GLL, GSA, ZDA, GSV, RMC), TSIP (Trimble Standard Interface Protocol)

Accuracy (RMS)[4] after differential correction

Postprocessed[5]	Submeter
Carrier postprocessed[6]	
With 10 minutes tracking satellites	30 cm
Real-time	Submeter

1 *WAAS (Wide Area Augmentation System). Available in North America only. For more information, see http://gps.faa.gov/programs/index.htm.*
2 *EGNOS (European Geostationary Navigation Overlay System). Available in Europe only. For more information, see http://www.esa.int/export/esaSA/navigation.html.*
3 *Serial clip also required.*
4 *Horizontal accuracy. Requires data to be collected with minimum of 4 satellites, maximum PDOP of 6, minimum SNR of 4, minimum elevation of 15 degrees, and reasonable multipath conditions. Ionospheric conditions, multipath signals or obstruction of the sky by buildings or heavy tree canopy may degrade precision by interfering with signal reception. Accuracy varies with proximity to base station by +1 ppm for postprocessing and real-time, and by +5 ppm for carrier postprocessing.*
5 *Postprocessing with GPS Pathfinder Office software or GPS Analyst extension for ArcGIS.*
6 *Requires collection of carrier data. (Only available with the GPS Pathfinder Office software).*

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www.trimble.com

ULTRAMETER II™

OVER 50 YEARS

MYRON L COMPANY

Water Quality Instrumentation

Accuracy • Reliability • Simplicity

ULTRAMETER II™

Advanced Design • Superior Performance

MADE IN USA

OVER 50 YEARS

pH/ORP Sensor protective cap

Four-digit display for full 9999 readings, with autoranging capability up to 200 mS/200 ppt

Powerful microprocessor based surface-mount circuitry

Display prompts for simple pH calibration

Memory for 100 readings with Date & Time Stamp

Real Time Clock

Factory calibrations stored in microprocessor

Conductivity

Resistivity

TDS

Temperature

pH

ORP

CE

ULTRA-FAST
ULTRA-EASY
ULTRA-POWERFUL

Since 1957, the Myron L Company has designed and manufactured highly reliable analytical instruments for a wide variety of applications. Thousands of professionals around the world rely every day on the performance of our instruments. Demanding uses range from boiler water testing to ultrapure water control to medical instruments for artificial kidney machines.

We are proud of the trust our handheld instruments and monitor/controllers have earned in the past. Our product line has evolved to a new level of outstanding performance and value in analytical instruments: the Ultrameter II series. While priced like affordable single-parameter instruments, the Ultrameter II does the job of three, four or even six instruments.

Accuracy You Can Trust

Both Ultrameter II models deliver performance of ±1% of reading (not merely full scale). This high level of accuracy has been achieved through advanced four-electrode conductivity cell technology, a unique pH/ORP sensor and powerful microprocessor-based circuitry. With displayed values of up to 9999, the full four-digit LCD ensures resolution levels never before possible in such affordable instruments. Factory calibrated with NIST traceable solutions, each Ultrameter II may be supplied with both certification of traceability and NIST traceable solutions for definitive calibration.

Fast and accurate in the laboratory, both Ultrameter II models are rugged enough for daily in-line controller checks in hostile process applications.

Innovative Engineering

The Ultrameter II is a prime example of how high-tech engineering can greatly simplify and streamline a task. Whether in the lab, industrial plant, or in a remote field location, merely:

1. Fill the cell cup
2. Push a parameter key
3. Take the reading

Temperature compensation and range selection are both rapid and automatic. The Ultrameter II is a true one-hand operation instrument.

Easy to Calibrate

All calibrations are quickly accomplished by pressing the ☒ or ☒ keys to agree with our NIST traceable Standard Solution. When calibration is necessary, display prompts simplify pH calibration and make sure the correct buffer is being used. Plus, all parameters (excluding factory-set temperature) have an internal electronic setting that can be used for field calibration and as a check on pH/ORP sensor life.

Advanced Features

- Fully automatic temperature compensation
- User adjustable temperature compensation (up to 9.99%/°C) which also allows TC to be disabled for applications requiring non-compensated readings.
- User adjustable conductivity/TDS conversion ratio for greater accuracy when measuring solutions not contained in the microprocessor.
- Auto-shutoff maximizes the life of the single 9V battery to more than 100 hours/5000 tests.
- Non-volatile microprocessor provides data back-up, even when the battery is changed. This assures all calibrations and memory data will be retained.
- Extended life pH/ORP sensor is user replaceable in the field.

High Performance at a Low Cost

Beyond their affordable purchase price, Ultra-Fast, Ultra-Easy, Ultra-Powerful Ultrameter II's save both time and money. Measure for measure, Ultrameter II's give you a better return on your investment than any other handheld instrument. To see for yourself, contact your distributor or the Myron L Company today.

Multiple Applications

Irrigation Water

Hydroponics

Laboratories

Homeland Security

Reverse Osmosis

Deionization

Wastewater

Cooling Towers

Environmental

Desalination

Fountain Solutions

BENEFITS DESIGNED TO SAVE YOU TIME & MONEY

Built-in IR Port allows you to conveniently download your data to a computer. **(Requires Myron L uDock™ Accessory Package)**

Ample memory provides increased flexibility to record and store 100 separate readings.

Real Time Clock with Date & Time Stamp allows you to maintain the integrity of each individual reading.

The advanced four-electrode cell for conductivity/resistivity/TDS eliminates polarization, allowing greater accuracy and stability with minimal maintenance.

The pH/ORP sensor chamber provides protection to a unique porous liquid-junction.

The large capacity KCl reservoir guarantees extended life.

A custom LCD helps simplify calibration and operation by using annunciators and prompts to indicate various conditions.

IP67/NEMA 6 rated Ultrameter II's are waterproof and buoyant and can be fully immersed to 3 feet/1 meter.

Features

Ultrameter II™ Models	4PII Conductivity TDS, Resistivity Temperature	6PII Conductivity, TDS Resistivity, pH ORP, Temperature
Autoranging	•	•
Adjustable Temp. Compensation	•	•
Adjustable Cond/TDS ratio	•	•
Memory (100 readings)	•	•
Date & Time Stamp	•	•
pH Calibration Prompts		•
Low battery indicator	•	•
Auto-off	•	•

Specifications

Display	4 Digit Liquid Crystal Display
Dimensions LxWxH	196 x 68 x 64 mm/ 7.7 x 2.7 x 2.5 inches
Weight	352 g/12.4 oz.
Case/conductivity cell material	VALOX*
Cell capacities	pH/ORP: 1,2 ml/0.04 oz. Cond/TDS/Res: 5 ml/0.2 oz.
Power	9V alkaline battery
Battery life	>100 hours (5000 readings)
Operating/storage temperature	0 – 55°C/32 – 132°F
Protection ratings	IP67/NEMA 6 Waterproof to 1 meter/3 feet

*™GENERAL ELECTRIC

Parameters

	Conductivity	TDS	Resistivity	pH	ORP	Temperature
Ranges	0–9999 µS/cm 10–200 mS/cm in 5 autoranges	0–9999 ppm 10–200 ppt in 5 autoranges	10 KΩ–30 MΩ	0–14 pH	±999 mV	0–71°C 32–160°F
Resolution	0.01(<100 µS) 0.1(<1000 µS) 1.0(<10 mS) 0.01(<100 mS) 0.1(<200 mS)	0.01(<100 ppm) 0.1(<1000 ppm) 1.0(<10 ppt) 0.01(<100 ppt) 0.1(<200 ppt)	0.01(<100 KΩ) 0.1(<1000 KΩ) 0.1(>1 MΩ)	±0.01 pH	±1 mV	0.1°C/F
Accuracy	±1% of reading	±1% of reading	±1% of reading	±0.01 pH	±1 mV	±0.1°C
Auto Temperature Compensation	0–71°C 32–160°F	0–71°C 32–160°F	0–71°C 32–160°F	0–71°C 32–160°F	—	—
Adjustable Temperature Compensation to 25°C	0–9.99%/°C	0–9.99%/°C	0–9.99%/°C	—	—	—
Conductivity/TDS Ratios Preprogrammed	KCl, 442*, NaCl	KCl, 442*, NaCl	—	—	—	—
Adjustable Conductivity/TDS Ratio Factor	0.20–7.99	0.20–7.99	—	—	—	—

*442 Natural Water Standard ™ Myron L Company

Accessories

uDock™ Accessory Package includes uDock™, USB cable and Macintosh/PC application software for downloading data. MODEL: U2CIP

Certificates confirming the NIST traceability of an Ultrameter II are available (must be specified when placing instrument order). MODEL: MC

Conductivity Standard Solutions are necessary to maintain accuracy and for periodic calibration of conductivity/TDS parameters. All Standard Solutions are NIST traceable for your complete confidence. RECOMMENDED VALUES: KCl-7000 (7 mS), 442-3000 (TDS), or NaCl-14.0 (mS) available in 2 oz/59 ml, 1 qt/1 L, and 1 gal/3,8 L.

pH Buffers are necessary to maintain accuracy and for periodic calibration of pH and ORP parameters. Calibration with pH 7 Buffer is especially important. All pH 4, 7, and 10 Buffers are NIST traceable and are available in 2 oz/59 ml, 1 qt/1 L, and 1 gal/3,8 L.

pH Sensor Storage Solution Available in 2 oz/59 ml, 1 qt/1 L, and 1 gal/3,8 L.
MODEL: SS2OZ, SSQ and SSG

Certificate of NIST traceability for pH Buffer or Conductivity Standard Solutions are available (must be specified when placing solution order).
MODEL: SC

Hard protective case (small)
MODEL: UPP

Hard protective case (kit) with three buffers (pH 4, 7, and 10), one pH/ORP storage solution, and two standard solutions, (KCl-7000 and 442-3000). All bottles are 2 oz/59 ml.
MODEL: PKU

Soft protective case is constructed of padded Nylon and features a belt clip for hands-free mobility.
MODEL: UCC (Blue)
UCCDT (Desert Tan)

Replacement pH/ORP sensor user-replaceable, features a unique/porous liquid-junction.
MODEL: RPR

Built on Trust

Founded in 1957, Myron L Company is one of the world's leading manufacturers of water quality instruments. Because of our policy of continuous product improvement, changes in design and the specifications in this brochure are possible. You have our assurance any changes will be guided by our product philosophy: Accuracy, Reliability, Simplicity.

Limited Warranty

All Myron L Ultrameter II's have a Two (2) Year Limited Warranty. The pH/ORP sensors have a Six (6) Month Limited Warranty. Warranty is limited to the repair or replacement of the Ultrameter II only, at our discretion. Myron L Company assumes no other responsibility or liability.

MYRON L COMPANY
Water Quality Instrumentation
Accuracy • Reliability • Simplicity

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SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

