

2012 OUTCROP ZONE REPORT

FRUITLAND FORMATION OUTCROP ZONE ARCHULETA COUNTY, COLORADO

NOVEMBER 2012

REVISED DECEMBER 2012



Prepared for:

**PETROX RESOURCES, INC.
Meeker, Colorado**

and

**ELM RIDGE RESOURCES, INC.
Dallas, Texas**



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EXECUTIVE SUMMARY

This 2012 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 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. Petrox has also submitted an APD to the BLM/USFS for the 9U#3 CBM production well that is proposed to be installed on federal lease within the Project Area. The approval of the APD by the BLM/USFS is scheduled for February 2013 with drilling tentatively scheduled for May 2013.

In addition to the 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 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 Cabezón 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 2012 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.

Based on reservoir, geological, and hydrogeological characteristics of the Kf within the Project Area, the potential for water depletion, methane seepage, and/or coal fires 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, Southern Ute Indian Tribe (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 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 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 (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;
- 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);
- 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 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 subsequent outcrop zone reports when available;
- Petrox will commit to utilizing the 10U#4, the 9U#3, or other existing/proposed CBM production well 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 within the Fosset Gulch Unit for Petrox.

1.0 INTRODUCTION

This 2012 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.

This report meets 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 2011 Petrox Resources, Inc. (Petrox) horizontally drilled the Candelaria 10U#3 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, which fell within the 1.5 mile BLM outcrop zone and required APD approval by the BLM. Petrox received the BLM/USFS-approved APD for the Candelaria 10U#3 CBM production well on November 7, 2012.

Petrox has also submitted an APD to the BLM/USFS for the 9U#3 CBM production well that is proposed to be installed on federal lease within the Project Area. The approval of the APD by the BLM/USFS is scheduled for February 2013 with drilled tentatively scheduled for May 2013.

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 for the Candelaria 10U#3 fee production well (Permit), issued by the Colorado Oil and Gas Conservation Commission (COGCC).

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, the Southern Ute Indian Tribe (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 TWG meeting. As a result of the meeting, the BLM/USFS informed Petrox that Conditions of Approval (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. Annual meetings of the TWG will continue to meet to discuss, evaluate, and assess future outcrop zone reports.

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 SUIT Reservation boundary at Cabezón 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 PROJECT OBJECTIVE

The objective of the 2012 Outcrop Zone Report is to characterize the Project Area and evaluate the existing conditions for CBM production of federal minerals within the outcrop zone. This 2012 Outcrop Zone Report marks the second year of evaluating the existing 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.

1.2 SCOPE OF WORK

The scope of work for this 2012 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 2012 Outcrop Zone Report with the TWG.

1.3 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 Cabezón 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. The COGCC has defined the outcrop zone as a 1.5-mile buffer from the Kf-Pictured Cliffs Sandstone (Kpc) contact. For this 2011 Outcrop Zone Report, the BLM-defined outcrop zone is included in the Project Area. Figure 1 illustrates the Project Area, defined by the BLM and COGCC respective outcrop zones.

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 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 as part 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

Era	System		Series		Lithologic Unit	
	Quaternary	Pleistocene				
Cenozoic	Tertiary	Recent	Bridge Timber Gravel			
		Pliocene	San Jose Formation			
Mesozoic	Upper Cretaceous	Animas Formation	Nacimiento Formation			
			Upper Member			
		Kirtland Shale	McDermott Member			
			Upper Member			
			Farmington Sandstone Member			
			Lower Member			
		Fruitland Formation				
		Pictured Cliffs Sandstone				
		Lewis Shale				
		Mesaverde Group	Cliffhouse Sandstone			
			Menefee Formation			
			Point Lookout Sandstone			
		Mancos Shale				
		Dakota Sandstone				
		Lower Cret.	Burro Canyon			
		Jurassic	Brushy Basin Member of Morrison Formation			

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 ranges 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).

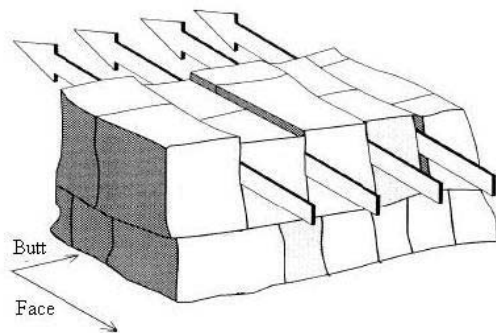
2.2.2 The Fruitland Formation

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 a FMI log during the drilling of the Fosset Gulch Unit 9U#2 CBM. Based on the FMI log, the face cleats 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 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 northwest-southeast north 130°. The drilling induced fractures orientation follow the maximum horizontal stress and predict 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 through 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 been 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 curvilinear 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 9U#1A CBM production well (9U#1A), the formation contains 94.489% methane (Appendix A). 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 (C₁), ethane (C₂), propane (C₃), butane (C₄), and isopentane (C₅) gases in the sample determines whether the CBM gas is considered dry or wet. The equations below illustrate whether gases are dry or wet.

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

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

Gas chemistry of the 9U#1A has a C₁/ C₁₋₅ value of 0.99. As a result, the CBM gas within the 9U#1A 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/ C₁₋₅ 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 *insitu* 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 Kf outcrop.

GEM Model Results Summary – Case 3 and 4 PARELLEL 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 @ Typical 160 Acre Pattern	0.75 md / 2:1	0%
6,230 feet	20 Years @ Typical 160 Acre Pattern	0.75 md / 4:1	0%
7,210 feet	20 Years Candelaria 10U#3 Lateral	0.75 md / 2:1	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% 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% 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:

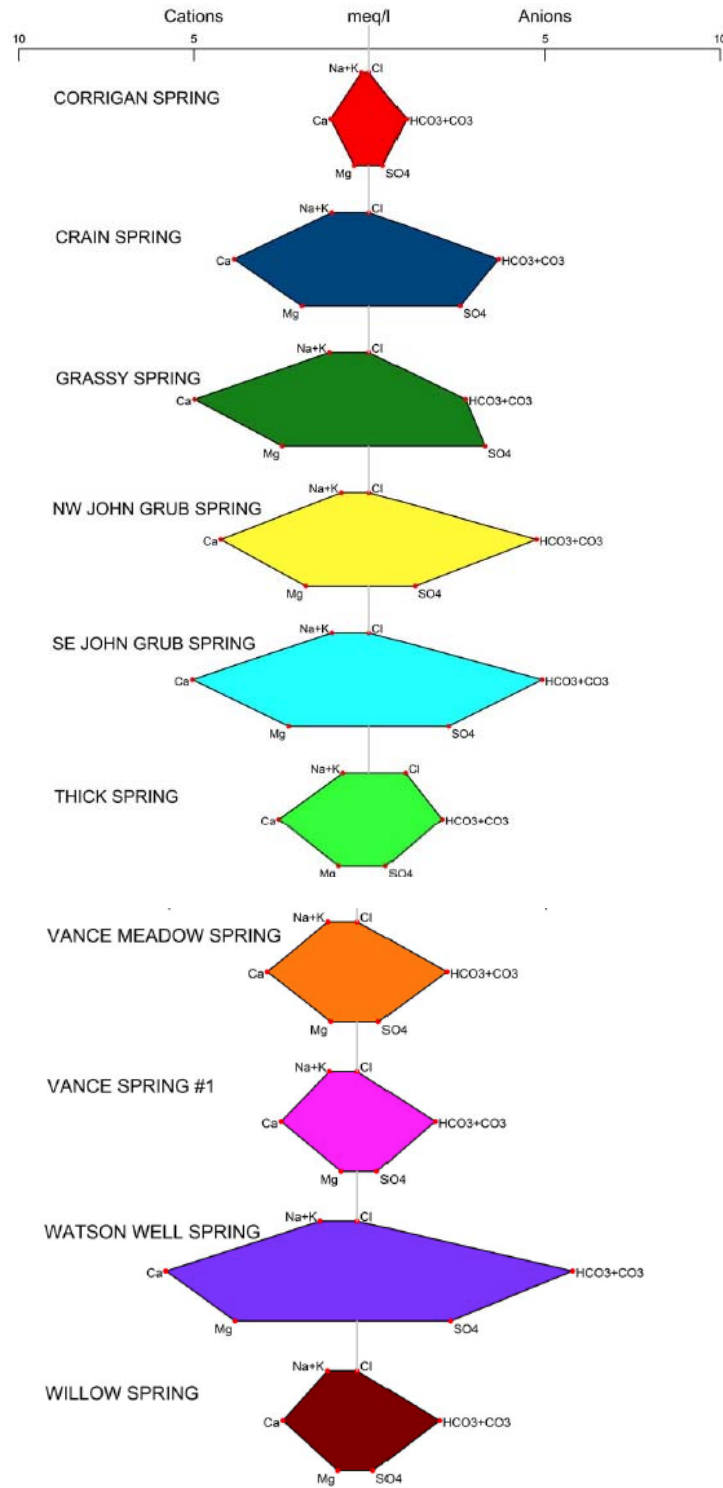
- Beaver Creek,
- Squaw Creek,
- Little Squaw Creek,
- Pole Gulch,
- Peterson Gulch,
- Candelaria Ranch,
- Piedra River,
- Stollsteimer Creek, and
- Cabezón Canyon.

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).

LTE has identified 28 natural springs on or adjacent to the Kf outcrop within the Project Area (Figure 3, Table 1) utilizing USGS and Colorado Division of Water Resources (DWR) databases. The natural springs listing is only those identified on or adjacent to the Kf outcrop in the two databases and in no way represents an exhaustive listing of natural springs not identified in those databases. If additional natural springs are present on or adjacent to the Kf outcrop within the Project Area are identified by landowners or other sources, LTE will evaluate the inclusion of those natural springs to the annual monitoring on a case-by-case basis

The 28 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 Wood Spring, which is calcium sulfate in makeup. Table 2 summarizes the historical ion chemistry of the natural spring waters. The 2012 natural springs 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 28 natural springs were sampled in 2012 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.

2012 Natural Springs Stiff Diagram

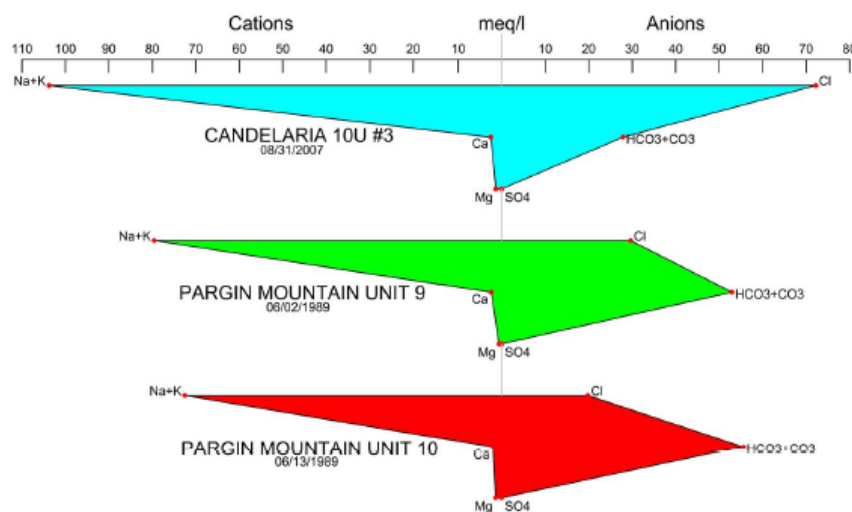


2.3.2 Groundwater and Aquifers

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 Nacimientto 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 Unit 10 are dominated by sodium and potassium cations and chloride and bicarbonate anions. The Candelaria 10U#3 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 C includes laboratory analytical results 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	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 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 Cliff House Sandstone 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 eight 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 United States Forest Service, 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 Pargin Mountain 10U#3 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.

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.

Below is a description of each task included in the monitoring plan.

3.1 DETAILED MAPPING

3.1.1 Property Access

Prior to conducting field activities, land information will be 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.

3.1.2 Drainage Transects

LTE conducts drainage transect 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.

3.1.3 Field Mapping

The grids for detailed mapping areas consist of a varying number of squares, ranging in area from 2,500 square feet (ft²) to 40,000 ft². Through 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. Beginning in 2013, grid spacing 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 200-foot spacing. This approach will be cost efficient and effective in achieving early methane seep 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 dated 2009 and 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 6 through July 24, 2012. Results of the 2012 mapping event are discussed in Section 4.2.

3.1.4 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 D.

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 ($\text{mol}/\text{m}^2\cdot\text{day}$).

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 ppm. The flux meter methane measurement range is $0.0 \text{ mol}/\text{m}^2\cdot\text{day}$ to $300 \text{ mol}/\text{m}^2\cdot\text{day}$. Methane flux values below $0.2 \text{ mol}/\text{m}^2\cdot\text{day}$ are detectable with decreased accuracy. Due to the low accuracy and confidence level of methane flux values below $0.2 \text{ mol}/\text{m}^2\cdot\text{day}$, the reporting limit set for the flux meter is $0.2 \text{ mol}/\text{m}^2\cdot\text{day}$. 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 E.

The carbon dioxide sensor has a full-scale range of 0.0 ppm to 20,000 ppm and a flux measurement range of $0.0 \text{ mol}/\text{m}^2\cdot\text{day}$ to $600 \text{ mol}/\text{m}^2\cdot\text{day}$ at an accuracy of $\pm 25\%$.

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/m²·day to 0.5 mol/m²·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.

3.1.5 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 D.

3.2 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 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 2012 abandoned production well survey was conducted on July 17, 2012. Results of the 2012 event are discussed in Section 4.3.

3.3 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.

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, and water bodies.

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

3.3.1 Aerial Color Infrared Imagery

Summer time is selected to provide 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 SUIIT Reservation in Archuleta County through La Plata County to the SUIIT 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 above mean sea level (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 then used to identify areas with anomalous color signatures requiring field verification.

3.3.2 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. Suspect areas are delineated as polygons and uploaded to the GPS unit for field verification.

3.3.3 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. A majority of the land intersecting the Kf outcrop in the Project Area is federal land but significant portions of the outcrop and 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 D.

3.4 ABANDONED COAL MINE SURVEYS

Abandoned coal mine surveys were implemented in 2011 to comply with Decision Point 5 of the ROD. The surveys are conducted using traditional subsurface soil gas techniques as described in Section 3.3. 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 ground surface temperature readings utilizing an infrared (IR) temperature meter. A map of abandoned coal mine survey sites can be found in Figure 9.

Due to the fluctuation of surface temperatures measured during the 2011 surveys, LTE replaced the IR temperature meter with a thermometer probe, which was inserted into the temporary probe holes to collect subsurface temperature readings. This method appears to be less influenced by surficial, topographical, vegetative, or timing factors.

The 2012 abandoned coal mine surveys were conducted from July 26 to August 3, 2012. The results of the 2012 event are discussed in Section 4.5.

3.5 NATURAL SPRING SURVEY

At each sampled natural spring, field personnel collect water samples and monitor for methane near the 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 (SO₄), bromide (Br), and fluoride (F)] by EPA Method 200.7/4500;
- pH by EPA Method 150.1;
- 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 2012 natural springs sampling event was conducted in May 2012. Results are discussed in Section 4.6.

3.6 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 and telemetry. The data are documented and interpreted by the COGCC in annual reports available for public review.

Results for the 2012 COGCC monitoring well evaluation are included in Section 4.7.

3.7 BLM/USFS SOIL VAPOR TUBE DATA

3.7.1 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 in October and November 2011. SVT data collection at the Candelaria Pasture transect ended in August 2006 when the BLM was denied access to the property. The first and last dates contained in the current data set for each transect are on Table 3.

3.7.2 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 2012 analysis are discussed in Section 4.8 and on Table 4.

3.8 MITIGATION ALTERNATIVES

The monitoring program outlined above and detailed in previous Kf outcrop monitoring reports (found in the COGCC website) provide early detection of potential methane seepage and/or coal fires 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.

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 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.

The two major concerns stated in the NSJB EIS in the Project Area are underground coal fires and methane seepage (discussed earlier in this section) at the Kf outcrop. 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 above the SUIT boundary. Data currently suggests that the production of CBM within the outcrop zone would produce limited water from the Kf, which would not create an atmosphere conducive for spontaneous combustion to occur. In addition, the depth of the Kf within the 10U#3 CBM 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.

Coal fires have not been observed during the past nine years of monitoring activities. In addition to annual outcrop monitoring activities, monitoring of abandoned coal mines along the Kf outcrop within the Project Area will be conducted by LTE for four consecutive quarters once the 10#3 is brought online. After the fourth quarterly monitoring event is conducted, the TWG will evaluate the data and determine monitoring frequency moving forward.

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 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.

In addition, 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).

4.0 MONITOR-AS-YOU-GO RESULTS

This section presents the 2012 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 2012 monitoring event. The 2012 status of access to parcels is illustrated on Figure 13 and presented in Table 5.

4.2 DRAINAGE TRANSECTS SURVEY

During 2012, LTE conducted inspections from July 6 to July 24, 2012, at the following six locations where surface water drainages transect the Kf outcrop in Archuleta County:

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

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 2012 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 2012 monitoring event. Reportable methane flux (greater than 0.2 mol/m²·day) was not recorded at any of the 642 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 2012 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 six drainage transects are presented on Figures 14 through 19. Flux data is summarized in Table 6. The soil gas flux measurement results for each drainage transect is presented Appendix E.

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/m²·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.

Every location sampled in Archuleta County fell below the reportable detection limit of 0.2 mol/m²·day in 2010, compared to 3 points in 2009. Reportable methane flux was recorded in two locations during the 2011 monitoring event. In 2012, reportable methane flux was not detected at any of the measurement points. Limited reportable methane flux values and low historical volumetric methane fluxes detected in Archuleta County appears 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 F1 through F7 in Appendix F.

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:

$$\frac{\text{mol CO}_2}{\text{day}} \times \frac{44.01 \text{ g CO}_2}{\text{mol CO}_2} \times \frac{0.0253 \text{ ft}^3 \text{ CO}_2}{\text{g CO}_2} = \frac{\text{ft}^3 \text{ CO}_2}{\text{day}}$$

For example,

$$1.0 \text{ mol/day CO}_2 = 1.11 \text{ CFD CO}_2$$

Notes:

mol – mole CO₂ – carbon dioxide g – gram ft³ – 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 E.

4.3 ABANDONED PRODUCTION WELL SURVEY

LTE conducted the 2012 Big Horn-Schomburg #1 abandoned production well site survey on July 17, 2012. LTE collected 18 flux measurements with no reportable methane detected. A single reportable methane flux point was detected in 2007, 2009, and 2011. Figure 20 presents the results of the Big Horn-Schomburg #1 abandoned production well survey. The flux measurement results are presented in Table 6.

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 2012, LTE identified seven abandoned coal mines along the Kf outcrop. Due to property access denial, the Unnamed Abandoned Mine, Cabezon Project mine, and Chimney Rock Coal mine were not surveyed. 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 26 to August 3, 2012. Figures 21 through 43 illustrate subsurface soil gas and temperature measurements. Subsurface soil gas and temperature measurements are presented in Appendix G.

Methane was detected at one measurement point at the Chimney Rock mine at a concentration of 22,500 ppm (48 measurement points with methane in 2011). Carbon monoxide was not detected at any of the measurement points. Shallow subsurface temperatures were all below 30° 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.

Methane was detected at three measurement points at the Columbine mine ranging at concentrations of 1,000 ppm (2 points) and 3,000 ppm. Carbon dioxide was not detected at any of the measurement points. Shallow subsurface temperatures were all below 20° C.

Methane was detected at two measurement points at concentrations of 500 ppm at Stollsteimer Creek site. Carbon monoxide was detected at six measurement points ranging in concentration from 1 ppm to 2 ppm. Surface temperatures ranged from 14.3° C to 68.9° C (Figure 44).

Carbon monoxide is a by-product of coal combustion and with limited measurement points detecting carbon monoxide, 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.

4.6 NATURAL SPRINGS SURVEY

4.6.1 Sampling Status

A total of 28 potential natural springs were identified on the Kf outcrop in Archuleta County. Of the 28 natural springs, 10 natural springs were sampled in 2012. Those natural springs that were not sampled were due to property access denial by property owners or the natural spring was dry at the time of sampling.

The locations of natural springs are presented on Figure 45. A summary of the natural springs sampled in 2012, 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 2012 field observations and measurements for the natural springs, including historical measurements, are summarized in Table 7.

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 2012 are similar to the low flow rates measured during previous monitoring events. Natural spring discharge rates, including historical data, are presented in Table 8.

4.6.3 Natural Spring Sampling and Analysis

The COGCC uses 2 milligrams per liter (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 2012, dissolved methane was detected in water from the NW John Grub Spring (0.27 mg/L) and SE John Grub Spring (0.29 mg/L), below the 2 mg/L threshold. Laboratory analytical results for dissolved methane in natural spring waters, including historical results, are summarized in Table 9.

All natural springs sampled are calcium bicarbonate waters with the exception of Wood 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 B.

4.6.4 Subsurface Soil Gas Measurements

One set of subsurface soil gas measurements, using traditional subsurface soil gas sampling techniques, was collected at four of the 10 natural springs in May 2012. Due to equipment error,

subsurface soil gas was not measured in six of the natural springs. Historically, subsurface soil methane has not been detected at the natural springs except for during the 2008 sampling where methane was detected in two springs: Walt Spring #1 (500 ppm) and Seep Spring (500 ppm). The results of the subsurface soil gas measurements are summarized in Table 10.

4.7 COGCC MONITORING WELL DATA ANALYSIS

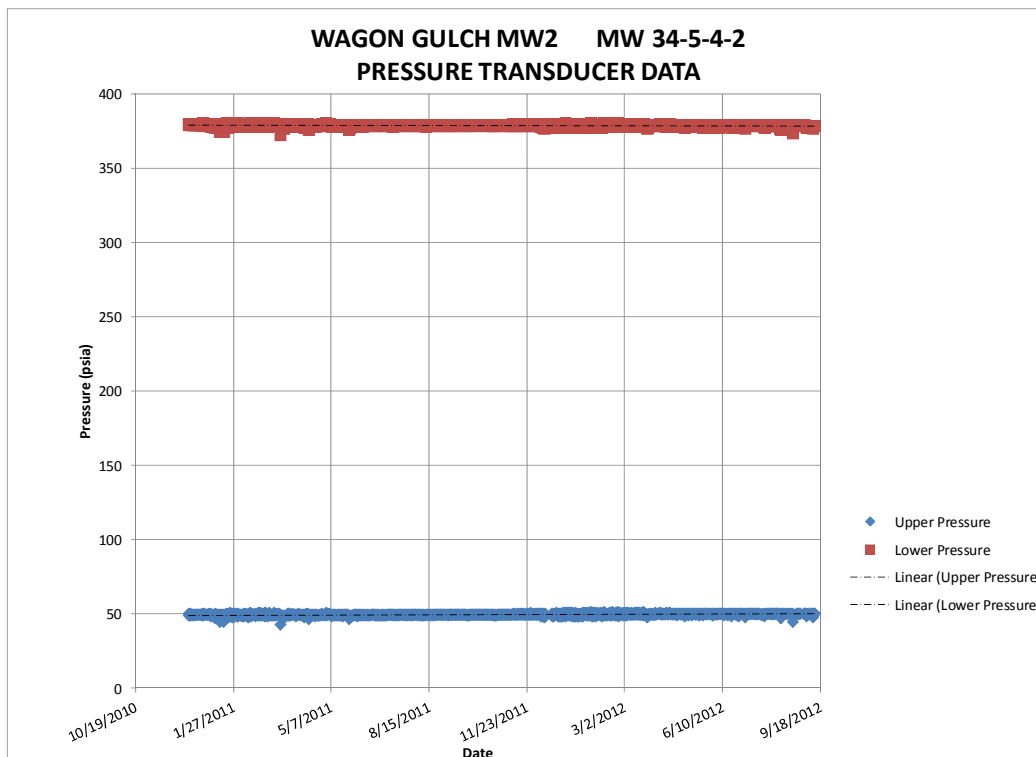
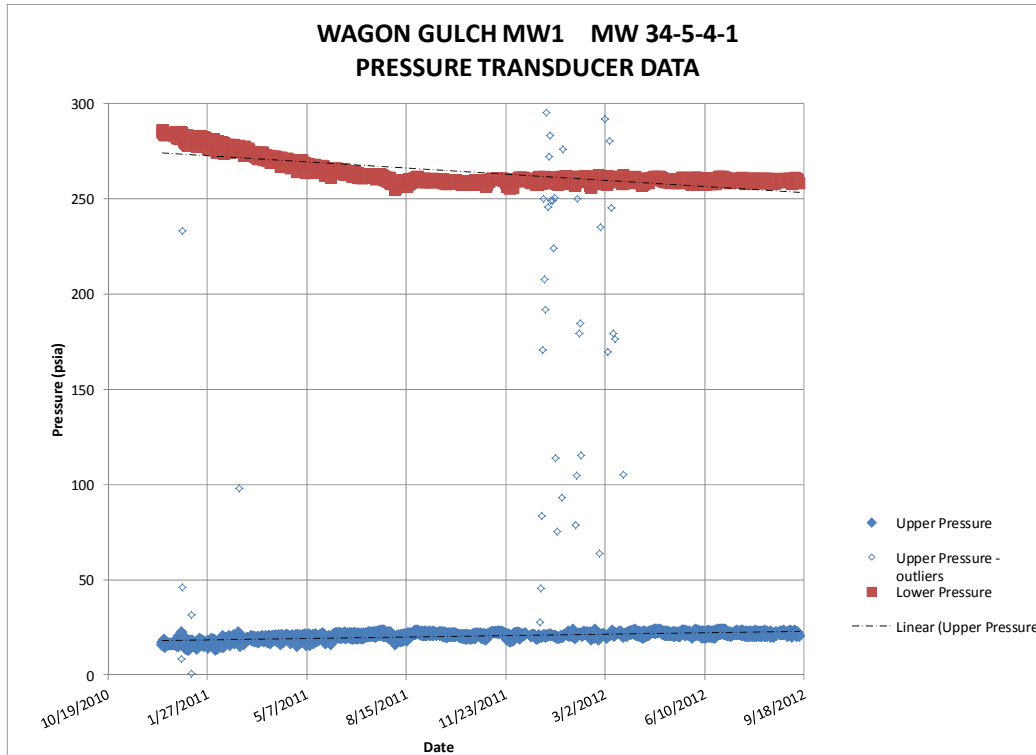
The COGCC provided LTE with twice-daily monitoring well pressure and temperature data from December 2010 through mid-September 2012 for each of the 4M/Archuleta monitoring wells. Historical data have been discussed in several reports on 4M Project Monitoring posted on the COGCC website. A general analysis of results for each well is discussed in the subsequent sections of this report. In general, all monitoring wells show 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 T34N R5W 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 2012, the wellhead pressures have remained relatively stable.

The graphs below depict upper (wellhead) and lower (bottomhole) transducer data from January 2011 to September 2012. A number of spurious readings in January and February 2011 and February and March 2012 have been plotted as outliers. All of those readings were collected in the early a.m. hours, and the erroneous readings are attributed to overnight freezing of the transducer. Readings collected in the afternoons are all consistent with expected pressures. Downhole pressures remained stable through 2012. 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.

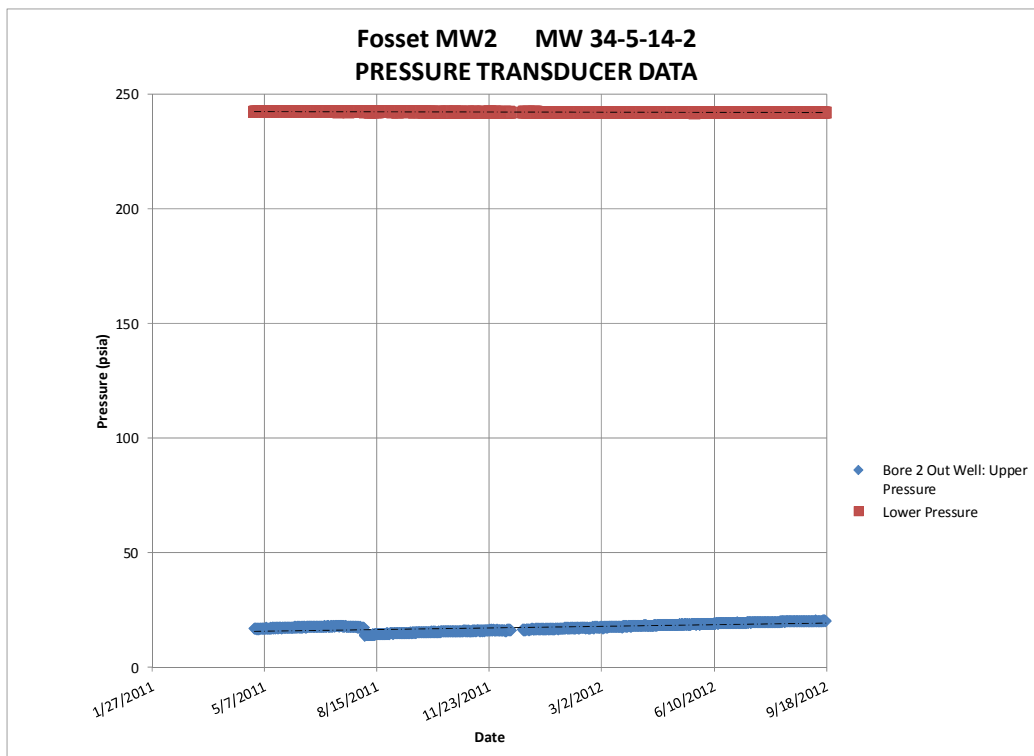
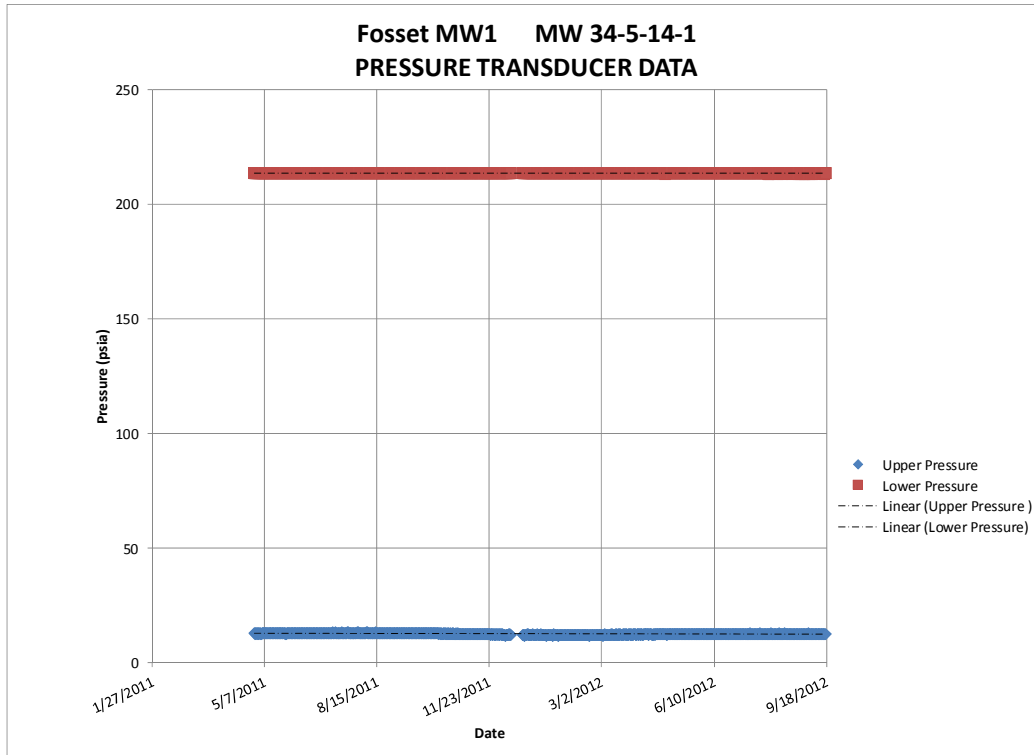
Monitoring well MW 34-5-4-2 was shut in for monitoring on December 4, 2008, but stable pressure transducer readings were not obtained until April 2009. From February 2009 to April 23, 2009, no data were available due to pressure transducer malfunction as a result of freeze damage. At this time, the water 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. 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.



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 T34N R5W 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 recovered nearly to previous levels. Pressure data from January 2011 through September 2012 are presented in the graphs below and exhibit nearly constant wellhead pressures of 12.5 psia and bottomhole pressure of 214 psia.

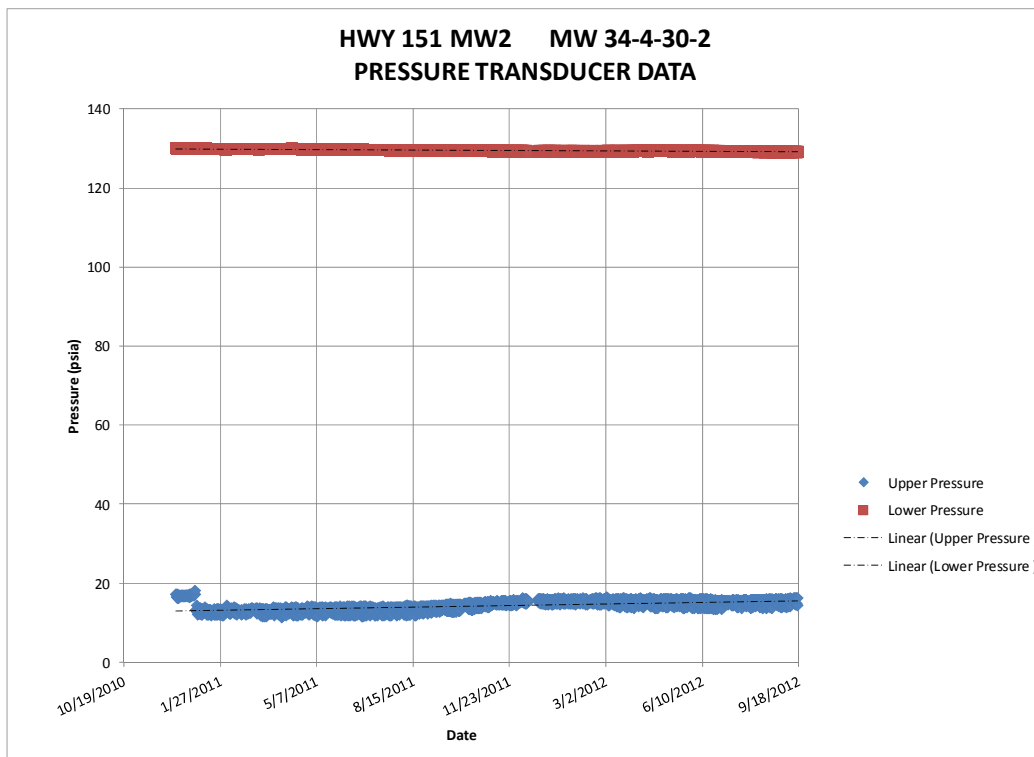
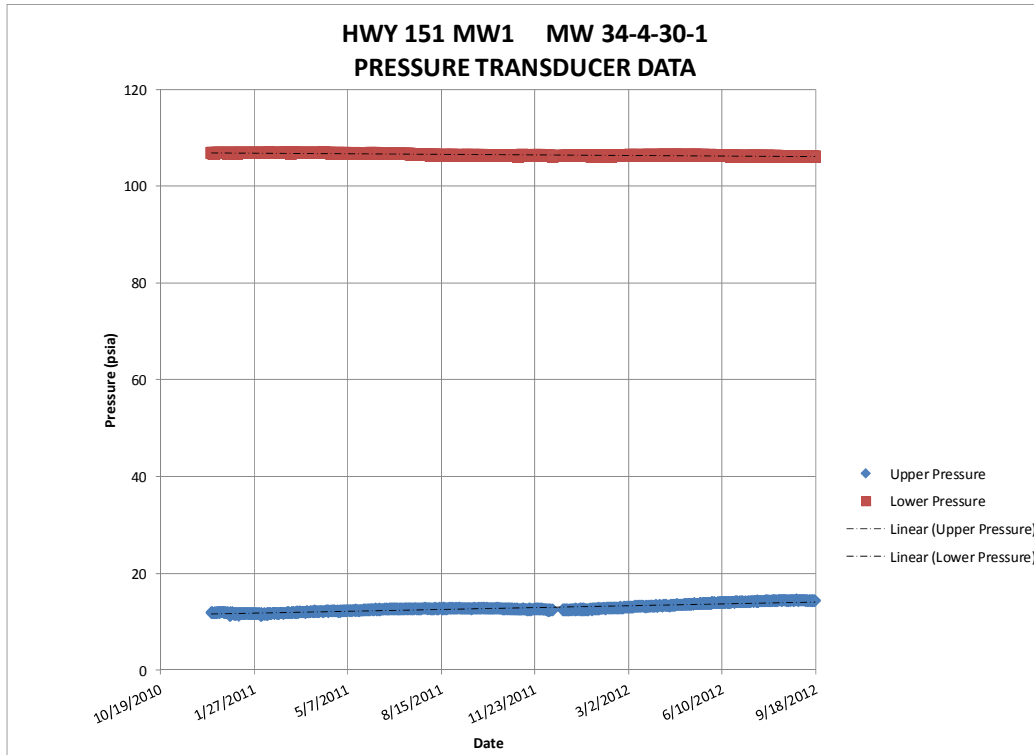
Monitoring well MW 34-5-14-2 has exhibited a nearly constant bottomhole pressure curve for the entire period of record. Records indicate wellhead pressure drops immediately corresponding to rises in water levels each time the well is vented to the atmosphere. The most recent venting event took place on August 3, 2011. Following venting, wellhead pressure took two to four months to return to the pressure regime exhibited prior to each venting event. Wellhead pressures for 2012 indicate that no venting took place this summer, and the pressures have remained constant.



4.7.3 Highway 151

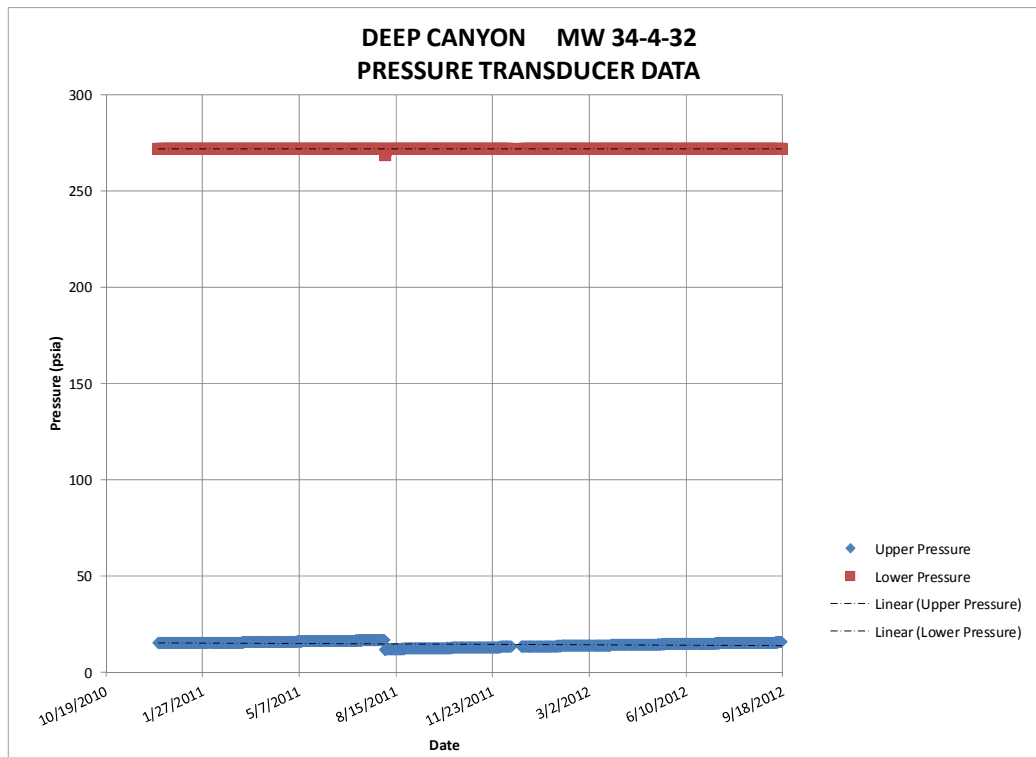
Monitoring wells MW 34-4-30-1 and MW 34-4-31-2, located in Section 30 of T34N R4W adjacent to the north end of the Petrox Fosset Gulch Unit, have been monitored since December 3, 2008. Pressure data from January 2011 through September 2012 are displayed in the graphs below. Monitoring well MW 34-4-30-1 shows a gradual increase in wellhead pressures from approximately 11 psia in December 2008 to 14 psia in September 2012. A small drop in wellhead pressure was observed on June 2, 2010, corresponding to wellhead venting. Bottomhole pressures have remained nearly constant at 106 psia for the entire period of record, with a slight decline from 106.9 to 106.1 psia between January 2011 and September 2012.

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 2012, with overall fluctuations of approximately 3 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.



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 2012. 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.



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

The initial statistical evaluation used all of the available bi-monthly data from 2001 through August 2012. Using the Mann-Kendall test, a z statistic was calculated for 66 of the 67 SVTs

within the Project Area (Figure 12, Table 3). A minimum of 10 data points are needed to calculate the z statistic. Only three measurements were available for SVT BM-109; therefore no z statistic could be calculated for this SVT. Results of the statistical analyses are in Table 4. A positive z statistic indicates an upward trend, and a negative z statistic indicates a downward trend. An upward trend with greater than 95% significance was reported in three of the 67 SVTs. Two of these three SVTs are located in the Pole Gulch Drainage, and the third is located in Yellow Jacket Pass. However, seeping methane gas was not detected during the flux survey. Statistical significance is a measure of the probability that a result is not an artifact of random scatter in the data.

The SVT measurement tool relies on methane concentration through a preferential pathway (the tube itself) to assess seepage. Unfortunately, this measurement does not assess the critical component of gas flow or seepage at the ground surface. The fact that many SVTs can detect methane but do not report incoming concentrations over time 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 2012 outcrop evaluation is based on past work within the Project Area and current conditions documented during the 2012 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 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

Twenty-eight natural springs have been identified on or adjacent to the Kf outcrop within the Project Area. 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 Wood 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 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 from 2012 and historically low 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 have developed since the 2008 regional reconnaissance survey. Vegetative indications of methane seepage 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 the Chimney Rock Mine as part of the flux mapping for the Stollsteimer Creek drainage transect. 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 well, the maximum horizontal stress orientation is north/northwest-south/southeast and the minimum horizontal stress is east-west. The CBM 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% 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 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 (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;
- 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);
- 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 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 subsequent outcrop zone reports when available;
- Petrox will commit to utilizing the 10U#4, the 9U#3, or other existing/planned production well 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 within the Fosset Gulch Unit for Petrox.

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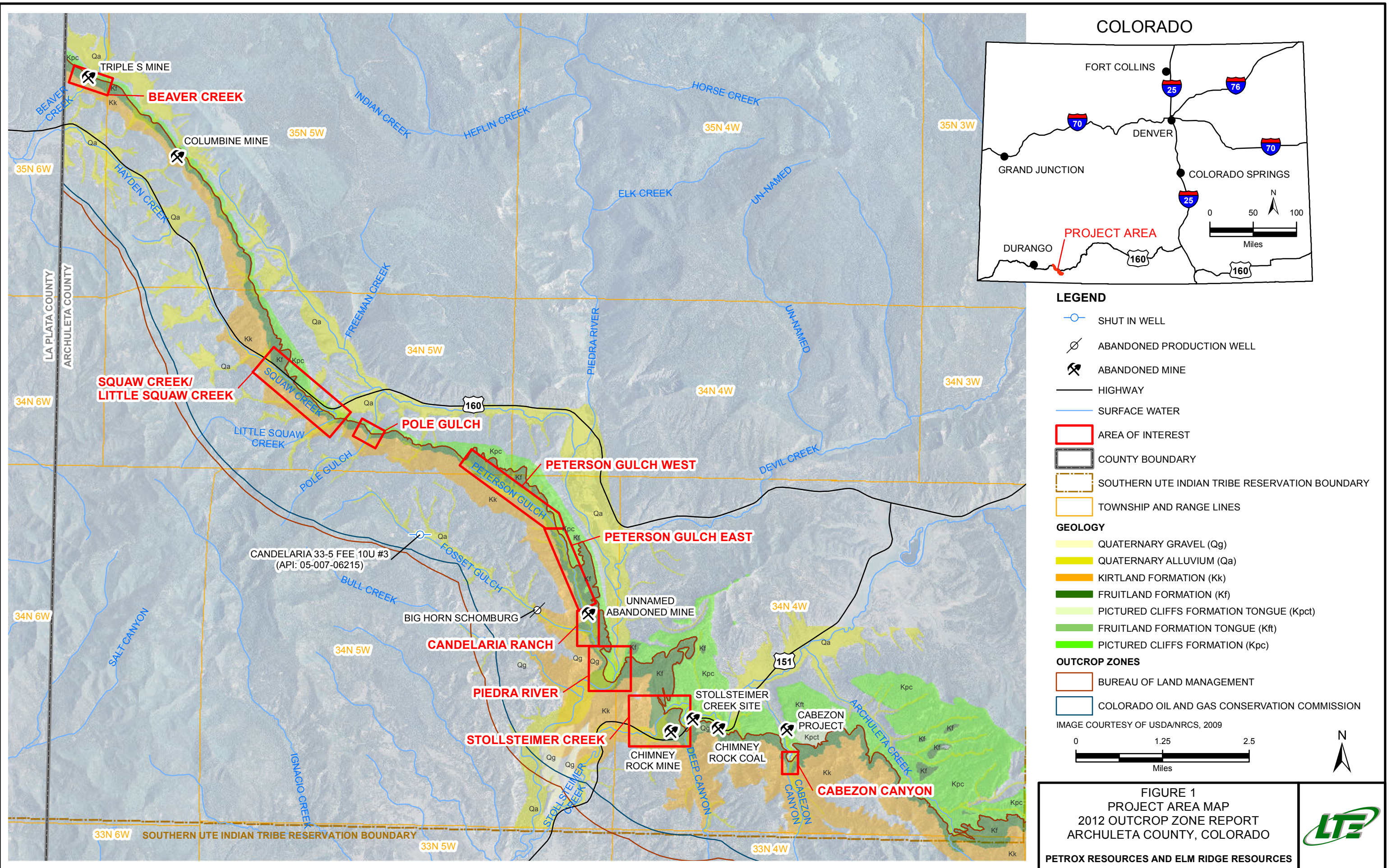
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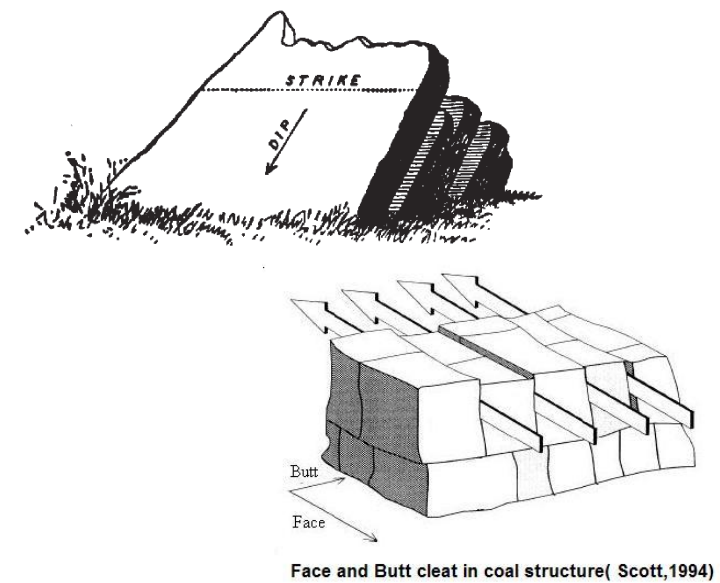
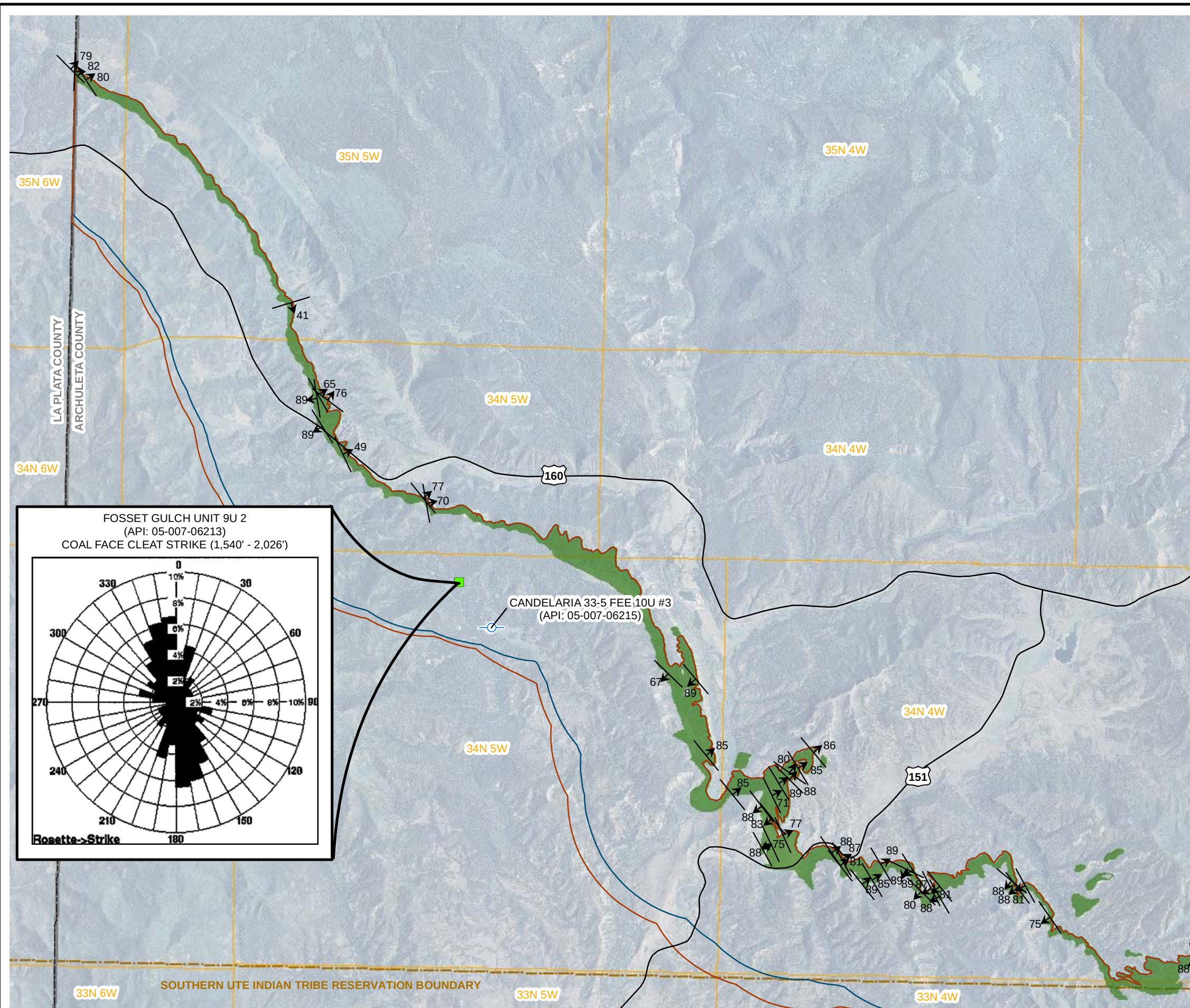
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FIGURES







LEGEND

- STRIKE AND DIP
- SHUT IN WELL
- WELL WAITING ON INFORMATION
- HIGHWAY
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES
- FRUITLAND FORMATION (Kf)
- OUTCROP ZONES
- BUREAU OF LAND MANAGEMENT
- COLORADO OIL AND GAS CONSERVATION COMMISSION

IMAGE COURTESY OF USDA/NRCS, 2009

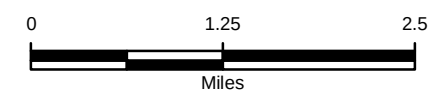
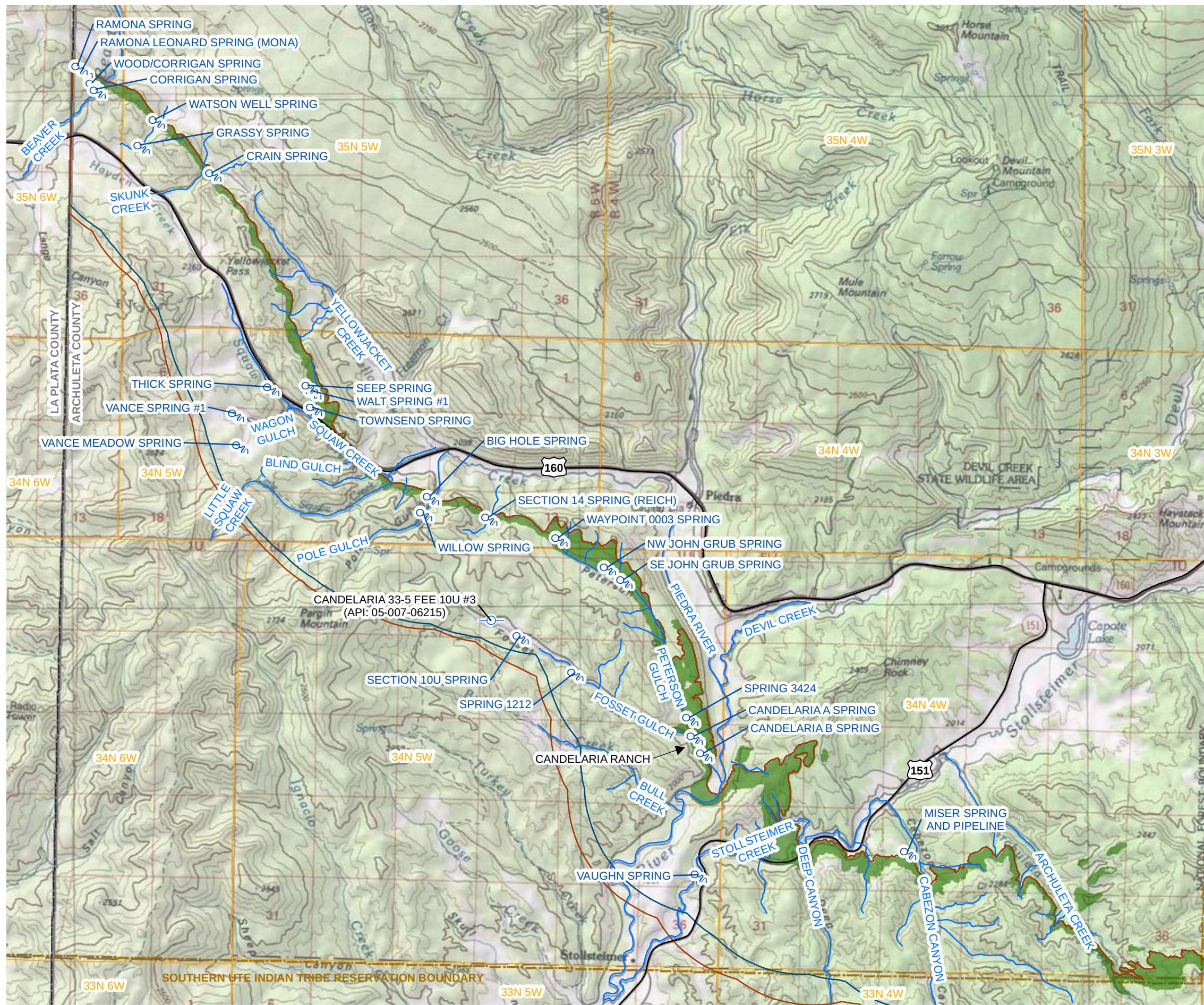


FIGURE 2
COAL FACE CLEAT ORIENTATION MAP
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

- NATURAL SPRING
- SHUT IN WELL
- HIGHWAY
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES
- FRUITLAND FORMATION (Kf)
- OUTCROP ZONES**
- BUREAU OF LAND MANAGEMENT
- COLORADO OIL AND GAS CONSERVATION COMMISSION

IMAGE COURTESY OF USDA/NRCS, VARIOUS DATES

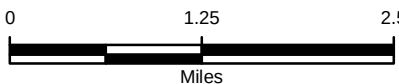
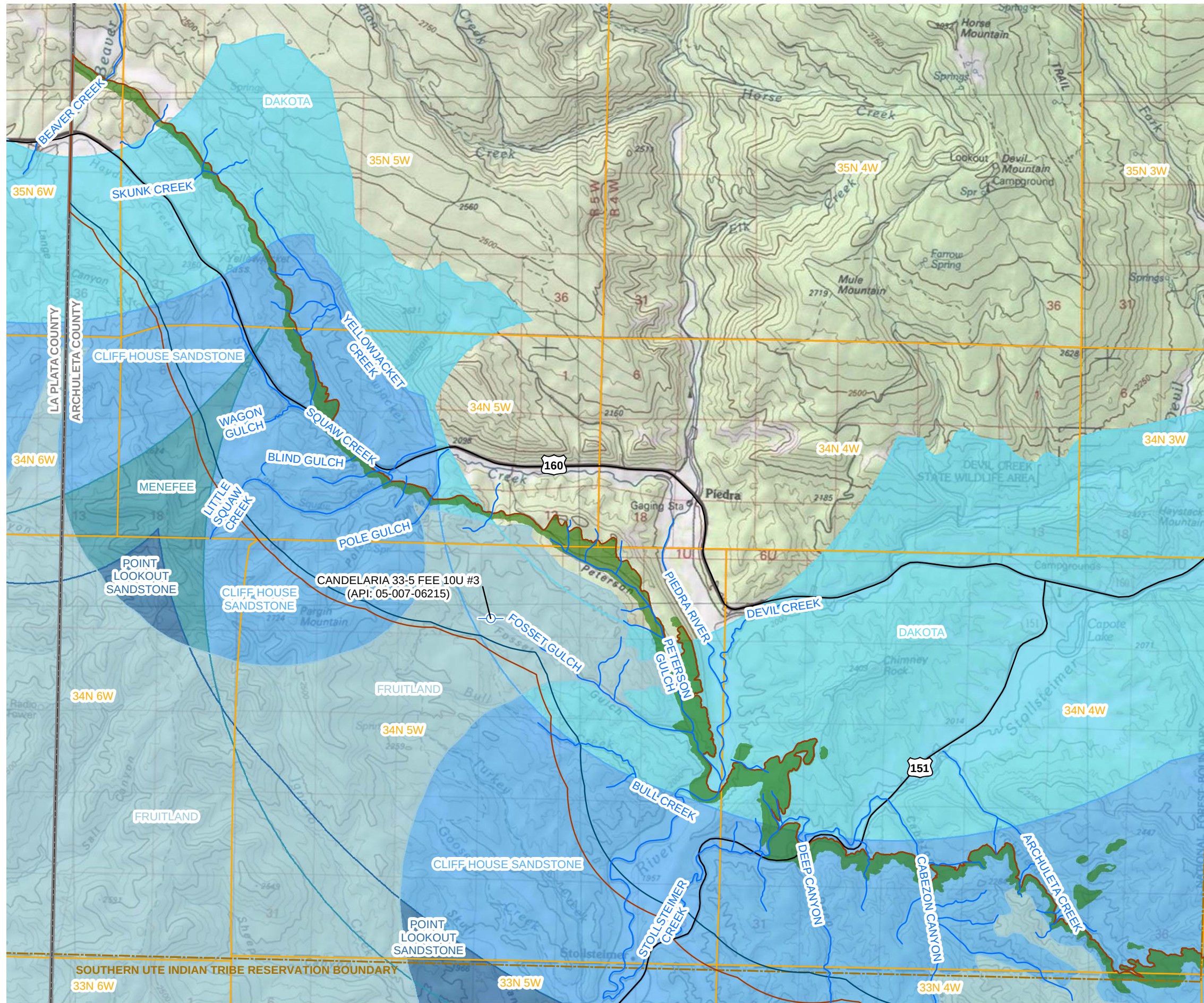


FIGURE 3
SURFACE WATER MAP
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO



PETROX RESOURCES AND ELM RIDGE RESOURCES



LEGEND

- SHUT IN WELL
- HIGHWAY
- SURFACE WATER
- ▭ 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
- FRUITLAND FORMATION (Kf)
- OUTCROP ZONES**
 - BUREAU OF LAND MANAGEMENT
 - COLORADO OIL AND GAS CONSERVATION COMMISSION