UMIIB 03-08

APPENDIX G

FLUX METER DATA

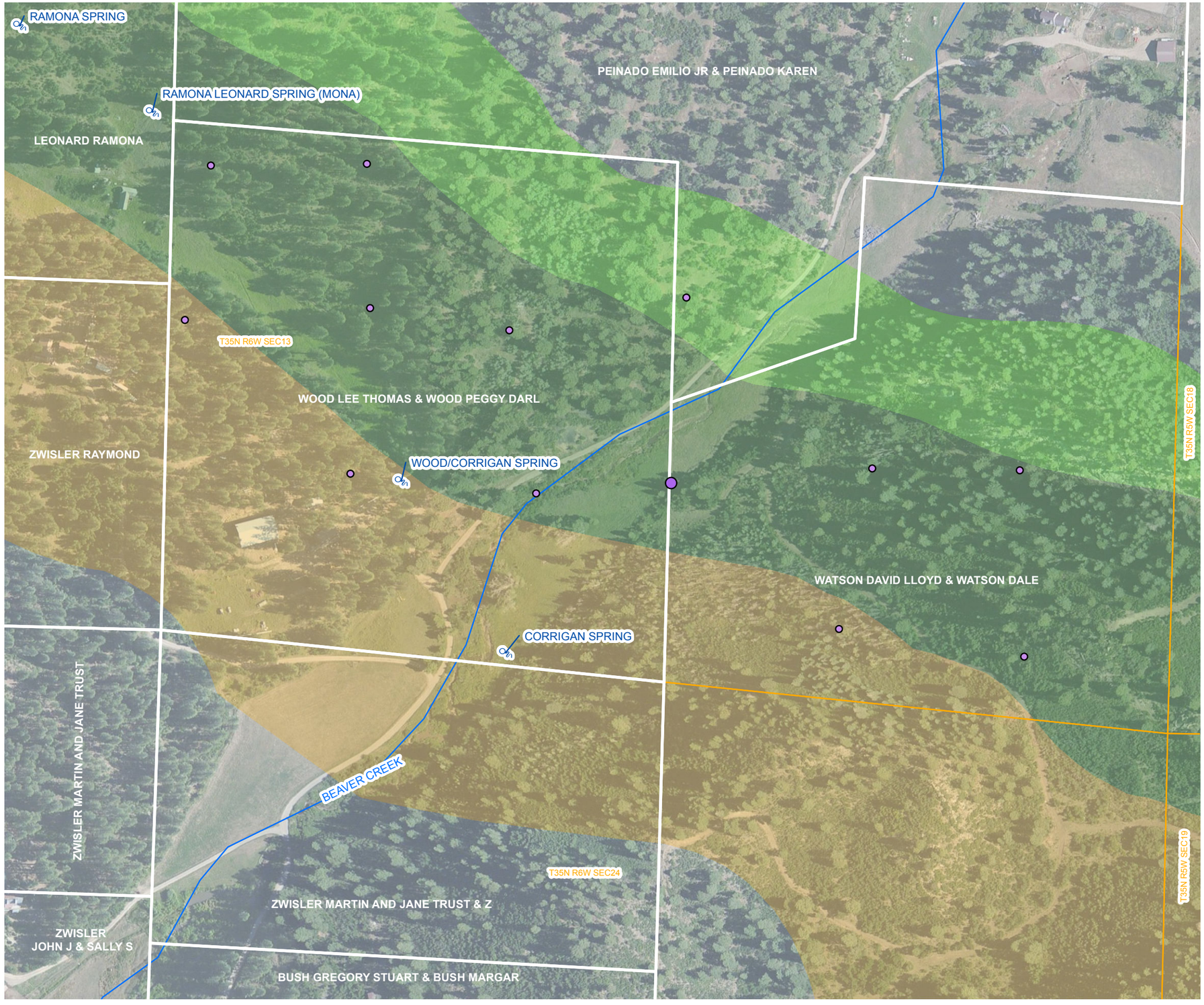
APPENDIX G

SitePt	Site	Northing	Easting	Date	CH_4flux	H_2Sflux	CO_2flux	ACCUMULATION CHAMBER	PRESSURE (HPa)	TEMP DegC	TIME	CH_4slope	H_2Sslope	CO_2slope	AcK
BeaverCreek071513_01	BeaverCreek071513	1234962.347	2424731.385	7/15/2013	0	0	0.033133	A	776.9	27.3	15-07-2013 09:15:19	0	-0.038	0.13699999	0.241848841
BeaverCreek071513_02	BeaverCreek071513	1235339.728	2424324.693	7/15/2013	0	0.006738	0.023824	A	776.9	28.8	15-07-2013 09:24:14	0	0.028	0.099	0.24064742
BeaverCreek071513_03	BeaverCreek071513	1235718.872	2424388.497	7/15/2013	0	0.003353	0.112811	A	775.8	29.8	15-07-2013 09:29:41	0	0.014	0.47099999	0.239513457
BeaverCreek071513_04	BeaverCreek071513	1235723.066	2424771.633	7/15/2013	0	0	0.029373	A	775.3	30.5	15-07-2013 09:34:32	0	-0.007	0.123	0.238807306
BeaverCreek071513_05	BeaverCreek071513	1235369.02	2424779.608	7/15/2013	0	0	0.156774	A	775.3	31.2	15-07-2013 09:39:31	0	-0.004	0.65799999	0.238258049
BeaverCreek071513_06	BeaverCreek071513	1235314.352	2425121.736	7/15/2013	0	0	0.032309	A	776.1	32.4	15-07-2013 09:53:07	0	-0.022	0.13600001	0.237567216
BeaverCreek071513_07	BeaverCreek071513	1234913.91	2425187.838	7/15/2013	0	0	0.036063	A	776.6	33.0	15-07-2013 10:02:02	0	-0.012	0.152	0.237254381
BeaverCreek071513_08	BeaverCreek071513	1235394.827	2425556.819	7/15/2013	0	0	0.189499	A	778.1	33.7	15-07-2013 10:09:58	0	-0.002	0.79900002	0.237170354
BeaverCreek071513_09	BeaverCreek071513	1234939.269	2425519.435	7/15/2013	0	0.003544	0.7827	A	776.6	34.3	15-07-2013 10:17:22	0	0.015	3.31299996	0.23625119
BeaverCreek071513_10	BeaverCreek071513	1234974.967	2426013.593	7/15/2013	0	0	0.049961	A	777.7	35.5	15-07-2013 10:32:54	0	-0.031	0.212	0.235665992
BeaverCreek071513_11	BeaverCreek071513	1234970.638	2426376.008	7/15/2013	0	0.005621	0.113124	A	774.9	36.3	15-07-2013 10:44:35	0	0.024	0.48300001	0.234210461
BeaverCreek071513_12	BeaverCreek071513	1234513.15	2426386.806	7/15/2013	0	0	0.028687	A	773.4	37.0	15-07-2013 11:00:39	0	-0.02	0.123	0.233229503
BeaverCreek071513_13	BeaverCreek071513	1234581.084	2425931.926	7/15/2013	0	0	0.063021	A	771.4	37.1	15-07-2013 11:10:39	0	-0.017	0.271	0.232551396
BHS1071513_01	BHS1071513	1194694.382	2459485.614	7/15/2013	0	0.010883	0.03289	A	799.1	35.9	15-07-2013 14:11:34	0	0.045	0.13600001	0.241837412
BHS1071513_02	BHS1071513	1194688.102	2459521.077	7/15/2013	0	0.018132	0.086308	A	799.1	36.0	15-07-2013 14:15:04	0	0.075	0.35699999	0.241759196
BHS1071513_03	BHS1071513	1194697.69	2459540.544	7/15/2013	0	0.025136	0.06284	A	799.4	36.2	15-07-2013 14:17:38	0	0.104	0.25999999	0.241693586
BHS1071513_04	BHS1071513	1194698.586	2459564.556	7/15/2013	0	0.027299	0.1249	A	799.3	36.3	15-07-2013 14:20:27	0	0.113	0.51700002	0.24158527
BHS1071513_05	BHS1071513	1194665.874	2459581.42	7/15/2013	0	0.010378	0.022446	A	799.3	36.6	15-07-2013 14:24:01	0	0.043	0.093	0.241351277
BHS1071513_06	BHS1071513	1194663.233	2459562.662	7/15/2013	0	0.00434	0	A	799.1	36.8	15-07-2013 14:26:56	-0.011	0.018	-0.008	0.241135195
BHS1071513_07	BHS1071513	1194662.924	2459545.337	7/15/2013	0	0.015418	0.060466	A	799.1	37.1	15-07-2013 14:30:17	0	0.064	0.25099999	0.240902022
BHS1071513_08	BHS1071513	1194660.89	2459515.672	7/15/2013	0	0.016612	0.072224	A	799.1	37.3	15-07-2013 14:33:04	0	0.069	0.30000001	0.240746826
BHS1071513_09	BHS1071513	1194660.159	2459484.892	7/15/2013	0	0.013001	0.065246	A	799.4	37.4	15-07-2013 14:35:46	0	0.054	0.271	0.240759656
BHS1071513_10	BHS1071513	1194632.348	2459486.864	7/15/2013	0	0.012747	0.00938	A	799.1	37.6	15-07-2013 14:38:23	0	0.053	0.039	0.240514413
BHS1071513_11	BHS1071513	1194631.421	2459511.4	7/15/2013	0	0.009139	0.049302	A	799.3	37.7	15-07-2013 14:40:46	0	0.038	0.205	0.240497217
BHS1071513_12	BHS1071513	1194636.417	2459530.825	7/15/2013	0	0.010098	0.007213	A	799.3	37.8	15-07-2013 14:43:01	0	0.042	0.03	0.24041988
BHS1071513_13	BHS1071513	1194635.467	2459555.791	7/15/2013	0	0.007451	0.014901	A	799.3	37.9	15-07-2013 14:46:06	0	0.031	0.062	0.240342572
BHS1071513_14	BHS1071513	1194636.551	2459587.128	7/15/2013	0	0.008407	0.015373	A	799.1	38.0	15-07-2013 14:48:29	0	0.035	0.064	0.240205213
BHS1071513_15	BHS1071513	1194615.87	2459583.79	7/15/2013	0	0.010572	0.031475	A	799.3	38.0	15-07-2013 14:50:57	0	0.044	0.131	0.24026534
BHS1071513_16	BHS1071513	1194607	2459537.755	7/15/2013	0	0.013691	0.019215	A	799.3	38.1	15-07-2013 14:53:29	0	0.057	0.08	0.240188137
BHS1071513_17	BHS1071513	1194587.013	2459539.169	7/15/2013	0	0.018489	0.024972	A	799.3	38.2	15-07-2013 14:56:04	0	0.077	0.104	0.240110993
BHS1071513_18	BHS1071513	1194610.834	2459508.388	7/15/2013	0	0.015127	0.044901	A	799.3	38.2	15-07-2013 14:58:22	0	0.063	0.18700001	0.240110993
PetersonGulch071713_01	PetersonGulch071713	1205739.327	2454175.774	7/17/2013	0	0	0.183778	A	792.4	28.5	17-07-2013 09:18:56	0	-0.012	0.74800003	0.2456927
PetersonGulch071713_02	PetersonGulch071713	1205766.891	2454607.359	7/17/2013	0	0	0.177459	A	792.4	28.8	17-07-2013 09:25:31	0	-0.004	0.72299999	0.245448589
PetersonGulch071713_03	PetersonGulch071713	1205333.437	2454566.476	7/17/2013	0	0	0.383724	A	792.6	29.0	17-07-2013 09:31:39	0	-0.003	1.56400001	0.245348036
PetersonGulch071713_04	PetersonGulch071713	1205296.371	2454956.985	7/17/2013	0	0	0.479614	A	793.2	29.1	17-07-2013 09:36:18	0	-0.001	1.954	0.245452523
PetersonGulch071713_05	PetersonGulch071713	1204892.761	2454979.515	7/17/2013	0	0	0.292913	A	793.3	29.3	17-07-2013 09:42:06	0	-0.003	1.19400001	0.24532114
PetersonGulch071713_06	PetersonGulch071713	1204909.819	2455394.499	7/17/2013	0	0	0.364981	A	793.7	29.5	17-07-2013 09:47:01	0	-0.002	1.48800004	0.245282635
PetersonGulch071713_07	PetersonGulch071713	1204551.537	2455363.165	7/17/2013	0	0	0.0407	A	793.9	29.7	17-07-2013 09:52:43	0	-0.002	0.16599999	0.245182425
PetersonGulch071713_08	PetersonGulch071713	1204524.059	2455798.611	7/17/2013	0	0	0.13259	A	794.1	29.9	17-07-2013 09:58:32	0	-0.001	0.54100001	0.245082334
PetersonGulch071713_09	PetersonGulch071713	1204945.432	2455796.715	7/17/2013	0	0.00294	0.228352	A	794.4	30.1	17-07-2013 10:03:31	0	0.012	0.93199998	0.245013237
PetersonGulch071713_10	PetersonGulch071713	1204887.799	2456164.865	7/17/2013	0	0	0.056963	A	793.7	30.5	17-07-2013 10:08:47	0	-0.006	0.233	0.244474858
PetersonGulch071713_11	PetersonGulch071713	1204506.985	2456195.445	7/17/2013	0	0	0.050713	A	793.9	31.4	17-07-2013 10:20:06	0	-0.001	0.208	0.243813813
PetersonGulch071713_12	PetersonGulch071713	1204153.964	2456158.758	7/17/2013	0	0	0.052839	A	794.7	32.1	17-07-2013 10:25:23	0	0	0.21699999	0.24349983
PetersonGulch071713_13	PetersonGulch071713	1204510.915	2456593.807	7/17/2013	0	0	0.039835	A	794.8	32.9	17-07-2013 10:33:14	0	-0.005	0.164	0.24289389
PetersonGulch071713_14	PetersonGulch071713	1204138.242	2456599.613	7/17/2013	0	0.000969	0.110487	A	794.4	33.5	17-07-2013 10:39:06	0	0.004	0.456	0.242296636
PetersonGulch071713_15	PetersonGulch071713	1204132.467	2456957.854	7/17/2013	0	0.002421	0.289591	A	794.9	33.9	17-07-2013 10:43:07	0	0.01	1.19599998	0.24213329
PetersonGulch071713_16	PetersonGulch071713	1204115.313	2457373.592	7/17/2013	0	0.009431	0.184749	A	794.9	34.3	17-07-2013 10:48:11	0	0.039	0.764	0.241818264
PetersonGulch071713_17	PetersonGulch071713	1203716.02	2457361.68	7/17/2013	0	0	0.072251	A	795.1	34.6	17-07-2013 10:53:33	0	-0.007	0.29899999	0.241643324
PetersonGulch071713_18	PetersonGulch071713	1203722.368	2456967.478	7/17/2013	0	0.00169	0.108156	A	795.4	35.0	17-07-2013 10:57:40	0	0.007	0.44800001	0.241420716
PetersonGulch071713_19	PetersonGulch071713	1203755.642	2457781.216	7/17/2013	0	0.000484	0.039895	A	797.9	35.5	17-07-2013 11:03:35	0	0.002	0.16500001	0.241787195
PetersonGulch071713_20	PetersonGulch071713	1203717.035	2458171.578	7/17/2013	0	0	0.084107	A	798.6	35.9	17-07-2013 11:07:58	0	-0.002	0.34799999	0.241686091
PetersonGulch071713_21	PetersonGulch071713	1203733.442	2458565.777	7/17/2013	0	0.001925	0.089029	A	796.1	36.3	17-07-2013 11:12:23	0	0.008	0.37	0.24061808
PetersonGulch071713_22	PetersonGulch071713	1203341.505	2458565.523	7/17/2013	0	0	0.235306	A	798.7	36.7	17-07-2013 11:17:22	0	-0.014	0.97600001	0.24109228
PetersonGulch071713_23	PetersonGulch071713	1203318.21	2458987.074	7/17/2013	0	0.006027	0.409096	A	799.4	37.0	17-07-2013 11:21:55	0	0.025	1.69700003	0.241070166
PetersonGulch071713_24	PetersonGulch071713	1202941.507	2458972.839	7/17/2013	0	0.003131	0.234804	A	799.1	37.2	17-07-2013 11:26:22	0	0.013	0.97500002	0.240824401
PetersonGulch071713_25	PetersonGulch071713	1202942.243	2459392.183	7/17/2013	0	0	0.138936	A	799.5	37.4	17-07-2013 11:30:47	0	-0.008	0.57700002	0.240789771
PetersonGulch071713_26	PetersonGulch071713	1202878.172	2459755.189	7/17/2013	0	0.003127	0.24609	A	799.5	37.7	17-07-2013 11:36:18	0	0.013	1.023	0.240557387
PetersonGulch071713_27	PetersonGulch071713	1202517.577	2459763.496	7/17/2013	0	0.002883	0.135022	A	799.0	37.9	17-07-2013 11:41:10	0	0.012	0.56199998	0.240252376
PetersonGulch071713_28	PetersonGulch071713	1202507.389	2460168.36	7/17/2013	0	0.001202	0.007451	A	799.9	38.1	17-07-2013 11:45:37	0	0.005	0.031	0.240368441
PetersonGulch071713_29	PetersonGulch071713	1202130.999	2460182.798	7/17/2013	0	0.001441	0.042027	A	799.7	38.3	17-07-2013 11:50:14	0	0.006	0.175	0.240154028
PetersonGulch071713_30	PetersonGulch071713	1202134.858	2460541.131	7/17/2013	0	0	0.075901	A	800.6	38.6	17-07-2013 11:57:36	0	-0.008	0.31600001	0.240192935
PetersonGulch071713_31	PetersonGulch071713	1201710.711	2460572.014	7/17/2013	0	0	0.150794	A	800.1	39.0	17-07-2013 12:02:01	0	-0.024	0.62900001	0.239735335
PetersonGulch071713_32	PetersonGulch071713	1201698.896	2460151.094	7/17/2013	0	0	0.073371	A	801.0	39.3	17-07-2013 12:06:24	0	-0.002	0.30599999	0.239774555
PetersonGulch071713_33	PetersonGulch071713	1201696.99	2459806.409	7/17/2013	0	0.000718	0.112791	A	800.5	39.5	17-07-2013 12:11:28	0	0.003	0.47099999	0.239471599
PetersonGulch071713_34	PetersonGulch071713	1202132.077	2459775.211	7/17/2013	0	0.002627	0.113204	A	798.6	39.6	17-07-2013 12:16:06	0	0.011	0.47400001	0.238826826
PetersonGulch071713_35	PetersonGulch071713	1202089.165	2459414.645	7/17/2013	0	0	0.003824	A	799.4	39.7	17-07-2013 12:21:16	0	0	0.016	0.238989651
PetersonGulch071713_36	PetersonGulch071713	1202525.823	2459385.776	7/17/2013	0	0	0.119763	A	798.0	39.7	17-07-2013 12:26:53	0	-0.006	0.50199997	0.238571107
PetersonGulch071713_37	PetersonGulch071713	1202525.313	2458943.273	7/17/2013	0	0	0.289324	A	799.4	39.8	17-07-2013 12:31:48	0	-0.002	1.21099997	0.238913283
PetersonGulch071713_38	PetersonGulch071713	1202924.447	2458583.437	7/17/2013	0	0	0.025498	A	797.6	39.9	17-07-2013 12:36:54	0	-0.004	0.107	0.238299176
PetersonGulch071713_39	PetersonGulch071713	1203317.95	2458190.974	7/17/2013	0	0.004529	0.279814	A	798.0	40.0	17-07-2013 12:42:25	0	0.019	1.17400002	0.238342553
PetersonGulch071713_40	PetersonGulch071713	1203328.601	2457802.197	7/17/2013	0	0.003097	0.164383	A	797.9	40.1	17-07-2013 12:47:14	0	0.013	0.69	0.238236606
PetersonGulch071913_01	PetersonGulch071913	1201305.783	2460981.047	7/19/2013	0	0	0.124671	A	796.4	22.0	19-07-2013 09:47:26	0	-0.001	0.49399999	0.252371073
PetersonGulch071913_02	PetersonGulch071913	1201014.035	2460995.658	7/19/2013	0	0.002246	0.544335	A	796.4	25.3	19-07-2013 09:56:45	0	0.009	2.18099999	0.249580577
PetersonGulch071913_03	PetersonGulch071913	1200494.484	2461202.923	7/19/2013	0	0	0.094346	A	798.9	28.6	19-07-2013 10:08:44	0	-0.004	0.38100001	0.247626007
PetersonGulch071913_04	PetersonGulch071913	1200171.922	2461250.309	7/19/2013	0	0.00222	0.100394	A	799.5	30.0	19-07-2013 10:15:08	0	0.009	0.40700001	0.246667549
PetersonGulch071913_05	PetersonGulch071913	1200185.112	2461649.405	7/19/2013	0	0.000738	0.018192	A	799.7	31.1	19-07-2013 10:21:29	0	0.003	0.074	0.245837212
PetersonGulch071913_06	PetersonGulch071913	1199690.655	2461617.093	7/19/2013	0	0	0.263474	A	796.5	32.5	19-07-2013 10:30:06	-0.001	-0.004	1.08099997	0.243731961
PetersonGulch071913_07	PetersonGulch071913	1199358.566	2461599.588	7/19/2013	0	0	0.042752	A	800.7	33.4	19-07-2013 10:35:24	0	-0.001	0.175	0.244297832
PetersonGulch071913_08	PetersonGulch071913	1199316.537	2461966.306	7/19/2013	0	0.002433	0.09635	A	801.1	34.8	19-07-2013 10:43:14	0	0.01	0.396	0.243308693
PetersonGulch071913_09	PetersonGulch071913	1198942.992	2462036.703	7/19/2013	0	0	0.006279	A	797.5	35.7	19-07-2013 10:49:23	0	-0.01	0.026	0.241509482
PetersonGulch071913_10	PetersonGulch071913	1198527.055	2462044.347	7/19/2013	0	0.00484	0.042348	A	800.9	36.4	19-07-2013 10:55:22	-0.003	0.02	0.175	0.241990656
PetersonGulch071913_11	PetersonGulch071913	1198098.325	2462060.896	7/19/2013	0	0.003624	0.3936	A	802.0	37.3	19-07-2013 11:03:48	0	0.015	1.62899995	0.241620526
PetersonGulch071913_12	PetersonGulch071913	1197776.487	2461977.7	7/19/2013	0	0.002898	0.17339	A	802.6	37.7	19-07-2013 11:09:12	-0.013	0.012	0.71799999	0.241490141
PetersonGulch071913_13	PetersonGulch071913	1197809.963	2462420.42	7/19/2013	0	0	0	A	799.1	38.4	19-07-2013 11:24:13	0	-0.01	-0.11	0.239896819
PetersonGulch071913_14	PetersonGulch071913	1197314.487	2462314.352	7/19/2013	0	0.000241	0.045964	A	802.9	38.9	19-07-2013 11:37:33	0	0.001	0.191	0.240651399
PetersonGulch071913_15	PetersonGulch071913	1197003.586	2462359.089	7/19/2013	0	0.006499	0.328301	A	803.8	39.2	19-07-2013 11:53:28	0	0.027	1.36399996	0.240689754
PetersonGulch071913_16	PetersonGulch071913	1196572.801	2462392.072	7/19/2013	0	0.002166	0.197543	A	803.8	39.3	19-07-2013 12:01:13	0	0.009	0.82099998	0.240612715
PetersonGulch071913_17	PetersonGulch071913	1196216.718	2462407.414	7/19/2013	0	0.003846	0.173315	A	803.8	39.6	19-07-2013 12:06:57	0	0.016	0.72100002	0.240381911
PetersonGulch071913_18	PetersonGulch071913	1195761.842	2462391.591	7/19/2013	0	0.019463	0.182376	A	804.5	40.0	19-07-2013 12:13:50	0	0.081	0.759	0.240283936
PetersonGulch071913_19	PetersonGulch071913	1195743.599	2462741.688	7/19/2013	0	0.003824	0.325788	A	801.3	40.4	19-07-2013 12:19:30	0	0.016	1.36300004	0.239022866
PetersonGulch071913_20	PetersonGulch071913	1195730.15	2463210.658	7/19/2013	0	0.003105	0.127562	A	802.1	40.9	19-07-2013 12:26:29	0	0.013	0.53399998	0.238880575
PetersonGulch071913_21	PetersonGulch071913	1195326.671	2463173.919	7/19/2013	0	0.005022	0.188433	A	803.7	41.2	19-07-2013 12:30:36	0	0.021	0.78799999	0.239128649
PetersonGulch071913_22	PetersonGulch071913	1196131.236	2462828.92	7/19/2013	0	0.006222	0.083994	A	805.3	41.6	19-07-2013 12:38:46	0	0.026	0.35100001	0.239300206
PetersonGulch071913_23	PetersonGulch071913	1196519.468	2462751.322	7/19/2013	0	0.004051	0.130358	A	803.0	42.0	19-07-2013 12:43:55	0	0.017	0.54699999	0.238313884
PetersonGulch071913_24	PetersonGulch071913	1200507.547	2460760.479	7/19/2013	0	0.000949	0.111464	A	802.4	43.3	19-07-2013 13:13:58	0	0.004	0.47	0.237157539
PetersonGulch071913_25	PetersonGulch071913	1200871.703	2460570.051	7/19/2013	0	0.00353	0.2384	A	796.0	43.2	19-07-2013 13:21:06	0	0.015	1.01300001	0.235340327
PetersonGulch071913_26	PetersonGulch071913	1201313.634	2460587.743	7/19/2013	0	0.002825	0.12572	A	795.8	43.0	19-07-2013 13:26:36	0	0.012	0.53399998	0.235430032
PiedraRiver071813_01	PiedraRiver071813	1192140.542	2463860.499	7/18/2013	0	0	0.18813	A	811.8	24.7	18-07-2013 10:01:35	0	-0.006	0.73799998	0.254919201
PiedraRiver071813_02	PiedraRiver071813	1191814.604	2464009.141	7/18/2013	0	0	0	A	811.8	27.3	18-07-2013 10:12:38	0	-0.006	-0.192	0.252713203
PiedraRiver071813_03	PiedraRiver071813	1191845.295	2464410.176	7/18/2013	0	0	0	A	811.1	28.8	18-07-2013 10:21:56	0	-0.009	-0.022	0.251240969
PiedraRiver071813_04	PiedraRiver071813	1191410.337	2464809.004	7/18/2013	0	0	0.113324	A	809.4	30.8	18-07-2013 10:37:27	0	-0.01	0.45500001	0.249064684
PiedraRiver071813_05	PiedraRiver071813	1191395.769	2464414.097	7/18/2013	0	0	0	A	814.6	34.4	18-07-2013 10:58:42	0	-0.014	-0.144	0.247730672
PiedraRiver071813_06	PiedraRiver071813	1191378.767	2464037.069	7/18/2013	0	0.00295	0.085539	A	816.4	37.5	18-07-2013 11:18:08	0	0.012	0.34799999	0.245800495
PiedraRiver071813_07	PiedraRiver071813	1191040.407	2464414.038	7/18/2013	0	0	0.027752	A	812.2	38.9	18-07-2013 11:29:04	0	-0.011	0.114	0.243438855
PiedraRiver071813_08	PiedraRiver071813	1190999.206	2464822.708	7/18/2013	0	0.004599	0.12974	A	809.9	39.8	18-07-2013 11:36:57	0	0.019	0.53600001	0.242051378
PiedraRiver071813_09	PiedraRiver071813	1190998.148	2465203.131	7/18/2013	0	0	0	A	813.3	40.5	18-07-2013 11:44:37	0	-0.012	-0.026	0.242525041
PiedraRiver071813_10	PiedraRiver071813	1191034.862	2465500.854	7/18/2013	0	0	0	A	814.2	41.9	18-07-2013 12:05:25	-0.008	-0.007	-0.014	0.241714507
PiedraRiver071813_11	PiedraRiver071813	1191297.472	2465321.931	7/18/2013	0	0	0.010631	A	814.9	42.3	18-07-2013 12:11:49	0	-0.005	0.044	0.241615564
PiedraRiver071813_12	PiedraRiver071813	1191426.78	2465215.915	7/18/2013	0	0	0.008675	A	814.8	43.1	18-07-2013 12:24:46	0	-0.011	0.036	0.240974784
PiedraRiver071813_13	PiedraRiver071813	1191646.555	2465210.37	7/18/2013	0	0	0	A	811.0	43.6	18-07-2013 12:32:52	0	-0.013	-0.004	0.23947233
PiedraRiver071813_14	PiedraRiver071813	1190616.173	2465162.339	7/18/2013	0	0.000477	0	A	811.1	44.9	18-07-2013 12:49:45	-0.001	0.002	-0.047	0.238522917
PiedraRiver071813_15	PiedraRiver071813	1190211.473	2465196.882	7/18/2013	0	0.00622	0.109804	A	814.0	45.1	18-07-2013 12:58:54	0	0.026	0.45899999	0.239225298
PiedraRiver071813_16	PiedraRiver071813	1189820.441	2465179.984	7/18/2013	0	0.004308	0.165865	A	814.4	45.1	18-07-2013 13:04:44	-0.001	0.018	0.69300002	0.239342853
PiedraRiver071813_17	PiedraRiver071813	1190215.201	2464813.694	7/18/2013	0	0.000957	0.019627	A	814.2	45.0	18-07-2013 13:11:21	0	0.004	0.082	0.239359289
PiedraRiver071813_18	PiedraRiver071813	1190640.697	2464845.388	7/18/2013	0	0.002395	0.004071	A	814.1	44.8	18-07-2013 13:17:09	0	0.01	0.017	0.239480436
PoleGulch071513_01	PoleGulch071513	1208505.071	2446417.515	7/15/2013	0	0	0	A	785.5	30.9	15-07-2013 12:14:05	0	-0.055	-0.159	0.241630808
PoleGulch071513_02	PoleGulch071513	1208542.855	2445991.651	7/15/2013	0	0	0.041488	A	785.5	33.2	15-07-2013 12:21:46	0	-0.007	0.17299999	0.239816695
PoleGulch071513_03	PoleGulch071513	1208141.068	2446412.339	7/15/2013	0	0	0	A	782.5	35.3	15-07-2013 12:30:20	0	-0.008	-0.064	0.237274289
PoleGulch071513_04	PoleGulch071513	1207723.038	2446382.375	7/15/2013	0	0	0.024616	A	786.9	37.8	15-07-2013 13:16:55	0	-0.008	0.104	0.236690104
PoleGulch071513_05	PoleGulch071513	1207694.244	2446815.55	7/15/2013	0	0.00071	0.344901	A	787.0	37.8	15-07-2013 13:24:05	0	0.003	1.45700002	0.236720175
PoleGulch071513_06	PoleGulch071513	1207746.55	2447190.299	7/15/2013	0	0.000237	0.043643	A	787.8	37.5	15-07-2013 13:30:19	0	0.001	0.184	0.237189651
PoleGulch071513_07	PoleGulch071513	1208140.148	2447182.095	7/15/2013	0	0	0.192291	A	786.5	37.1	15-07-2013 13:37:15	0	-0.008	0.81099999	0.237103552
PoleGulch071513_08	PoleGulch071513	1208130.814	2446776.64	7/15/2013	0	0	0.58709	A	788.7	36.7	15-07-2013 13:42:55	0	-0.006	2.46600008	0.238073722
SquawCreek071613_01	SquawCreek071613	1209393.864	2444606.665	7/16/2013	0	0	0.321074	A	794.5	22.4	16-07-2013 09:06:40	0	-0.032	1.27699995	0.251428246
SquawCreek071613_02	SquawCreek071613	1208944.216	2444565.701	7/16/2013	0	0	0.16617	A	793.1	24.6	16-07-2013 09:20:08	0	-0.018	0.667	0.249130726
SquawCreek071613_03	SquawCreek071613	1208878.447	2444194.238	7/16/2013	0	0	0.193721	A	788.3	26.0	16-07-2013 09:30:59	-0.019	-0.022	0.78600001	0.246464074
SquawCreek071613_04	SquawCreek071613	1208863.328	2443811.559	7/16/2013	0	0	0.231285	A	791.6	26.8	16-07-2013 09:39:51	0	-0.026	0.93699998	0.246835738
SquawCreek071613_05	SquawCreek071613	1208917.269	2443407.107	7/16/2013	0	0	1.150453	A	792.3	27.4	16-07-2013 09:49:37	0	-0.024	4.66599989	0.246560797
SquawCreek071613_06	SquawCreek071613	1209373.818	2443308.271	7/16/2013	0	0	0.585448	A	791.7	28.0	16-07-2013 10:00:01	-0.889	-0.024	2.38100004	0.245883211
SquawCreek071613_07	SquawCreek071613	1209593.003	2443485.008	7/16/2013	0	0	0.237919	A	788.1	28.3	16-07-2013 10:07:27	0	-0.021	0.97299999	0.244521558