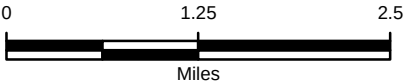
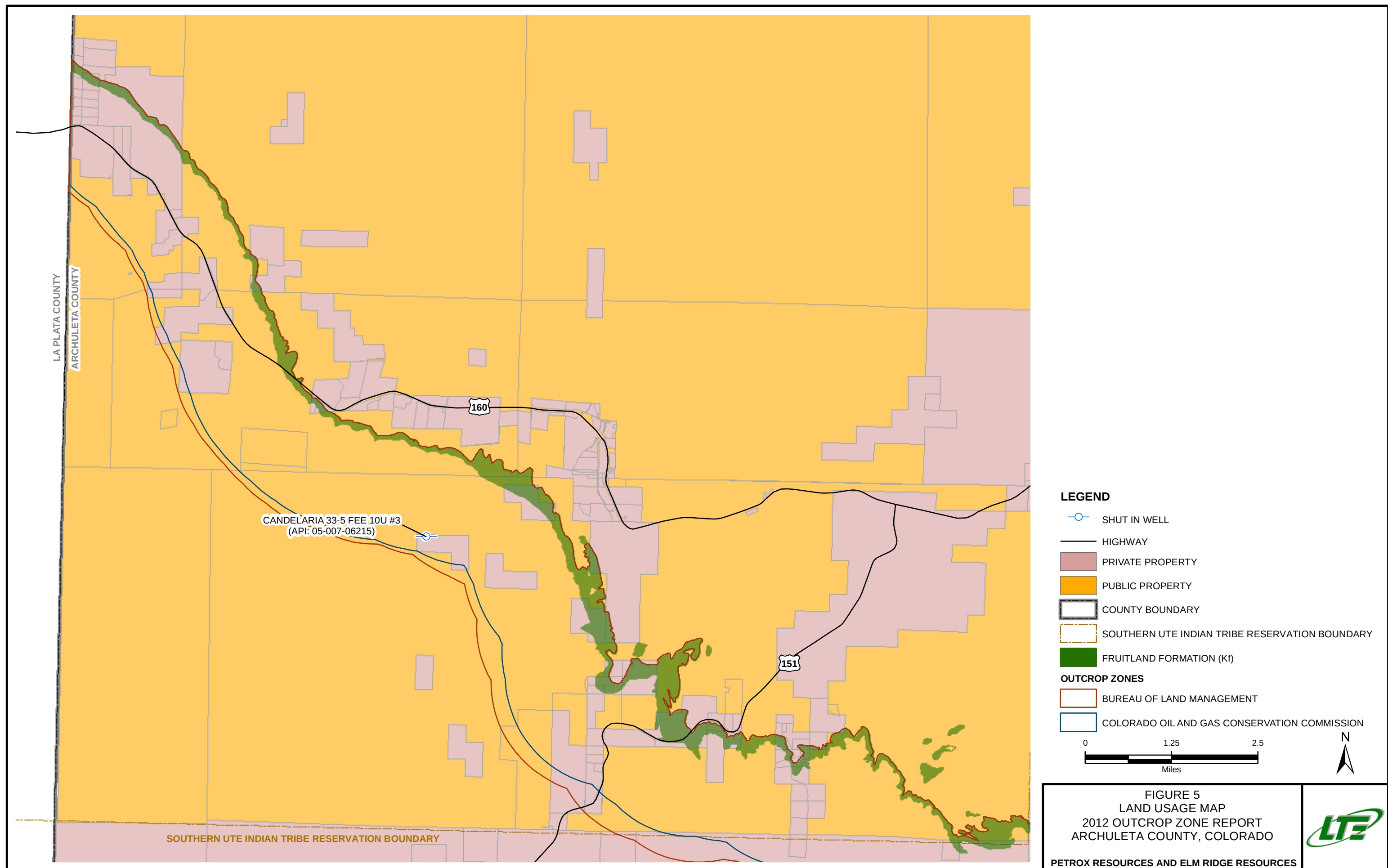
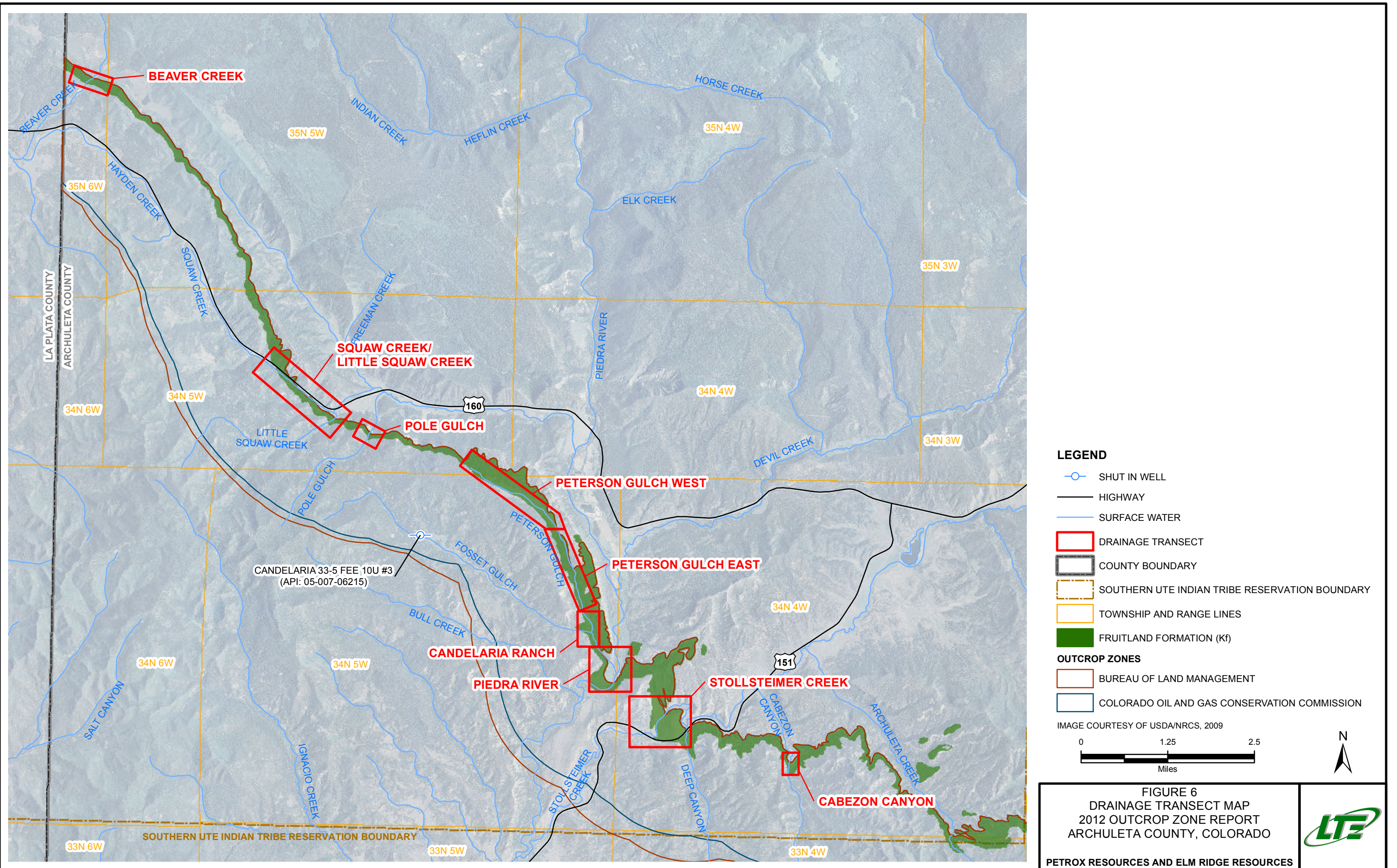
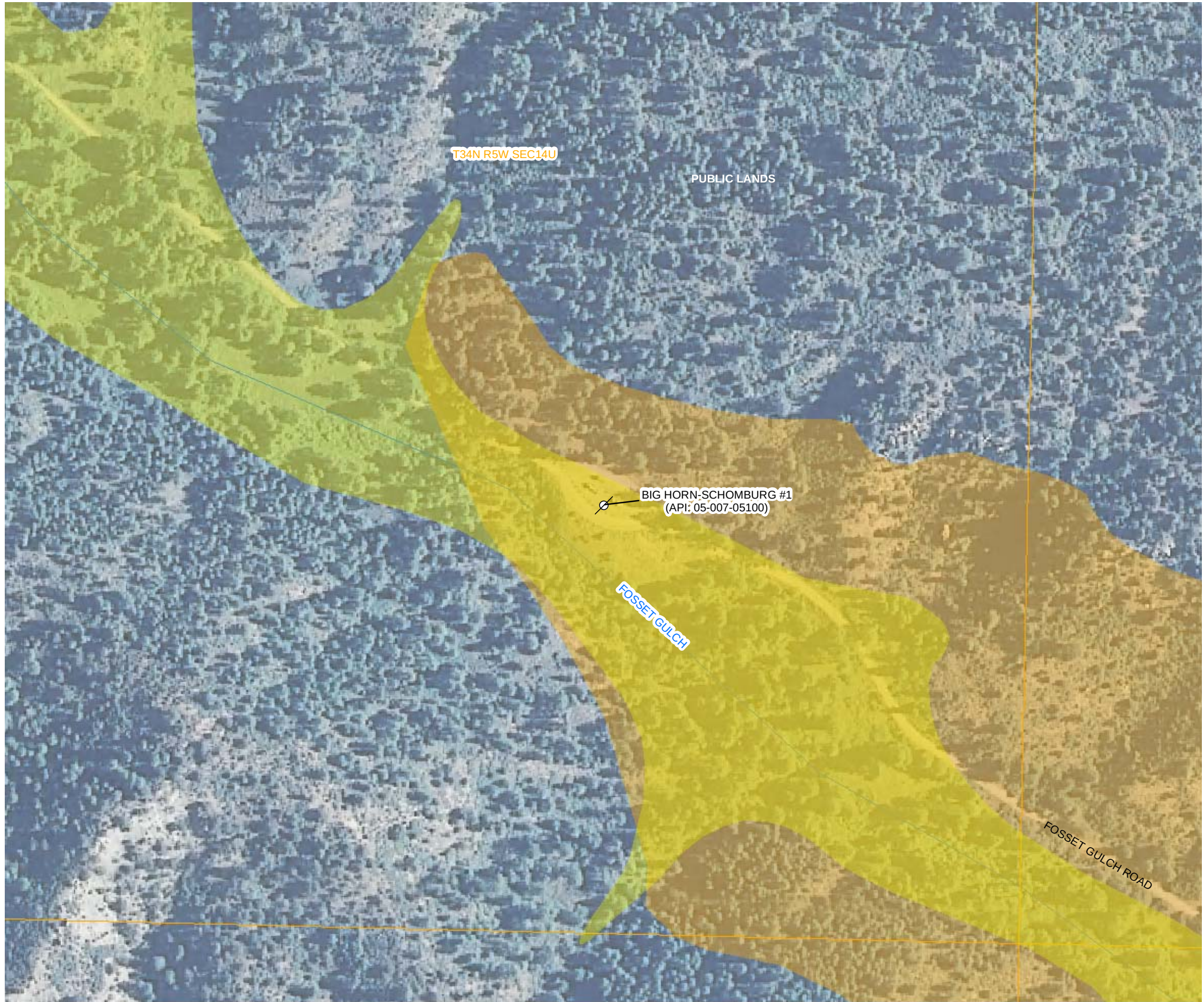


FIGURE 4
NONTRIBUTARY GROUNDWATERS OF
NORTHERN SAN JUAN BASIN
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES









LEGEND

ABANDONED PRODUCTION WELL

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY

QUATERNARY ALLUVIUM (Qa)

KIRTLAND FORMATION (KK)

IMAGE COURTESY OF USDA/NRCS, 2009

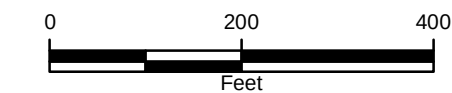
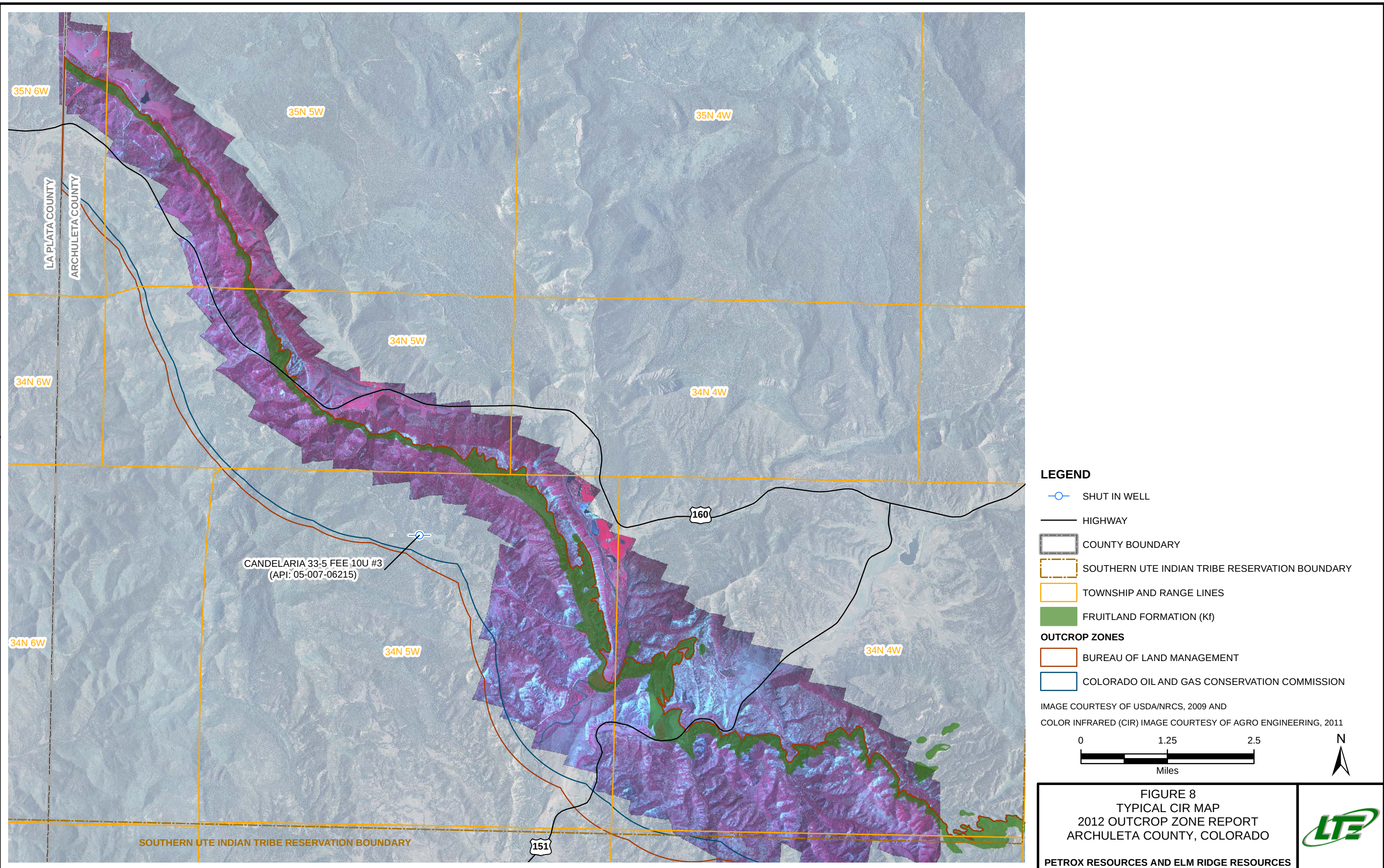


FIGURE 7
BIG HORN-SCHOMBURG #1
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

- SHUT IN WELL
- HIGHWAY
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES
- FRUITLAND FORMATION (Kf)
- OUTCROP ZONES**
- BUREAU OF LAND MANAGEMENT
- COLORADO OIL AND GAS CONSERVATION COMMISSION

IMAGE COURTESY OF USDA/NRCS, 2009 AND
COLOR INFRARED (CIR) IMAGE COURTESY OF AGRO ENGINEERING, 2011

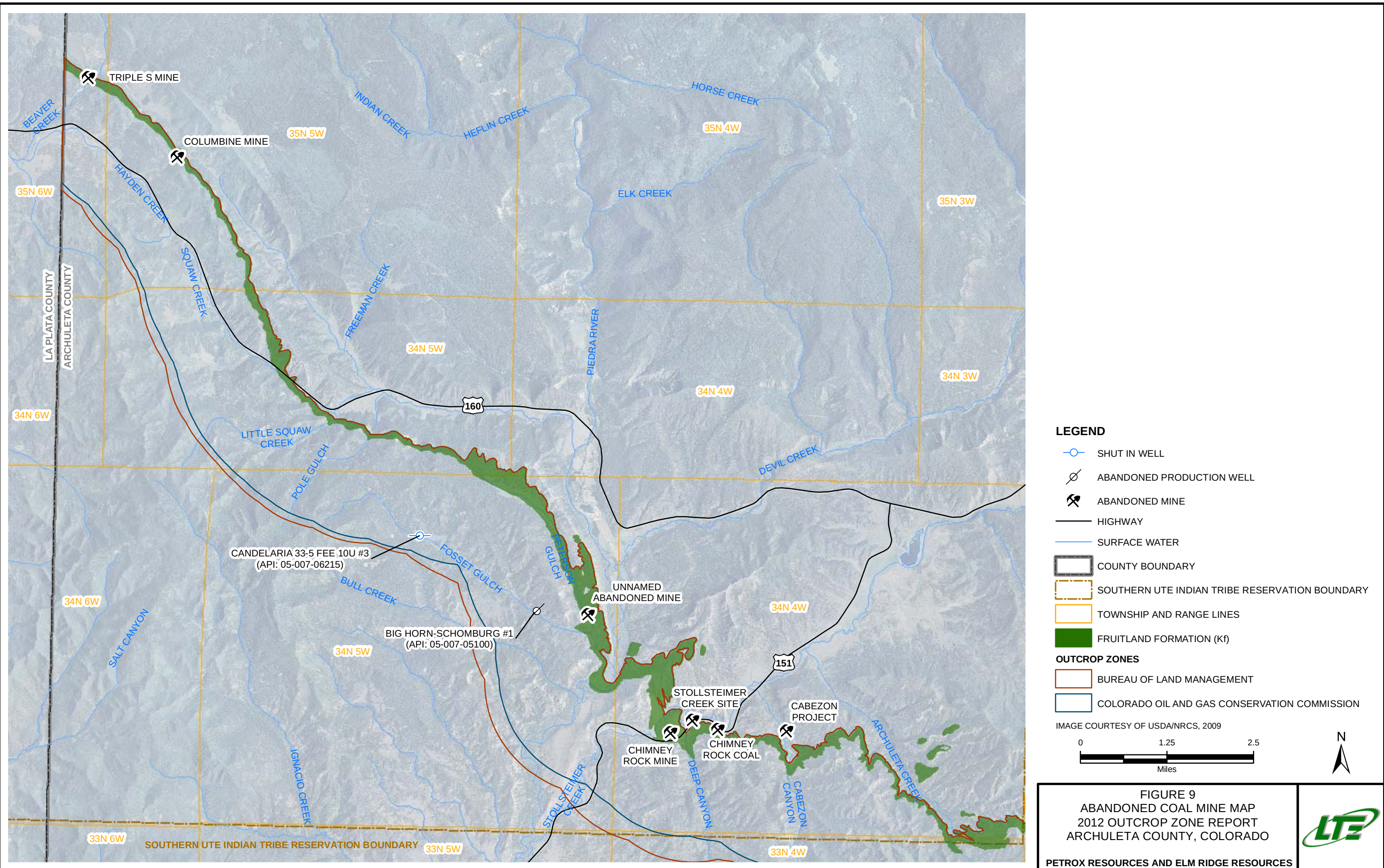
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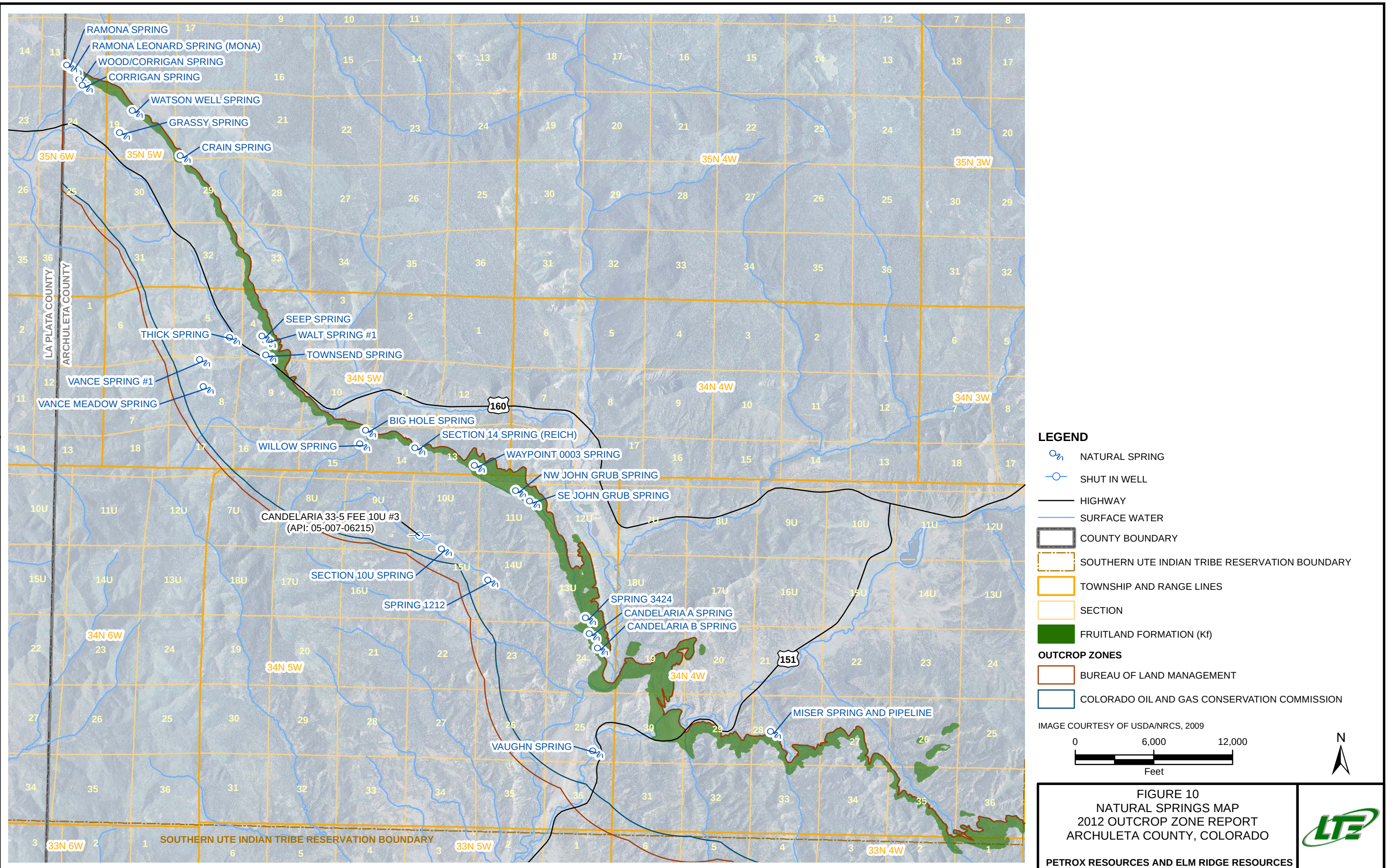
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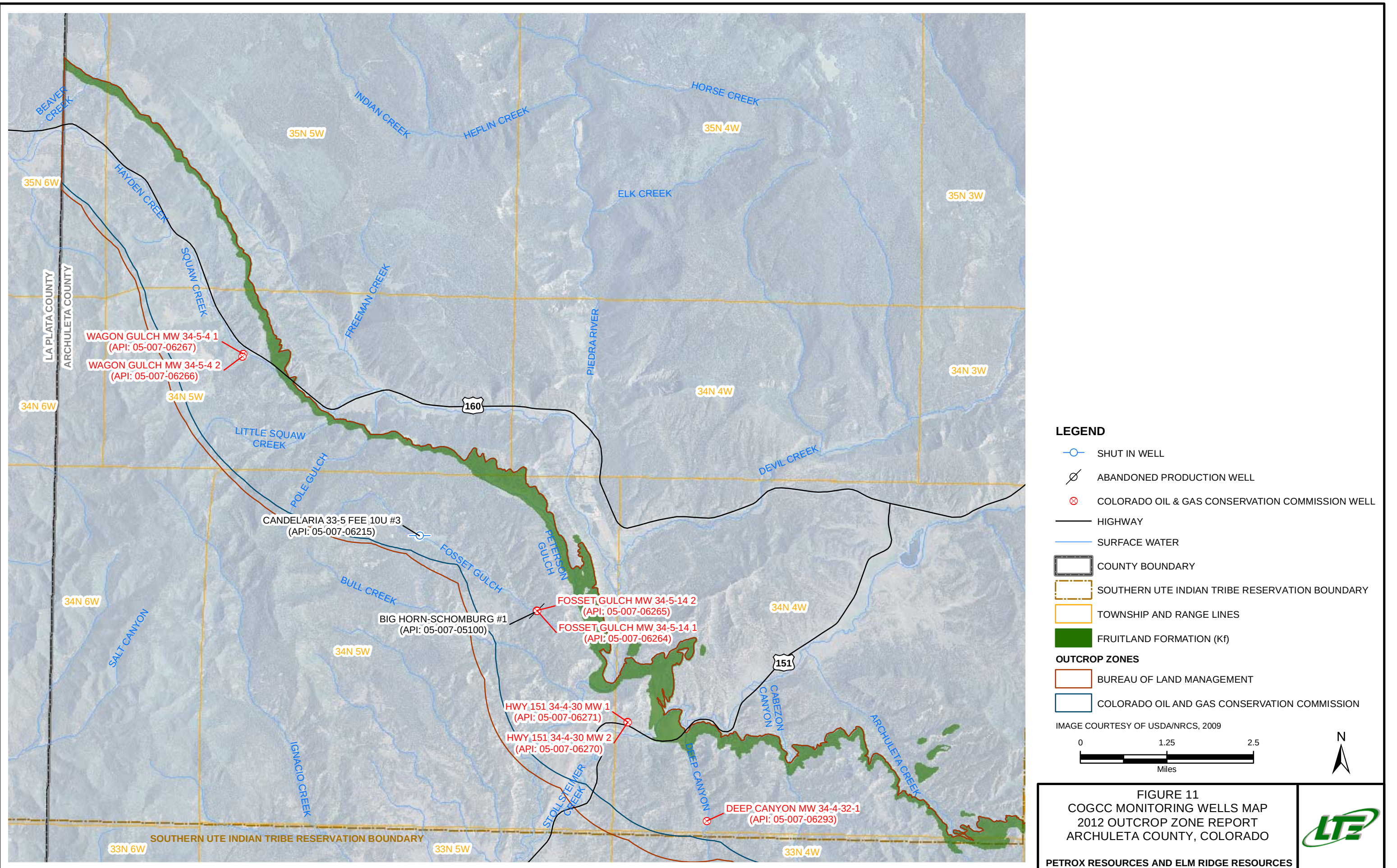
FIGURE 8
TYPICAL CIR MAP
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

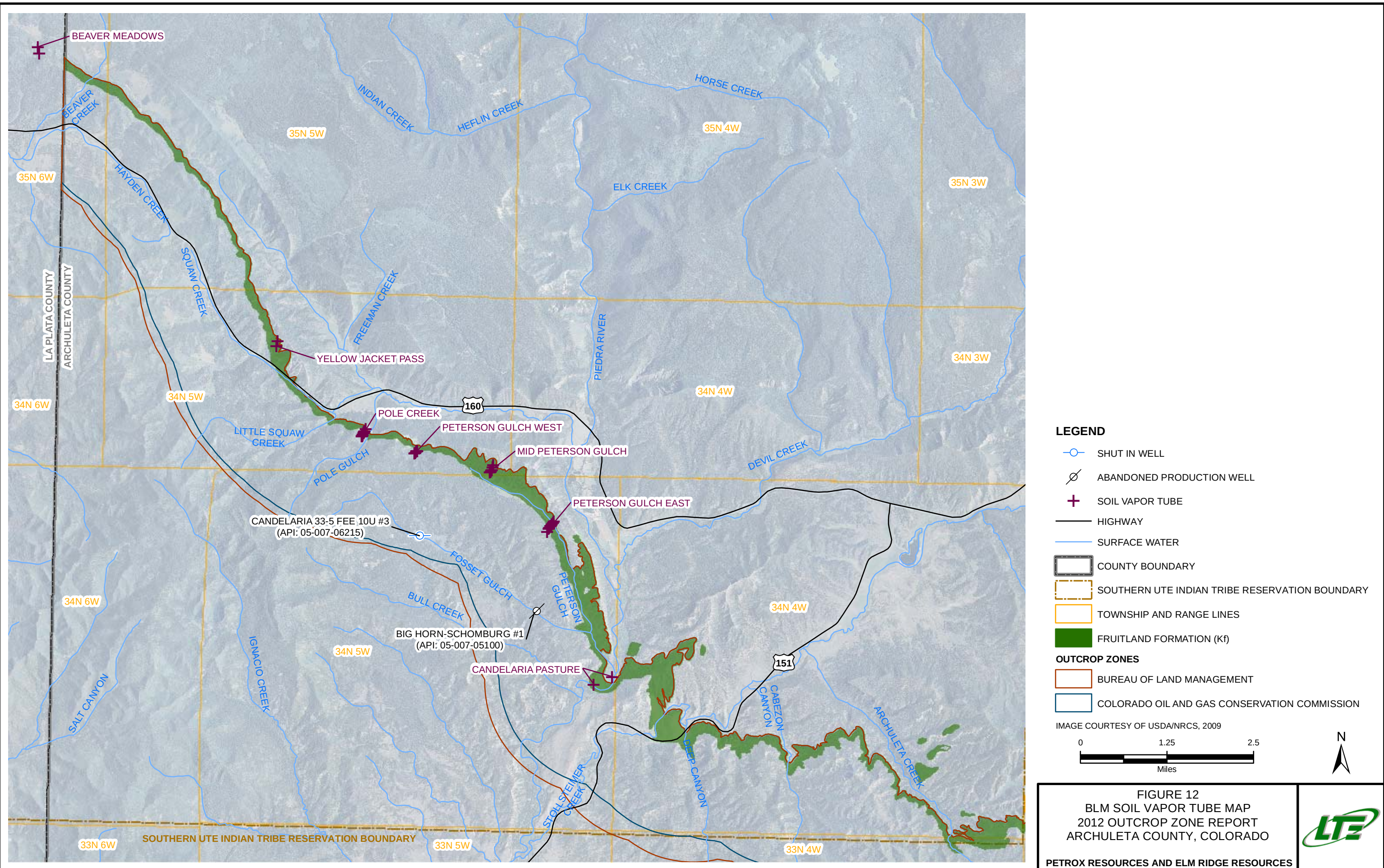
PETROX RESOURCES AND ELM RIDGE RESOURCES

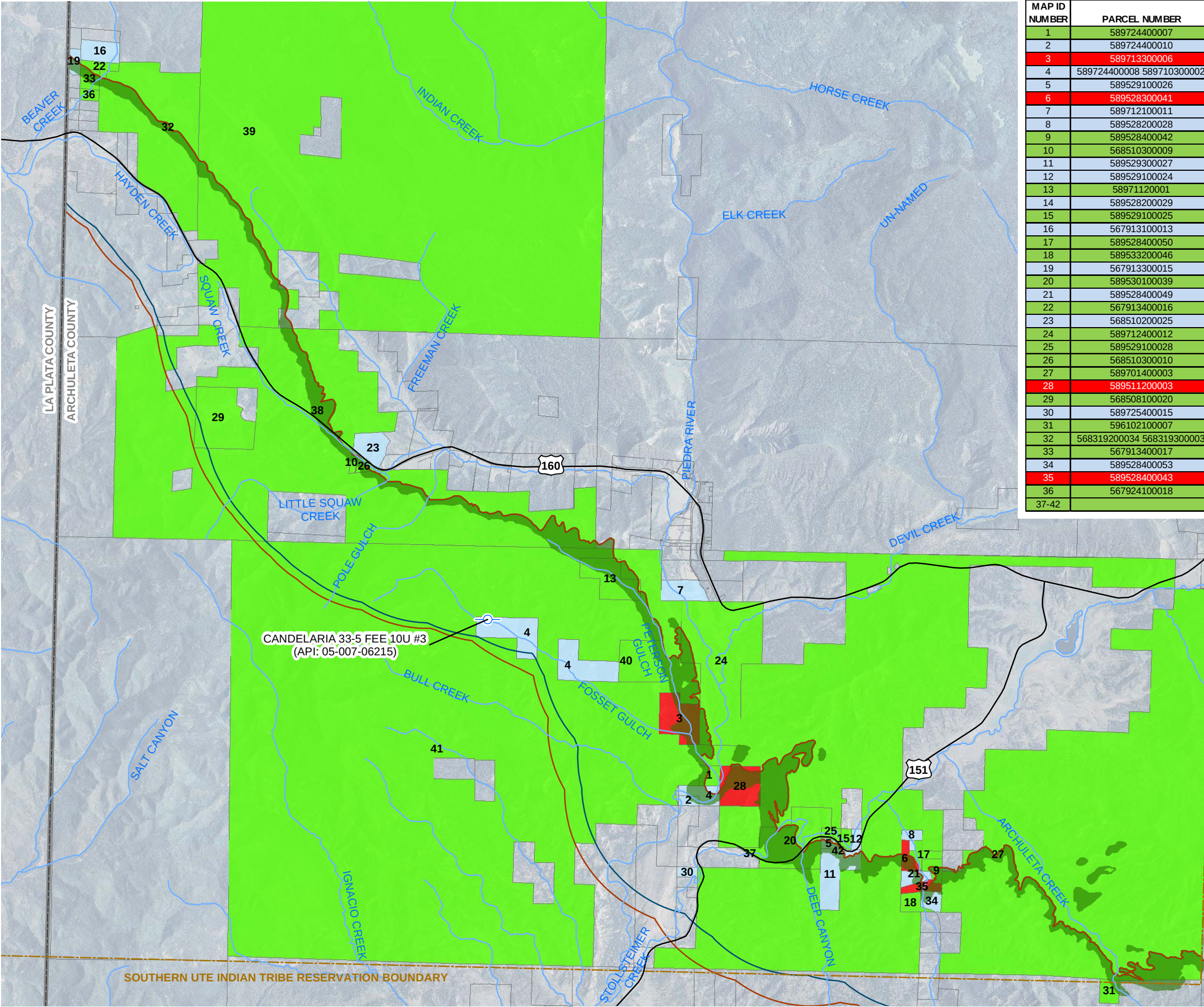












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3	589713300006	NO	CANDELARIA SUSIE E TRUST
4	589724400008 589710300002		CANDELARIA SY TRUSTEE & GILBERT CANDELARIA MEL & LEONARD & ANNET
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6	5895283000041	NO	CHENAULT ROBERT G
7	589712100011		COMMERCIAL ROCK PRODUCTS
8	589528200028		DANSBEE BILLY K & RITA S
9	589528400042	YES	EARTHBLOCK INC
10	568510300009	YES	EDWARDS DURWOOD
11	589529300027		EF COAL RESOURCES LIMITED PRTN ATTN NEWELL DANIEL K
12	589529100024		FUMAGALLI DAN E & JENIFER L
13	58971120001	YES	GRUBB JOHN W & PAMELA K
14	589528200029		GYMREK JOSEPH B
15	589529100025	YES	HEATH HAROLD E & MADELINE D
16	567913100013		JOHNSON BUILDERS
17	589528400050	YES	LEISER SANDRA J
18	589533200046	YES	LEON EUGENIAWOZNY THEODORE GPALMA GUSTAVO I
19	567913300015		LEONARD RAMONA
20	589530100039	YES	MARTINEZ MEL
21	589528400049		NEUMANN DIANE REVOCABLE TRUST
22	567913400016	YES	PEINADO EMILIO JR & KAREN R
23	568510200025		POPP JOHN R & CARI A
24	589712400012	YES	RAFTER T LLC
25	589529100028	YES	RENDEZVOUS BOOKS AND ART
26	568510300010	YES	TRACY BRYAN H & MARITES G
27	589701400003	YES	UNITED STATES OF AMERICA FOREST SERV; DEPT OF AGRICULTURE
28	589511200003	NO	UNITED STATES OF AMERICA T/F SOUTHERN UTE TRIBE
29	568508100020	YES	VANCE WILLIAM S JR
30	589725400015		VAUGHN LARRY C
31	596102100007	YES	VINZANT JAMES H & MARK N TRUSTEE VINZANT WHITNEY L & ELIZABETH C&
32	568319200034 568319300003	YES	WATSON DAVID LLOYD & WATSON DALE LLOYD
33	567913400017	YES	WOOD LEE THOMAS & PEGGY DARLENE
34	589528400053		WOZNY THEODORE G TRUST ACCOUNT
35	589528400043	NO	WRIGHT JEAN PAUL & SUSAN
36	567924100018	YES	ZWISLER MARTIN AND JANE TRUSTZWISLER RAYMOND
37-42		YES	PUBLIC LANDS