SquawCreek071613_08	SquawCreek071613	1209348.019	2443763.505	7/16/2013	0	0	0.171785	A	788.1	28.5	16-07-2013 10:13:09	0	-0.015	0.70300001	0.244359434
SquawCreek071613_09	SquawCreek071613	1209402.657	2444202.174	7/16/2013	0	0.002453	0.86571	A	791.7	28.7	16-07-2013 10:20:52	0	0.01	3.52900004	0.245313004
SquawCreek071613_10	SquawCreek071613	1209604.662	2443729.19	7/16/2013	0	0	0.327367	A	793.3	29.2	16-07-2013 10:30:27	0	-0.004	1.33399999	0.245402277
SquawCreek071613_11	SquawCreek071613	1210157.15	2443388.975	7/16/2013	0	0	0.430626	A	793.3	30.1	16-07-2013 10:49:29	0	-0.004	1.75999999	0.244673967
SquawCreek071613_12	SquawCreek071613	1210284.245	2443106.683	7/16/2013	0	0.005378	0.247121	A	793.3	30.4	16-07-2013 10:53:26	-0.031	0.022	1.01100004	0.244432151
SquawCreek071613_13	SquawCreek071613	1210574.441	2442835.963	7/16/2013	0	0.004393	0.297763	A	792.9	30.7	16-07-2013 10:57:51	-0.063	0.018	1.22000003	0.244067684
SquawCreek071613_14	SquawCreek071613	1211347.78	2441915.094	7/16/2013	0	0.001461	0.654435	A	792.8	31.3	16-07-2013 11:12:18	0	0.006	2.68700004	0.243555963
SquawCreek071613_15	SquawCreek071613	1210925.453	2442323.875	7/16/2013	0	0.003156	0.505639	A	791.2	31.7	16-07-2013 11:18:04	0	0.013	2.08299994	0.242745504
SquawCreek071613_16	SquawCreek071613	1210964.485	2441953.493	7/16/2013	0	0	0.501447	A	792.0	31.9	16-07-2013 11:23:32	0	-0.001	2.06500006	0.242831632
SquawCreek071613_17	SquawCreek071613	1212113.375	2440855.563	7/16/2013	0	0	0.199821	A	791.0	32.3	16-07-2013 11:41:03	-0.011	-0.009	0.82499999	0.242207438
SquawCreek071613_18	SquawCreek071613	1211797.88	2441186.375	7/16/2013	0	0.010147	0.52884	A	789.5	32.5	16-07-2013 11:45:47	0	0.042	2.18899989	0.241589934
SquawCreek071613_19	SquawCreek071613	1211733.219	2441461.526	7/16/2013	0	0.008698	0.193051	A	790.1	32.7	16-07-2013 11:50:00	0	0.036	0.79900002	0.241615444
SquawCreek071613_20	SquawCreek071613	1212586.955	2440444.29	7/16/2013	0	0.004099	0.399332	A	790.1	33.3	16-07-2013 12:06:44	0	0.017	1.65600002	0.241142377
SquawCreek071613_21	SquawCreek071613	1212921.29	2440374.039	7/16/2013	0	0.007683	0.202169	A	788.5	34.0	16-07-2013 12:26:07	0	0.032	0.84200001	0.240105599
SquawCreek071613_22	SquawCreek071613	1213351.571	2440368.232	7/16/2013	0	0.002874	0.727487	A	786.9	34.2	16-07-2013 12:33:33	0	0.012	3.03800011	0.239462465
SquawCreek071613_23	SquawCreek071613	1213359.8	2440007.291	7/16/2013	0	0	0.294076	A	783.5	34.6	16-07-2013 12:41:45	0	-0.041	1.23500001	0.238117903
SquawCreek071613_24	SquawCreek071613	1213739.181	2439554.574	7/16/2013	0	0.006411	0.440693	A	782.8	35.2	16-07-2013 12:51:42	0	0.027	1.85599995	0.23744224
SquawCreek071613_25	SquawCreek071613	1213744.644	2439140.002	7/16/2013	0	0.007581	0.549855	A	782.8	35.9	16-07-2013 12:59:28	0	0.032	2.3210001	0.236904427
SquawCreek071613_26	SquawCreek071613	1213316.44	2439565.421	7/16/2013	0	0.008772	0.055006	A	785.2	36.6	16-07-2013 13:14:35	0	0.037	0.23199999	0.237093747
SquawCreek071613_27	SquawCreek071613	1213368.374	2439286.328	7/16/2013	0	0.00593	0.409425	A	786.6	37.0	16-07-2013 13:22:34	0	0.025	1.72599995	0.237210155
SquawCreek071613_28	SquawCreek071613	1212939.436	2439570.65	7/16/2013	0	0.00237	0.224629	A	786.5	37.3	16-07-2013 13:33:22	0	0.01	0.94800001	0.2369508
SquawCreek071613_29	SquawCreek071613	1212543.309	2439933.243	7/16/2013	0	0	0.475908	A	785.9	37.3	16-07-2013 13:41:33	0	-0.001	2.00999999	0.236770034
SquawCreek071613_30	SquawCreek071613	1212174.789	2440348.779	7/16/2013	0	0.001659	0.267078	A	786.6	37.3	16-07-2013 13:48:51	0	0.007	1.12699997	0.23698093
SquawCreek071613_31	SquawCreek071613	1211732.205	2440709.395	7/16/2013	0	0	0.128256	A	785.2	37.2	16-07-2013 13:57:34	0	-0.002	0.542	0.236635372
SquawCreek071613_32	SquawCreek071613	1211271.626	2441128.525	7/16/2013	0	0.009018	1.035227	A	787.5	37.2	16-07-2013 14:05:36	0	0.038	4.36199999	0.237328514
SquawCreek071613_33	SquawCreek071613	1210992.838	2441520.792	7/16/2013	0	0.003082	0.257477	A	786.7	37.2	16-07-2013 14:11:47	0	0.013	1.08599997	0.237087414
SquawCreek071613_34	SquawCreek071613	1211302.723	2441600.449	7/16/2013	0	0.002375	0.251557	A	787.7	37.0	16-07-2013 14:19:26	0	0.01	1.05900002	0.237541869
SquawCreek071613_35	SquawCreek071613	1212938.669	2440017.271	7/16/2013	0	0.01882	0.269191	A	789.7	36.9	16-07-2013 14:33:00	0	0.079	1.13	0.238221809
StollsteimerCreek072213_01	StollsteimerCreek072213	1185112.854	2468945.448	7/22/2013	0	0.006053	0.441117	A	808.3	26.6	22-07-2013 09:59:47	0	0.024	1.74899995	0.252211273
StollsteimerCreek072213_02	StollsteimerCreek072213	1185132.556	2469340.629	7/22/2013	0	0.006791	0.602107	A	809.0	27.7	22-07-2013 10:04:21	0	0.027	2.39400005	0.251506746
StollsteimerCreek072213_03	StollsteimerCreek072213	1185138.846	2469756.275	7/22/2013	0	0.006025	0.108195	A	811.5	29.2	22-07-2013 10:10:43	0	0.024	0.43099999	0.251032323
StollsteimerCreek072213_04	StollsteimerCreek072213	1185507.649	2469806.334	7/22/2013	0	0.002993	0.038915	A	809.6	30.4	22-07-2013 10:16:37	0	0.012	0.156	0.249454513
StollsteimerCreek072213_05	StollsteimerCreek072213	1185586.218	2470210.924	7/22/2013	0	0.008186	0.160503	A	807.5	31.3	22-07-2013 10:20:56	-0.06	0.033	0.64700001	0.248071954
StollsteimerCreek072213_06	StollsteimerCreek072213	1185563.022	2470642.613	7/22/2013	0	0.010103	0.150803	A	804.2	32.1	22-07-2013 10:24:41	0	0.041	0.61199999	0.246410668
StollsteimerCreek072213_07	StollsteimerCreek072213	1185935.814	2470167.508	7/22/2013	0	0.003457	0.043209	A	809.0	33.3	22-07-2013 10:31:01	0	0.014	0.175	0.246910751
StollsteimerCreek072213_08	StollsteimerCreek072213	1186309.973	2470155.667	7/22/2013	0	0.004418	0.113161	A	806.9	34.3	22-07-2013 10:35:10	0	0.018	0.461	0.24546881
StollsteimerCreek072213_09	StollsteimerCreek072213	1186708.006	2470207.631	7/22/2013	0	0.006366	0.006366	A	807.7	35.4	22-07-2013 10:39:53	0	0.026	0.026	0.244836211
StollsteimerCreek072213_10	StollsteimerCreek072213	1186697.457	2469786.056	7/22/2013	0	0.004633	0.127535	A	806.8	36.3	22-07-2013 10:44:30	0	0.019	0.523	0.243852109
StollsteimerCreek072213_11	StollsteimerCreek072213	1186326.511	2469786.104	7/22/2013	0	0.007022	0.108723	A	804.0	37.4	22-07-2013 10:49:31	0	0.029	0.449	0.242145061
StollsteimerCreek072213_12	StollsteimerCreek072213	1185929.522	2469734.665	7/22/2013	0	0.00772	1.539704	A	802.6	38.0	22-07-2013 10:53:20	0	0.032	6.38199997	0.241257295
StollsteimerCreek072213_13	StollsteimerCreek072213	1185181.059	2470200.844	7/22/2013	0	0.00169	0.06785	A	805.6	38.9	22-07-2013 10:59:43	0	0.007	0.28099999	0.241460666
StollsteimerCreek072213_14	StollsteimerCreek072213	1185523.482	2469358.941	7/22/2013	0	0.001449	0.13837	A	808.0	39.8	22-07-2013 11:08:40	-0.075	0.006	0.57300001	0.241483524
StollsteimerCreek072213_15	StollsteimerCreek072213	1185924.064	2469293.126	7/22/2013	0	0.003375	0.15984	A	807.7	40.2	22-07-2013 11:12:51	0	0.014	0.66299999	0.241085723
StollsteimerCreek072213_16	StollsteimerCreek072213	1186340.429	2469341.445	7/22/2013	0	0.000483	0.002897	A	810.0	40.7	22-07-2013 11:18:09	0	0.002	0.012	0.241387069
StollsteimerCreek072213_17	StollsteimerCreek072213	1186693.083	2469417.972	7/22/2013	0	0.007448	0.112439	A	808.0	41.4	22-07-2013 11:26:16	0	0.031	0.46799999	0.240255192
StollsteimerCreek072213_18	StollsteimerCreek072213	1187136.582	2469332.404	7/22/2013	0	0.003357	0.152264	A	809.5	42.6	22-07-2013 11:53:07	0	0.014	0.63499999	0.239786431
StollsteimerCreek072213_19	StollsteimerCreek072213	1187525.96	2469376.555	7/22/2013	0	0.004553	0.082918	A	809.8	42.9	22-07-2013 11:59:38	0	0.019	0.34599999	0.239647597
StollsteimerCreek072213_20	StollsteimerCreek072213	1187490.404	2468943.395	7/22/2013	0	0.004049	0.010479	A	806.3	43.5	22-07-2013 12:09:13	0	0.017	0.044	0.238159701
StollsteimerCreek072213_21	StollsteimerCreek072213	1187116.085	2468993.129	7/22/2013	0	0.004281	0.027825	A	805.4	43.6	22-07-2013 12:24:23	0	0.018	0.117	0.237818763
StollsteimerCreek072213_22	StollsteimerCreek072213	1187158.409	2468580.246	7/22/2013	0	0.003801	0.22756	A	808.0	45.0	22-07-2013 12:30:54	0	0.016	0.958	0.237536609
StollsteimerCreek072213_23	StollsteimerCreek072213	1186752.702	2468598.62	7/22/2013	0	0.005904	0.184669	A	805.3	45.8	22-07-2013 12:36:43	0	0.025	0.78200001	0.236149058
StollsteimerCreek072213_24	StollsteimerCreek072213	1186687.153	2469017.86	7/22/2013	0	0.004961	0.074882	A	806.3	46.1	22-07-2013 12:42:54	0	0.021	0.317	0.236220106
StollsteimerCreek072213_25	StollsteimerCreek072213	1186338.624	2468985.859	7/22/2013	0	0.006396	0.112056	A	809.4	46.4	22-07-2013 12:49:20	0	0.027	0.47299999	0.236905694
StollsteimerCreek072213_26	StollsteimerCreek072213	1186327.137	2468592.815	7/22/2013	0	0.004267	0.009718	A	810.1	46.5	22-07-2013 12:56:21	0	0.018	0.041	0.237036392
StollsteimerCreek072213_27	StollsteimerCreek072213	1185933.382	2468974.942	7/22/2013	0	0.008009	0.214606	A	805.6	46.7	22-07-2013 13:04:18	0	0.034	0.91100001	0.235572293
StollsteimerCreek072213_28	StollsteimerCreek072213	1185932.985	2468636.062	7/22/2013	0	0.013493	0.36811	A	809.8	46.8	22-07-2013 13:08:05	0	0.057	1.55499995	0.236726448
StollsteimerCreek072213_29	StollsteimerCreek072213	1185528.282	2468995.309	7/22/2013	0	0.012779	1.205271	A	809.8	46.9	22-07-2013 13:12:34	0	0.054	5.09299994	0.236652479
StollsteimerCreek072213_30	StollsteimerCreek072213	1185500.079	2468610.079	7/22/2013	0	0.003549	0.040226	A	809.7	46.9	22-07-2013 13:17:28	0	0.015	0.17	0.236623257
StollsteimerCreek072213_31	StollsteimerCreek072213	1185496.566	2467802.933	7/22/2013	0	0.003779	0.053383	A	809.8	47.5	22-07-2013 14:28:55	0	0.016	0.226	0.236209646
StollsteimerCreek072213_32	StollsteimerCreek072213	1185570.734	2468154.736	7/22/2013	0	0.008726	0.072871	A	809.0	47.7	22-07-2013 14:34:26	0	0.037	0.30899999	0.235829204
StollsteimerCreek072213_33	StollsteimerCreek072213	1185141.892	2468590.851	7/22/2013	0	0.006122	0.139403	A	808.3	47.9	22-07-2013 14:40:25	0	0.026	0.59200001	0.235478371
StollsteimerCreek072213_34	StollsteimerCreek072213	1185167.436	2468158.299	7/22/2013	0	0.005411	0.17902	A	809.0	48.5	22-07-2013 14:50:57	0	0.023	0.76099998	0.235242665

APPENDIX H

CARBON DIOXIDE FLUX CONTOUR FIGURES



LEGEND

NATURAL SPRING

CARBON DIOXIDE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 10.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 250 500
Feet

N

FIGURE H1
CARBON DIOXIDE FLUX CONTOURS
BEAVER CREEK
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2013\2013_ARCH_APPX_H_CO2.mxd

TOWNSEND SPRING

T34N R5WA SEC4

SQUAW CREEK

T34N R5WA SEC3

ELLIOTT DENISE L

PRIVATE

ELLIOTT DENISE L

POPP JOHN R & CARI A

SAN JUAN NF

T34N R5WA SEC9

T34N R5WA SEC10

EDWARDS DURWOOD

MUIRHEAD GEORGE & MUIRHEAD LINDA

TRACY BRYAN H & MARITES G

160

HUTCHERSON

GOV-01

LITTLE SQUAW CREEK

STATE TRUST LANDS

T34N R5WA SEC16

T34N R5WA SEC15

LEGEND

NATURAL SPRING

CARBON DIOXIDE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 10.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 600 1,200

Feet

N

FIGURE H2
CARBON DIOXIDE FLUX CONTOURS
SQUAW CREEK / LITTLE SQUAW CREEK
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

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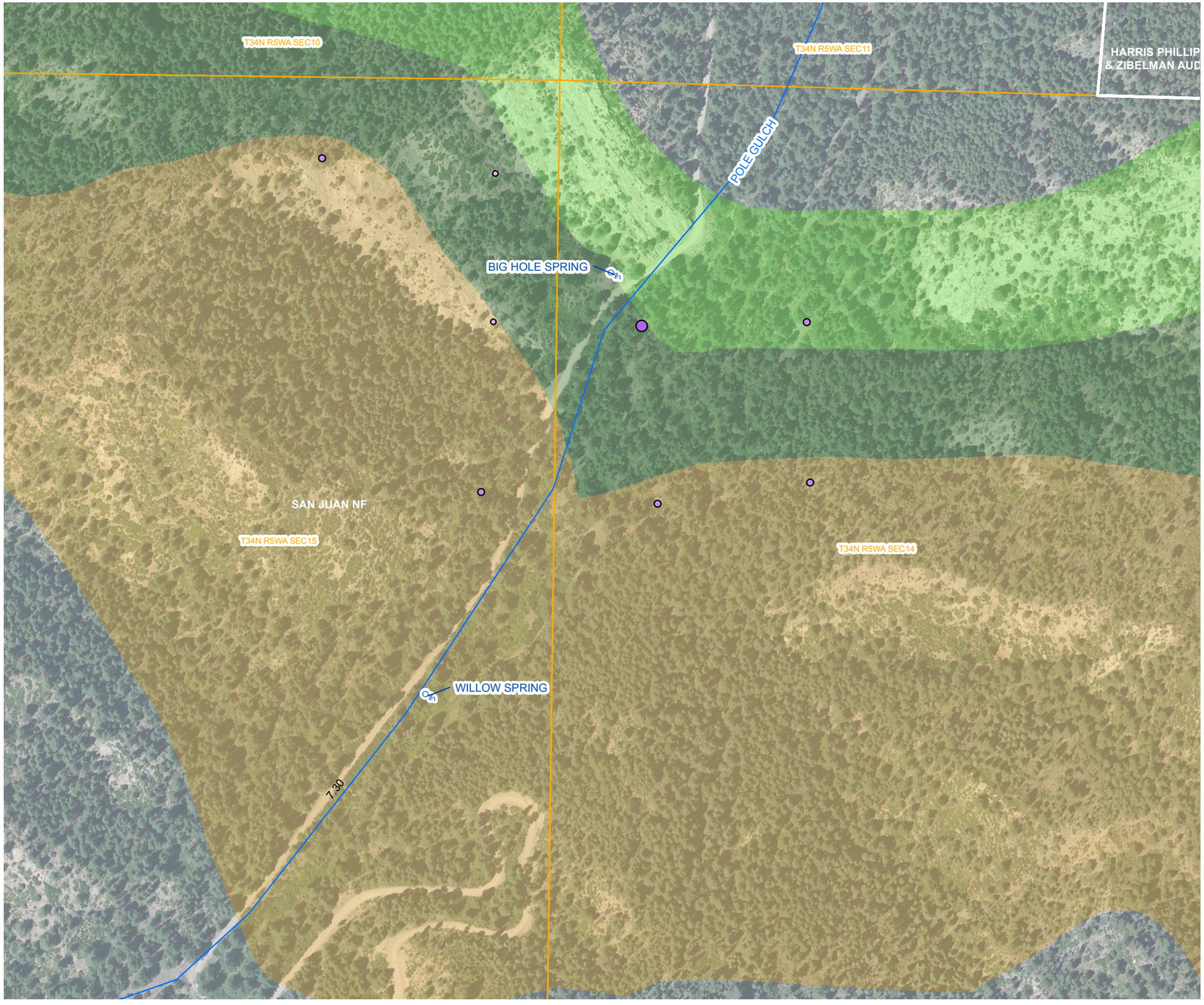

LEGEND

NATURAL SPRING

CARBON DIOXIDE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 10.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 250 500
Feet

N

FIGURE H3
CARBON DIOXIDE FLUX CONTOURS
POLE GULCH
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

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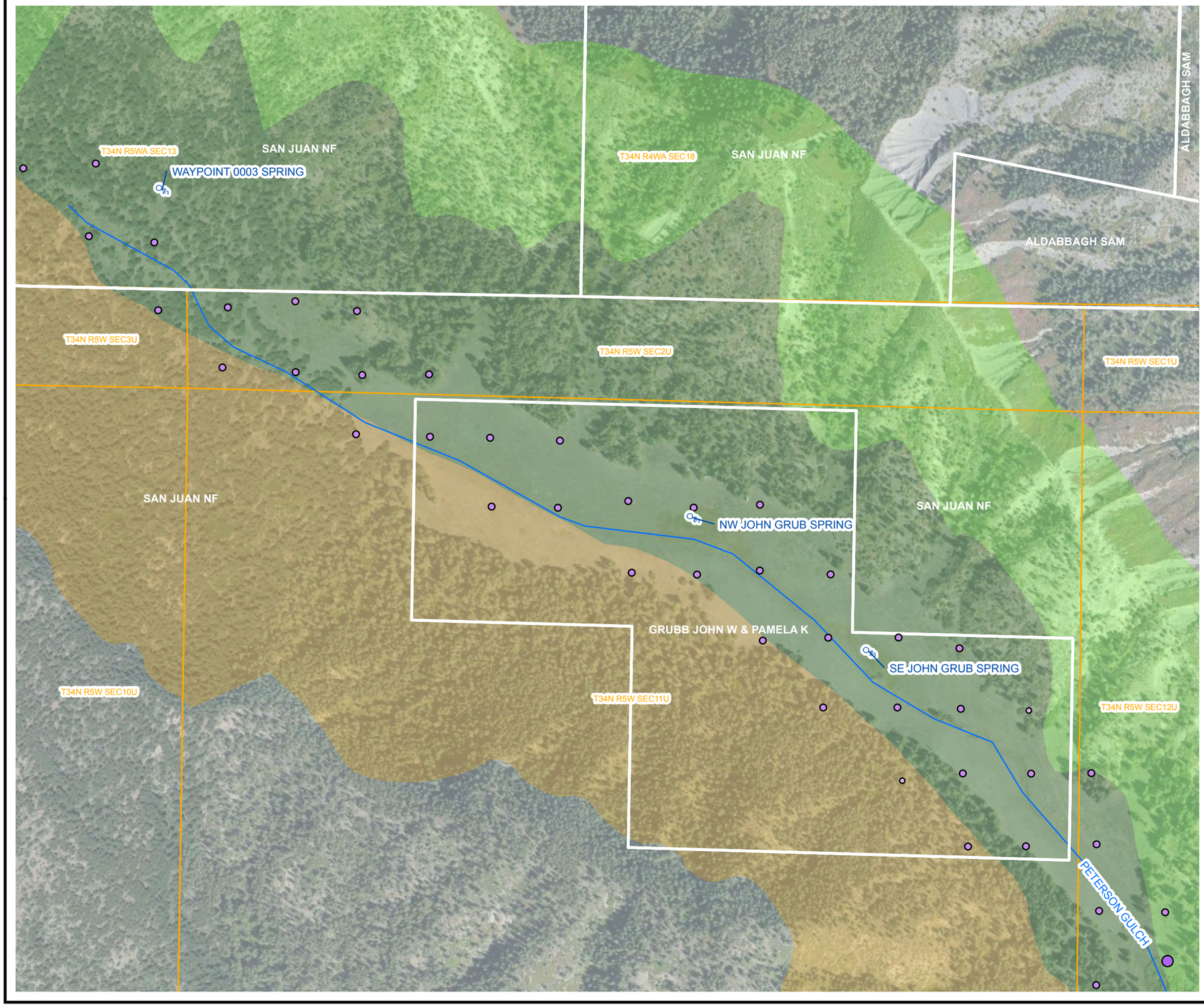

LEGEND

NATURAL SPRING

CARBON DIOXIDE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 10.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 600 1,200
Feet

N

FIGURE H4
CARBON DIOXIDE FLUX CONTOURS
PETERSON GULCH WEST
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

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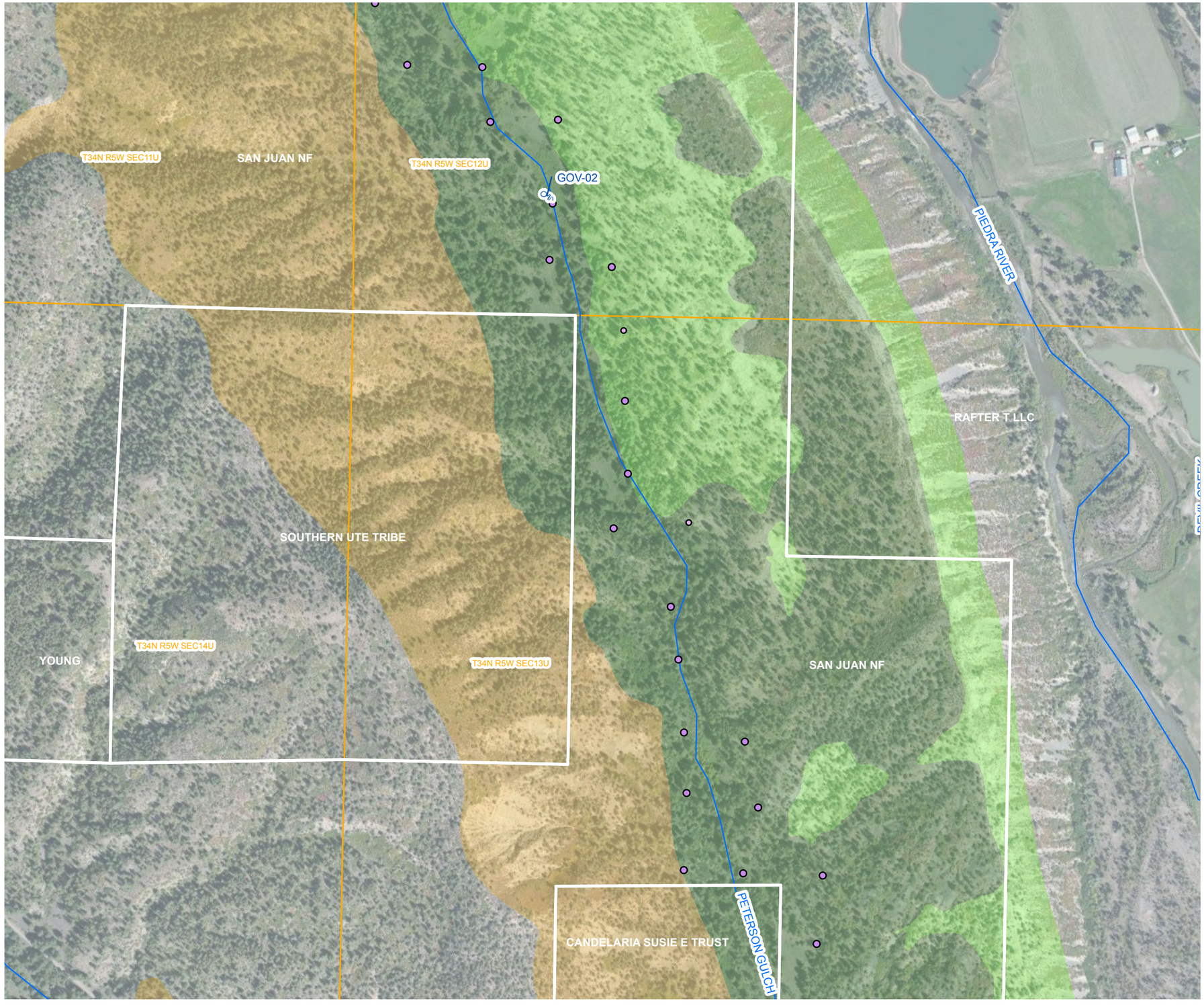

LEGEND

NATURAL SPRING

CARBON DIOXIDE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 10.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 600 1,200

Feet

N

FIGURE H5
CARBON DIOXIDE FLUX CONTOURS
PETERSON GULCH EAST
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

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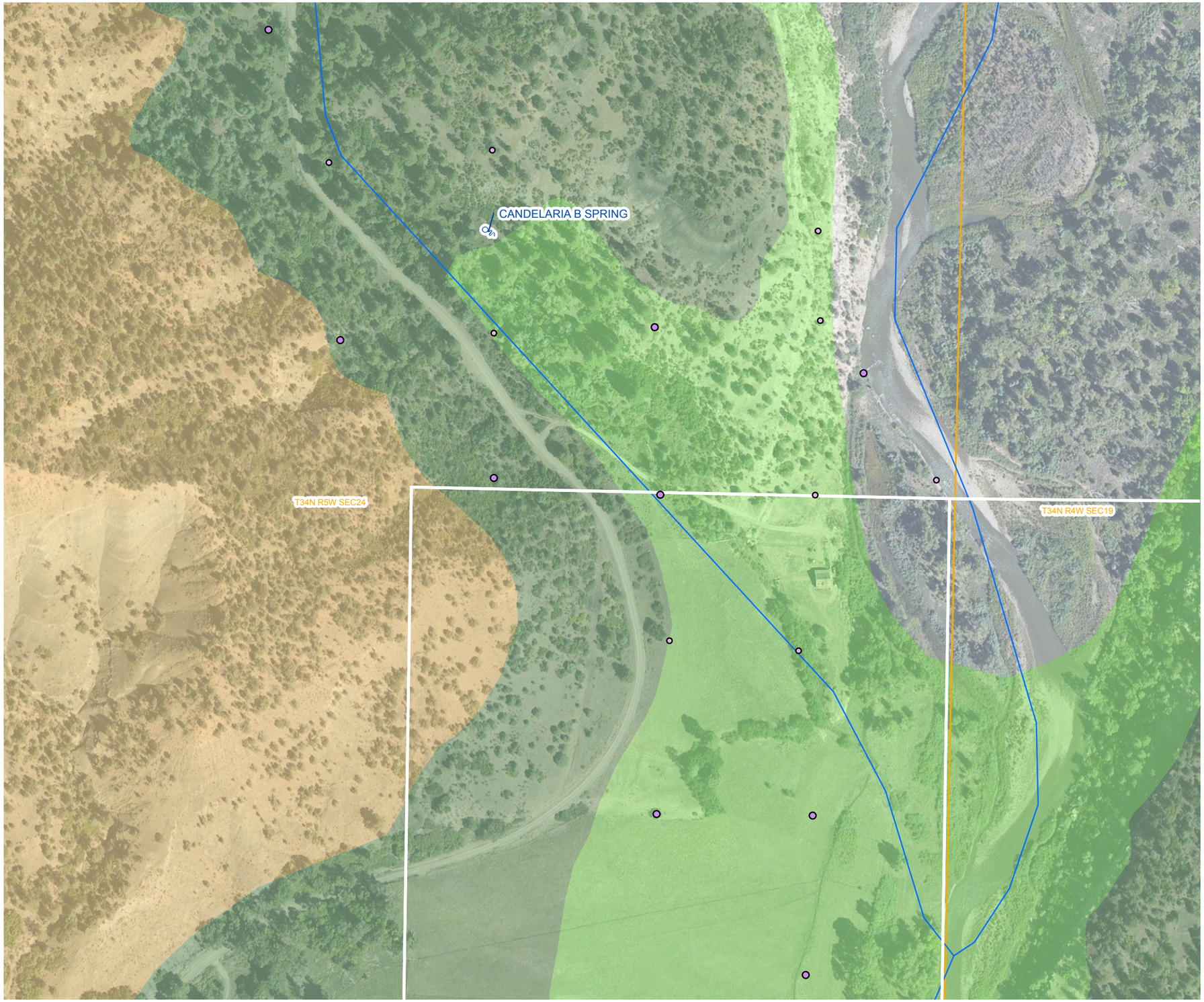