LEGEND

SHUT IN WELL

HIGHWAY

SURFACE WATER

ACCESS APPROVED

ACCESS DENIED

NO RESPONSE

COUNTY BOUNDARY

SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY

FRUITLAND FORMATION (Kf)

OUTCROP ZONES

BUREAU OF LAND MANAGEMENT

COLORADO OIL AND GAS CONSERVATION COMMISSION

IMAGE COURTESY OF USDA/NRCS, 2009

01.252.5

Miles

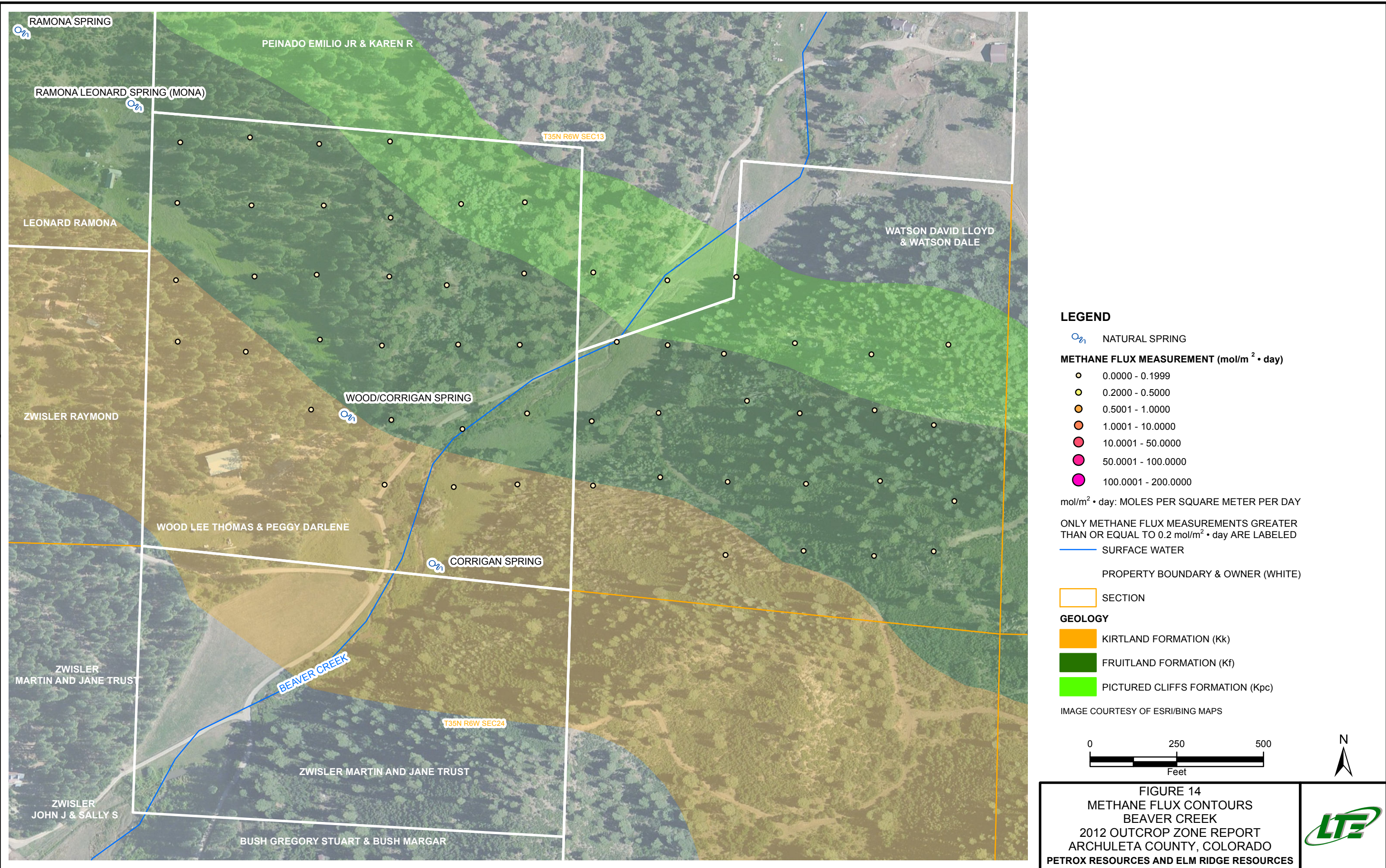
FIGURE 13

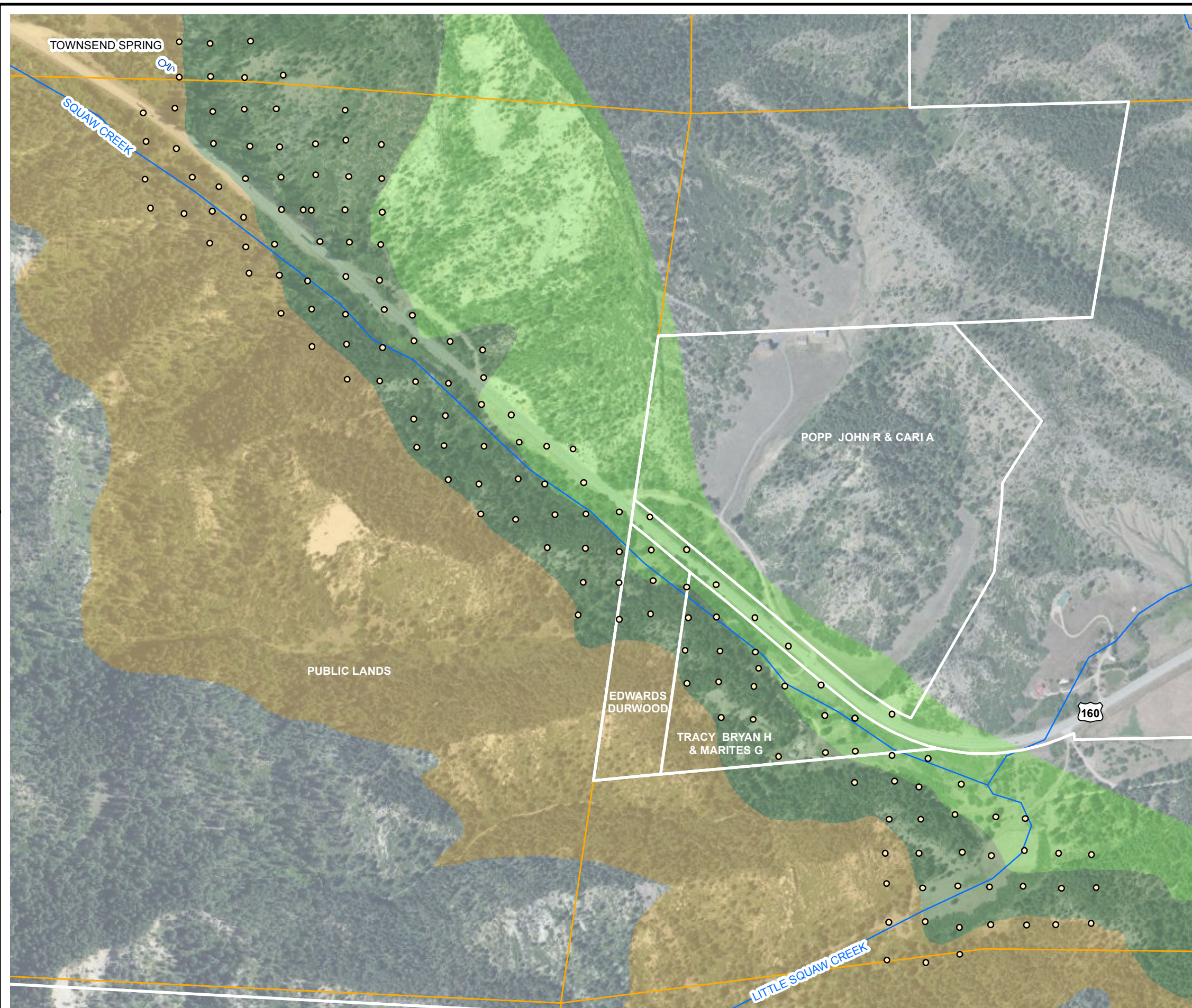
2012 PROPERTY ACCESS MAP

2012 OUTCROP ZONE REPORT

ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

NATURAL SPRING

METHANE FLUX MEASUREMENT (mol/m² • 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/m² • day: MOLES PER SQUARE METER PER DAY

ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO 0.2 mol/m² • day ARE LABELED

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

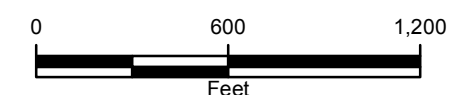
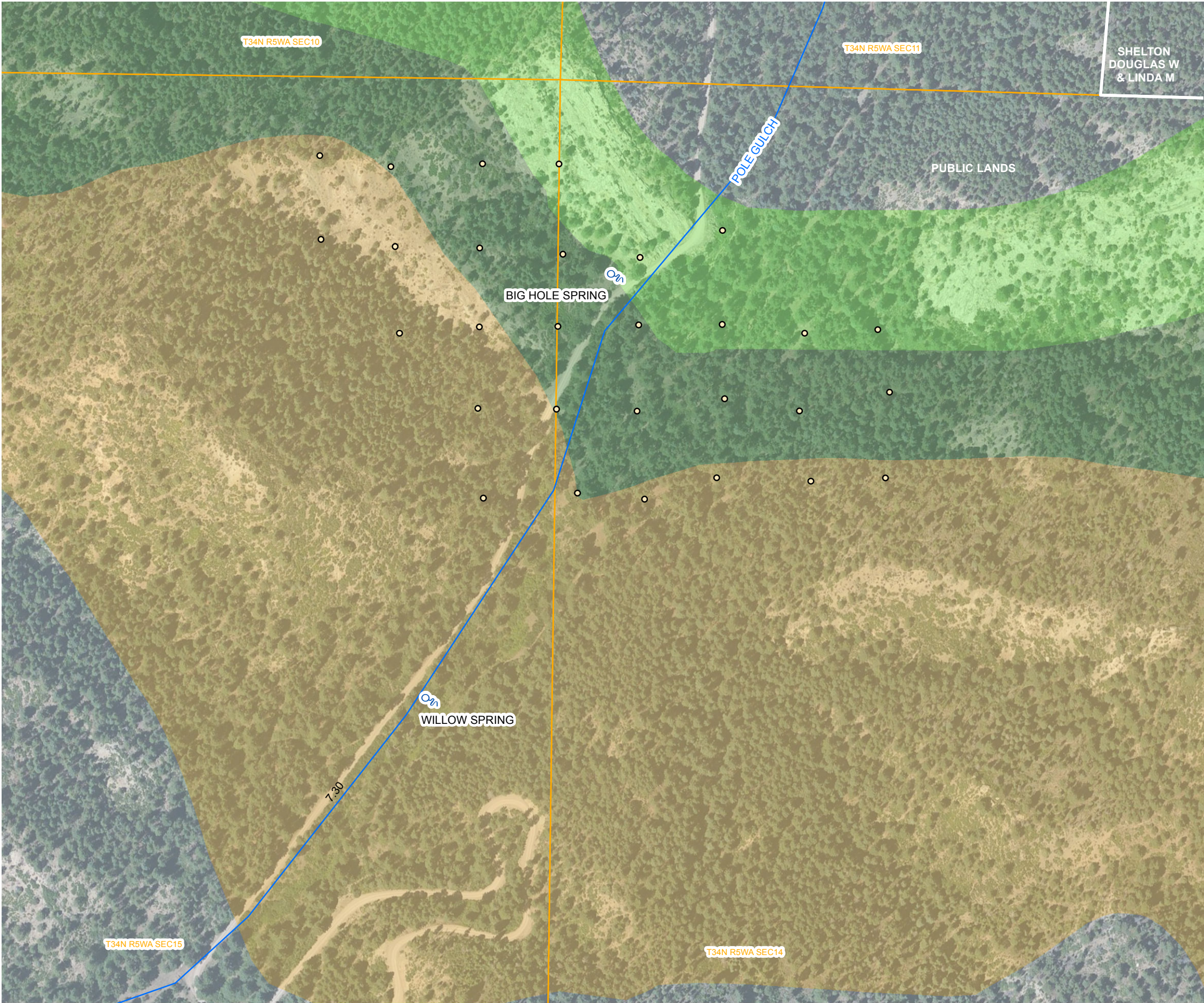


FIGURE 15
METHANE FLUX CONTOURS
SQUAW CREEK / LITTLE SQUAW CREEK
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

-  NATURAL SPRING
- METHANE FLUX MEASUREMENT (mol/m² • 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/m² • day: MOLES PER SQUARE METER PER DAY
- ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO 0.2 mol/m² • day ARE LABELED
-  SURFACE WATER
-  PROPERTY BOUNDARY & OWNER (WHITE)

-  SECTION
- GEOLOGY**
-  KIRTLAND FORMATION (Kk)
 -  FRUITLAND FORMATION (Kf)
 -  PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

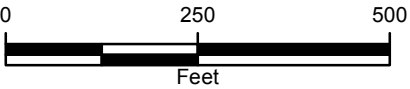
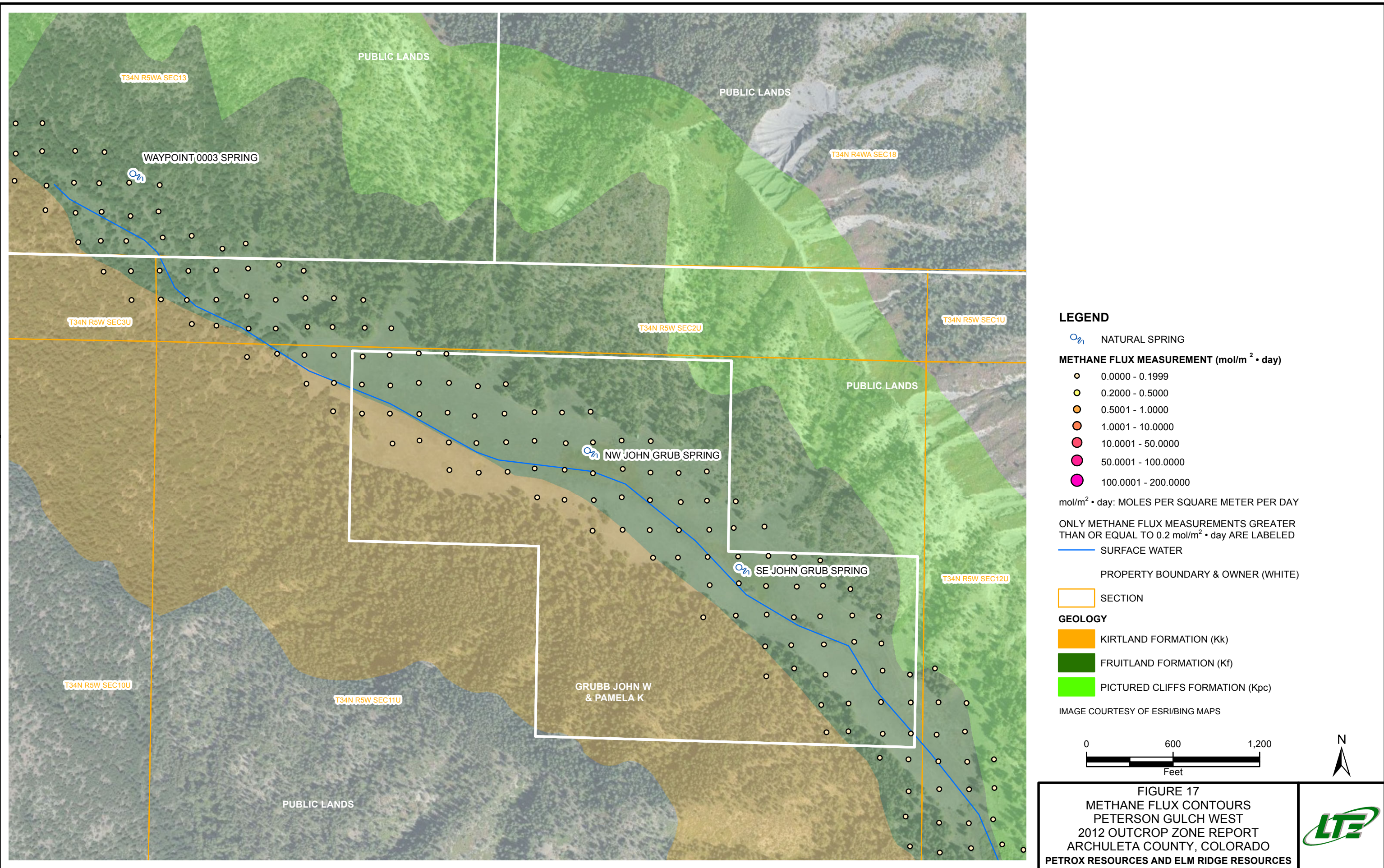
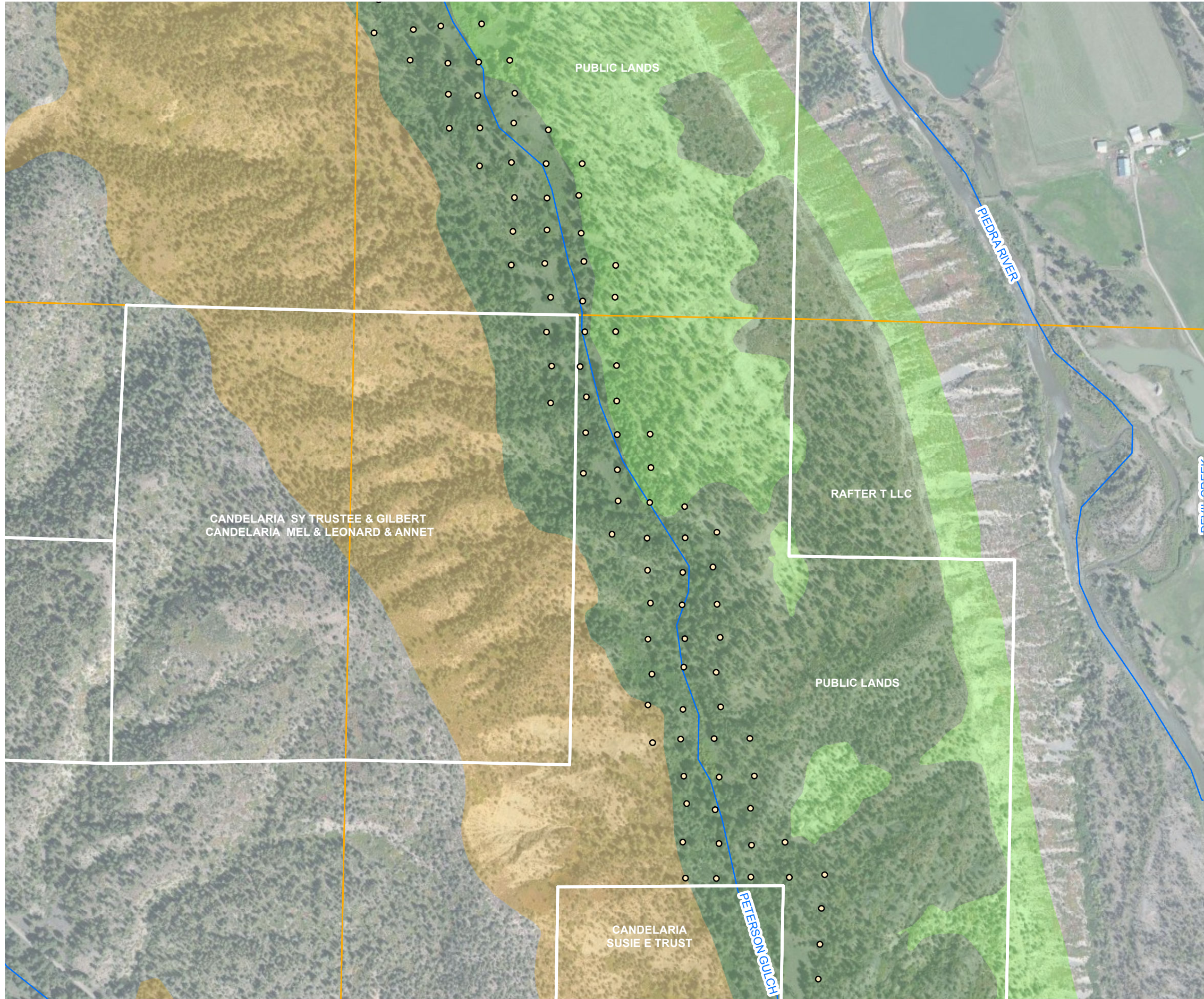


FIGURE 16
METHANE FLUX CONTOURS
POLE GULCH
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES







LEGEND

-  NATURAL SPRING
- METHANE FLUX MEASUREMENT (mol/m² • 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/m² • day: MOLES PER SQUARE METER PER DAY
- ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO 0.2 mol/m² • day ARE LABELED
-  SURFACE WATER
- PROPERTY BOUNDARY & OWNER (WHITE)

-  SECTION
- GEOLOGY**
-  KIRTLAND FORMATION (Kk)
 -  FRUITLAND FORMATION (Kf)
 -  PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

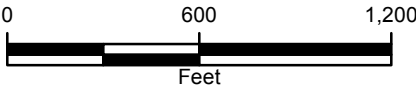
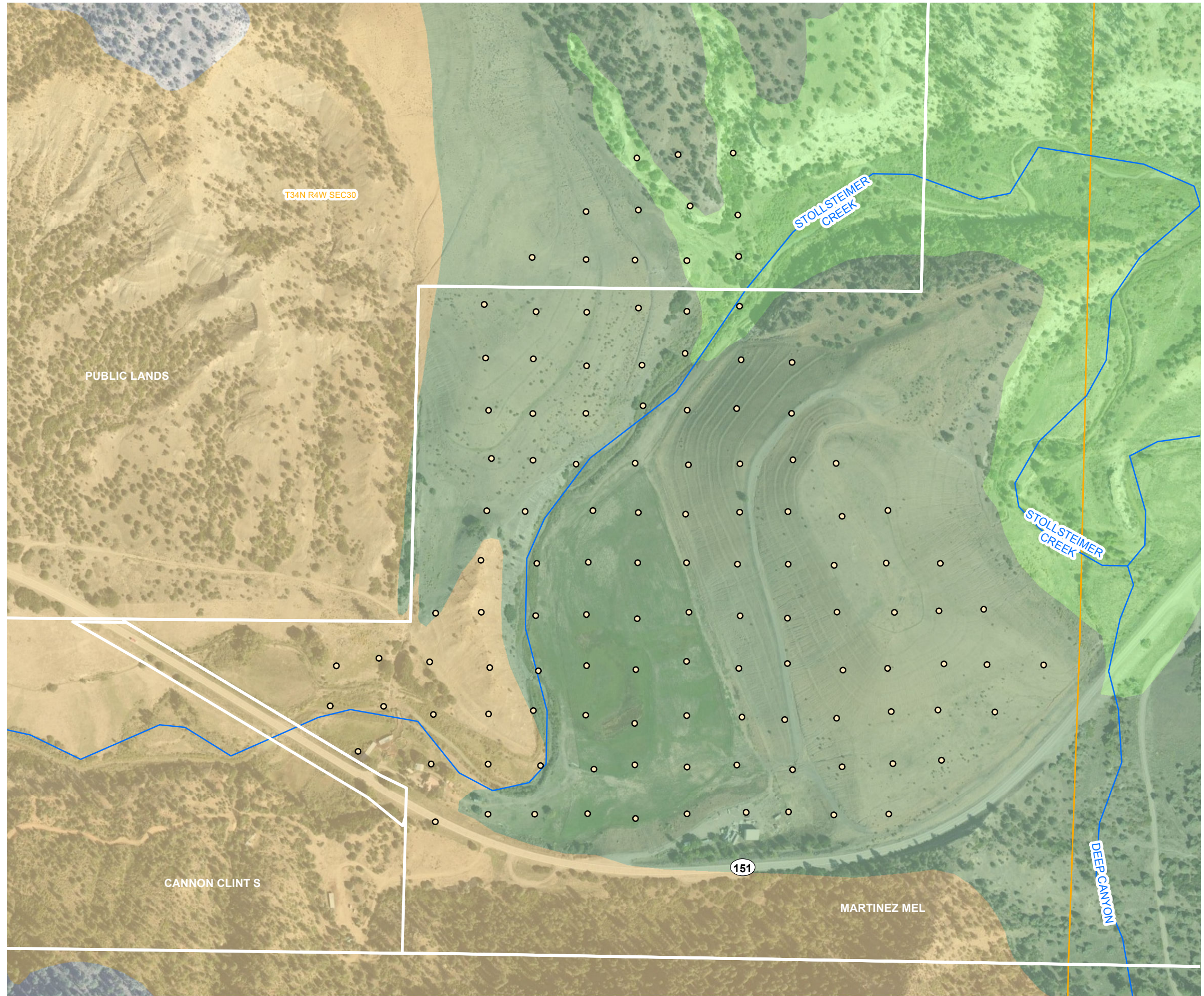


FIGURE 18
METHANE FLUX CONTOURS
PETERSON GULCH EAST
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

-  NATURAL SPRING
- METHANE FLUX MEASUREMENT ($\text{mol/m}^2 \cdot \text{day}$)**
-  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
- $\text{mol/m}^2 \cdot \text{day}$: MOLES PER SQUARE METER PER DAY
- ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO $0.2 \text{ mol/m}^2 \cdot \text{day}$ ARE LABELED
-  SURFACE WATER
- PROPERTY BOUNDARY & OWNER (WHITE)

-  SECTION
- GEOLOGY**
-  KIRTLAND FORMATION (Kk)
 -  FRUITLAND FORMATION (Kf)
 -  PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

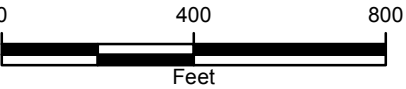


FIGURE 19
METHANE FLUX CONTOURS
STOLLSTEIMER CREEK
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

- ABANDONED PRODUCTION WELL
- METHANE FLUX MEASUREMENT (mol/m² • 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/m² • day: MOLES PER SQUARE METER PER DAY
- ONLY METHANE FLUX MEASUREMENTS GREATER THAN OR EQUAL TO 0.2 mol/m² • day ARE LABELED
- SURFACE WATER
- PROPERTY BOUNDARY & OWNER (WHITE)

- SECTION
- GEOLOGY**
 - KIRTLAND FORMATION (Kk)
 - FRUITLAND FORMATION (Kf)
 - PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

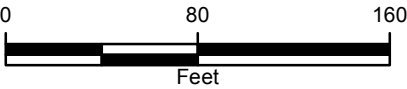


FIGURE 20
METHANE FLUX CONTOURS
BIG HORN-SCHOMBURG #1
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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

PROPERTY BOUNDARY & OWNER (WHITE)
SECTION

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

IMAGE COURTESY OF ESRI/BING MAPS

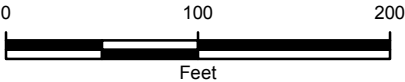


FIGURE 21
METHANE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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
- PROPERTY BOUNDARY & OWNER (WHITE)

- SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

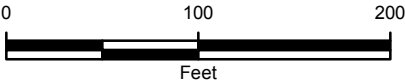
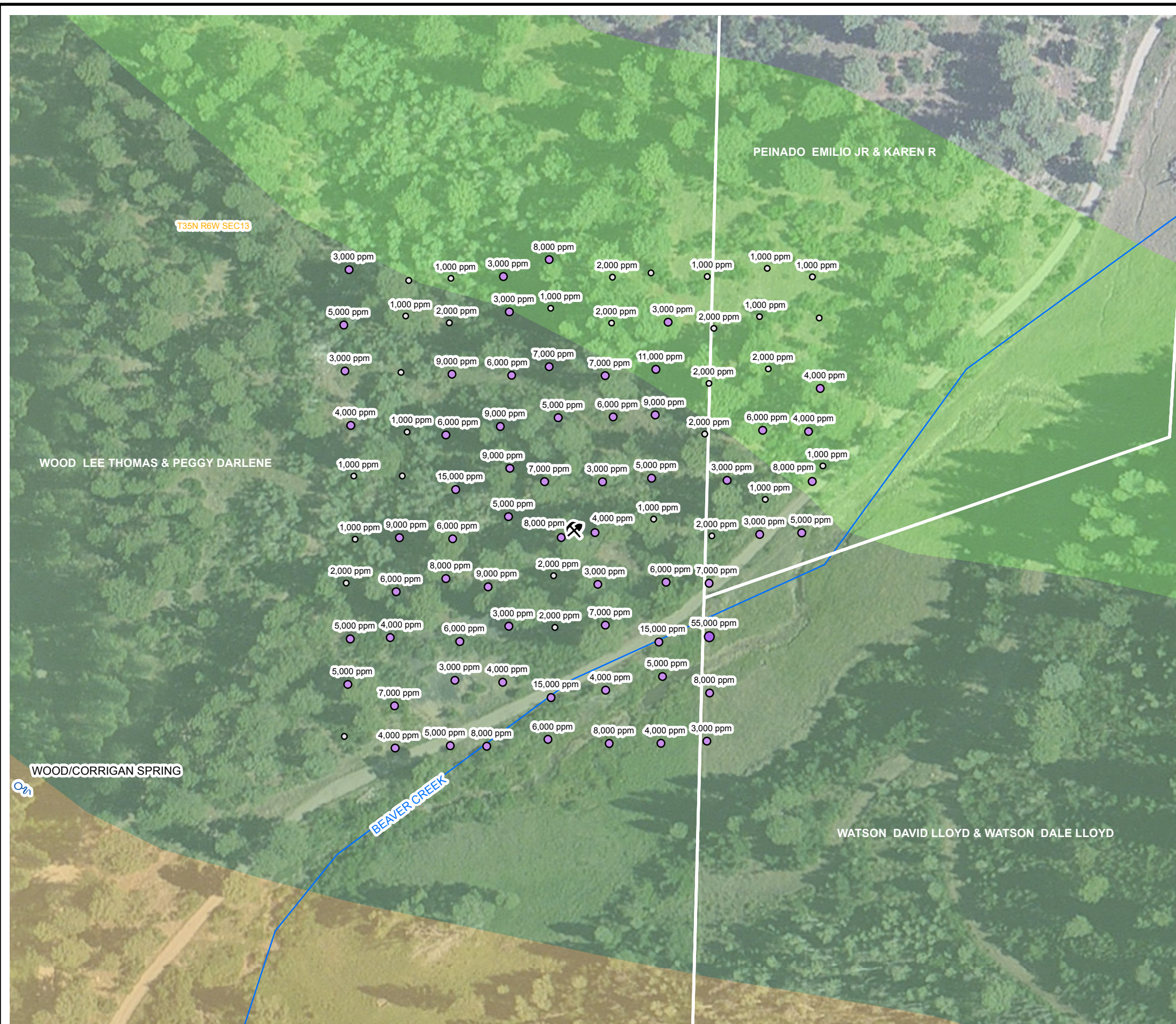