LEGEND

NATURAL SPRING

CARBON DIOXIDE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 10.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 250 500
Feet

N

FIGURE H6
CARBON DIOXIDE FLUX CONTOURS
PIEDRA RIVER
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

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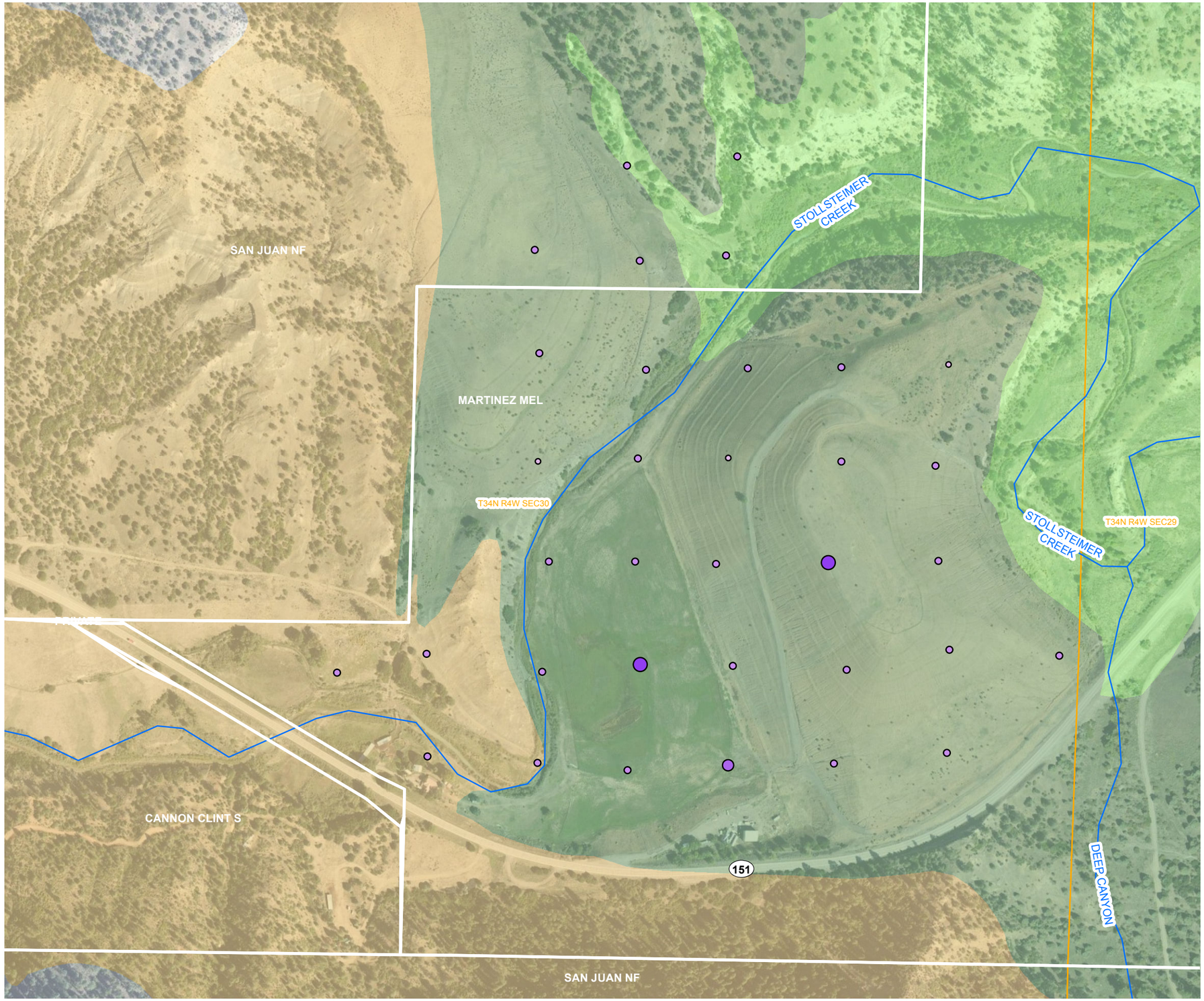

LEGEND

NATURAL SPRING

CARBON DIOXIDE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 10.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 400 800
Feet

N

FIGURE H7
CARBON DIOXIDE FLUX CONTOURS
STOLLSTEIMER CREEK
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

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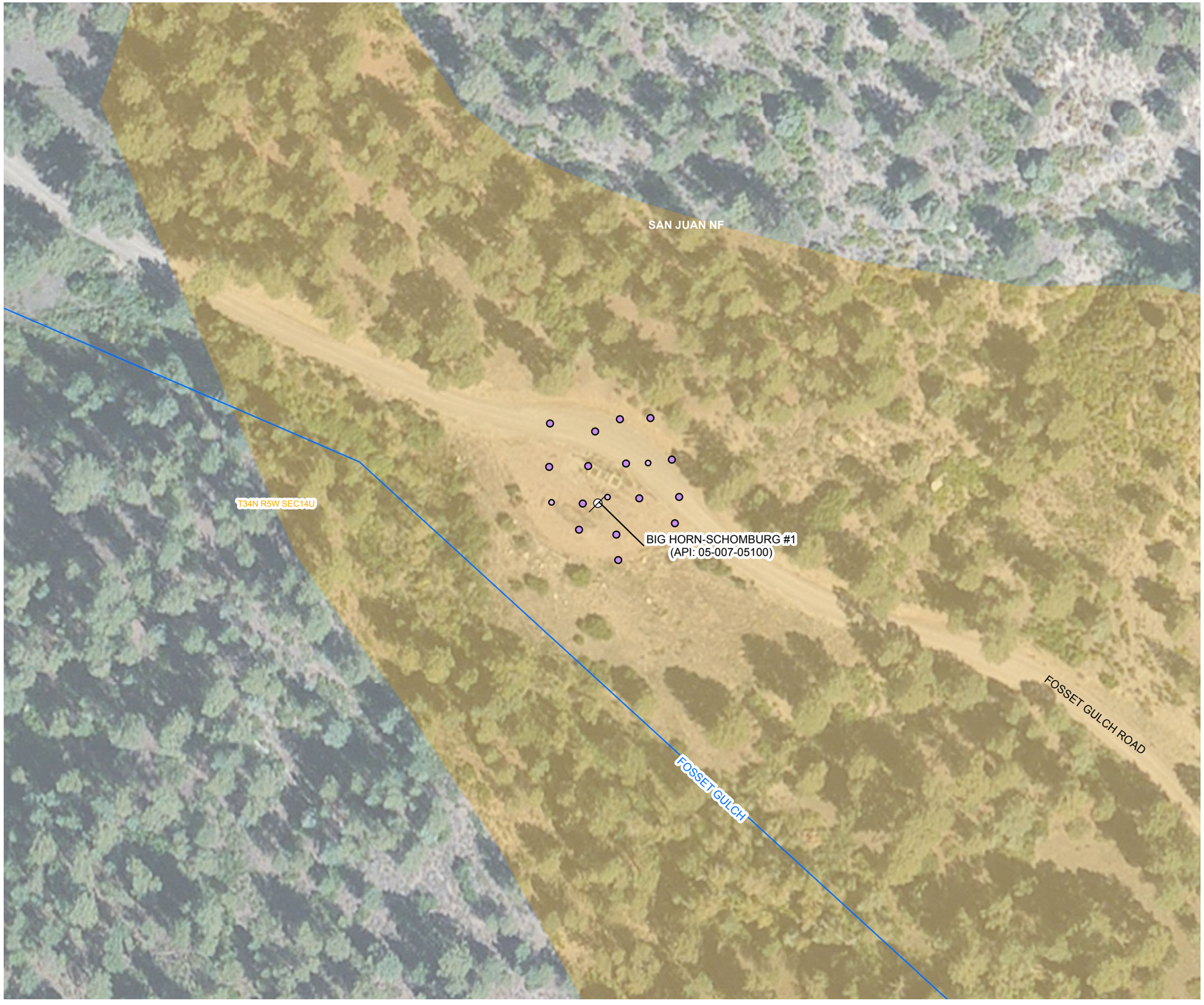

LEGEND

NATURAL SPRING

CARBON DIOXIDE FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 10.0000

mol/m^2 • day: MOLES PER SQUARE METER PER DAY

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY - COLORADO GEOLOGICAL SURVEY, 2011

- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 80 160
Feet

N

FIGURE H8
CARBON DIOXIDE FLUX CONTOURS
BIG HORN-SCHOMBURG #1
2013 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

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APPENDIX I

ABANDONED COAL MINE SUBSURFACE SOIL GAS AND TEMPERATURE MEASUREMENTS

APPENDIX I

LOCATION	Sub_CH_4_Co	Sub_O_2_Con	Sub_H_2S_Co	Sub_CO_Con	CO_2_PPM	TEMP_F	TEMP_C	GPS_Date	GPS_Time	Northing	Easting
CHIMNEY ROCK MINE	0	19.2	0	0	8000	55	12.78	8/6/2013	09:42:34am	1185724.994000	2469826.971000
CHIMNEY ROCK MINE	0	19.6	0	0	6000	54	12.22	8/6/2013	09:47:52am	1185724.258000	2469784.930000
CHIMNEY ROCK MINE	0	19.1	0	0	8000	55	12.78	8/6/2013	09:51:38am	1185770.005000	2469825.105000
CHIMNEY ROCK MINE	0	19.9	0	0	4000	54	12.22	8/6/2013	09:54:39am	1185770.745000	2469773.012000
CHIMNEY ROCK MINE	0	19.8	0	0	4000	55	12.78	8/6/2013	09:57:41am	1185772.937000	2469732.427000
CHIMNEY ROCK MINE	0	20.5	0	0	0	54	12.22	8/6/2013	10:01:20am	1185774.797000	2469682.451000
CHIMNEY ROCK MINE	0	20.1	0	0	1000	55	12.78	8/6/2013	10:05:42am	1185823.968000	2469679.568000
CHIMNEY ROCK MINE	0	19.9	0	0	1000	57	13.89	8/6/2013	10:09:19am	1185870.171000	2469671.277000
CHIMNEY ROCK MINE	0	19.0	0	0	3000	58	14.44	8/6/2013	10:13:09am	1185924.933000	2469680.174000
CHIMNEY ROCK MINE	0	17.2	0	0	13000	56	13.33	8/6/2013	10:16:31am	1185970.766000	2469681.332000
CHIMNEY ROCK MINE	0	17.1	0	0	11000	58	14.44	8/6/2013	10:20:37am	1186026.311000	2469672.520000
CHIMNEY ROCK MINE	0	13.9	0	0	20000	58	14.44	8/6/2013	10:25:32am	1186118.253000	2469617.567000
CHIMNEY ROCK MINE	0	18.9	0	0	4000	57	13.89	8/6/2013	10:28:16am	1186115.307000	2469577.788000
CHIMNEY ROCK MINE	0	19.8	0	0	2000	58	14.44	8/6/2013	10:32:22am	1186123.662000	2469529.304000
CHIMNEY ROCK MINE	0	19.9	0	0	0	59	15.00	8/6/2013	10:37:01am	1186140.329000	2469486.029000
CHIMNEY ROCK MINE	0	19.5	0	0	1000	53	11.67	8/6/2013	10:39:40am	1186177.046000	2469473.794000
CHIMNEY ROCK MINE	0	19.6	0	0	1000	55	12.78	8/6/2013	10:42:35am	1186228.052000	2469474.939000
CHIMNEY ROCK MINE	0	19.2	0	0	4000	56	13.33	8/6/2013	10:45:09am	1186280.734000	2469486.527000
CHIMNEY ROCK MINE	0	19.9	0	0	2000	56	13.33	8/6/2013	10:48:41am	1186274.171000	2469523.960000
CHIMNEY ROCK MINE	0	17.7	0	0	13000	58	14.44	8/6/2013	10:51:43am	1186220.387000	2469528.510000
CHIMNEY ROCK MINE	0	18.3	0	0	9000	57	13.89	8/6/2013	10:54:31am	1186173.107000	2469534.144000
CHIMNEY ROCK MINE	0	19.3	0	0	7000	53	11.67	8/6/2013	10:58:02am	1186169.853000	2469577.787000
CHIMNEY ROCK MINE	0	17.8	0	0	15000	52	11.11	8/6/2013	11:11:24am	1186224.490000	2469578.489000
CHIMNEY ROCK MINE	0	19.3	0	0	9000	53	11.67	8/6/2013	11:16:00am	1186276.992000	2469574.902000
CHIMNEY ROCK MINE	0	18.9	0	0	10000	52	11.11	8/6/2013	11:19:04am	1186324.708000	2469640.129000
CHIMNEY ROCK MINE	0	18.4	0	0	14000	58	14.44	8/6/2013	11:22:02am	1186317.493000	2469680.503000
CHIMNEY ROCK MINE	0	19.9	0	0	4000	57	13.89	8/6/2013	11:24:32am	1186271.153000	2469674.496000
CHIMNEY ROCK MINE	0	19.6	0	0	7000	53	11.67	8/6/2013	11:26:45am	1186278.744000	2469629.093000
CHIMNEY ROCK MINE	0	19.7	0	0	6000	55	12.78	8/6/2013	11:29:39am	1186221.638000	2469634.681000
CHIMNEY ROCK MINE	0	19.7	0	0	7000	55	12.78	8/6/2013	11:32:52am	1186170.828000	2469610.624000
CHIMNEY ROCK MINE	0	17.7	0	0	16000	58	14.44	8/6/2013	11:37:02am	1185971.045000	2469722.932000
CHIMNEY ROCK MINE	0	16.9	0	0	16000	56	13.33	8/6/2013	11:39:18am	1185912.888000	2469730.784000
CHIMNEY ROCK MINE	0	18.5	0	0	12000	55	12.78	8/6/2013	11:41:21am	1185861.211000	2469725.719000
CHIMNEY ROCK MINE	0	20.3	0	0	2000	56	13.33	8/6/2013	11:43:38am	1185812.103000	2469728.527000
CHIMNEY ROCK MINE	0	19.2	0	0	7000	57	13.89	8/6/2013	11:46:31am	1185817.213000	2469786.450000
CHIMNEY ROCK MINE	0	19.9	0	0	2000	58	14.44	8/6/2013	11:49:21am	1185825.789000	2469841.641000
CHIMNEY ROCK MINE	0	20.3	0	0	1000	59	15.00	8/6/2013	11:51:11am	1185872.465000	2469827.725000
CHIMNEY ROCK MINE	0	19.9	0	0	2000	59	15.00	8/6/2013	11:53:00am	1185923.381000	2469828.797000
CHIMNEY ROCK MINE	0	19.8	0	0	5000	55	12.78	8/6/2013	11:56:35am	1185970.513000	2469832.726000
CHIMNEY ROCK MINE	0	19.7	0	0	7000	58	14.44	8/6/2013	12:04:46pm	1186023.650000	2469821.137000
CHIMNEY ROCK MINE	0	20.5	0	0	0	58	14.44	8/6/2013	12:07:45pm	1186074.580000	2469836.966000
CHIMNEY ROCK MINE	0	19.5	0	0	1000	56	13.33	8/6/2013	12:10:07pm	1186124.654000	2469818.554000
CHIMNEY ROCK MINE	0	20.1	0	0	1000	58	14.44	8/6/2013	12:13:40pm	1186174.849000	2469813.147000
CHIMNEY ROCK MINE	0	19.8	0	0	2000	59	15.00	8/6/2013	12:16:29pm	1186227.204000	2469825.375000
CHIMNEY ROCK MINE	0	20.4	0	0	1000	55	12.78	8/6/2013	12:18:42pm	1186270.340000	2469815.838000
CHIMNEY ROCK MINE	0	20.1	0	0	1000	58	14.44	8/6/2013	12:21:00pm	1186270.644000	2469769.079000
CHIMNEY ROCK MINE	0	18.8	0	0	9000	58	14.44	8/6/2013	12:25:51pm	1186224.043000	2469675.366000
CHIMNEY ROCK MINE	0	19.0	0	0	6000	58	14.44	8/6/2013	12:28:26pm	1186218.043000	2469723.936000
CHIMNEY ROCK MINE	0	20.3	0	0	2000	58	14.44	8/6/2013	12:33:36pm	1186217.136000	2469775.490000
CHIMNEY ROCK MINE	0	19.0	0	0	6000	57	13.89	8/6/2013	12:37:34pm	1186178.379000	2469779.827000
CHIMNEY ROCK MINE	0	19.7	0	0	4000	58	14.44	8/6/2013	12:40:06pm	1186179.720000	2469719.399000
CHIMNEY ROCK MINE	0	17.5	0	0	14000	58	14.44	8/6/2013	12:43:08pm	1186171.736000	2469671.485000
CHIMNEY ROCK MINE	0	18.5	0	0	9000	59	15.00	8/6/2013	12:46:30pm	1186119.218000	2469686.032000
CHIMNEY ROCK MINE	0	19.6	0	0	5000	58	14.44	8/6/2013	12:48:49pm	1186124.627000	2469730.271000
CHIMNEY ROCK MINE	0	20.2	0	0	1000	58	14.44	8/6/2013	12:51:41pm	1186130.365000	2469785.651000
CHIMNEY ROCK MINE	0	20.2	0	0	1000	58	14.44	8/6/2013	12:54:46pm	1186075.319000	2469796.637000
CHIMNEY ROCK MINE	0	17.5	0	0	13000	59	15.00	8/6/2013	12:57:09pm	1186069.754000	2469725.617000
CHIMNEY ROCK MINE	0	18.8	0	0	8000	58	14.44	8/6/2013	12:59:23pm	1186077.850000	2469675.292000
CHIMNEY ROCK MINE	0	19.5	0	0	4000	58	14.44	8/6/2013	01:01:43pm	1186021.102000	2469726.113000
CHIMNEY ROCK MINE	0	18.9	0	0	6000	58	14.44	8/6/2013	01:04:14pm	1186018.794000	2469788.726000
CHIMNEY ROCK MINE	0	19.4	0	0	4000	59	15.00	8/6/2013	01:06:05pm	1185969.630000	2469789.365000
CHIMNEY ROCK MINE	0	17.5	0	0	12000	59	15.00	8/6/2013	01:09:09pm	1185916.535000	2469784.699000
CHIMNEY ROCK MINE	0	18.8	0	0	9	47	8.33	7/30/2013	09:47:22am	1185621.372000	2469873.212000
CHIMNEY ROCK MINE	0	19.9	0	0	3000	44	6.67	7/30/2013	10:00:59am	1185626.754000	2469827.034000
CHIMNEY ROCK MINE	0	19.8	0	0	3000	48	8.89	7/30/2013	10:05:09am	1185629.440000	2469771.433000
CHIMNEY ROCK MINE	0	18.1	0	0	10000	46	7.78	7/30/2013	10:10:00am	1185677.814000	2469776.957000
CHIMNEY ROCK MINE	0	18.1	0	0	9000	48	8.89	7/30/2013	10:14:44am	1185673.834000	2469836.553000
CHIMNEY ROCK MINE	0	19.0	0	0	6000	45	7.22	7/30/2013	10:19:49am	1185678.233000	2469879.467000
CHIMNEY ROCK MINE	0	18.7	0	0	9000	48	8.89	7/30/2013	10:24:25am	1185676.852000	2469927.465000
CHIMNEY ROCK MINE	0	20.1	0	0	1000	49	9.44	7/30/2013	10:28:37am	1185727.387000	2469919.494000
CHIMNEY ROCK MINE	0	19.4	0	0	6000	42	5.56	7/30/2013	10:33:56am	1185742.397000	2470028.811000
CHIMNEY ROCK MINE	0	19.7	0	0	4000	43	6.11	7/30/2013	10:38:11am	1185736.473000	2470073.509000
CHIMNEY ROCK MINE	0	19.2	0	0	6000	47	8.33	7/30/2013	10:42:41am	1185743.763000	2470121.201000
CHIMNEY ROCK MINE	0	19.0	0	0	6000	50	10.00	7/30/2013	10:47:03am	1185791.044000	2470121.031000
CHIMNEY ROCK MINE	0	16.5	0	0	19000	49	9.44	7/30/2013	10:51:02am	1185836.415000	2470117.786000
CHIMNEY ROCK MINE	0	15.7	0	0	19000	51	10.56	7/30/2013	10:54:56am	1185883.816000	2470120.099000
CHIMNEY ROCK MINE	0	18.3	0	0	2000	46	7.78	7/30/2013	10:59:23am	1185881.990000	2470177.819000
CHIMNEY ROCK MINE	0	19.8	0	0	1000	51	10.56	7/30/2013	11:03:34am	1185932.563000	2470174.921000
CHIMNEY ROCK MINE	0	19.9	0	0	2000	46	7.78	7/30/2013	11:12:43am	1185988.158000	2470169.850000
CHIMNEY ROCK MINE	0	16.1	0	0	17000	47	8.33	7/30/2013	11:20:31am	1186024.525000	2470164.339000
CHIMNEY ROCK MINE	0	18.9	0	0	3000	49	9.44	7/30/2013	11:23:38am	1186028.593000	2470126.851000
CHIMNEY ROCK MINE	0	18.8	0	0	2000	51	10.56	7/30/2013	11:28:45am	1185982.857000	2470119.738000
CHIMNEY ROCK MINE	0	18.8	0	0	2000	52	11.11	7/30/2013	11:32:43am	1185929.181000	2470125.205000
CHIMNEY ROCK MINE	0	18.1	0	0	6000	47	8.33	7/30/2013	11:36:58am	1186075.891000	2470115.186000
CHIMNEY ROCK MINE	0	18.4	0	0	4000	45	7.22	7/30/2013	11:40:22am	1186130.267000	2470123.581000
CHIMNEY ROCK MINE	0	19.1	0	0	1000	51	10.56	7/30/2013	11:43:51am	1186178.229000	2470118.114000
CHIMNEY ROCK MINE	0	19.3	0	0	1000	52	11.11	7/30/2013	11:47:16am	1186229.473000	2470125.198000
CHIMNEY ROCK MINE	0	18.6	0	0	3000	48	8.89	7/30/2013	11:50:56am	1186265.372000	2470069.213000
CHIMNEY ROCK MINE	0	18.2	0	0	3000	48	8.89	7/30/2013	11:54:33am	1186225.398000	2470063.855000
CHIMNEY ROCK MINE	0	17.3	0	0	10000	49	9.44	7/30/2013	11:58:06am	1186170.361000	2470058.196000
CHIMNEY ROCK MINE	0	18.3	0	0	3000	52	11.11	7/30/2013	12:02:04pm	1186122.276000	2470062.728000
CHIMNEY ROCK MINE	0	18.0	0	0	4000	46	7.78	7/30/2013	12:06:15pm	1186070.890000	2470071.542000
CHIMNEY ROCK MINE	0	14.9	0	0	20000	49	9.44	7/30/2013	12:09:54pm	1186025.581000	2470076.462000
CHIMNEY ROCK MINE	0	15.1	0	0	18000	47	8.33	7/30/2013	12:13:48pm	1185972.751000	2470078.679000
CHIMNEY ROCK MINE	0	16.1	0	0	16000	45	7.22	7/30/2013	12:18:10pm	1185925.271000	2470070.598000
CHIMNEY ROCK MINE	0	15.9	0	0	16000	51	10.56	7/30/2013	12:21:36pm	1185873.691000	2470070.755000
CHIMNEY ROCK MINE	0	17.3	0	0	12000	51	10.56	7/30/2013	12:24:41pm	1185827.883000	2470075.943000
CHIMNEY ROCK MINE	0	16.9	0	0	13000	48	8.89	7/30/2013	12:28:40pm	1185782.303000	2470072.729000

LOCATION	Sub_CH_4_Co	Sub_O_2_Con	Sub_H_2S_Co	Sub_CO_Con	CO_2_PPM	TEMP_F	TEMP_C	GPS_Date	GPS_Time	Northing	Easting
CHIMNEY ROCK MINE	0	19.1	0	0	1000	47	8.33	7/30/2013	12:33:11pm	1185776.967000	2470021.258000
CHIMNEY ROCK MINE	0	19.6	0	0	1000	53	11.67	7/30/2013	12:36:25pm	1185822.956000	2470019.811000
CHIMNEY ROCK MINE	0	19.6	0	0	1000	56	13.33	7/30/2013	12:40:03pm	1185887.147000	2470023.565000
CHIMNEY ROCK MINE	0	16.2	0	0	16000	49	9.44	7/30/2013	12:44:04pm	1185934.064000	2470027.659000
CHIMNEY ROCK MINE	0	15.8	0	0	18000	52	11.11	7/30/2013	12:47:54pm	1185984.414000	2470020.350000
CHIMNEY ROCK MINE	0	17.0	0	0	11000	50	10.00	7/30/2013	12:52:28pm	1186029.225000	2470022.819000
CHIMNEY ROCK MINE	0	17.6	0	0	10000	47	8.33	7/30/2013	12:57:10pm	1186081.459000	2470020.553000
CHIMNEY ROCK MINE	0	15.9	0	0	17000	49	9.44	7/30/2013	01:01:35pm	1186126.151000	2470023.640000
CHIMNEY ROCK MINE	0	16.5	0	0	17000	42	5.56	7/30/2013	01:06:27pm	1186177.752000	2470021.954000
CHIMNEY ROCK MINE	0	18.1	0	0	7000	46	7.78	7/30/2013	01:13:58pm	1186224.529000	2470017.792000
CHIMNEY ROCK MINE	0	17.1	0	0	15000	47	8.33	7/30/2013	01:18:45pm	1186275.859000	2470014.522000
CHIMNEY ROCK MINE	0	16.4	0	0	21000	45	7.22	7/30/2013	01:22:54pm	1186276.915000	2469969.204000
CHIMNEY ROCK MINE	0	19.5	0	0	1000	50	10.00	7/30/2013	01:26:15pm	1186221.156000	2469964.016000
CHIMNEY ROCK MINE	0	18.9	0	0	4000	54	12.22	7/30/2013	01:28:41pm	1186166.417000	2469970.145000
CHIMNEY ROCK MINE	0	16.4	0	0	17000	49	9.44	7/30/2013	01:32:08pm	1186121.286000	2469972.836000
CHIMNEY ROCK MINE	0	16.5	0	0	17000	49	9.44	7/30/2013	01:35:58pm	1186076.991000	2469980.545000
CHIMNEY ROCK MINE	0	17.2	0	0	13000	47	8.33	7/30/2013	01:39:13pm	1186024.432000	2469987.440000
CHIMNEY ROCK MINE	0	18.7	0	0	3000	52	11.11	7/30/2013	01:42:52pm	1185980.045000	2469978.734000
CHIMNEY ROCK MINE	0	17.7	0	0	8000	50	10.00	7/30/2013	01:46:05pm	1185929.436000	2469972.837000
CHIMNEY ROCK MINE	0	19.3	0	0	1000	46	7.78	7/30/2013	01:48:38pm	1185869.055000	2469980.885000
CHIMNEY ROCK MINE	0	19.1	0	0	2000	46	7.78	7/30/2013	01:51:23pm	1185821.813000	2469982.787000
CHIMNEY ROCK MINE	0	19.0	0	0	1000	48	8.89	7/30/2013	01:53:52pm	1185768.841000	2469986.194000
CHIMNEY ROCK MINE	0	18.8	0	0	3000	45	7.22	7/30/2013	01:57:33pm	1185768.197000	2469929.342000
CHIMNEY ROCK MINE	0	19.0	0	0	3000	47	8.33	7/30/2013	02:00:13pm	1185824.459000	2469924.844000
CHIMNEY ROCK MINE	0	18.2	0	0	7000	46	7.78	7/30/2013	02:03:11pm	1185871.974000	2469926.101000
CHIMNEY ROCK MINE	0	18.9	0	0	4000	49	9.44	7/30/2013	02:05:37pm	1185930.669000	2469929.110000
CHIMNEY ROCK MINE	0	19.7	0	0	0	49	9.44	7/30/2013	02:08:30pm	1185986.083000	2469930.613000
CHIMNEY ROCK MINE	0	19.7	0	0	1000	47	8.33	7/30/2013	02:12:13pm	1186028.569000	2469927.905000
CHIMNEY ROCK MINE	0	18.4	0	0	8000	46	7.78	7/30/2013	02:15:41pm	1186073.719000	2469925.482000
CHIMNEY ROCK MINE	0	19.9	0	0	1000	48	8.89	7/30/2013	02:18:36pm	1186124.069000	2469920.964000
CHIMNEY ROCK MINE	0	19.8	0	0	1000	49	9.44	7/30/2013	02:21:13pm	1186165.521000	2469920.032000
CHIMNEY ROCK MINE	0	20.0	0	0	0	45	7.22	7/30/2013	02:24:09pm	1186218.454000	2469923.884000
CHIMNEY ROCK MINE	0	20.0	0	0	0	48	8.89	7/30/2013	02:28:06pm	1186266.547000	2469921.989000
CHIMNEY ROCK MINE	0	19.9	0	0	1000	48	8.89	7/30/2013	02:30:57pm	1186267.618000	2469875.763000
CHIMNEY ROCK MINE	0	19.9	0	0	1000	50	10.00	7/30/2013	02:34:08pm	1186225.417000	2469865.412000
CHIMNEY ROCK MINE	0	20.2	0	0	0	50	10.00	7/30/2013	02:37:27pm	1186175.254000	2469861.857000
CHIMNEY ROCK MINE	0	19.8	0	0	1000	51	10.56	7/30/2013	02:40:32pm	1186120.766000	2469873.509000
CHIMNEY ROCK MINE	0	20.2	0	0	0	52	11.11	7/30/2013	02:43:43pm	1186068.247000	2469879.192000
CHIMNEY ROCK MINE	0	18.9	0	0	7000	54	12.22	7/30/2013	02:47:45pm	1186018.562000	2469874.687000
CHIMNEY ROCK MINE	0	19.6	0	0	2000	50	10.00	7/30/2013	02:50:20pm	1185976.619000	2469876.690000
CHIMNEY ROCK MINE	0	18.8	0	0	8000	50	10.00	7/30/2013	02:52:57pm	1185914.636000	2469876.876000
CHIMNEY ROCK MINE	0	19.6	0	0	3000	51	10.56	7/30/2013	02:55:29pm	1185870.027000	2469878.802000
CHIMNEY ROCK MINE	0	19.3	0	0	4000	49	9.44	7/30/2013	02:58:18pm	1185823.616000	2469882.024000
CHIMNEY ROCK MINE	0	19.8	0	0	2000	50	10.00	7/30/2013	03:00:52pm	1185769.145000	2469880.446000
CHIMNEY ROCK MINE	0	19.4	0	0	3000	51	10.56	7/30/2013	03:03:14pm	1185716.886000	2469883.506000
CHIMNEY ROCK MINE	0	17.0	0	0	14000	59	15.00	8/6/2013	01:11:41pm	1185869.219000	2469783.463000
CHIMNEY ROCK MINE	0	20.0	0	0	1000	55	12.78	8/6/2013	12:23:17pm	1186273.156000	2469724.752000
COLUMBINE MINE	0	20.3	0	0	5000	39	3.89	8/7/2013	09:56:35am	1229435.796000	2432036.002000
COLUMBINE MINE	0	19.6	0	0	10000	42	5.56	8/7/2013	09:59:58am	1229434.144000	2432101.731000
COLUMBINE MINE	0	19.7	0	2	3000	42	5.56	8/7/2013	10:02:21am	1229438.712000	2432151.290000
COLUMBINE MINE	0	20.3	0	0	4000	40	4.44	8/7/2013	10:16:43am	1229428.893000	2432258.827000
COLUMBINE MINE	0	19.8	0	2	7000	42	5.56	8/7/2013	10:19:44am	1229420.836000	2432305.203000
COLUMBINE MINE	0	20.4	0	0	2000	41	5.00	8/7/2013	10:22:51am	1229419.330000	2432360.330000
COLUMBINE MINE	0	20.2	0	0	3000	41	5.00	8/7/2013	10:25:47am	1229431.118000	2432406.690000
COLUMBINE MINE	0	19.9	0	1	4000	43	6.11	8/7/2013	10:28:11am	1229424.895000	2432453.825000
COLUMBINE MINE	0	19.4	0	2	5000	41	5.00	8/7/2013	10:32:00am	1229432.330000	2432504.582000
COLUMBINE MINE	0	20.1	0	0	2000	42	5.56	8/7/2013	10:35:08am	1229380.048000	2432492.176000
COLUMBINE MINE	0	19.7	0	0	6000	44	6.67	8/7/2013	10:37:13am	1229384.805000	2432455.894000
COLUMBINE MINE	0	20.3	0	0	5000	44	6.67	8/7/2013	10:39:58am	1229376.783000	2432403.986000
COLUMBINE MINE	0	20.5	0	0	3000	43	6.11	8/7/2013	10:50:09am	1229385.558000	2432362.868000
COLUMBINE MINE	0	20.4	0	0	3000	42	5.56	8/7/2013	10:53:04am	1229382.737000	2432310.560000
COLUMBINE MINE	0	20.5	0	0	3000	42	5.56	8/7/2013	10:55:51am	1229389.529000	2432269.390000
COLUMBINE MINE	0	20.5	0	0	3000	44	6.67	8/7/2013	10:59:33am	1229391.390000	2432207.826000
COLUMBINE MINE	0	19.7	0	0	10000	45	7.22	8/7/2013	11:03:13am	1229387.408000	2432153.319000
COLUMBINE MINE	0	20.0	0	0	7000	46	7.78	8/7/2013	11:06:09am	1229380.806000	2432100.064000
COLUMBINE MINE	0	20.1	0	0	6000	46	7.78	8/7/2013	11:08:50am	1229377.793000	2432042.542000
COLUMBINE MINE	0	20.0	0	0	7000	46	7.78	8/7/2013	11:11:45am	1229319.553000	2432050.960000
COLUMBINE MINE	0	19.4	0	0	9000	42	5.56	8/7/2013	11:15:04am	1229337.261000	2432112.677000
COLUMBINE MINE	0	20.4	0	0	4000	41	5.00	8/7/2013	11:24:27am	1229326.751000	2432199.547000
COLUMBINE MINE	0	20.5	0	0	3000	47	8.33	8/7/2013	11:27:02am	1229327.984000	2432260.815000
COLUMBINE MINE	0	20.5	0	0	3000	43	6.11	8/7/2013	11:30:09am	1229340.594000	2432316.837000
COLUMBINE MINE	0	20.2	0	0	6000	45	7.22	8/7/2013	11:33:41am	1229322.591000	2432341.854000
COLUMBINE MINE	0	20.6	0	0	2000	45	7.22	8/7/2013	11:38:26am	1229336.111000	2432414.275000
COLUMBINE MINE	0	20.6	0	0	2000	48	8.89	8/7/2013	11:42:03am	1229326.641000	2432452.940000
COLUMBINE MINE	0	20.4	0	0	3000	45	7.22	8/7/2013	11:44:40am	1229330.572000	2432513.628000
COLUMBINE MINE	0	20.4	0	0	2000	44	6.67	8/7/2013	11:48:00am	1229277.685000	2432515.827000
COLUMBINE MINE	0	20.3	0	0	2000	46	7.78	8/7/2013	11:53:27am	1229284.503000	2432406.429000
COLUMBINE MINE	0	20.3	0	0	3000	48	8.89	8/7/2013	11:55:48am	1229285.406000	2432362.879000
COLUMBINE MINE	0	19.0	0	0	11000	39	3.89	8/7/2013	11:59:24am	1229270.976000	2432307.931000
COLUMBINE MINE	0	20.2	0	0	3000	45	7.22	8/7/2013	12:03:14pm	1229282.076000	2432264.633000
COLUMBINE MINE	0	20.5	0	0	2000	48	8.89	8/7/2013	12:06:22pm	1229289.680000	2432219.360000
COLUMBINE MINE	0	20.1	0	0	4000	46	7.78	8/7/2013	12:09:04pm	1229297.773000	2432165.966000
COLUMBINE MINE	0	20.0	0	0	5000	47	8.33	8/7/2013	12:11:20pm	1229283.546000	2432124.260000
COLUMBINE MINE	0	19.8	0	0	7000	48	8.89	8/7/2013	12:13:51pm	1229289.506000	2432064.539000
COLUMBINE MINE	0	19.7	0	0	5000	44	6.67	8/7/2013	12:17:23pm	1229237.767000	2432056.215000
COLUMBINE MINE	0	19.9	0	0	4000	42	5.56	8/7/2013	12:20:12pm	1229238.596000	2432104.024000
COLUMBINE MINE	0	19.5	0	0	5000	43	6.11	8/7/2013	12:28:15pm	1229229.054000	2432264.829000
COLUMBINE MINE	0	19.9	0	0	4000	42	5.56	8/7/2013	12:30:56pm	1229232.927000	2432315.077000
COLUMBINE MINE	0	19.9	0	0	5000	42	5.56	8/7/2013	12:33:34pm	1229229.385000	2432361.809000
COLUMBINE MINE	0	19.5	0	0	7000	39	3.89	8/7/2013	12:36:16pm	1229222.873000	2432407.100000
COLUMBINE MINE	0	18.7	0	0	15000	39	3.89	8/7/2013	12:39:11pm	1229210.620000	2432466.077000
COLUMBINE MINE	0	19.7	0	0	4000	42	5.56	8/7/2013	12:43:53pm	1229176.298000	2432516.249000
COLUMBINE MINE	0	20.3	0	0	2000	48	8.89	8/7/2013	12:46:41pm	1229232.129000	2432523.072000
COLUMBINE MINE	0	19.3	0	0	7000	43	6.11	8/7/2013	12:49:12pm	1229160.736000	2432524.319000
COLUMBINE MINE	0	20.1	0	0	6000	47	8.33	8/7/2013	12:51:42pm	1229181.295000	2432472.618000
COLUMBINE MINE	0	20.0	0	0	4000	42	5.56	8/7/2013	12:59:09pm	1229188.943000	2432367.708000
COLUMBINE MINE	0	20.2	0	0	3000	43	6.11	8/7/2013	01:04:02pm	1229183.246000	2432318.125000
COLUMBINE MINE	0	19.9	0	0	5000	40	4.44	8/7/2013	01:07:45pm	1229181.568000	2432266.642000