FIGURE 22
CARBON MONOXIDE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

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

SUBSURFACE 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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

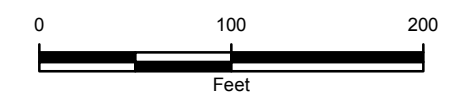


FIGURE 23
CARBON DIOXIDE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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
- PROPERTY BOUNDARY & OWNER (WHITE)

- SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

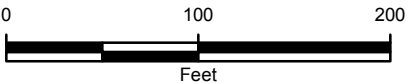
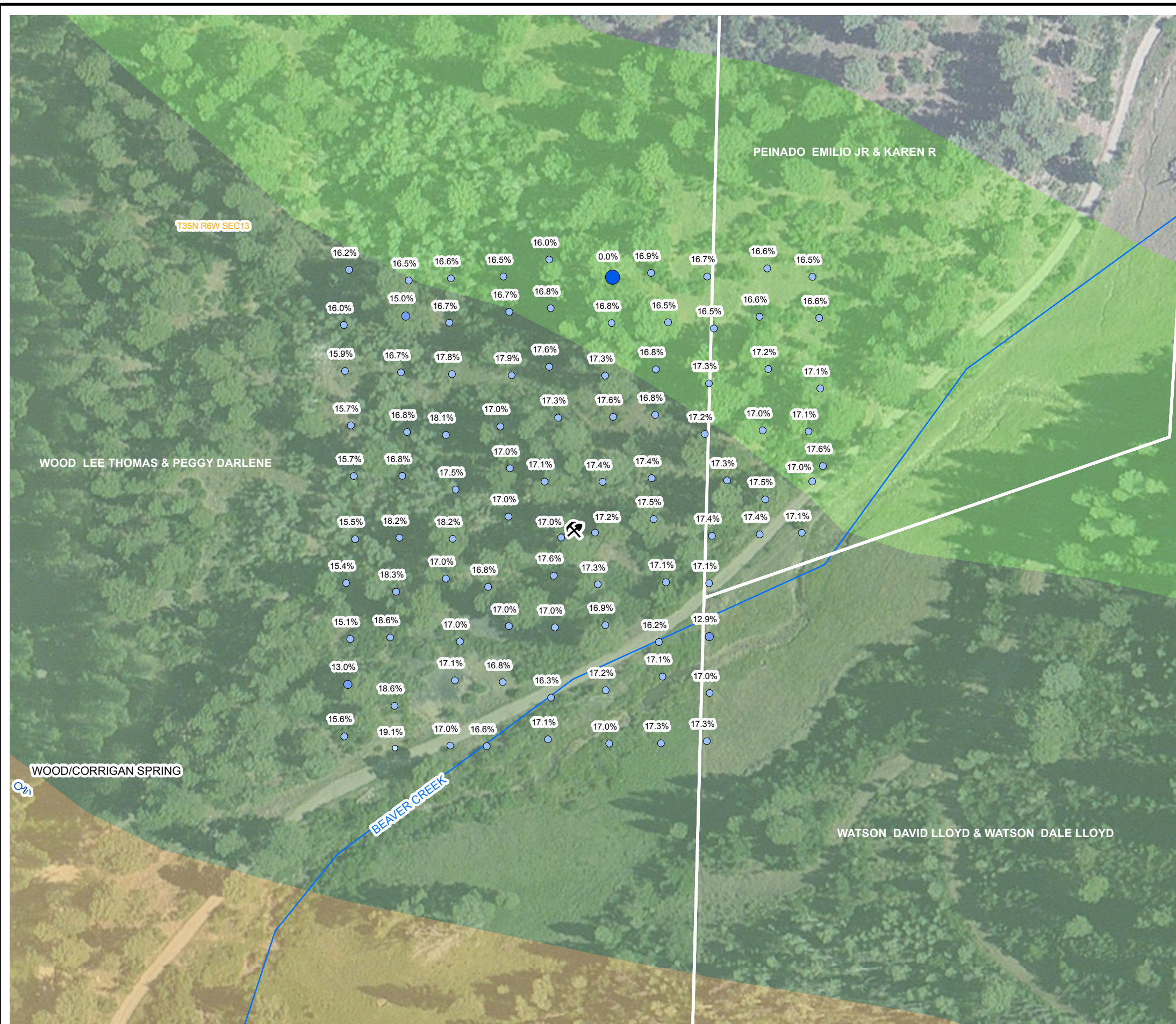


FIGURE 24
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

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

SUBSURFACE OXYGEN MEASUREMENT

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

?: PERCENT

ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

— SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

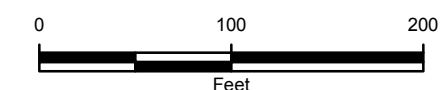
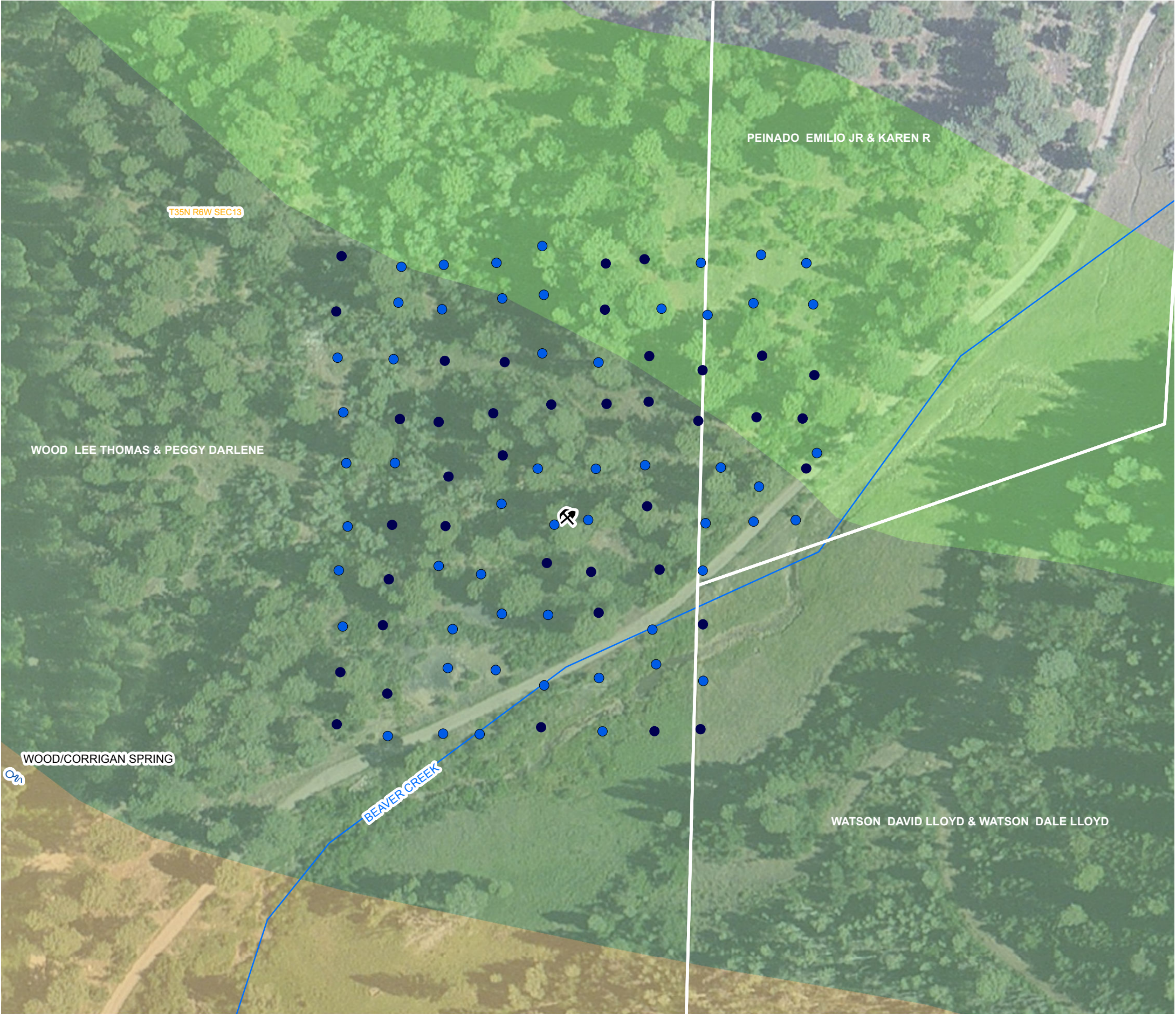


FIGURE 25
OXYGEN SOIL GAS MEASUREMENTS
TRIPLE S MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

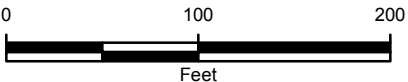
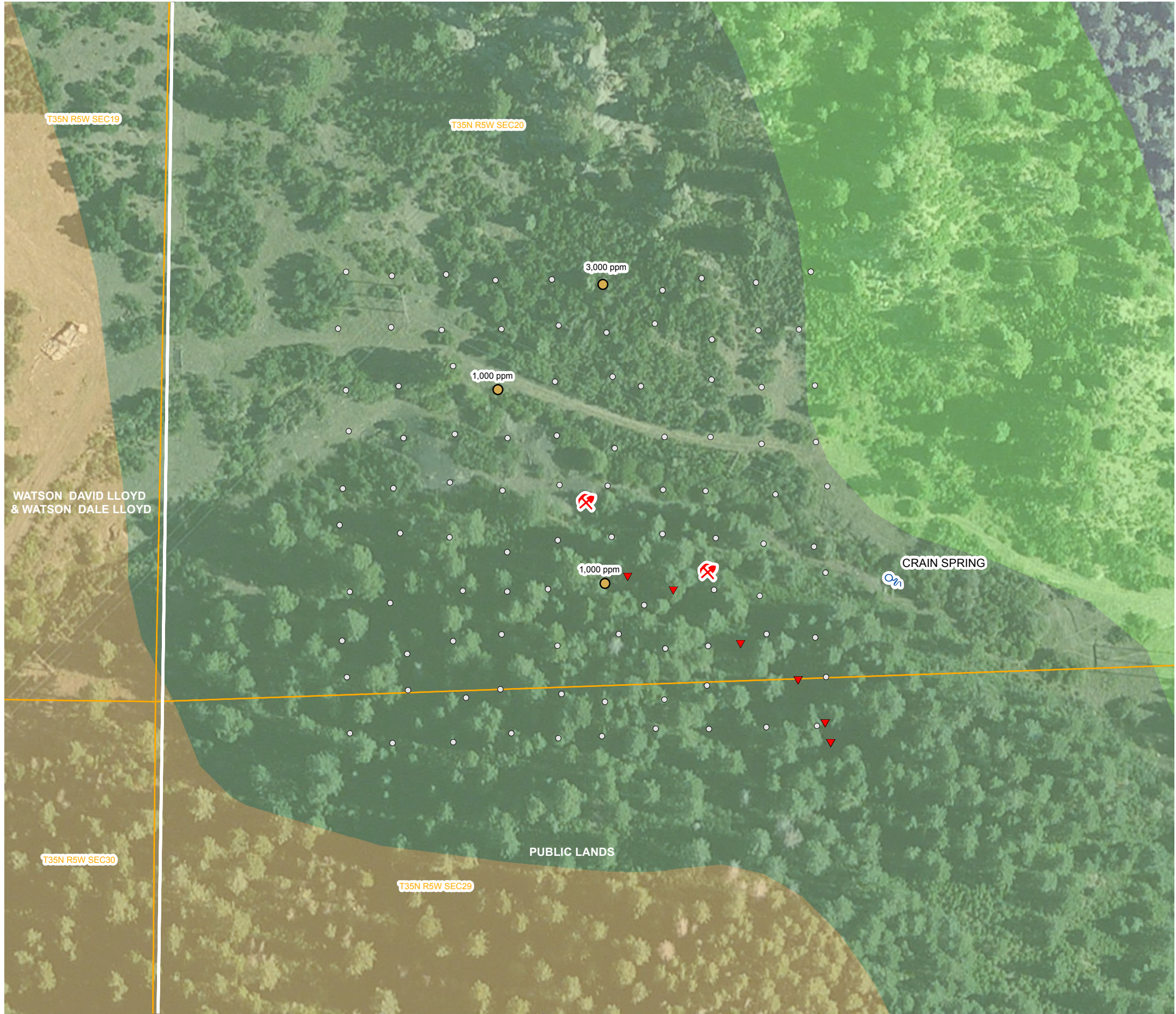


FIGURE 26
SURFACE TEMPERATURE MEASUREMENTS
TRIPLE S MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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

PROPERTY BOUNDARY & OWNER (WHITE)
SECTION

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

IMAGE COURTESY OF ESRI/BING MAPS

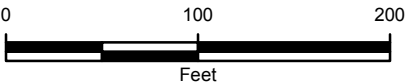
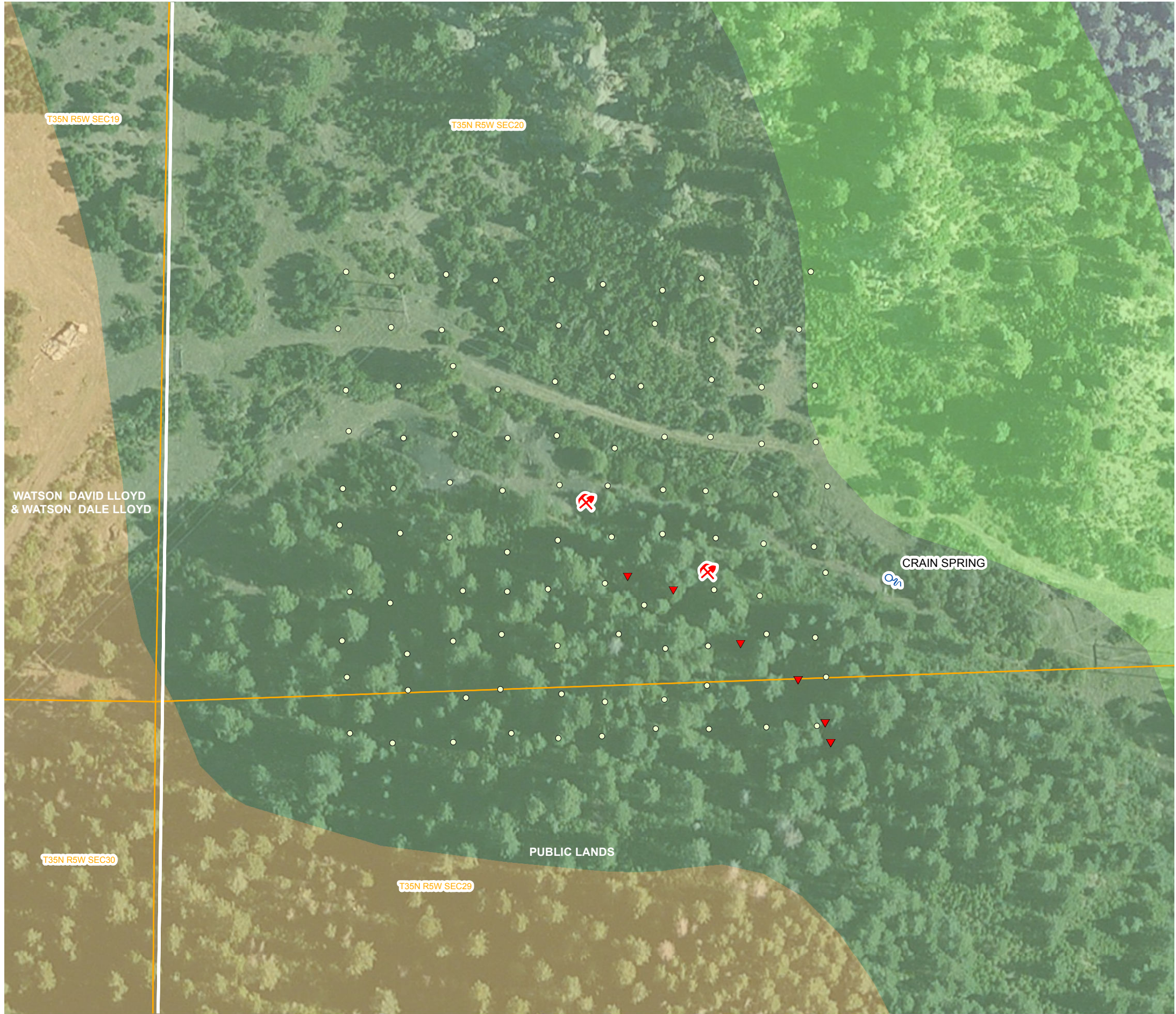


FIGURE 27
METHANE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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
- PROPERTY BOUNDARY & OWNER (WHITE)
- SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

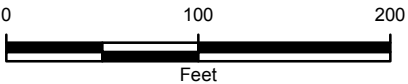
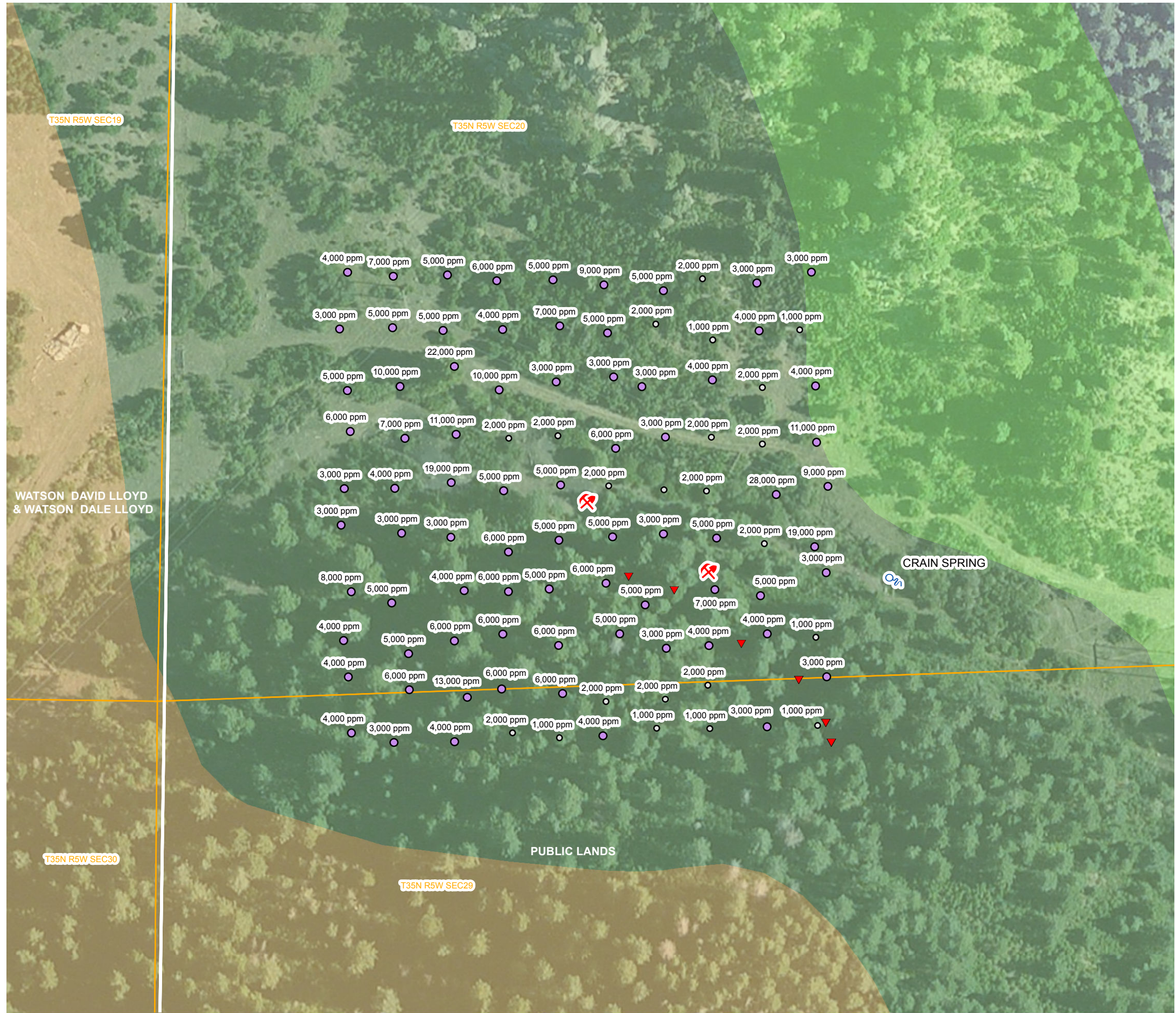


FIGURE 28
CARBON MONOXIDE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

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

SUBSURFACE 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
- PROPERTY BOUNDARY & OWNER (WHITE)

- SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

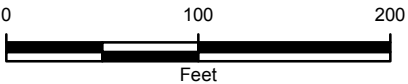
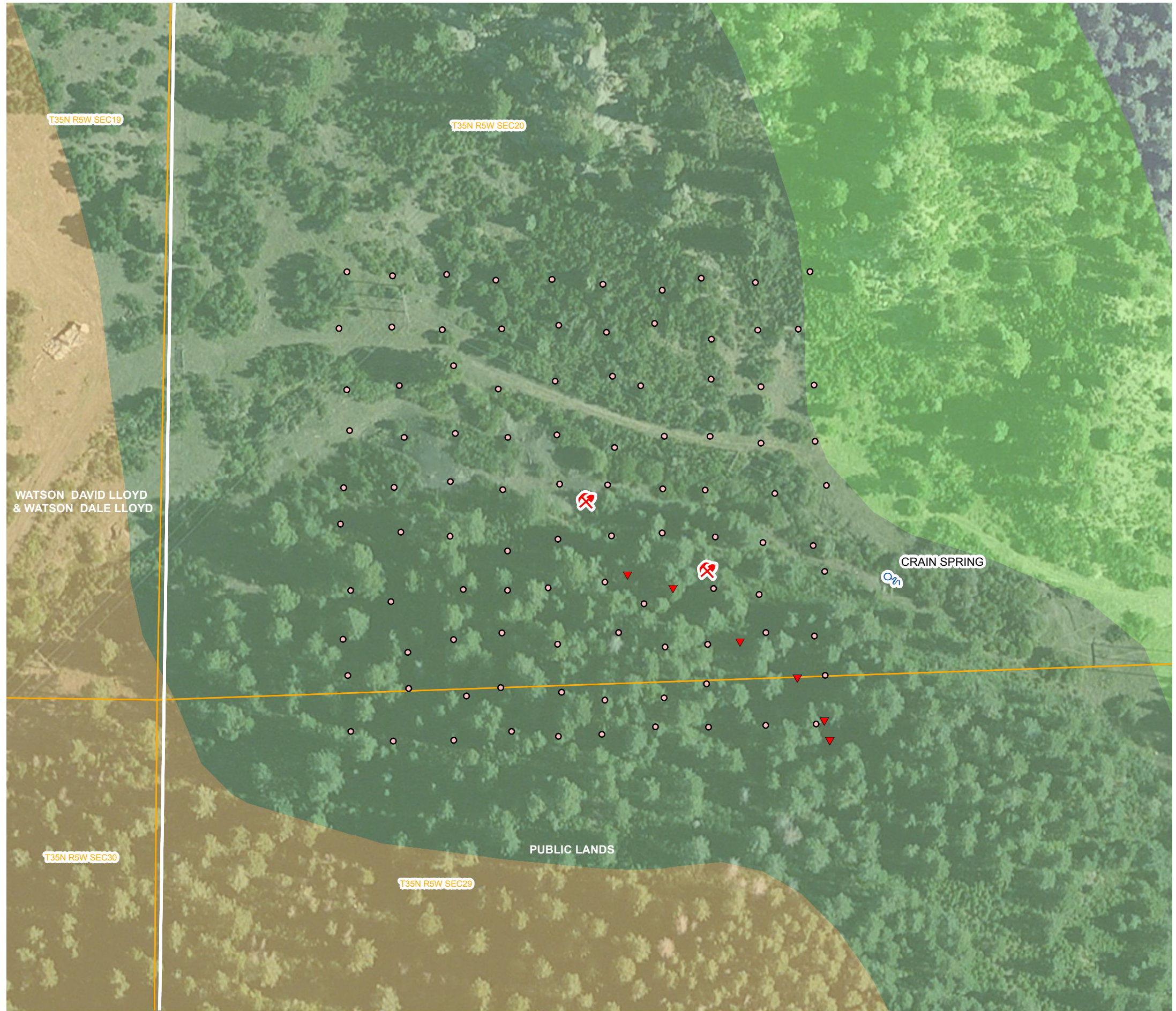


FIGURE 29
CARBON DIOXIDE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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
- PROPERTY BOUNDARY & OWNER (WHITE)

- SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

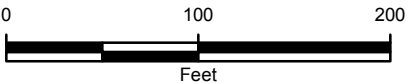
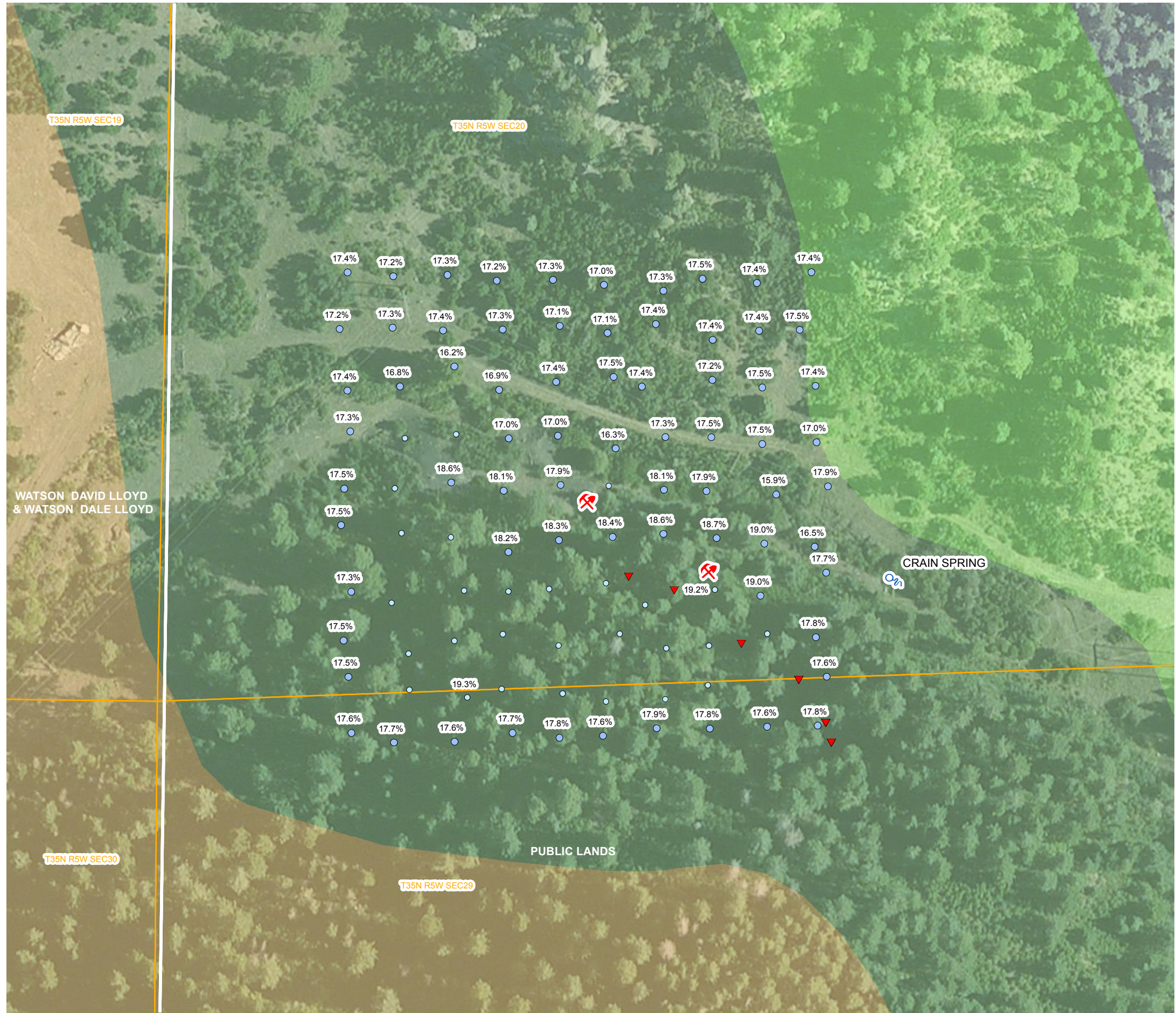


FIGURE 30
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

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

SUBSURFACE OXYGEN MEASUREMENT

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

?: PERCENT
ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

- SURFACE WATER
- PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

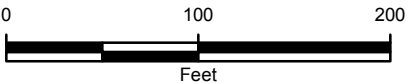
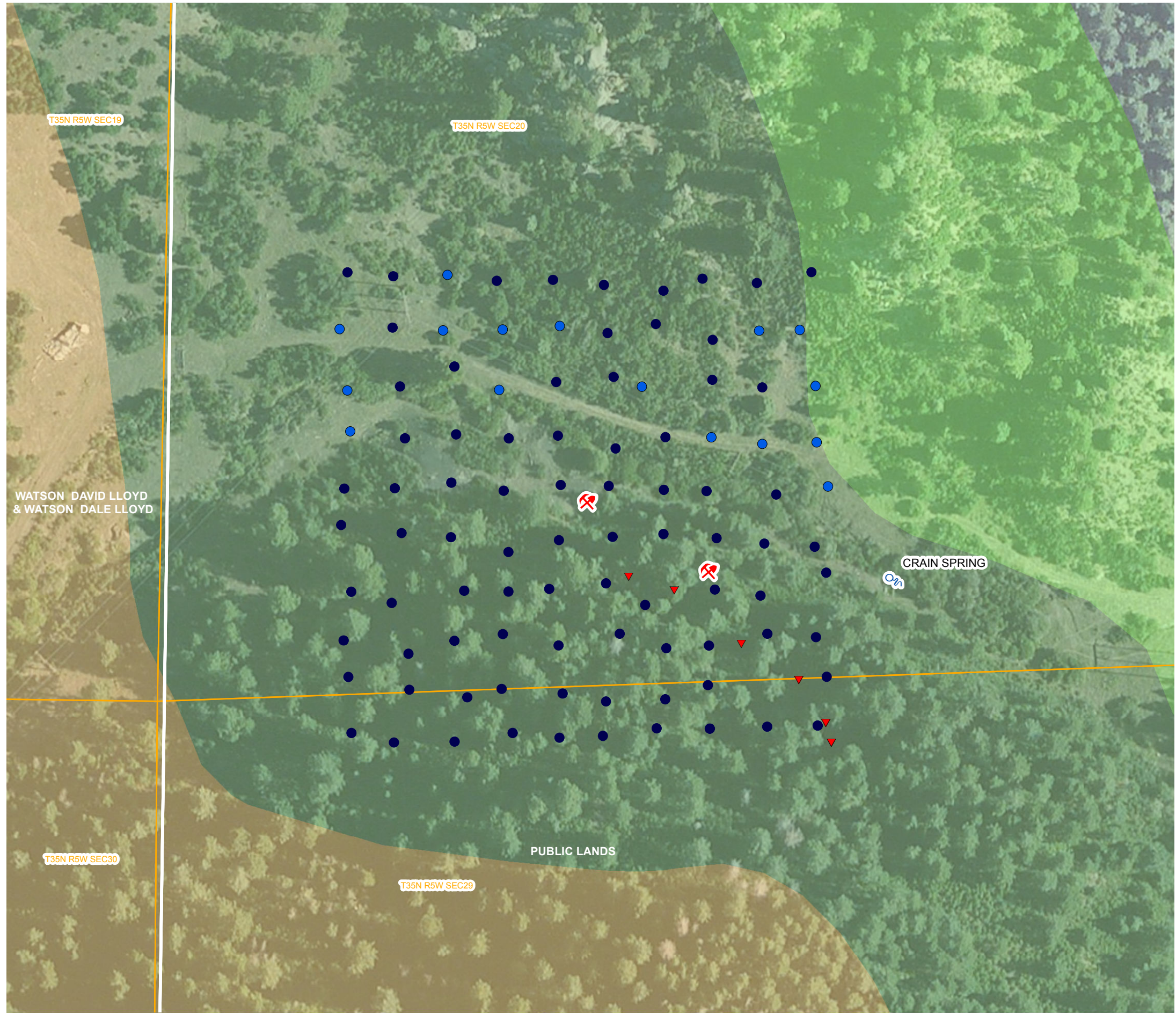