LOCATION	Sub_CH_4_Co	Sub_O_2_Con	Sub_H_2S_Co	Sub_CO_Con	CO_2_PPM	TEMP_F	TEMP_C	GPS_Date	GPS_Time	Northing	Easting
COLUMBINE MINE	0	20.3	0	0	3000	41	5.00	8/7/2013	01:10:40pm	1229162.994000	2432222.506000
COLUMBINE MINE	0	19.9	0	0	5000	41	5.00	8/7/2013	01:14:44pm	1229176.620000	2432162.271000
COLUMBINE MINE	0	20.1	0	0	1000	38	3.33	8/7/2013	01:19:11pm	1229175.035000	2432123.467000
COLUMBINE MINE	0	19.8	0	0	7000	40	4.44	8/7/2013	01:22:05pm	1229187.385000	2432061.830000
COLUMBINE MINE	0	19.9	0	0	4000	39	3.89	8/7/2013	01:25:08pm	1229133.812000	2432066.977000
COLUMBINE MINE	0	20.0	0	0	3000	40	4.44	8/7/2013	01:29:10pm	1229131.009000	2432114.288000
COLUMBINE MINE	0	20.1	0	0	4000	40	4.44	8/7/2013	01:32:40pm	1229146.149000	2432179.357000
COLUMBINE MINE	0	20.4	0	0	2000	39	3.89	8/7/2013	01:35:12pm	1229137.049000	2432206.673000
COLUMBINE MINE	0	20.4	0	0	2000	38	3.33	8/7/2013	01:38:25pm	1229119.573000	2432267.932000
COLUMBINE MINE	0	19.9	0	0	5000	40	4.44	8/7/2013	01:41:32pm	1229128.358000	2432310.020000
COLUMBINE MINE	0	20.3	0	0	3000	38	3.33	8/7/2013	01:44:35pm	1229118.113000	2432352.787000
COLUMBINE MINE	0	20.5	0	0	2000	40	4.44	8/7/2013	01:47:43pm	1229085.855000	2432374.928000
COLUMBINE MINE	0	20.4	0	0	2000	38	3.33	8/7/2013	01:50:27pm	1229070.782000	2432407.626000
COLUMBINE MINE	0	20.4	0	0	2000	39	3.89	8/7/2013	01:57:00pm	1229094.401000	2432461.970000
COLUMBINE MINE	0	20.1	0	0	5000	38	3.33	8/7/2013	02:00:13pm	1229112.305000	2432472.321000
COLUMBINE MINE	0	20.0	0	0	5000	39	3.89	8/7/2013	02:08:31pm	1229043.752000	2432540.830000
COLUMBINE MINE	0	20.5	0	0	3000	40	4.44	8/7/2013	02:11:26pm	1229089.422000	2432521.616000
COLUMBINE MINE	0	20.6	0	0	2000	38	3.33	8/7/2013	02:17:38pm	1228968.016000	2432505.206000
COLUMBINE MINE	0	20.5	0	0	3000	38	3.33	8/7/2013	02:19:13pm	1228993.235000	2432465.959000
COLUMBINE MINE	0	20.4	0	0	3000	38	3.33	8/7/2013	02:22:40pm	1229001.106000	2432416.587000
COLUMBINE MINE	0	20.6	0	0	2000	37	2.78	8/7/2013	02:25:17pm	1229028.860000	2432410.325000
COLUMBINE MINE	0	20.2	0	0	4000	38	3.33	8/7/2013	02:28:43pm	1229067.127000	2432413.962000
COLUMBINE MINE	0	20.5	0	0	3000	40	4.44	8/7/2013	02:32:06pm	1229019.782000	2432369.020000
COLUMBINE MINE	0	20.4	0	0	3000	39	3.89	8/7/2013	02:34:42pm	1228992.110000	2432359.202000
COLUMBINE MINE	0	20.6	0	0	1000	39	3.89	8/7/2013	02:37:29pm	1228992.462000	2432308.487000
COLUMBINE MINE	0	20.6	0	0	2000	40	4.44	8/7/2013	02:40:02pm	1229013.711000	2432303.260000
COLUMBINE MINE	0	20.3	0	0	4000	39	3.89	8/7/2013	02:42:21pm	1229062.745000	2432317.367000
COLUMBINE MINE	0	20.6	0	0	2000	39	3.89	8/7/2013	02:44:28pm	1229069.871000	2432268.228000
COLUMBINE MINE	0	20.5	0	0	3000	39	3.89	8/7/2013	02:46:26pm	1229024.424000	2432271.455000
COLUMBINE MINE	0	20.4	0	0	4000	42	5.56	8/7/2013	02:48:39pm	1228974.752000	2432262.104000
COLUMBINE MINE	0	20.5	0	0	3000	39	3.89	8/7/2013	02:50:54pm	1228979.674000	2432234.900000
COLUMBINE MINE	0	20.3	0	0	5000	41	5.00	8/7/2013	02:53:36pm	1228976.216000	2432160.809000
COLUMBINE MINE	0	20.5	0	0	4000	38	3.33	8/7/2013	02:55:59pm	1228974.975000	2432106.961000
COLUMBINE MINE	0	20.5	0	0	4000	39	3.89	8/7/2013	02:58:11pm	1228991.298000	2432052.659000
COLUMBINE MINE	0	19.9	0	0	7000	43	6.11	8/7/2013	03:00:54pm	1229048.412000	2432070.630000
COLUMBINE MINE	0	20.5	0	0	4000	37	2.78	8/7/2013	03:03:10pm	1229052.602000	2432108.736000
COLUMBINE MINE	0	20.3	0	0	5000	40	4.44	8/7/2013	03:05:07pm	1229025.586000	2432125.758000
COLUMBINE MINE	0	20.3	0	0	5000	39	3.89	8/7/2013	03:09:06pm	1229025.231000	2432207.993000
COLUMBINE MINE	0	20.4	0	0	5000	38	3.33	8/7/2013	03:11:08pm	1229083.487000	2432220.737000
COLUMBINE MINE	0	20.7	0	0	2000	40	4.44	8/7/2013	03:13:10pm	1229075.572000	2432135.098000
COLUMBINE MINE	0	20.7	0	0	1000	39	3.89	8/7/2013	03:16:10pm	1229084.025000	2432049.248000
COLUMBINE MINE	0	19.0	0	0	10000	48	8.89	8/7/2013	12:23:34pm	1229240.431000	2432155.830000
COLUMBINE MINE	0	20.0	0	0	4000	40	4.44	8/7/2013	10:05:49am	1229433.338000	2432200.544000
COLUMBINE MINE	0	20.0	0	0	2000	47	8.33	8/7/2013	11:50:31am	1229269.959000	2432461.067000
COLUMBINE MINE	0	20.0	0	0	4000	40	4.44	8/7/2013	12:26:11pm	1229231.181000	2432208.170000
COLUMBINE MINE	0	20.0	0	0	4000	46	7.78	8/7/2013	12:55:48pm	1229189.604000	2432423.649000
COLUMBINE MINE	0	21.0	0	0	2000	40	4.44	8/7/2013	03:07:25pm	1229017.661000	2432169.332000
COLUMBINE MINE	13000	20.2	0	0	4000	43	6.11	8/7/2013	11:17:58am	1229345.270000	2432152.316000
STOLLSTEIMER CREEK SITE	0	20.4	0	0	4000	50	10.00	7/29/2013	09:53:40am	1185971.519000	2471642.257000
STOLLSTEIMER CREEK SITE	0	20.1	0	0	2000	48	8.89	7/29/2013	09:58:39am	1185922.351000	2471638.950000
STOLLSTEIMER CREEK SITE	0	19.3	0	0	2000	49	9.44	7/29/2013	10:02:39am	1185866.072000	2471624.612000
STOLLSTEIMER CREEK SITE	0	20.2	0	0	2000	50	10.00	7/29/2013	10:06:54am	1185807.862000	2471613.993000
STOLLSTEIMER CREEK SITE	0	19.1	0	0	3000	49	9.44	7/29/2013	10:11:51am	1185753.813000	2471633.440000
STOLLSTEIMER CREEK SITE	0	20.1	0	0	1000	48	8.89	7/29/2013	10:14:56am	1185725.751000	2471613.473000
STOLLSTEIMER CREEK SITE	0	19.3	0	0	1000	50	10.00	7/29/2013	10:18:27am	1185729.256000	2471683.620000
STOLLSTEIMER CREEK SITE	0	19.8	0	0	5000	52	11.11	7/29/2013	10:22:09am	1185764.758000	2471676.960000
STOLLSTEIMER CREEK SITE	0	20.2	0	0	2000	53	11.67	7/29/2013	10:25:38am	1185813.433000	2471678.823000
STOLLSTEIMER CREEK SITE	0	18.9	0	1	1000	49	9.44	7/29/2013	10:29:08am	1185876.842000	2471699.035000
STOLLSTEIMER CREEK SITE	0	19.2	0	1	2000	49	9.44	7/29/2013	10:32:12am	1185914.652000	2471693.283000
STOLLSTEIMER CREEK SITE	0	20.1	0	1	2000	54	12.22	7/29/2013	10:35:58am	1185969.179000	2471683.768000
STOLLSTEIMER CREEK SITE	0	19.2	0	2	2000	53	11.67	7/29/2013	10:38:57am	1186020.187000	2471677.711000
STOLLSTEIMER CREEK SITE	0	20.2	0	0	1000	53	11.67	7/29/2013	10:42:51am	1186083.775000	2471681.431000
STOLLSTEIMER CREEK SITE	0	20.3	0	0	1000	52	11.11	7/29/2013	10:48:47am	1186128.202000	2471672.574000
STOLLSTEIMER CREEK SITE	0	19.6	0	0	2000	49	9.44	7/29/2013	10:54:18am	1186166.834000	2471673.543000
STOLLSTEIMER CREEK SITE	0	20.2	0	0	1000	51	10.56	7/29/2013	10:58:05am	1186163.840000	2471740.843000
STOLLSTEIMER CREEK SITE	0	19.7	0	2	1000	53	11.67	7/29/2013	11:02:46am	1186124.034000	2471736.750000
STOLLSTEIMER CREEK SITE	0	19.4	0	0	0	52	11.11	7/29/2013	11:07:30am	1186077.739000	2471727.584000
STOLLSTEIMER CREEK SITE	0	20.1	0	0	1000	54	12.22	7/29/2013	11:12:33am	1186028.175000	2471731.525000
STOLLSTEIMER CREEK SITE	0	20.4	0	0	1000	52	11.11	7/29/2013	11:16:25am	1185981.864000	2471721.974000
STOLLSTEIMER CREEK SITE	0	19.4	0	0	0	50	10.00	7/29/2013	11:21:13am	1185936.358000	2471728.160000
STOLLSTEIMER CREEK SITE	0	20.4	0	1	1000	54	12.22	7/29/2013	11:26:04am	1185873.891000	2471717.252000
STOLLSTEIMER CREEK SITE	0	19.8	0	0	0	51	10.56	7/29/2013	11:32:33am	1185814.511000	2471724.423000
STOLLSTEIMER CREEK SITE	0	19.2	0	0	3000	58	14.44	7/29/2013	11:35:39am	1185768.285000	2471731.141000
STOLLSTEIMER CREEK SITE	0	20.2	0	0	1000	54	12.22	7/29/2013	11:39:36am	1185721.249000	2471731.142000
STOLLSTEIMER CREEK SITE	0	20.3	0	0	1000	53	11.67	7/29/2013	11:43:57am	1185719.583000	2471777.892000
STOLLSTEIMER CREEK SITE	0	19.7	0	0	3000	53	11.67	7/29/2013	11:46:37am	1185758.114000	2471787.222000
STOLLSTEIMER CREEK SITE	0	20.4	0	0	0	56	13.33	7/29/2013	11:49:59am	1185806.135000	2471786.532000
STOLLSTEIMER CREEK SITE	0	19.7	0	1	4000	52	11.11	7/29/2013	11:54:47am	1185871.102000	2471785.958000
STOLLSTEIMER CREEK SITE	0	20.1	0	0	2000	55	12.78	7/29/2013	11:58:38am	1185916.409000	2471783.653000
STOLLSTEIMER CREEK SITE	0	19.9	0	4	1000	53	11.67	7/29/2013	12:04:50pm	1185971.701000	2471763.579000
STOLLSTEIMER CREEK SITE	0	20.0	0	2	1000	56	13.33	7/29/2013	12:10:24pm	1186016.639000	2471772.949000
STOLLSTEIMER CREEK SITE	0	19.1	0	1	1000	51	10.56	7/29/2013	12:14:49pm	1186065.891000	2471771.073000
STOLLSTEIMER CREEK SITE	0	19.8	0	0	0	56	13.33	7/29/2013	12:20:16pm	1186131.285000	2471781.081000
STOLLSTEIMER CREEK SITE	0	18.8	0	2	3000	51	10.56	7/29/2013	12:24:01pm	1186176.752000	2471777.110000
STOLLSTEIMER CREEK SITE	0	18.8	0	1	3000	53	11.67	7/29/2013	12:28:40pm	1186178.558000	2471836.108000
STOLLSTEIMER CREEK SITE	0	19.1	0	2	1000	56	13.33	7/29/2013	12:32:24pm	1186131.427000	2471832.308000
STOLLSTEIMER CREEK SITE	0	18.7	0	0	2000	58	14.44	7/29/2013	12:35:54pm	1186134.615000	2471880.058000
STOLLSTEIMER CREEK SITE	0	19.6	0	0	0	56	13.33	7/29/2013	12:38:44pm	1186178.999000	2471883.220000
STOLLSTEIMER CREEK SITE	0	17.9	0	1	1000	54	12.22	7/29/2013	12:41:27pm	1186173.096000	2471927.406000
STOLLSTEIMER CREEK SITE	0	18.8	0	0	1000	53	11.67	7/29/2013	12:44:57pm	1186184.233000	2471990.963000
STOLLSTEIMER CREEK SITE	0	16.5	0	0	1000	49	9.44	7/29/2013	12:48:20pm	1186177.371000	2472038.663000
STOLLSTEIMER CREEK SITE	0	17.6	0	2	1000	54	12.22	7/29/2013	12:51:08pm	1186134.844000	2472034.526000
STOLLSTEIMER CREEK SITE	0	19.9	0	0	1000	54	12.22	7/29/2013	12:54:48pm	1186116.682000	2471991.547000
STOLLSTEIMER CREEK SITE	0	18.6	0	0	0	52	11.11	7/29/2013	12:58:48pm	1186124.386000	2471938.417000
STOLLSTEIMER CREEK SITE	0	18.7	0	1	1000	55	12.78	7/29/2013	01:03:38pm	1186112.314000	2471883.541000
STOLLSTEIMER CREEK SITE	0	17.5	0	2	1000	56	13.33	7/29/2013	01:08:55pm	1186064.075000	2471826.243000
STOLLSTEIMER CREEK SITE	0	18.6	0	1	1000	52	11.11	7/29/2013	01:12:10pm	1186078.828000	2471881.445000
STOLLSTEIMER CREEK SITE	0	18.9	0	0	0	52	11.11	7/29/2013	01:16:28pm	1186072.606000	2471925.161000