FIGURE 31
OXYGEN SOIL GAS MEASUREMENTS
COLUMBINE MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

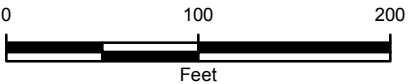


FIGURE 32
SURFACE TEMPERATURE MEASUREMENTS
COLUMBINE MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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
 PROPERTY BOUNDARY & OWNER (WHITE)

- SECTION
- GEOLOGY**
- KIRTLAND FORMATION (Kk)
 - FRUITLAND FORMATION (Kf)
 - PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

0 100 200
Feet



FIGURE 33
METHANE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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

 PROPERTY BOUNDARY & OWNER (WHITE)

 SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

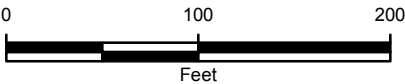


FIGURE 34
CARBON MONOXIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

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

SUBSURFACE 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
- PROPERTY BOUNDARY & OWNER (WHITE)
- SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

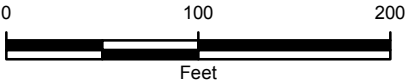


FIGURE 35
CARBON DIOXIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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

 PROPERTY BOUNDARY & OWNER (WHITE)

 SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

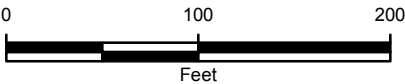


FIGURE 36
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

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

SUBSURFACE OXYGEN MEASUREMENT

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

ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

- SURFACE WATER
- PROPERTY BOUNDARY & OWNER (WHITE)

- SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

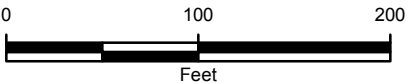


FIGURE 37
OXYGEN SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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

 PROPERTY BOUNDARY & OWNER (WHITE)

 SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

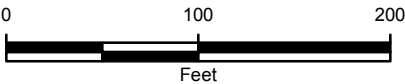


FIGURE 38
SURFACE TEMPERATURE MEASUREMENTS
CHIMNEY ROCK MINE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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

PROPERTY BOUNDARY & OWNER (WHITE)

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

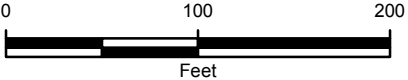


FIGURE 39
METHANE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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

 PROPERTY BOUNDARY & OWNER (WHITE)

 SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

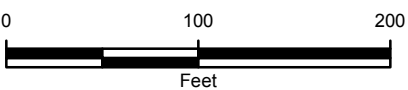
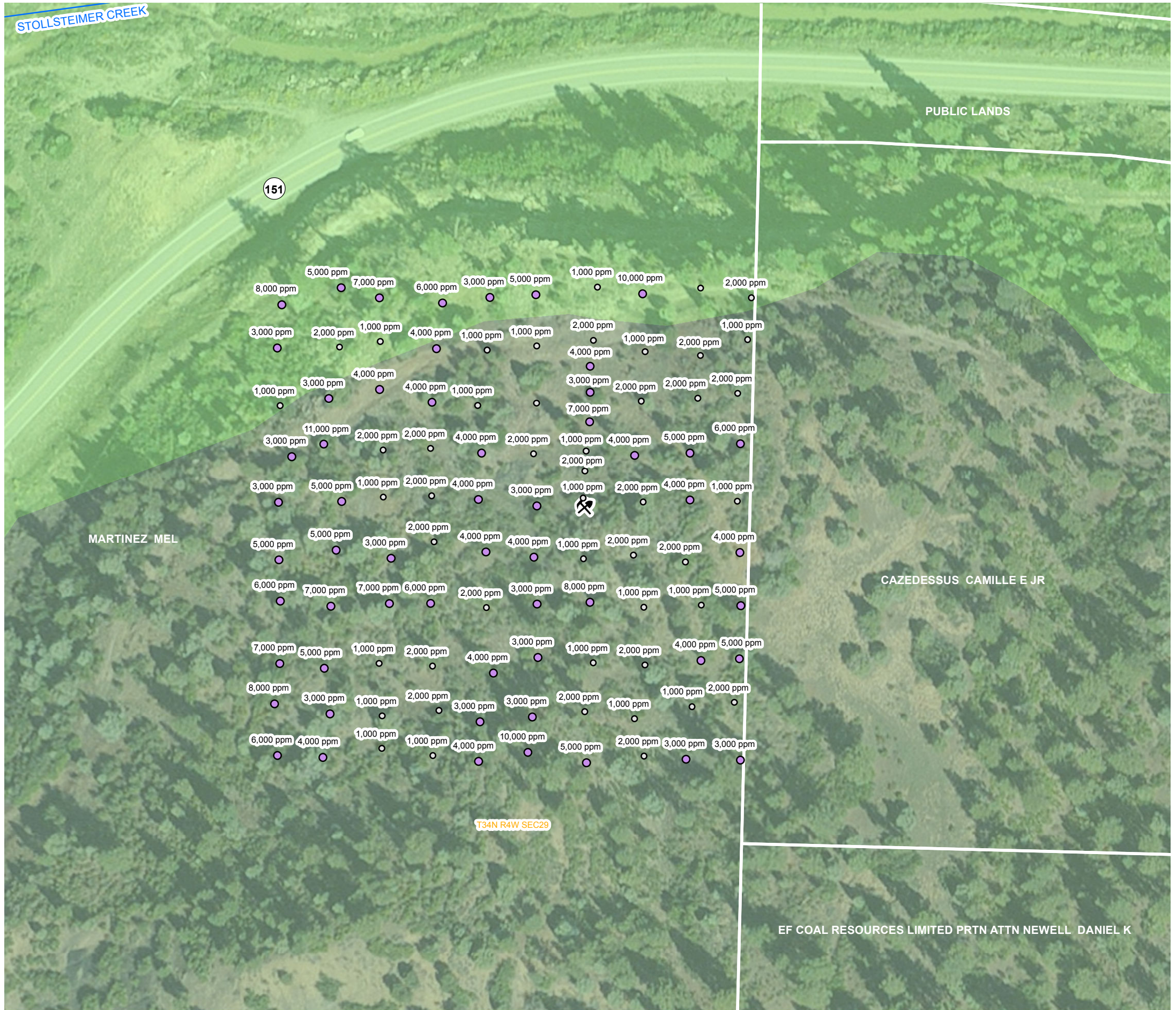


FIGURE 40
CARBON MONOXIDE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

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

SUBSURFACE 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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

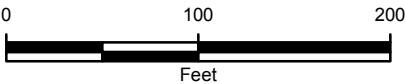


FIGURE 41
CARBON DIOXIDE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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

 PROPERTY BOUNDARY & OWNER (WHITE)

 SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

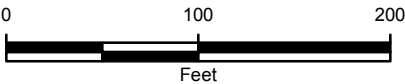
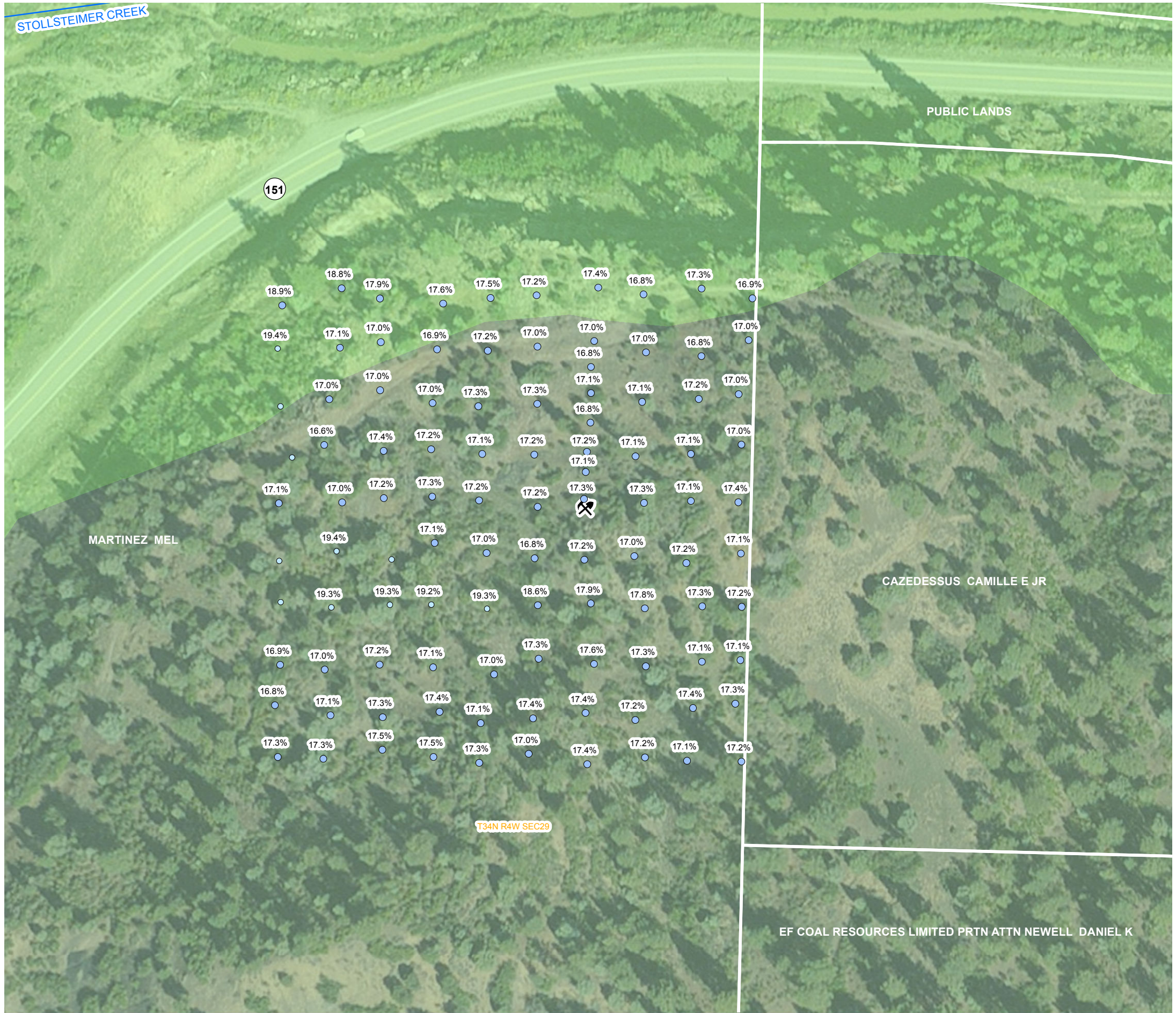


FIGURE 42
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

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

SUBSURFACE OXYGEN MEASUREMENT

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

?: PERCENT
ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

 SURFACE WATER

 PROPERTY BOUNDARY & OWNER (WHITE)

 SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

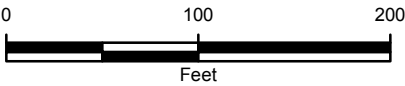
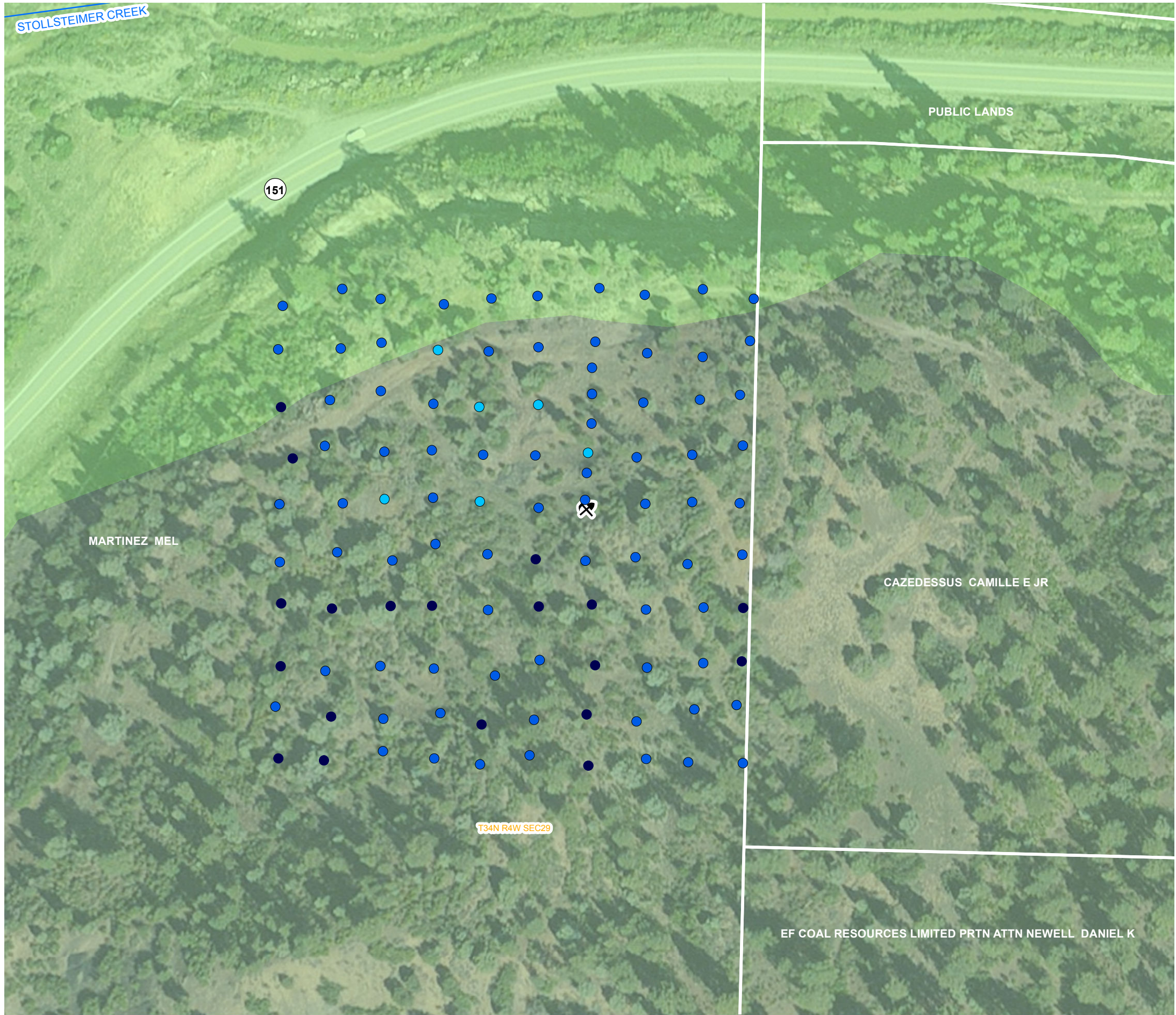


FIGURE 43
OXYGEN SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





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

 PROPERTY BOUNDARY & OWNER (WHITE)

 SECTION

GEOLOGY

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

IMAGE COURTESY OF ESRI/BING MAPS

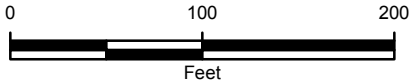
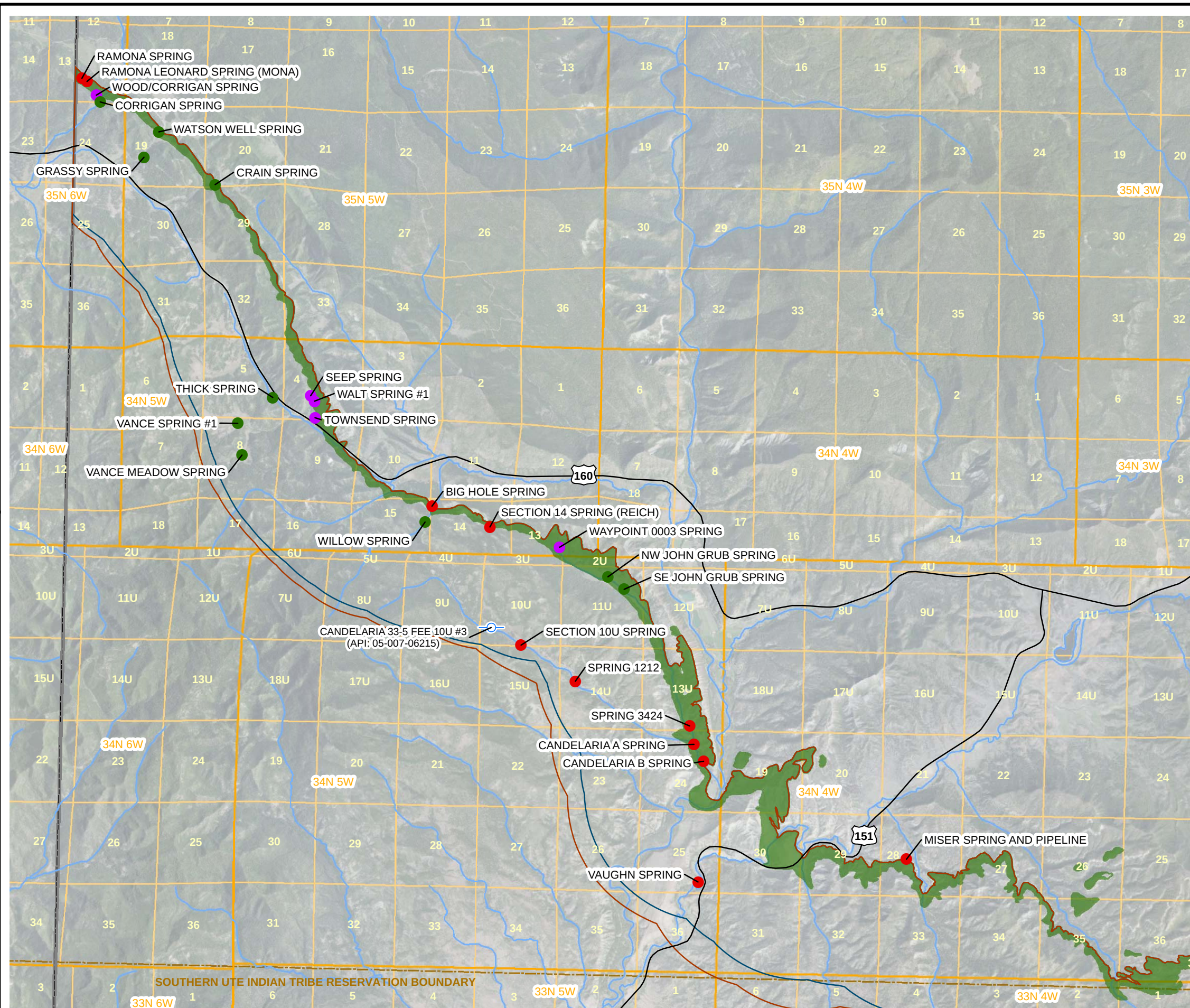


FIGURE 44
SURFACE TEMPERATURE MEASUREMENTS
STOLLSTEIMER CREEK SITE
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

○ SHUT IN WELL

2012 NATURAL SPRING STATUS

- SAMPLED
- FIELD PARAMETERS ONLY
- 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)

OUTCROP ZONES

□ BUREAU OF LAND MANAGEMENT

□ COLORADO OIL AND GAS CONSERVATION COMMISSION

SUBSURFACE METHANE MEASUREMENTS WERE COLLECTED FROM TEMPORARY SOIL PROBES ADVANCED WITH A SLIDE HAMMER AT ALL SAMPLED SPRINGS.

ALL SUBSURFACE METHANE MEASUREMENTS WERE COLLECTED IN MAY 2012. CONCENTRATIONS WERE 0 PARTS PER MILLION (ppm) METHANE FOR ALL LOCATIONS SURVEYED.

IMAGE COURTESY OF ESRI/BING MAPS

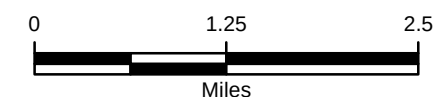


FIGURE 45
NATURAL SPRINGS STATUS
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES



TABLES

TABLE 1
NATURAL SPRINGS SAMPLING STATUS
2012 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
Ramona Spring	NS	NS	NS	Dry	Not Located	Not Located	No Access	No Access	No Access
Ramona Leonard Spring (Mona)	NS	Sampled	Sampled	Sampled	Sampled	Sampled	No Access	No Access	No Access
Wood/Corrigan Spring	NS	NS	NS	Dry	Sampled	Dry	NS	Sampled	Dry
Beaver Creek	NS	NS	NS	Sampled	NS	NS	NS	NS	NS
Corrigan Spring	NS	NS	NS	Not Located	Sampled	Dry	Dry	Sampled	Sampled
Watson Well Spring	NS	Sampled	NS	Sampled	Sampled	Sampled	Sampled	No Access	Sampled
Grassy Spring	NS	Sampled	Sampled	No Access	No Access	No Access	No Access	No Access	Sampled
Crain Spring	NS	Sampled	NS	Sampled	Sampled	Dry	Sampled	No Access	Sampled
Thick Spring	NS	Sampled	Sampled	Not Located	Sampled	Dry	NS	Sampled	Sampled
Seep Spring	NS	NS	NS	Dry	Not Located	Not Located	Not Located	Not Located	Dry
Walt Spring #1	NS	Sampled	NS	Dry	Dry	Dry	Dry	Sampled	Dry
Townsend Spring	NS	NS	NS	Dry	Dry	Dry	Dry	Dry	Dry
Vance Spring #1	NS	Sampled	Sampled	Sampled	Sampled	Sampled	Sampled	Sampled	Sampled
Vance Meadow Spring	NS	Sampled	Sampled	Sampled	Sampled	Dry	Dry	Sampled	Sampled
Willow Spring	NS	Sampled	Sampled	Sampled	Sampled	Dry	Sampled	Sampled	Sampled
Big Hole Spring	NS	Sampled		Dry	Not Located	Not Located	Dry	Dry	NS
Section 14 (Reich) Spring	Sampled	Sampled	Sampled	Sampled	Sampled	Dry	Sampled	No Access	NS
Waypoint 0003 Spring	NS	NS	NS	Not Located	Not Located	Not Located	NS	Not Located	Dry
NW John Grubb Spring	Sampled	Sampled	Sampled	Sampled	Sampled	Dry	Sampled	Sampled	Sampled
SE John Grubb Spring	Sampled	Sampled	Sampled	Sampled	Sampled	Dry	NS	Sampled	Sampled
High Watson Spring	NS	NS	NS	NS	NS	NS	NS	No Access	NS
Section 10U Spring	Sampled	Sampled	NS	No Access	No Access	No Access	No Access	No Access	No Access
Spring 1212	Sampled	Sampled	NS	No Access	No Access	No Access	No Access	No Access	No Access
Spring 3424	Sampled	Sampled	NS	No Access	No Access	No Access	No Access	No Access	No Access
Candelaria A Spring	NS		NS	No Access	No Access	No Access	No Access	No Access	No Access
Candelaria B Spring	NS	Sampled	NS	No Access	No Access	No Access	No Access	No Access	No Access
Vaughn Spring	NS	NS	NS	No Access	No Access	No Access	No Access	No Access	No Access
Miser Spring & Pipeline	NS	NS	NS	No Access	No Access	No Access	No Access	No Access	No Access

Notes:

NS - Not Sampled



TABLE 2
NATURAL SPRINGS ANALYTICAL RESULTS - MAJOR IONS
2012 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	NS	NS	NS	NS	NS	NS	NS	NS
	July 2010	NS	NS	NS	NS	NS	NS	NS	NS
	May/June 2011	NS	NS	NS	NS	NS	NS	NS	NS
	May 2012	NS	NS	NS	NS	NS	NS	NS	NS
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
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	NS	NS	NS	NS	NS	NS	NS	NS
	May 2012	NS	NS	NS	NS	NS	NS	NS	NS
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
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	NS	NS	NS	NS	NS	NS	NS	NS
	May 2011	NS	NS	NS	NS	NS	NS	NS	NS
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	NS	NS	NS	NS	NS	NS	NS	NS
	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
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
Thick Spring	October 2008	NS	NS	NS	NS	NS	NS	NS	NS
	May 2009	44.6	8.2	14.4	0.8	<10	124	28	22
	July 2010	NS	NS	NS	NS	NS	NS	NS	NS
	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
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	NS	NS	NS	NS	NS	NS	NS	NS
	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
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
Walt Spring #1	May 2011	43.8	13.6	11.7	0.6	<10	141	65	<10
	May 2012	NS	NS	NS	NS	NS	NS	NS	NS
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	NS	NS	NS	NS	NS	NS	NS	NS
	May 2012	102	39.4	21.4	2.04	<10	348	118	<10
Grassy Spring	May 2012	95.1	27.9	23.8	2.89	12	246	158	<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
Wood Spring	October 2008	NS	NS	NS	NS	NS	NS	NS	NS
	May 2009	65.7	11.6	10.7	1.6	<10	142	122	<10
	July 2010	NS	NS	NS	NS	NS	NS	NS	NS
	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

Notes:
mg/L - milligrams per liter
NA - Not Analyzed
< - less than the laboratory reporting limit



TABLE 3
BLM SOIL VAPOR TUBE DATA
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Transect Name	Line	No. of Probes	No. of Probes with Trends	First Data	Last Data	Total No. of Sampling Events	90% Significance	
							Up	Down
BM: Beaver Meadows - North of HWY 160	101-109	9	0	11/28/01	8/23/12	481		
CP: Candelaria Pasture - East of NW corner of Fosset Gulch RD, near Piedra River	201-213	13	0	10/28/04	8/17/06	163		
PG: Peterson Gulch Line 1 South of Hwy 160	101-112	12	2	5/3/00	8/27/12	504		1
PG: Peterson Gulch Line 2 - South of Hwy 160	201-206	6	0	8/19/04	8/27/12	264		
PG: Peterson Gulch Line 3 - South of Hwy 160	301-308	8	0	8/19/04	8/27/12	352		
PC: Pole Creek South of Hwy 160 on right side of Fosset Gulch Rd	101-110	10	8	8/26/04	8/23/12	420	5	
SC: Stollsteimer Creek South of Hwy 160 on State 151 one mile south of Chimney Rock Road	101-106	6	0	8/19/04	8/27/12	295		
YJP: Yellow Jacket Pass North of Hwy 160	101-103	3	1	11/28/01	8/23/12	162		1
Totals							5	2



TABLE 4
BLM SOIL VAPOR TUBE ANALYSIS RESULTS
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Transect	First Data	Last Data	Number of Readings	Maximum Concentration (ppm)	Z	Direction	Significance
Beaver Meadows							
BM-101	11/28/01	08/23/12	61	600	-0.26	down	
BM-102	11/28/01	08/23/12	60	600	0.26	up	
BM-103	11/28/01	08/23/12	60	900	0.50	up	
BM-104	11/28/01	08/23/12	60	550	0.12	up	
BM-105	01/31/02	08/23/12	59	2,520	0.56	up	
BM-106	01/31/02	08/23/12	59	900	0.11	up	
BM-107	11/28/01	08/23/12	59	800	0.54	up	
BM-108	11/28/01	08/23/12	60	750	0.62	up	
BM-109	01/31/02	05/29/02	3	450	2	up	
Candelaria Pasture							
CP-201	10/28/04	08/02/06	12	900	0.16	up	
CP-202	10/28/04	08/02/06	12	850	0.16	up	
CP-203	10/28/04	08/02/06	12	900	1.11	up	
CP-204	10/28/04	08/02/06	12	600	0.81	up	
CP-205	10/28/04	08/02/06	12	650	1.46	up	
CP-206	10/28/04	08/02/06	12	1,050	0.21	up	
CP-207	10/28/04	08/17/06	13	1,050	0.48	up	
CP-208	10/28/04	08/17/06	13	670,000	0.90	up	
CP-209	10/28/04	08/17/06	13	5,350	0		
CP-210	10/28/04	08/17/06	13	160,000	0.97	up	
CP-211	10/28/04	08/17/06	13	850	0.14	up	
CP-212	10/28/04	08/17/06	13	800	0		
CP-213	10/28/04	08/17/06	13	900	0.82	up	
Peterson Gulch							
PG-101	08/19/04	08/27/12	42	550	1.01	up	
PG-102	08/19/04	08/27/12	42	650	-1.50	down	
PG-103	08/19/04	08/27/12	42	700	-1.48	down	
PG-104	08/19/04	08/27/12	41	850	-0.47	down	
PG-105	08/19/04	08/27/12	42	1,150	-0.53	down	
PG-106	08/19/04	08/27/12	43	800	-0.61	down	
PG-107	08/19/04	08/27/12	42	650	-1.39	down	
PG-108	08/19/04	08/27/12	42	650	-1.10	down	
PG-109	08/19/04	08/27/12	42	850	-1.60	down	
PG-110	08/19/04	08/27/12	42	800	-1.45	down	
PG-111	05/03/00	08/27/12	42	700	-1.20	down	
PG-112	08/19/04	08/27/12	42	550	-1.69	down	v
PG-201	08/19/04	08/27/12	44	1,050	0.29	up	
PG-202	08/19/04	08/27/12	44	950	0.94	up	
PG-203	08/19/04	08/27/12	44	1,100	0.40	up	
PG-204	08/19/04	08/27/12	44	1,300	0.73	up	
PG-205	08/19/04	08/27/12	44	750	0.90	up	
PG-206	08/19/04	08/27/12	44	1,050	0.53	up	
PG-301	08/19/04	08/27/12	44	1,850	0.77	up	
PG-302	08/19/04	08/27/12	44	1,350	-0.18	down	
PG-303	08/19/04	08/27/12	44	850	0.41	up	
PG-304	08/19/04	08/27/12	44	950	0.91	up	
PG-305	08/19/04	08/27/12	44	700	0.08	up	
PG-306	08/19/04	08/27/12	44	1,000	0.11	up	
PG-307	08/19/04	08/27/12	44	500	0.48	up	
PG-308	08/19/04	08/27/12	44	650	0.47	up	
Pole Creek							
PC-101	08/26/04	08/23/12	42	650	1.96	up	^^
PC-102	08/26/04	08/23/12	42	700	2.07	up	^^
PC-103	08/26/04	08/23/12	42	950	1.75	up	^
PC-104	08/26/04	08/23/12	42	650	1.66	up	^
PC-105	08/26/04	08/23/12	42	800	1.88	up	^
PC-106	08/26/04	08/23/12	42	900	1.15	up	
PC-107	08/26/04	08/23/12	42	750	1.24	up	
PC-108	08/26/04	08/23/12	42	750	0.89	up	
PC-109	08/26/04	08/23/12	42	650	0.34	up	
PC-110	08/26/04	08/23/12	42	700	0.32	up	
Stollsteimer Creek							
SC-101	08/19/04	08/27/12	49	950	0.98	up	
SC-102	08/19/04	08/27/12	49	700	0.53	up	
SC-103	08/19/04	08/27/12	50	750	0.88	up	
SC-104	08/19/04	08/27/12	49	870,000	1.01	up	
SC-105	08/19/04	08/27/12	49	240,000	0.76	up	
SC-106	08/19/04	08/27/12	49	550	0.53	up	
Yellow Jacket Pass							
YJ-101	11/28/01	08/23/12	54	1,200	2.10	up	^^
YJ-102	11/28/01	08/23/12	54	1,150	0.68	up	
YJ-103	11/28/01	08/23/12	54	950	0.02	up	