APPENDIX I

LOCATION	Sub_CH_4_Co	Sub_O_2_Con	Sub_H_2S_Co	Sub_CO_Con	CO_2_PPM	TEMP_F	TEMP_C	GPS_Date	GPS_Time	Northing	Easting
STOLLSTEIMER CREEK SITE	0	19.6	0	0	1000	51	10.56	7/29/2013	01:21:09pm	1186080.289000	2471997.123000
STOLLSTEIMER CREEK SITE	0	18.9	0	0	1000	52	11.11	7/29/2013	01:25:32pm	1186080.021000	2472027.397000
STOLLSTEIMER CREEK SITE	0	19.9	0	0	1000	54	12.22	7/29/2013	01:29:12pm	1186035.386000	2472026.710000
STOLLSTEIMER CREEK SITE	0	20.6	0	1	2000	52	11.11	7/29/2013	01:40:14pm	1186029.935000	2471979.485000
STOLLSTEIMER CREEK SITE	0	20.1	0	1	1000	51	10.56	7/29/2013	01:44:33pm	1186021.056000	2471928.529000
STOLLSTEIMER CREEK SITE	0	19.8	0	0	2000	55	12.78	7/29/2013	01:47:31pm	1186049.975000	2471881.397000
STOLLSTEIMER CREEK SITE	0	20.4	0	0	0	55	12.78	7/29/2013	01:50:17pm	1186015.651000	2471828.789000
STOLLSTEIMER CREEK SITE	0	20.1	0	1	1000	52	11.11	7/29/2013	01:53:09pm	1185964.109000	2471820.748000
STOLLSTEIMER CREEK SITE	0	20.0	0	0	0	56	13.33	7/29/2013	01:56:44pm	1185919.496000	2471832.624000
STOLLSTEIMER CREEK SITE	0	19.8	0	0	2000	52	11.11	7/29/2013	02:01:07pm	1185871.973000	2471832.465000
STOLLSTEIMER CREEK SITE	0	20.5	0	0	0	55	12.78	7/29/2013	02:04:48pm	1185824.662000	2471822.231000
STOLLSTEIMER CREEK SITE	0	19.7	0	2	2000	55	12.78	7/29/2013	02:08:44pm	1185761.945000	2471837.925000
STOLLSTEIMER CREEK SITE	0	20.1	0	0	2000	57	13.89	7/29/2013	02:12:23pm	1185729.992000	2471821.818000
STOLLSTEIMER CREEK SITE	0	20.6	0	0	0	52	11.11	7/29/2013	02:15:32pm	1185720.162000	2471876.838000
STOLLSTEIMER CREEK SITE	0	19.7	0	1	3000	50	10.00	7/29/2013	02:19:15pm	1185765.223000	2471882.418000
STOLLSTEIMER CREEK SITE	0	20.6	0	1	0	53	11.67	7/29/2013	02:22:12pm	1185812.826000	2471887.289000
STOLLSTEIMER CREEK SITE	0	20.4	0	0	1000	49	9.44	7/29/2013	02:25:20pm	1185844.938000	2471895.801000
STOLLSTEIMER CREEK SITE	0	20.6	0	0	0	54	12.22	7/29/2013	02:29:29pm	1185884.415000	2471889.566000
STOLLSTEIMER CREEK SITE	0	20.3	0	0	0	55	12.78	7/29/2013	02:32:32pm	1185914.160000	2471886.428000
STOLLSTEIMER CREEK SITE	0	19.5	0	1	2000	57	13.89	7/29/2013	02:35:54pm	1185963.769000	2471882.072000
STOLLSTEIMER CREEK SITE	0	20.4	0	0	0	58	14.44	7/29/2013	02:38:51pm	1186006.813000	2471874.361000
STOLLSTEIMER CREEK SITE	0	19.0	0	0	0	60	15.56	7/29/2013	02:42:46pm	1186018.697000	2471880.170000
STOLLSTEIMER CREEK SITE	0	18.9	0	3	1000	50	10.00	7/29/2013	02:46:55pm	1185964.083000	2471942.568000
STOLLSTEIMER CREEK SITE	0	19.6	0	1	0	53	11.67	7/29/2013	02:51:05pm	1185966.775000	2471983.402000
STOLLSTEIMER CREEK SITE	0	20.3	0	0	1000	52	11.11	7/29/2013	02:54:26pm	1185967.317000	2472033.627000
STOLLSTEIMER CREEK SITE	0	19.9	0	0	1000	58	14.44	7/29/2013	02:57:24pm	1185915.190000	2472017.758000
STOLLSTEIMER CREEK SITE	0	20.1	0	1	0	51	10.56	7/29/2013	03:01:05pm	1185914.748000	2471964.123000
STOLLSTEIMER CREEK SITE	0	19.8	0	0	0	54	12.22	7/29/2013	03:04:45pm	1185908.565000	2471912.184000
STOLLSTEIMER CREEK SITE	0	19.4	0	1	0	53	11.67	7/29/2013	03:09:42pm	1185868.103000	2471946.466000
STOLLSTEIMER CREEK SITE	0	20.0	0	0	0	53	11.67	7/29/2013	03:13:33pm	1185866.464000	2471989.151000
STOLLSTEIMER CREEK SITE	0	18.7	0	1	3000	53	11.67	7/29/2013	03:16:58pm	1185868.445000	2472029.014000
STOLLSTEIMER CREEK SITE	0	20.3	0	0	1000	56	13.33	7/29/2013	03:20:48pm	1185812.421000	2472014.090000
STOLLSTEIMER CREEK SITE	0	18.9	0	5	1000	55	12.78	7/29/2013	03:23:49pm	1185820.813000	2471989.628000
STOLLSTEIMER CREEK SITE	0	19.7	2	0	0	52	11.11	7/29/2013	03:27:14pm	1185798.542000	2471915.452000
STOLLSTEIMER CREEK SITE	0	20.1	0	0	0	56	13.33	7/29/2013	03:30:30pm	1185753.807000	2471925.710000
STOLLSTEIMER CREEK SITE	0	19.6	0	0	2000	55	12.78	7/29/2013	03:35:27pm	1185770.590000	2471977.515000
STOLLSTEIMER CREEK SITE	0	19.1	0	2	1000	54	12.22	7/29/2013	03:38:40pm	1185766.053000	2472017.735000
STOLLSTEIMER CREEK SITE	0	19.7	0	2	1000	55	12.78	7/29/2013	03:44:21pm	1185706.923000	2472026.028000
STOLLSTEIMER CREEK SITE	0	19.6	0	0	0	53	11.67	7/29/2013	03:47:59pm	1185713.487000	2471982.831000
STOLLSTEIMER CREEK SITE	0	19.5	0	0	1000	56	13.33	7/29/2013	03:53:05pm	1185725.195000	2471935.659000
STOLLSTEIMER CREEK SITE	0	19.7	0	4	0	49	9.44	7/24/2013	02:08:14pm	1186065.209000	2471586.332000
STOLLSTEIMER CREEK SITE	0	19.7	0	0	0	50	10.00	7/24/2013	02:13:54pm	1186128.933000	2471585.947000
STOLLSTEIMER CREEK SITE	0	19.2	0	0	5000	54	12.22	7/24/2013	02:18:43pm	1186164.680000	2471581.823000
STOLLSTEIMER CREEK SITE	0	19.8	0	0	1000	51	10.56	7/24/2013	02:23:58pm	1186186.379000	2471640.540000
STOLLSTEIMER CREEK SITE	0	19.7	0	2	1000	51	10.56	7/24/2013	02:28:58pm	1186124.802000	2471638.628000
STOLLSTEIMER CREEK SITE	0	19.7	0	0	2000	55	12.78	7/24/2013	02:34:10pm	1186070.624000	2471619.054000
STOLLSTEIMER CREEK SITE	0	19.8	0	0	1000	54	12.22	7/24/2013	02:38:22pm	1186025.488000	2471610.772000
STOLLSTEIMER CREEK SITE	0	19.7	0	0	0	53	11.67	7/24/2013	02:43:37pm	1186023.124000	2471583.901000
STOLLSTEIMER CREEK SITE	0	19.4	0	2	3000	47	8.33	7/26/2013	12:02:58pm	1185731.959000	2471589.904000
STOLLSTEIMER CREEK SITE	0	19.4	0	0	3000	51	10.56	7/26/2013	12:10:17pm	1185776.644000	2471571.171000
STOLLSTEIMER CREEK SITE	0	19.2	0	2	5000	51	10.56	7/26/2013	12:17:09pm	1185823.863000	2471576.070000
STOLLSTEIMER CREEK SITE	0	19.2	0	1	3000	47	8.33	7/26/2013	12:22:51pm	1185881.319000	2471577.049000
STOLLSTEIMER CREEK SITE	0	18.9	0	0	1000	54	12.22	7/26/2013	12:29:33pm	1185915.515000	2471578.150000
STOLLSTEIMER CREEK SITE	0	18.4	0	0	2000	56	13.33	7/26/2013	12:48:28pm	1185975.079000	2471582.519000
TRIPLE S MINE	0	20.0	0	0	3000	49	9.44	7/23/2013	09:25:04am	1235011.905000	2425163.400000
TRIPLE S MINE	0	19.4	0	0	5000	49	9.44	7/23/2013	09:33:22am	1235070.103000	2425175.396000
TRIPLE S MINE	0	19.9	0	0	2000	50	10.00	7/23/2013	09:37:48am	1235103.510000	2425173.529000
TRIPLE S MINE	0	19.8	0	0	2000	46	7.78	7/23/2013	09:42:23am	1235158.501000	2425176.067000
TRIPLE S MINE	0	19.1	0	2	1000	44	6.67	7/23/2013	09:46:26am	1235194.272000	2425182.213000
TRIPLE S MINE	0	19.7	0	2	2000	43	6.11	7/23/2013	09:52:02am	1235253.878000	2425174.058000
TRIPLE S MINE	0	19.6	0	0	5000	53	11.67	7/23/2013	10:01:25am	1235354.741000	2425162.305000
TRIPLE S MINE	0	19.5	0	0	2000	52	11.11	7/23/2013	10:05:49am	1235407.233000	2425169.829000
TRIPLE S MINE	0	19.3	0	0	1000	48	8.89	7/23/2013	10:11:53am	1235461.015000	2425174.502000
TRIPLE S MINE	0	19.7	0	0	3000	45	7.22	7/23/2013	10:17:05am	1235448.572000	2425226.403000
TRIPLE S MINE	0	19.6	0	1	4000	44	6.67	7/23/2013	10:22:14am	1235408.402000	2425237.755000
TRIPLE S MINE	0	19.5	0	0	1000	46	7.78	7/23/2013	10:26:16am	1235355.393000	2425222.933000
TRIPLE S MINE	0	19.8	0	2	3000	44	6.67	7/23/2013	10:30:53am	1235289.766000	2425223.407000
TRIPLE S MINE	0	19.5	0	0	5000	50	10.00	7/23/2013	10:35:44am	1235256.747000	2425229.738000
TRIPLE S MINE	0	19.5	0	1	1000	47	8.33	7/23/2013	10:40:44am	1235199.030000	2425221.639000
TRIPLE S MINE	0	19.4	0	1	2000	49	9.44	7/23/2013	10:44:48am	1235140.298000	2425222.901000
TRIPLE S MINE	0	19.3	0	41	4000	51	10.56	7/23/2013	10:51:20am	1235101.162000	2425214.395000
TRIPLE S MINE	0	19.4	0	4	3000	51	10.56	7/23/2013	10:58:12am	1235037.022000	2425222.605000
TRIPLE S MINE	0	19.4	0	9	1000	50	10.00	7/23/2013	11:04:05am	1234991.970000	2425223.706000
TRIPLE S MINE	0	19.6	0	13	4000	51	10.56	7/23/2013	11:08:11am	1234991.124000	2425271.770000
TRIPLE S MINE	0	19.8	0	0	0	49	9.44	7/23/2013	11:12:46am	1235051.175000	2425272.533000
TRIPLE S MINE	0	19.6	0	1	2000	51	10.56	7/23/2013	11:16:44am	1235094.433000	2425281.844000
TRIPLE S MINE	0	19.7	0	14	2000	47	8.33	7/23/2013	11:21:06am	1235157.984000	2425271.758000
TRIPLE S MINE	0	19.8	0	1	1000	45	7.22	7/23/2013	11:25:55am	1235196.637000	2425276.598000
TRIPLE S MINE	0	19.7	0	1	4000	49	9.44	7/23/2013	11:29:36am	1235240.107000	2425278.594000
TRIPLE S MINE	0	19.8	0	0	2000	50	10.00	7/23/2013	11:33:52am	1235295.586000	2425268.458000
TRIPLE S MINE	0	19.6	0	0	3000	48	8.89	7/23/2013	11:38:43am	1235362.190000	2425275.767000
TRIPLE S MINE	0	19.8	0	1	2000	49	9.44	7/23/2013	11:43:20am	1235405.155000	2425275.152000
TRIPLE S MINE	0	19.5	0	0	4000	48	8.89	7/23/2013	11:47:30am	1235447.798000	2425275.469000
TRIPLE S MINE	0	19.2	0	0	5000	51	10.56	7/23/2013	11:59:35am	1235455.292000	2425326.056000
TRIPLE S MINE	0	19.4	0	0	5000	49	9.44	7/23/2013	12:04:29pm	1235412.996000	2425318.341000
TRIPLE S MINE	0	19.6	0	0	4000	50	10.00	7/23/2013	12:09:59pm	1235365.093000	2425323.213000
TRIPLE S MINE	0	19.4	0	4	5000	48	8.89	7/23/2013	12:12:19pm	1235301.922000	2425303.352000
TRIPLE S MINE	0	19.6	0	2	2000	51	10.56	7/23/2013	12:17:55pm	1235265.167000	2425327.810000
TRIPLE S MINE	0	19.6	0	8	1000	50	10.00	7/23/2013	12:21:12pm	1235219.344000	2425327.228000
TRIPLE S MINE	0	19.6	0	15	0	51	10.56	7/23/2013	12:28:35pm	1235148.458000	2425299.852000
TRIPLE S MINE	0	19.2	0	0	2000	54	12.22	7/23/2013	12:33:38pm	1235106.473000	2425315.858000
TRIPLE S MINE	0	19.7	0	3	4000	53	11.67	7/23/2013	12:37:25pm	1235054.528000	2425320.036000
TRIPLE S MINE	0	19.1	0	4	4000	52	11.11	7/23/2013	12:40:54pm	1235045.179000	2425376.239000
TRIPLE S MINE	0	19.2	0	1	2000	54	12.22	7/23/2013	12:45:00pm	1235110.584000	2425365.095000
TRIPLE S MINE	0	19.3	0	1	1000	49	9.44	7/23/2013	12:48:07pm	1235164.992000	2425382.810000
TRIPLE S MINE	0	19.2	0	5	2000	52	11.11	7/23/2013	12:53:41pm	1235201.499000	2425383.814000
TRIPLE S MINE	0	18.9	0	0	3000	52	11.11	7/23/2013	12:57:38pm	1235254.695000	2425362.026000
TRIPLE S MINE	0	18.8	0	6	3000	47	8.33	7/23/2013	01:01:19pm	1235323.812000	2425385.855000

APPENDIX I

LOCATION	Sub_CH_4_Co	Sub_O_2_Con	Sub_H_2S_Co	Sub_CO_Con	CO_2_PPM	TEMP_F	TEMP_C	GPS_Date	GPS_Time	Northing	Easting
TRIPLE S MINE	0	18.7	0	13	4000	50	10.00	7/23/2013	01:05:01pm	1235356.549000	2425364.797000
TRIPLE S MINE	0	18.5	0	0	4000	54	12.22	7/23/2013	01:08:13pm	1235414.289000	2425364.186000
TRIPLE S MINE	0	18.3	0	0	5000	52	11.11	7/23/2013	01:11:41pm	1235466.271000	2425376.780000
TRIPLE S MINE	0	18.6	0	0	1000	52	11.11	7/23/2013	01:17:51pm	1235451.194000	2425421.152000
TRIPLE S MINE	0	18.3	0	6	0	45	7.22	7/23/2013	01:23:45pm	1235410.813000	2425439.925000
TRIPLE S MINE	0	17.5	0	1	8000	48	8.89	7/23/2013	01:27:50pm	1235355.228000	2425425.311000
TRIPLE S MINE	0	18.2	0	0	2000	51	10.56	7/23/2013	01:31:10pm	1235321.692000	2425435.859000
TRIPLE S MINE	0	18.3	0	6	0	52	11.11	7/23/2013	01:35:22pm	1235253.998000	2425429.904000
TRIPLE S MINE	0	18.1	0	13	0	48	8.89	7/23/2013	01:39:27pm	1235206.448000	2425423.022000
TRIPLE S MINE	0	18.2	0	0	3000	49	9.44	7/23/2013	01:43:34pm	1235165.830000	2425421.108000
TRIPLE S MINE	0	17.7	0	3	6000	50	10.00	7/23/2013	01:50:06pm	1235102.069000	2425425.412000
TRIPLE S MINE	0	17.7	0	2	1000	50	10.00	7/23/2013	01:54:52pm	1235056.540000	2425435.350000
TRIPLE S MINE	0	17.3	0	0	4000	51	10.56	7/23/2013	01:58:45pm	1235101.158000	2425481.694000
TRIPLE S MINE	0	15.8	0	5	11000	48	8.89	7/23/2013	02:03:03pm	1235059.982000	2425490.245000
TRIPLE S MINE	0	15.4	0	24	10000	45	7.22	7/23/2013	02:07:50pm	1235051.156000	2425526.715000
TRIPLE S MINE	0	15.7	0	1	2000	45	7.22	7/23/2013	02:11:44pm	1235002.894000	2425523.735000
TRIPLE S MINE	0	19.0	0	1	3000	51	10.56	7/23/2013	09:56:34am	1235307.761000	2425176.640000