Notes:
Z: Mann-Kendall test statistic. (If n<10 then S statistic is displayed).
Slope: Sen slope of trend
Direction: direction of trend (up or down)

Max conc = Methane PPM
Significance: Level of significance of trend (one tailed test)

^ or v 90.0%
^^ or vv 95.0%
^^^ or vvv 99.0%
^^^^ or vvvv 99.9%



TABLE 5
PROPERTY OWNER AND ACCESS INFORMATION
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

PID	TYPE	OWNER	OWNER ADDRESS	LEGAL DESCRIPTION	2012ACCESS
589724400007	FLUX	CANDELARIA LUCY S & GONZALES BERNADETTE M	PO BOX 1812 ARBOLES, CO 81121-0000	Sec:24, 34UN-5W	Yes
568510300009	FLUX	EDWARDS DURWOOD	309 OLDS CREEK DR FORT DAVIS, TX 79734-0000	RURAL	Yes
589528400042	FLUX	EARTHBLOCK INC	135 COUNTRY CENTER DR, SUITE F PMB 214 PAGOSA SPRING		Yes
58971120001	SPRING & FLUX	GRUBB JOHN W & PAMELA K	8325 OLD AZTEC HWY FLORA VISTA, NM 87415-0000	Sec:11, 34UN-5W	Yes
589529100025	FLUX	HEATH HAROLD E & MADELEINE D	4421 HIGHWAY 151 PAGOSA SPRINGS, CO 81147-0000	Sec:29, 34UN-4W	Yes
589528400050	FLUX	LEISER SANDRA J	1473 340TH ST MADISON, KS 66860-0000	Sec:28, 34UN-4W	Yes
589533200046	FLUX	LEON EUGENIA WOZNY THEODORE G PALMA GUSTAVO I	1601A COUNTY RD 917 PAGOSA SPRINGS, CO 81147-0000	Sec:33, 34UN-4W	Yes
589530100039	FLUX	MARTINEZ MEL	5671 HIGHWAY 151 PAGOSA SPRINGS, CO 81147-0000	RURAL	Yes
567913400016	FLUX	PEINADO EMILIO JR & KAREN R	PO BOX 706 BAYFIELD, CO 81122-0000	Sec:13, 35N-6W	Yes
589712400012	FLUX	RAFTER T LLC	340 SEABREEZE DR MARCO ISLAND, FL 34145-0000	Sec:12, 34UN-5W	Yes
589529100028	FLUX	RENDEZVOUS BOOKS AND ART	5055 HIGHWAY 151 PAGOSA SPRINGS, CO 81147-0000		Yes
568510300010	FLUX	TRACY BRYAN H & MARITES G	PO BOX 799 BAYFIELD, CO 81122-0000	Sec:10, 34N-5W	Yes
589701400003	FLUX	UNITED STATES OF AMERICA FOREST SERV; DEPT OF AGRICULTURE	ROCKY MOUNTAIN REGION 11127 W 8TH AVE LAKEWOOD, CO 80226	34UN-5W	Yes
568508100020	SPRING	VANCE WILLIAM S JR	27360 W US HWY 160 BAYFIELD, CO 81122-0000	Sec:8, 34N-5W	Yes
596102100007	FLUX	VINZANT JAMES H & MARK N TRUSTEE VINZANT WHITNEY L & ELIZABETH C&	VINZANT LARRY JOE & MARY KAY 1246 ARMSTRONG CT DERBY, KS 67037	Sec:2, 33N-4W	Yes
568319200034 568319300003	SPRING & FLUX	WATSON DAVID LLOYD & WATSON DALE LLOYD	30301 US HWY 160 BAYFIELD, CO 81122-0000	Sec:19, 35N-5W	Yes
567913400017	SPRING & FLUX	WOOD LEE THOMAS & PEGGY DARLENE	31861 L W HWY 160 BAYFIELD, CO 81122-0000	Sec:13, 35N-6W	Yes



TABLE 5
PROPERTY OWNER AND ACCESS INFORMATION
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

567924100018	FLUX	ZWISLER MARTIN AND JANE TRUST ZWISLER RAYMOND	31861 K HIGHWAY 160 BAYFIELD, CO 81122	Sec:24, 35N-6W	Yes
589713300006	SPRING & FLUX	CANDELARIA SUSIE E TRUST	8815 N ACACIA GROVE TUCSON, AZ 85743	RURAL	No
589528300041	SPRING	CHENAULT ROBERT G	PO BOX 328 BLOOMFIELD, NM 87413-0000	RURAL	No
589511200003	FLUX	UNITED STATES OF AMERICA T/F SOUTHERN UTE TRIBE	PO BOX 737 IGNACIO, CO 81137-0000	34UN-4W	No
589528400043	FLUX	WRIGHT JEAN PAUL & SUSAN	1023 COUNTY RD 917 PAGOSA SPRINGS, CO 81147-0000	Sec:28, 34UN-4W	No
589724400010	FLUX	CANDELARIA ROGER	9105 SIXTH ST LANHAM, MD 20706-0000	Sec:24, 34UN-5W	No Response
589724400008 589710300002	FLUX	CANDELARIA SY TRUSTEE & GILBERT CANDELARIA MEL & LEONARD & ANNET	YOUNG LORRAINE & ABEYTA VILLA PO BOX 1771 ARBOLES, CO 81121-0000	Sec:24, 34UN-5W	No Response
589529100026	FLUX	CAZEDESSUS CAMILLE E JR	PO BOX 2340 PAGOSA SPRINGS, CO 81147-2340	Sec:29, 34UN-4W	No Response
589712100011	FLUX	COMMERCIAL ROCK PRODUCTS	1139 CR 175 BAYFIELD, CO 81122-0000		No Response
589528200028	FLUX	DANSBEE BILLY K & RITA S	482 COUNTY RD 917 PAGOSA SPRINGS, CO 81147-0000	Sec:28, 34UN-4W	No Response
589529300027	FLUX	EF COAL RESOURCES LIMITED PRTN ATTN NEWELL DANIEL K	PO BOX 773457 STEAMBOAT SPRINGS, CO 80477-0000	Sec:29, 34UN-4W	No Response
589529100024	FLUX	FUMAGALLI DAN E & JENIFER L	P O BOX 729 POST, TX 79356-0729	Sec:29, 34UN-4W	No Response
589528200029	FLUX	GYMREK JOSEPH B	PO BOX 880220 PUKALANI, HI 96788	Sec:28, 34UN-4W	No Response
567913100013	FLUX	JOHNSON BUILDERS	PO BOX 1159 BAYFIELD, CO 81122-1159		No Response
567913300015	SPRING	LEONARD RAMONA	PO BOX 207 MAYER, AZ 86333-0000	Sec:13, 35N-6W	No Response
589528400049	FLUX	NEUMANN DIANE REVOCABLE TRUST	427 FARRINGTON DR LINCOLNSHIRE, IL 60069	Sec:28, 34N-4W	No Response
568510200025	FLUX	POPP JOHN R & CARI A	1325 E RD 3 SOUTH CHINO VALLEY, AZ 86323-0000	Sec:10, 34N-5W	No Response
589725400015	SPRING	VAUGHN LARRY C	6505A HWY 151 PAGOSA SPRINGS, CO 81147-0000	Sec:25, 34UN-5W	No Response
589528400053	FLUX	WOZNY THEODORE G TRUST ACCOUNT	1601 COUNTY RD 917 PAGOSA SPRINGS, CO 81147-0000	Sec:28, 34UN-4W	No Response



TABLE 6
METHANE FLUX DATA
2012 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	2007	2008	2009	2010	2011	2012	2007	2008	2009	2010	2011	2008	2009	2010	2011	2012
Beaver Creek	14	53	46	48	48	54	1	0	0	0	1	0	0.2000	0.1579	0.0607	0.0740	0.5347	0	0	0	NA	0.0
Little Squaw Creek	21	77	78	77	76	29	2	2	0	0	0	0	0.2300	0.2911	0.0268	0.0852	0.0830	0.27	0	0	0	0
Yellow Jacket Pass/ Squaw Creek	10	208	170	204	205	127	0	0	0	0	0	0	0.0700	0.0373	0.0970	0.0140	0.1366	0	0	0	0	0
Pole Gulch	10	86	87	85	88	29	1	0	1	0	0	0	0.3000	0.1775	0.2156	0.1089	0.0117	0	0.02	0	0	0
Peterson Gulch	18	357	331	382	412	263	1	0	0	0	0	0	0.2300	0.1925	0.1733	0.0069	0.1991	0	0	0	0	0
Stollsteimer Creek	11	201	203	176	195	122	0	3	2	0	1	0	0.1500	0.3440	0.3382	0.1493	0.2997	0.38	0.50	0	NA	0.0
TOTAL	84	982	915	972	1024	624	5	5	3	0	2	0	--	--	--	--	--	0.65	0.52	0	NA	0.0

Abandoned Production Well																						
Big Horn-Schomburg #1	5	9	5	9	26	18	1	0	1	0	1	0	0.2364	0.0661	0.0055	0.0852	0.2122	--	--	--	--	--

Notes:
moles/m²·day - moles per meter squared per day
MCFD - thousand cubic feet per day
-- - No data available
> - greater than

¹Only methane flux values that were greater than the portable flux meter reporting limit of 0.2 moles/m²·day were used in calculations
Bold indicates methane flux values above the reporting limit
NA - Not applicable due to insufficient data points to calculate volumetric methane flux



TABLE 7
NATURAL SPRINGS FIELD OBSERVATIONS AND MEASUREMENTS
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Natural Spring	2011 Field Observations / Notes	2012 Field Observations/ Notes	Inspection Date	Water Quality Field Measurements				
				Conductivity (µS/cm)	pH (Units)	ORP (mV)	Temperature (°C)	TDS (ppm)
Ramona Leonard Spring (Mona)	Not sampled due to access	Not Sampled due to access	9/19/2005	NM	NM	NM	NM	NM
			6/1/2006	768.4	6.35	107	13.5	522.4
			10/13/2007	793.5	7.68	42	11.8	413.4
			10/16/2008	879	6.99	185.6	9.67	571
			5/28/2009	793	6.97	NM	9.1	NM
			10/8/2009	825	7.24	NM	10	NM
			7/12/2010	NM	NM	NM	NM	NM
Ramona Spring	Not sampled due to access	Not sampled due to access	6/1/2006	NM	NM	NM	NM	NM
			10/14/2007	NM	NM	NM	NM	NM
			10/16/2008	NM	NM	NM	NM	NM
			5/28/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
Wood/Corrigan Spring	Sampled	Dry	6/1/2006	NM	NM	NM	NM	NM
			10/14/2008	NM	NM	NM	NM	NM
			10/16/2008	NM	NM	NM	NM	NM
			5/14/2009	480	6.96	NM	7.5	NM
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	NM	NM	NM	NM	NM
			5/3/2011	476	7.13	279.2	12.1	241
Corrigan Spring	Sampled	Sampled	5/24/2012	NM	NM	NM	NM	NM
			6/1/2006	170.3	6.08	122	17.7	109.7
			10/13/2007	NM	NM	NM	NM	NM
			10/16/2008	NM	NM	NM	NM	NM
			5/14/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	NM	NM	NM	NM	NM
Beaver Creek	Not Sampled	Not Sampled	5/3/2011	253	6.83	97.4	22.5	126
			5/24/2012	162.3	6.53	-45.2	11.5	81.2
			10/13/2007	286.6	8.00	21	10.0	146.6
			10/16/2008	303.0	7.40	166.0	5.80	197
Watson Well Spring	Not sampled due to access	Sampled	5/14/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
			6/1/2006	745.5	7.29	34	13.0	507.7
			10/14/2007	NM	NM	NM	NM	NM
			10/16/2008	869.0	6.9	273.20	13.90	565
			5/28/2009	705	6.9	NM	9.9	NM
			10/8/2009	852	6.9	NM	13.4	NM
High Watson Spring	Not sampled due to access	Not sampled due to access	7/12/2010	570	6.75	NM	17.8	NM
			5/23/2012	836	6.46	9.5	20.3	418
			10/16/2008	NM	NM	NM	NM	NM
			5/28/2009	NM	NM	NM	NM	NM
Grassy Spring	Not sampled due to access	Sampled	10/8/2009	NM	NM	NM	NM	NM
			5/23/2012	789	7.49	18.1	16.7	392
			6/1/2006	570.3	7.5	-115	29.1	375.3
			10/14/2007	88.37	8.18	16	8.6	44.32
			5/28/2009	NM	NM	NM	NM	NM
Crain Spring	Not sampled due to access	Sampled	10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	482	6.8	NM	11.8	NM
			5/23/2012	677	6.67	8.5	6.13	338
			10/16/2008	526.0	7.47	273.00	8.80	342
			5/14/2009	811	6.87	NM	7.5	NM
			10/8/2009	NM	NM	NM	NM	NM
			6/1/2006	570.3	7.5	-115	29.1	375.3
Seep Spring	Dry or not located	Dry or not located	10/14/2007	NM	NM	NM	NM	NM
			10/17/2008	NM	NM	NM	NM	NM
			5/28/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	NM	NM	NM	NM	NM
			5/24/2006	NM	NM	NM	NM	NM



TABLE 7
NATURAL SPRINGS FIELD OBSERVATIONS AND MEASUREMENTS
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Natural Spring	2011 Field Observations / Notes	2012 Field Observations/ Notes	Inspection Date	Water Quality Field Measurements				
				Conductivity (µS/cm)	pH (Units)	ORP (mV)	Temperature (°C)	TDS (ppm)
Townsend Spring	Dry or not located	Dry	10/14/2007	NM	NM	NM	NM	NM
			10/17/2008	NM	NM	NM	NM	NM
			5/28/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	NM	NM	NM	NM	NM
Thick Spring	Sampled	Sampled	5/24/2006	325.6	7.80	120	11.7	214.6
			10/13/2007	376.5	7.74	32	12.9	192.2
			10/16/2008	NM	NM	NM	NM	NM
			5/28/2009	54.6	7.52	NM	12.3	NM
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	NM	NM	NM	NM	NM
			5/3/2011	408	7.01	40	11.4	203
Vance Spring #1	Sampled	Sampled	5/23/2012	457	6.51	22.6	7.12	229
			5/26/2006	404	7.75	-12	11.6	269.6
			10/14/2007	417.1	7.34	519	9.6	213.2
			10/16/2008	464.0	7.2	120.30	7.20	302
			6/1/2009	399	7.88	NM	12.8	NM
			10/8/2009	481	7.41	NM	6.8	NM
			7/12/2010	421	7.13	NM	15.8	NM
			5/4/2011	298	6.72	6	10.7	151
Vance Meadow Spring	Sampled	Sampled	5/23/2012	332	6.86	51.2	8.72	166
			6/6/2006	459.9	7.2	-60	16.5	310.9
			10/14/2007	389.8	7.2	-67	12.2	195.1
			10/16/2008	476.0	7.9	249.60	8.00	308
			6/1/2009	455	7.23	NM	13.7	NM
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	NM	NM	NM	NM	NM
Big Hole Spring	Dry	Dry	5/4/2011	365	7.24	22.9	16.9	182
			5/23/2012	360	8.3	33.1	18.1	179
			5/24/2006	365.5	7.27	141	11.7	249.1
			10/13/2007	NM	NM	NM	NM	NM
			10/18/2008	NM	NM	NM	NM	NM
			6/1/2009	NM	NM	NM	NM	NM
Willow Spring	Sampled	Sampled	10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	NM	NM	NM	NM	NM
			5/26/2011	277	6.3	116.5	10.4	139
			5/23/2012	335	6.79	29.5	10.56	167
			5/24/2006	252.9	7.39	122	14.0	178.7
			10/13/2007	318.3	7.42	508	13.9	161.4
			10/18/2008	325.0	7.09	243.40	6.60	211
Section 14 (Reich) Spring	Not Sampled	Not Sampled	6/1/2009	285	7.54	NM	10.4	NM
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	284	6.7	NM	12.4	NM
			9/19/2005	412.2	7.93	NM	20.2	277.5
			5/24/2006	372.9	7.48	79	13.3	251.5
			10/14/2007	394.7	7.92	0	10.7	198.7
Waypoint 0003 Spring	Not Located	Not Located	10/18/2008	445.0	7.09	45.00	8.61	290
			6/5/2009	607	6.89	NM	9	NM
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	404	6.77	NM	10.7	NM
			5/26/2006	NM	NM	NM	NM	NM
NW John Grub Spring	Sampled	Sampled	10/14/2007	NM	NM	NM	NM	NM
			10/18/2008	NM	NM	NM	NM	NM
			6/5/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	441	5.91	NM	16.4	NM
			5/5/2011	561	7.08	21.7	21	278
			5/23/2012	540	6.77	20.3	22	271
			9/19/2005	415.8	6.97	NM	15.8	282.3
			5/26/2006	421.7	7.83	108	27	275.9
SE John Grub Spring	Sampled	Sampled	10/14/2007	292.2	7.28	-162	17.1	254.8
			10/18/2008	425	7.07	-15	15.68	276
			6/5/2009	339	8.7	NM	14.5	NM
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	441	5.91	NM	16.4	NM
			5/5/2011	561	7.08	21.7	21	278
SE John Grub Spring	Sampled	Sampled	5/23/2012	540	6.77	20.3	22	271
			9/19/2005	524.5	7.04	NM	15.6	358.5
			5/26/2006	509.5	7.86	-49	24.4	336.9
			10/14/2007	980.1	7.29	-68	18.4	513
			10/18/2008	528	7.18	63.5	12.37	342
			6/5/2009	542	6.58	12	NM	NM
SE John Grub Spring	Sampled	Sampled	10/8/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM



TABLE 7
NATURAL SPRINGS FIELD OBSERVATIONS AND MEASUREMENTS
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Natural Spring	2011 Field Observations / Notes	2012 Field Observations/ Notes	Inspection Date	Water Quality Field Measurements				
				Conductivity (µS/cm)	pH (Units)	ORP (mV)	Temperature (°C)	TDS (ppm)
			7/12/2010	NM	NM	NM	NM	NM
			5/5/2011	428	7.08	16	23.6	213
			5/23/2012	341	7.13	-18.1	25.6	170
Section 10U Spring	Not sampled due to access	Not sampled due to access	9/19/2005	458.1	7.27	131	10.9	314.7
			6/6/2006	489.9	7.18	521	20.0	328.2
			10/14/2007	NM	NM	NM	NM	NM
			6/5/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
Spring 1212	Not sampled due to access	Not Sampled due to access	10/7/2005	420	6.59	NM	9.1	NM
			6/6/2006	356.6	7.29	75	15.3	243.9
			10/14/2007	NM	NM	NM	NM	NM
			6/5/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
Spring 3424	Not sampled due to access	Not Sampled due to access	9/14/2005	725.2	6.86	71	16.5	504
			5/26/2006	641.5	7.97	-98	17.3	436.7
			10/14/2007	NM	NM	NM	NM	NM
			6/5/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
Candelaria A Spring	Not sampled due to access	Not Sampled due to access	5/26/2006	NM	NM	NM	NM	NM
			10/14/2007	NM	NM	NM	NM	NM
			6/5/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
Candelaria B Spring	Not sampled due to access	Not Sampled due to access	5/26/2006	NM	NM	NM	NM	NM
			10/14/2007	NM	NM	NM	NM	NM
			6/5/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
Vaughn Spring	Not sampled due to access	Not Sampled due to access	6/6/2006	730.7	7.55	521	20.1	509.5
			10/14/2007	NM	NM	NM	NM	NM
			6/5/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
Miser Spring and Pipeline	Not sampled due to access	Not Sampled due to access	6/6/2006	NM	NM	NM	NM	NM
			10/14/2007	NM	NM	NM	NM	NM
			6/5/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM

Notes:
µS/cm - microSiemens per centimeter
ORP - oxidation reduction potential
mV - millivolts
°C - degrees celsius

TDS - total dissolved solids
ppm - parts per million
NM - Not Measured



TABLE 8
NATURAL SPRINGS WATER FLOW RATE MEASUREMENTS
2012 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 2009	October 2009	July 2010	May 2011	May 2012
Ramona Leonard Spring	NM	0.6	0.4	0.75	1.3	0.24	NM	NM	NM
Beaver Creek	NM	NM	7	NM	NM	NM	NM	NM	NM
Corrigan Spring	NM	NM	NM	NM	NM	NM	NM	NM	NM
Wood/Corrigan Spring	NM	NM	NM	NM	NM	NM	NM	0.3	NM
Grassy Spring	NM	NM	<0.25	NM	NM	NM	NM	NM	NM
Crain Spring	NM	NM	NM	0.2	2.66	NM	2	NM	NM
Walt Spring #1	NM	NM	<1	NM	NM	NM	NM	0.4	NM
Thick Spring	NM	2	<1	NM	NM	NM	NM	0.2	0.15
Vance Spring #1	NM	1	<0.5	0	1.9	0.2	NM	0.4	0.53
Vance Meadow Spring	NM	<0.5	<0.5	0	NM	NM	0.27	0.2	NM
Big Hole Spring	NM	<1	NM	NM	NM	NM	NM	NM	NM
Willow Spring	NM	1	<0.25	0.03	0.6	NM	0.5	0.3	1.06
Section 14 (Reich) Spring	NM	<1	<0.5	0	1.5	NM	1.3	NM	NM
NW John Grub Spring	0.1	<1	<0.5	0.9	NM	NM	NM	NM	NM
SE John Grub Spring	0.25	<1	<0.25	0	NM	NM	NM	NM	NM
Section 10U Spring	0.9	1	NM	NM	NM	NM	NM	NM	NM
Spring 1212	NM	5.28	NM	NM	NM	NM	NM	NM	NM
Spring 3424	1	1	NM	NM	NM	NM	NM	NM	NM
Townsend Spring	NM	NM	NM	NM	NM	NM	NM	NM	NM
Seep Spring	NM	NM	NM	NM	NM	NM	NM	NM	NM
Watson Well Spring	NM	NM	NM	NM	NM	NM	NM	NM	0.88
Vaughn Spring	NM	<1	NM	NM	NM	NM	NM	NM	NM

Notes:

NM - Not Measured

< - less than designated flow rate



TABLE 9
NATURAL SPRINGS ANALYTICAL RESULTS - DISSOLVED METHANE
2012 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 2009	October 2009	July 2010	May 2011	May 2012
Ramona Leonard Spring	<0.0005	<0.001	<0.02	<0.02	<0.02	<0.02	NS	NS	NS
Beaver Creek	NS	NS	<0.02	<0.02	NS	NS	NS	NS	NS
Corrigan Spring	NS	<0.001	NS	NS	<0.02	NS	NS	<0.02	<0.02
Watson Well Spring	NS	0.016	NS	<0.02	<0.02	<0.02	NS	NS	<0.02
Grassy Spring	NS	NS	<0.02	NS	NS	NS	NS	NS	NS
Crain Spring	NS	0.0067	NS	<0.02	<0.02	NS	<0.02	NS	NS
Walt Spring #1	NS	<0.001	NS	NS	NS	NS	NS	<0.02	NS
Thick Spring	NS	<0.001	<0.02	NS	<0.02	NS	NS	<0.02	<0.02
Vance Spring #1	NS	0.022	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.02
Vance Meadow Spring	NS	0.011	0.06	<0.02	<0.02	NS	NS	<0.02	<0.02
Big Hole Spring	NS	0.001	NS	NS	NS	NS	NS	NS	NS
Willow Spring	NS	<0.001	<0.02	<0.02	<0.02	NS	<0.02	NS	<0.02
Section 14 (Reich) Spring	0.0006	<0.001	0.02	0.02	<0.02	NS	NS	NS	NS
NW John Grub Spring	0.015	0.0016	0.30	0.03	0.07	NS	0.07	0.03	0.27
SE John Grub Spring	<0.0005	0.0025	0.65	<0.02	0.02	NS	NS	0.023	0.29
Section 10U Spring	<0.0005	0.0062	NS	NS	NS	NS	NS	NS	NS
Section 12U Spring	<0.0005	NS	NS	NS	NS	NS	NS	NS	NS
Spring 1212	0.0005	<0.001	NS	NS	NS	NS	NS	NS	NS
Spring 3424	0.0017	0.023	NS	NS	NS	NS	NS	NS	NS
Townsend Spring	NS	NS	NS	NS	NS	NS	NS	NS	NS
Vaughn Spring	NS	0.0037	NS	NS	NS	NS	NS	NS	NS

Notes:

mg/L - milligrams per liter

NS - Not Sampled

< - indicates not detected above the detection limit



TABLE 10
SUBSURFACE SOIL GAS MEASUREMENTS AT NATURAL SPRINGS
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

NATURAL SPRING	Date	SUBSURFACE SOIL GAS CONCENTRATIONS			
		Methane (ppm)	Oxygen (%)	Hydrogen Sulfide (ppm)	Carbon Monoxide (ppm)
Beaver Creek	October 2008	0	19.4	0	1
	May 2009	NM	NM	NM	NM
	October 2009	NM	NM	NM	NM
	July 2010	NM	NM	NM	NM
	May 2011	NM	NM	NM	NM
	May 2012	NM	NM	NM	NM
Big Hole Spring	October 2008	0	20.7	0	0
	May 2009	NM	NM	NM	NM
	October 2009	NM	NM	NM	NM
	July 2010	0	20	0	0
	May 2011	NM	NM	NM	NM
	May 2012	NM	NM	NM	NM
Corrigan Spring	October 2008	NM	NM	NM	NM
	May 2009	NM	NM	NM	NM
	October 2009	NM	NM	NM	NM
	July 2010	0	19.8	0	0
	May 2011	0	19.6	0	0
	May 2012	0	19.5	0	0
Crain Spring	October 2008	0	18.8	0	4
	May 2009	0	20.6	0	8
	October 2009	0	19.2	0	0
	July 2010	0	19.4	0	0
	May 2011	NM	NM	NM	NM
	May 2012	NM	NM	NM	NM
NW John Grub Spring	October 2008	0	20.8	0	0
	May 2009	0	20.6	0	6
	October 2009	0	20	0	0
	July 2010	0	19.7	0	0
	May 2011	0	20.8	0	0
	May 2012	0	19.2	0	6
Ramona Leonard Spring	October 2008	0	18.5	0	8
	May 2009	0	19.3	0	0
	October 2009	0	19.1	0	0
	July 2010	0	20	0	0
	May 2011	NM	NM	NM	NM
	May 2012	NM	NM	NM	NM
Ramona Spring	October 2008	0	18.6	0	0
	May 2009	NM	NM	NM	NM
	October 2009	NM	NM	NM	NM
	July 2010	NM	NM	NM	NM
	May 2011	NM	NM	NM	NM
	May 2012	NM	NM	NM	NM
SE John Grub Spring	October 2008	0	20.7	0	0
	May 2009	0	20.4	0	7
	October 2009	0	20	0	0
	July 2010	0	20	0	0
	May/June 2011	0	20.9	0	0
	May 2012	0	20	0	0
Section 14 (Reich) Spring	October 2008	0	20.6	0	0
	May 2009	0	20.8	0	0
	October 2009	0	19.2	0	0
	July 2010	0	19.2	0	0
	May 2011	NM	NM	NM	NM
	May 2012	NM	NM	NM	NM



TABLE 10
SUBSURFACE SOIL GAS MEASUREMENTS AT NATURAL SPRINGS
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

NATURAL SPRING	Date	SUBSURFACE SOIL GAS CONCENTRATIONS			
		Methane (ppm)	Oxygen (%)	Hydrogen Sulfide (ppm)	Carbon Monoxide (ppm)
Seep Spring	October 2008	500	20.8	0	7
	May 2009	NM	NM	NM	NM
	October 2009	NM	NM	NM	NM
	July 2010	NM	NM	NM	NM
	May 2011	NM	NM	NM	NM
	May 2012	NM	NM	NM	NM
Thick Spring	October 2008	NM	NM	NM	NM
	May 2009	0	20.1	0	22
	October 2009	0	19.4	0	0
	July 2010	0	19.4	0	0
	May 2011	0	19.8	0	0
	May 2012	NM	NM	NM	NM
Townsend Spring	October 2008	0	22	0	1
	May 2009	0	20.4	0	0
	October 2009	0	19	0	0
	July 2010	0	20	0	0
	May 2011	NM	NM	NM	NM
	May 2012	NM	NM	NM	NM
Vance Meadow Spring	October 2008	0	21	0	4
	May 2009	0	20.8	0	5
	October 2009	0	19	0	0
	July 2010	NM	20	0	0
	May 2011	0	18.7	0	0
	May 2012	NM	NM	NM	NM
Vance Spring #1	October 2008	0	20	0	20
	May 2009	0	20.7	0	6
	October 2009	0	19.3	0	6
	July 2010	0	19.8	0	0
	May 2011	0	19.8	0	0
	May 2012	NM	NM	NM	NM
Walt Spring #1	October 2008	500	20	0	12
	May 2009	0	20.8	0	0
	October 2009	0	19.4	0	0
	July 2010	0	NM	NM	NM
	May 2011	0	20	0	0
	May 2012	NM	NM	NM	NM
Watson Spring	October 2008	NM	NM	NM	NM
	May 2009	0	20.5	0	0
	October 2009	0	19.2	NM	6
	July 2010	0	19.7	0	0
	May 2011	NM	NM	NM	NM
	May 2012	NM	NM	NM	NM
Willow Spring	October 2008	0	20.4	0	0
	May 2009	0	20.9	0	4
	October 2009	0	19.2	0	0
	July 2010	0	20	0	0
	May 2011	0	20	0	0
	May 2012	NM	NM	NM	NM



TABLE 10
SUBSURFACE SOIL GAS MEASUREMENTS AT NATURAL SPRINGS
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

NATURAL SPRING	Date	SUBSURFACE SOIL GAS CONCENTRATIONS			
		Methane (ppm)	Oxygen (%)	Hydrogen Sulfide (ppm)	Carbon Monoxide (ppm)
Wood Spring	October 2008	NM	NM	NM	NM
	May 2009	0	20.2	0	28
	October 2009	0	19.5	NM	0
	July 2010	NM	NM	NM	NM
	May 2011	0	20.3	0	0
	May 2012	0	19.7	0	0

Notes:
ppm - parts per million
% - percent
NM - Not Measured



APPENDIX A
NATURAL GAS COMPOSITION LABORATORY ANALYTICAL REPORT





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	0.0028	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 (1/2)	1.0022
BTU/CU.FT (DRY) CORRECTED FOR (1/2)	977.6
BTU/CU.FT (WET) CORRECTED FOR (1/2)	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 B
NATURAL SPRINGS LABORATORY ANALYTICAL REPORT





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

14 June 2012

Sam LaRue
LT Environmental
2243 MAin Ave Suite 3
Durango, CO 81301
RE: Archuleta Springs

Enclosed are the results of analyses for samples received by the laboratory on 05/24/12 09:45.
If you need any further assistance, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads 'Debbie Zufelt'. The script is cursive and fluid, with the first name 'Debbie' and last name 'Zufelt' clearly legible.

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
2243 Main Ave Suite 3
Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Vance #1	1205114-01	Water	05/23/12 10:35	05/24/12 09:45
Vance #2	1205114-02	Water	05/23/12 11:32	05/24/12 09:45
Willow Spring	1205114-03	Water	05/23/12 12:35	05/24/12 09:45
Thick Spring	1205114-04	Water	05/23/12 14:10	05/24/12 09:45
Watson #1	1205114-05	Water	05/23/12 15:18	05/24/12 09:45
Watson #2	1205114-06	Water	05/23/12 16:09	05/24/12 09:45
Watson #3	1205114-07	Water	05/23/12 16:33	05/24/12 09:45

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. In no event shall Green Analytical Laboratories be liable for incidental or consequential damages. GALs liability, and clients exclusive remedy for any claim arising, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever, shall be deemed waived unless made in writing and received within thirty days after completion of the applicable service.



LT Environmental
2243 MAin Ave Suite 3
Durango CO, 81301

Project: Archuletta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Sample 1205-114-03 was re-analyzed for cations, with similar results. The RE (reanalysis) results are reported. Sample 1205-114-06 was reanalyzed for Alkalinity, Chloride and cations due to a high CAB. The reanalysis confirmed the original results for Chloride and cations. The RE Alkalinity result was higher than the original of 167 mg/L. Using the RE results makes the CAB within acceptance criteria. RE results are reported for Alkalinity, Chloride and cations for 1205-114-06. Please call if you have any questions.

Green Analytical Laboratories

A handwritten signature in black ink that reads 'Debbie Zufelt'.

Debbie Zufelt, Reports Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. In no event shall Green Analytical Laboratories be liable for incidental or consequential damages. GALs liability, and clients exclusive remedy for any claim arising, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever, shall be deemed waived unless made in writing and received within thirty days after completion of the applicable service.



LT Environmental
2243 Main Ave Suite 3
Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Vance #1**1205114-01 (Water)**

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes	Analyst
---------	--------	-----------------	-------	----------	----------	--------	-------	---------

General Chemistry

Alkalinity, Bicarbonate	125	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Carbonate	ND	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Hydroxide	ND	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Total	125	10.0	mg/L	1	05/29/12	2320 B		ABP
Bromide	ND	0.100	mg/L	1	06/07/12	4500Br B		ABP
Chloride	ND	10.0	mg/L	1	05/29/12	4500Cl- B		ABP
Conductivity	298	10.0	uS/cm	1	05/24/12	2510 B		MJV
Fluoride	0.330	0.200	mg/L	1	06/01/12	4500F C		ABP
Nitrate/Nitrite as N	ND	0.020	mg/L	1	05/29/12	353.2		KLJ
pH	7.72		pH Units	1	05/24/12	150.1		MJV
Sulfate	25.0	10.0	mg/L	1	05/30/12	4500SO4 E		ABP
TDS	110	10.0	mg/L	1	05/29/12	160.1		ABP

Dissolved Metals by ICP

Calcium	40.6	1.00	mg/L	1	05/29/12	200.7		JGS
Iron	0.113	0.050	mg/L	1	05/29/12	200.7		JGS
Magnesium	5.16	1.00	mg/L	1	05/29/12	200.7		JGS
Potassium	7.89	1.00	mg/L	1	05/29/12	200.7		JGS
Sodium	12.2	1.00	mg/L	1	05/29/12	200.7		JGS
Cation/Anion Balance	9.33							

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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LT Environmental
2243 Main Ave Suite 3
Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Vance #2**1205114-02 (Water)**

Analyte	Result	Reporting		Units	Dilution	Analyzed	Method	Notes	Analyst
		Limit							

General Chemistry

Alkalinity, Bicarbonate	144	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Carbonate	ND	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Hydroxide	ND	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Total	152	10.0	mg/L	1	05/29/12	2320 B		ABP
Bromide	ND	0.100	mg/L	1	06/07/12	4500Br B		ABP
Chloride	ND	10.0	mg/L	1	05/29/12	4500Cl- B		ABP
Conductivity	328	10.0	uS/cm	1	05/24/12	2510 B		MJV
Fluoride	0.417	0.200	mg/L	1	06/01/12	4500F C		ABP
Nitrate/Nitrite as N	ND	0.020	mg/L	1	05/29/12	353.2		KLJ
pH	8.69		pH Units	1	05/24/12	150.1		MJV
Sulfate	27.0	10.0	mg/L	1	05/30/12	4500SO4 E		ABP
TDS	200	10.0	mg/L	1	05/29/12	160.1		ABP

Dissolved Metals by ICP

Calcium	47.8	1.00	mg/L	1	05/29/12	200.7		JGS
Iron	ND	0.050	mg/L	1	05/29/12	200.7		JGS
Magnesium	8.49	1.00	mg/L	1	05/29/12	200.7		JGS
Potassium	2.36	1.00	mg/L	1	05/29/12	200.7		JGS
Sodium	16.5	1.00	mg/L	1	05/29/12	200.7		JGS
Cation/Anion Balance	8.78							

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2243 Main Ave Suite 3
Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Willow Spring

1205114-03 (Water)

Analyte	Result	Reporting		Units	Dilution	Analyzed	Method	Notes	Analyst
		Limit							
General Chemistry									
Alkalinity, Bicarbonate	132	10.0	mg/L	1	05/29/12	2320 B			ABP
Alkalinity, Carbonate	ND	10.0	mg/L	1	05/29/12	2320 B			ABP
Alkalinity, Hydroxide	ND	10.0	mg/L	1	05/29/12	2320 B			ABP
Alkalinity, Total	132	10.0	mg/L	1	05/29/12	2320 B			ABP
Bromide	0.281	0.100	mg/L	1	06/07/12	4500Br B			ABP
Chloride	ND	10.0	mg/L	1	05/29/12	4500Cl- B			ABP
Conductivity	298	10.0	uS/cm	1	05/24/12	2510 B			MJV
Fluoride	0.639	0.200	mg/L	1	06/01/12	4500F C			ABP
Nitrate/Nitrite as N	ND	0.020	mg/L	1	05/29/12	353.2			KLJ
pH	7.74		pH Units	1	05/24/12	150.1			MJV
Sulfate	20.0	10.0	mg/L	1	05/30/12	4500SO4 E			ABP
TDS	125	10.0	mg/L	1	05/29/12	160.1			ABP
Cation/Anion Balance	8.09								

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LT Environmental
2243 Main Ave Suite 3
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Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Willow Spring

1205114-03RE1 (Water)

Analyte	Result	Reporting		Units	Dilution	Analyzed	Method	Notes	Analyst
		Limit							

Dissolved Metals by ICP

Calcium	38.0	1.00	mg/L	1	06/08/12	200.7			JGS
Iron	ND	0.050	mg/L	1	06/08/12	200.7			JGS
Magnesium	5.81	1.00	mg/L	1	06/08/12	200.7			JGS
Potassium	1.17	1.00	mg/L	1	06/08/12	200.7			JGS
Sodium	16.9	1.00	mg/L	1	06/08/12	200.7			JGS

Cation/Anion Balance

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Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Thick Spring

1205114-04 (Water)

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes	Analyst
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General Chemistry

Alkalinity, Bicarbonate	126	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Carbonate	ND	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Hydroxide	ND	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Total	126	10.0	mg/L	1	05/29/12	2320 B		ABP
Bromide	0.417	0.100	mg/L	1	06/07/12	4500Br B		ABP
Chloride	36.0	10.0	mg/L	1	05/29/12	4500Cl- B		ABP
Conductivity	404	10.0	uS/cm	1	05/24/12	2510 B		MJV
Fluoride	0.261	0.200	mg/L	1	06/01/12	4500F C		ABP
Nitrate/Nitrite as N	0.029	0.020	mg/L	1	05/29/12	353.2		KLJ
pH	7.31		pH Units	1	05/24/12	150.1		MJV
Sulfate	23.0	10.0	mg/L	1	05/30/12	4500SO4 E		ABP
TDS	295	10.0	mg/L	1	05/29/12	160.1		ABP

Dissolved Metals by ICP

Calcium	51.6	1.00	mg/L	1	05/29/12	200.7		JGS
Iron	ND	0.050	mg/L	1	05/29/12	200.7		JGS
Magnesium	10.5	1.00	mg/L	1	05/29/12	200.7		JGS
Potassium	1.39	1.00	mg/L	1	05/29/12	200.7		JGS
Sodium	16.2	1.00	mg/L	1	05/29/12	200.7		JGS
Cation/Anion Balance	7.82							

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Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Watson #1**1205114-05 (Water)**

Analyte	Result	Reporting		Units	Dilution	Analyzed	Method	Notes	Analyst
		Limit							

General Chemistry

Alkalinity, Bicarbonate	224	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Carbonate	ND	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Hydroxide	ND	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Total	224	10.0	mg/L	2	05/29/12	2320 B		ABP
Bromide	0.311	0.100	mg/L	1	06/07/12	4500Br B		ABP
Chloride	ND	10.0	mg/L	1	05/29/12	4500Cl- B		ABP
Conductivity	579	10.0	uS/cm	1	05/24/12	2510 B		MJV
Fluoride	0.251	0.200	mg/L	1	06/01/12	4500F C		ABP
Nitrate/Nitrite as N	0.132	0.020	mg/L	1	05/29/12	353.2		KLJ
pH	7.68		pH Units	1	05/24/12	150.1		MJV
Sulfate	124	20.0	mg/L	2	05/30/12	4500SO4 E		ABP
TDS	290	10.0	mg/L	1	05/29/12	160.1		ABP

Dissolved Metals by ICP

Calcium	77.2	1.00	mg/L	1	05/29/12	200.7		JGS
Iron	ND	0.050	mg/L	1	05/29/12	200.7		JGS
Magnesium	23.3	1.00	mg/L	1	05/29/12	200.7		JGS
Potassium	1.61	1.00	mg/L	1	05/29/12	200.7		JGS
Sodium	23.4	1.00	mg/L	1	05/29/12	200.7		JGS
Cation/Anion Balance	3.61							

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Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Watson #2**1205114-06 (Water)**

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes	Analyst
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General Chemistry

Bromide	0.545	0.100	mg/L	1	06/07/12	4500Br B		ABP
Chloride	ND	10.0	mg/L	1	05/29/12	4500Cl- B		ABP
Conductivity	726	10.0	uS/cm	1	05/24/12	2510 B		MJV
Fluoride	0.506	0.200	mg/L	1	06/01/12	4500F C		ABP
Nitrate/Nitrite as N	0.042	0.020	mg/L	1	05/29/12	353.2		KLJ
pH	8.24		pH Units	1	05/24/12	150.1		MJV
Sulfate	158	20.0	mg/L	2	05/30/12	4500SO4 E		ABP
TDS	460	10.0	mg/L	1	05/29/12	160.1		ABP
Cation/Anion Balance	1.98							

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Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Watson #2**1205114-06RE1 (Water)**

Analyte	Result	Reporting		Units	Dilution	Analyzed	Method	Notes	Analyst
		Limit							

General Chemistry

Alkalinity, Bicarbonate	246	10.0	mg/L	2	06/11/12	2320 B	H2	ABP
Alkalinity, Carbonate	12.0	10.0	mg/L	2	06/11/12	2320 B	H2	ABP
Alkalinity, Hydroxide	ND	10.0	mg/L	2	06/11/12	2320 B	H2	ABP
Alkalinity, Total	258	10.0	mg/L	2	06/11/12	2320 B	H2	ABP
Chloride	ND	10.0	mg/L	1	06/12/12	4500Cl- B		ABP

Dissolved Metals by ICP

Calcium	95.1	1.00	mg/L	1	06/08/12	200.7		JGS
Iron	ND	0.050	mg/L	1	06/08/12	200.7		JGS
Magnesium	27.9	1.00	mg/L	1	06/08/12	200.7		JGS
Potassium	2.89	1.00	mg/L	1	06/08/12	200.7		JGS
Sodium	23.8	1.00	mg/L	1	06/08/12	200.7		JGS

Cation/Anion Balance

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Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Watson #3**1205114-07 (Water)**

Analyte	Result	Reporting		Units	Dilution	Analyzed	Method	Notes	Analyst
		Limit							

General Chemistry

Alkalinity, Bicarbonate	348	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Carbonate	ND	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Hydroxide	ND	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Total	348	10.0	mg/L	2	05/29/12	2320 B		ABP
Bromide	0.733	0.100	mg/L	1	06/07/12	4500Br B		ABP
Chloride	ND	10.0	mg/L	1	05/29/12	4500Cl- B		ABP
Conductivity	778	10.0	uS/cm	1	05/24/12	2510 B		MJV
Fluoride	0.330	0.200	mg/L	1	06/01/12	4500F C		ABP
Nitrate/Nitrite as N	3.06	0.020	mg/L	1	05/29/12	353.2		KLJ
pH	7.86		pH Units	1	05/24/12	150.1		MJV
Sulfate	118	20.0	mg/L	2	05/30/12	4500SO4 E		ABP
TDS	440	10.0	mg/L	1	05/29/12	160.1		ABP

Dissolved Metals by ICP

Calcium	102	1.00	mg/L	1	05/29/12	200.7		JGS
Iron	ND	0.050	mg/L	1	05/29/12	200.7		JGS
Magnesium	39.4	1.00	mg/L	1	05/29/12	200.7		JGS
Potassium	2.04	1.00	mg/L	1	05/29/12	200.7		JGS
Sodium	21.4	1.00	mg/L	1	05/29/12	200.7		JGS
Cation/Anion Balance	5.52							

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Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B205156 - General Prep - Wet Chem

Duplicate (B205156-DUP1)		Source: 1205114-01		Prepared & Analyzed: 05/24/12						
pH	7.74		pH Units		7.72			0.259	20	
Reference (B205156-SRM1)				Prepared & Analyzed: 05/24/12						
pH	7.60		pH Units		7.60	100	90-110			

Batch B205157 - General Prep - Wet Chem

Blank (B205157-BLK1)				Prepared & Analyzed: 05/24/12						
Conductivity	ND	10.0	uS/cm							
Duplicate (B205157-DUP1)		Source: 1205114-01		Prepared & Analyzed: 05/24/12						
Conductivity	286	10.0	uS/cm		298			4.01	20	
Reference (B205157-SRM1)				Prepared & Analyzed: 05/24/12						
Conductivity	1450		uS/cm		1410	103	92-106			

Batch B205170 - General Prep - Wet Chem

Blank (B205170-BLK1)				Prepared & Analyzed: 05/29/12						
Nitrate/Nitrite as N	ND	0.020	mg/L							
LCS (B205170-BS1)				Prepared & Analyzed: 05/29/12						
Nitrate/Nitrite as N	0.094	0.020	mg/L		0.100	93.6	85-115			
LCS Dup (B205170-BSD1)				Prepared & Analyzed: 05/29/12						
Nitrate/Nitrite as N	0.096	0.020	mg/L		0.100	95.6	85-115	2.11	20	

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LT Environmental
2243 Main Ave Suite 3
Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B205177 - General Prep - Wet Chem

Blank (B205177-BLK1)

Prepared & Analyzed: 05/29/12

Alkalinity, Total	ND	10.0	mg/L
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LCS (B205177-BS1)

Prepared & Analyzed: 05/29/12

Alkalinity, Total	92.0	10.0	mg/L	100	92.0	85-115
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LCS Dup (B205177-BSD1)

Prepared & Analyzed: 05/29/12

Alkalinity, Total	98.0	10.0	mg/L	100	98.0	85-115	6.32	20
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Batch B205179 - General Prep - Wet Chem

Blank (B205179-BLK1)

Prepared & Analyzed: 05/29/12

Chloride	ND	10.0	mg/L
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LCS (B205179-BS1)

Prepared & Analyzed: 05/29/12

Chloride	98.0	10.0	mg/L	100	98.0	85-115
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LCS Dup (B205179-BSD1)

Prepared & Analyzed: 05/29/12

Chloride	99.0	10.0	mg/L	100	99.0	85-115	1.02	20
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Batch B205188 - General Prep - Wet Chem

Blank (B205188-BLK1)

Prepared & Analyzed: 05/30/12

Sulfate	ND	10.0	mg/L
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LCS (B205188-BS1)

Prepared & Analyzed: 05/30/12

Sulfate	54.0	10.0	mg/L	50.0	108	85-115
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LT Environmental
2243 Main Ave Suite 3
Durango CO, 81301Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRueReported:
06/14/12 15:03

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B205188 - General Prep - Wet Chem

LCS Dup (B205188-BSD1)

Prepared & Analyzed: 05/30/12

Sulfate	55.0	10.0	mg/L	50.0	110	85-115	1.83	20
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Batch B205190 - General Prep - Wet Chem

Blank (B205190-BLK1)

Prepared & Analyzed: 05/29/12

TDS	ND	10.0	mg/L
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Duplicate (B205190-DUP1)

Source: 1205114-01

Prepared & Analyzed: 05/29/12

TDS	100	10.0	mg/L	110	9.52	20
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Reference (B205190-SRM1)

Prepared & Analyzed: 05/29/12

TDS	3170	10.0	mg/L	3170	99.8	86.1-114
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Batch B206005 - General Prep - Wet Chem

Blank (B206005-BLK1)

Prepared & Analyzed: 06/01/12

Fluoride	ND	0.200	mg/L
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LCS (B206005-BS1)

Prepared & Analyzed: 06/01/12

Fluoride	1.10	0.200	mg/L	1.00	110	85-115
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LCS Dup (B206005-BSD1)

Prepared & Analyzed: 06/01/12

Fluoride	1.14	0.200	mg/L	1.00	114	85-115	3.89	20
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Batch B206046 - General Prep - Wet Chem

Blank (B206046-BLK1)

Prepared & Analyzed: 06/07/12

Bromide	ND	0.100	mg/L
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LT Environmental
2243 Main Ave Suite 3
Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B206046 - General Prep - Wet Chem

LCS (B206046-BS1)

Prepared & Analyzed: 06/07/12

Bromide	0.560	0.100	mg/L	0.600	93.3	85-115
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LCS Dup (B206046-BSD1)

Prepared & Analyzed: 06/07/12

Bromide	0.567	0.100	mg/L	0.600	94.6	85-115	1.33	20
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Batch B206096 - General Prep - Wet Chem

Blank (B206096-BLK1)

Prepared & Analyzed: 06/12/12

Chloride	ND	10.0	mg/L
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LCS (B206096-BS1)

Prepared & Analyzed: 06/12/12

Chloride	100	10.0	mg/L	100	100	85-115
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LCS Dup (B206096-BSD1)

Prepared & Analyzed: 06/12/12

Chloride	99.0	10.0	mg/L	100	99.0	85-115	1.01	20
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Batch B206102 - General Prep - Wet Chem

Blank (B206102-BLK1)

Prepared & Analyzed: 06/11/12

Alkalinity, Total	ND	10.0	mg/L
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LCS (B206102-BS1)

Prepared & Analyzed: 06/11/12

Alkalinity, Total	99.0	10.0	mg/L	100	99.0	85-115
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LCS Dup (B206102-BSD1)

Prepared & Analyzed: 06/11/12

Alkalinity, Total	98.0	10.0	mg/L	100	98.0	85-115	1.02	20
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Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

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LT Environmental
2243 MAIn Ave Suite 3
Durango CO, 81301

Project: Archuletta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Dissolved Metals by ICP - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B205168 - Dissolved/Potentially Dissolved Metals

Blank (B205168-BLK1)

Prepared & Analyzed: 05/29/12

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 (B205168-BS1)

Prepared & Analyzed: 05/29/12

Calcium	5.31	1.00	mg/L	5.00	106	85-115
Iron	5.37	0.050	mg/L	5.00	107	85-115
Magnesium	27.3	1.00	mg/L	25.0	109	85-115
Potassium	10.5	1.00	mg/L	10.0	105	85-115
Sodium	8.42	1.00	mg/L	8.10	104	85-115

LCS Dup (B205168-BSD1)

Prepared & Analyzed: 05/29/12

Calcium	5.32	1.00	mg/L	5.00	106	85-115	0.309	20
Iron	5.39	0.050	mg/L	5.00	108	85-115	0.357	20
Magnesium	27.5	1.00	mg/L	25.0	110	85-115	0.371	20
Potassium	10.2	1.00	mg/L	10.0	102	85-115	2.89	20
Sodium	8.41	1.00	mg/L	8.10	104	85-115	0.111	20

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Debbie Zufelt, Reports Manager

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LT Environmental
2243 MAin Ave Suite 3
Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/14/12 15:03

Notes and Definitions

H2 Sample analysis performed past hold time.
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)

Green Analytical Laboratories

A handwritten signature in black ink that reads 'Debbie Zufelt'.

Debbie Zufelt, Reports Manager

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NOTES:

Page 1 of 1

Contact: Sam Latve
Address: 2243 Main Ave Suite #3
Average Co, 81301
Phone Number: 970-385 1096
Email: slatve@gte.com

- 1) Ensure proper container packaging.
- 2) Ship samples promptly following collection.
- 3) Designate Sample Reject Disposition.

Table 1. – Matrix Type

1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) Spillage

FOR GAL USE ONLY

GAL JOB #

1205-114

Project Name: Arctophila Speiweys Samplers Signatures: _____

Samplers Signature:

✓ *Chlorophanes*

Lab Name: Green Analytical Laboratories		(970) 247-4220 FAX (970) 247-4227		Analyses Required		#18								
Address: 75 Suttle Street, Durango, CO 81303		www.greenanalytical.com				5.9°C on ice								
Sample ID	Collection	Date	Time	Collected by: (Init.)	Matrix Type From Table 1	No. of Containers	Sample Filtered ? Y/N	Unpreserved (Ice Only)	Preservative(s)					Comments
	Miscellaneous								HNO3	HCL	H2SO4	NAOH	Other (Specify)	
1. VANCE #1	5.23	10:35	P2	7	3	2	X							SEE Attached.
2. VANCE #2	5.23	11:32	P2	7	3	2	X							SEE Attached.
3. Willow Spring	5.23	12:35	P2	7	3	2	X							
4. Thick Spring	5.23	14:10	P2	7	3	2	X							
5. WATSON #1	5.23	15:18	P2	7	3	2	X							
6. WATSON #2	5.23	16:09	P2	7	3	2	X							
7. WATSON #3	5.23	16:33	P2	7	3	2	X							
8.														
9.														
10.														
Relinquished by: [Signature]		Date: 5/24/12		Time: 8:17		Received by: [Signature]		Date: 5/24/12		Time: 8:17				
Relinquished by: [Signature]		Date: 5/24/12		Time: 8:45		Received by: [Signature]		Date: 5-24-12		Time: 08:45				
* Sample Reject: [] Return [] Dispose [] Store (30 Days)														

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

Archuleta County Analytes:

- Major cations [dissolved sodium (Na), calcium (Ca), magnesium (Mg), potassium (K), and iron (Fe)] by EPA method 200.7/4500;
- Alkalinity (carbonate/bicarbonate) by EPA method 2320B;
- Major Anions [chloride (Cl), sulfate (SO₄), bromide (Br), and fluoride (F)] by EPA method 200.7/4500;
- Total Dissolved Solids (TDS) by EPA method 2540C;
- pH by EPA method 150.1;
- SC by MCA method WW 120.1;
- Nitrate/Nitrite as Nitrogen (N) by EPA method 353.3;



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

11 June 2012

Sam LaRue
LT Environmental
2243 MAin Ave Suite 3
Durango, CO 81301
RE: Archuleta Springs

Enclosed are the results of analyses for samples received by the laboratory on 05/24/12 15:45.
If you need any further assistance, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads 'Debbie Zufelt'. The script is cursive and fluid, with the first name 'Debbie' and last name 'Zufelt' clearly legible.

Debbie Zufelt
Reports Manager



LT Environmental
2243 MAIn Ave Suite 3
Durango CO, 81301

Project: Archuletta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/11/12 14:15

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Petersen Gulch #2	1205124-01	Water	05/24/12 11:35	05/24/12 15:45
Petersen Gulch #3	1205124-02	Water	05/24/12 12:15	05/24/12 15:45
Bever Creek #1	1205124-03	Water	05/24/12 14:05	05/24/12 15:45

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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LT Environmental
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Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/11/12 14:15

Petersen Gulch #2**1205124-01 (Water)**

Analyte	Result	Reporting Limit	Units	Dilution	Analyzed	Method	Notes	Analyst
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General Chemistry

Alkalinity, Bicarbonate	290	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Carbonate	ND	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Hydroxide	ND	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Total	290	10.0	mg/L	2	05/29/12	2320 B		ABP
Bromide	ND	0.100	mg/L	1	06/07/12	4500Br B		ABP
Chloride	ND	10.0	mg/L	1	05/29/12	4500Cl- B		ABP
Conductivity	565	10.0	uS/cm	1	05/24/12	2510 B		MJV
Fluoride	0.664	0.200	mg/L	1	06/01/12	4500F C		ABP
Nitrate/Nitrite as N	0.035	0.020	mg/L	1	05/31/12	353.2		KLJ
pH	7.55		pH Units	1	05/24/12	150.1		MJV
Sulfate	62.0	20.0	mg/L	2	06/04/12	4500SO4 E		ABP
TDS	285	10.0	mg/L	1	05/29/12	160.1		ABP

Dissolved Metals by ICP

Calcium	84.7	1.00	mg/L	1	05/29/12	200.7		JGS
Iron	0.096	0.050	mg/L	1	05/29/12	200.7		JGS
Magnesium	21.9	1.00	mg/L	1	05/29/12	200.7		JGS
Potassium	2.27	1.00	mg/L	1	05/29/12	200.7		JGS
Sodium	16.7	1.00	mg/L	1	05/29/12	200.7		JGS
Cation/Anion Balance	5.25							

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LT Environmental
2243 Main Ave Suite 3
Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/11/12 14:15

Petersen Gulch #3**1205124-02 (Water)**

Analyte	Result	Reporting		Units	Dilution	Analyzed	Method	Notes	Analyst
		Limit							

General Chemistry

Alkalinity, Bicarbonate	300	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Carbonate	ND	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Hydroxide	ND	10.0	mg/L	2	05/29/12	2320 B		ABP
Alkalinity, Total	300	10.0	mg/L	2	05/29/12	2320 B		ABP
Bromide	ND	0.100	mg/L	1	06/07/12	4500Br B		ABP
Chloride	ND	10.0	mg/L	1	05/29/12	4500Cl- B		ABP
Conductivity	640	10.0	uS/cm	1	05/24/12	2510 B		MJV
Fluoride	1.06	0.200	mg/L	1	06/01/12	4500F C		ABP
Nitrate/Nitrite as N	ND	0.020	mg/L	1	05/31/12	353.2		KLJ
pH	7.33		pH Units	1	05/24/12	150.1		MJV
Sulfate	108	20.0	mg/L	2	06/04/12	4500SO4 E		ABP
TDS	385	10.0	mg/L	1	05/29/12	160.1		ABP

Dissolved Metals by ICP

Calcium	101	1.00	mg/L	1	05/29/12	200.7		JGS
Iron	0.525	0.050	mg/L	1	05/29/12	200.7		JGS
Magnesium	27.8	1.00	mg/L	1	05/29/12	200.7		JGS
Potassium	3.79	1.00	mg/L	1	05/29/12	200.7		JGS
Sodium	22.0	1.00	mg/L	1	05/29/12	200.7		JGS
Cation/Anion Balance	6.96							

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Debbie Zufelt, Reports Manager

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LT Environmental
2243 Main Ave Suite 3
Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/11/12 14:15

Bever Creek #1**1205124-03 (Water)**

Analyte	Result	Reporting		Units	Dilution	Analyzed	Method	Notes	Analyst
		Limit							

General Chemistry

Alkalinity, Bicarbonate	64.0	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Carbonate	ND	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Hydroxide	ND	10.0	mg/L	1	05/29/12	2320 B		ABP
Alkalinity, Total	64.0	10.0	mg/L	1	05/29/12	2320 B		ABP
Bromide	0.153	0.100	mg/L	1	06/07/12	4500Br B		ABP
Chloride	ND	10.0	mg/L	1	05/29/12	4500Cl- B		ABP
Conductivity	170	10.0	uS/cm	1	05/24/12	2510 B		MJV
Fluoride	0.343	0.200	mg/L	1	06/01/12	4500F C		ABP
Nitrate/Nitrite as N	ND	0.020	mg/L	1	05/31/12	353.2		KLJ
pH	7.05		pH Units	1	05/24/12	150.1		MJV
Sulfate	19.0	10.0	mg/L	1	06/04/12	4500SO4 E		ABP
TDS	ND	10.0	mg/L	1	05/29/12	160.1		ABP

Dissolved Metals by ICP

Calcium	21.9	1.00	mg/L	1	05/29/12	200.7		JGS
Iron	ND	0.050	mg/L	1	05/29/12	200.7		JGS
Magnesium	5.02	1.00	mg/L	1	05/29/12	200.7		JGS
Potassium	1.10	1.00	mg/L	1	05/29/12	200.7		JGS
Sodium	4.23	1.00	mg/L	1	05/29/12	200.7		JGS
Cation/Anion Balance	8.07							

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Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/11/12 14:15

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B205156 - General Prep - Wet Chem

Duplicate (B205156-DUPA)		Source: 1205124-01		Prepared & Analyzed: 05/24/12						
pH	7.58		pH Units		7.55			0.397	20	
Reference (B205156-SRM1)				Prepared & Analyzed: 05/24/12						
pH	7.60		pH Units		7.60	100	90-110			

Batch B205157 - General Prep - Wet Chem

Blank (B205157-BLK1)				Prepared & Analyzed: 05/24/12						
Conductivity	ND	10.0	uS/cm							
Duplicate (B205157-DUP2)		Source: 1205117-04		Prepared & Analyzed: 05/24/12						
Conductivity	711	10.0	uS/cm		703			1.13	20	
Reference (B205157-SRM1)				Prepared & Analyzed: 05/24/12						
Conductivity	1450		uS/cm		1410	103	92-106			

Batch B205177 - General Prep - Wet Chem

Blank (B205177-BLK1)				Prepared & Analyzed: 05/29/12						
Alkalinity, Total	ND	10.0	mg/L							
LCS (B205177-BS1)				Prepared & Analyzed: 05/29/12						
Alkalinity, Total	92.0	10.0	mg/L		100	92.0	85-115			
LCS Dup (B205177-BSD1)				Prepared & Analyzed: 05/29/12						
Alkalinity, Total	98.0	10.0	mg/L		100	98.0	85-115	6.32	20	

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

www.GreenAnalytical.com

LT Environmental
2243 Main Ave Suite 3
Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/11/12 14:15

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B205179 - General Prep - Wet Chem

Blank (B205179-BLK1)

Prepared & Analyzed: 05/29/12

Chloride	ND	10.0	mg/L
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LCS (B205179-BS1)

Prepared & Analyzed: 05/29/12

Chloride	98.0	10.0	mg/L	100	98.0	85-115
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LCS Dup (B205179-BSD1)

Prepared & Analyzed: 05/29/12

Chloride	99.0	10.0	mg/L	100	99.0	85-115	1.02	20
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Batch B205190 - General Prep - Wet Chem

Blank (B205190-BLK1)

Prepared & Analyzed: 05/29/12

TDS	ND	10.0	mg/L
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Duplicate (B205190-DUP2)

Source: 1205117-04

Prepared & Analyzed: 05/29/12

TDS	300	10.0	mg/L	355	16.8	20
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Reference (B205190-SRM1)

Prepared & Analyzed: 05/29/12

TDS	3170	10.0	mg/L	3170	99.8	86.1-114
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Batch B206005 - General Prep - Wet Chem

Blank (B206005-BLK1)

Prepared & Analyzed: 06/01/12

Fluoride	ND	0.200	mg/L
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LCS (B206005-BS1)

Prepared & Analyzed: 06/01/12

Fluoride	1.10	0.200	mg/L	1.00	110	85-115
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Debbie Zufelt, Reports Manager

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

www.GreenAnalytical.com

LT Environmental
2243 Main Ave Suite 3
Durango CO, 81301

Project: Archuleta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/11/12 14:15

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B206005 - General Prep - Wet Chem

LCS Dup (B206005-BSD1)

Prepared & Analyzed: 06/01/12

Fluoride	1.14	0.200	mg/L	1.00		114	85-115	3.89	20	
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Batch B206015 - General Prep - Wet Chem

Blank (B206015-BLK1)

Prepared & Analyzed: 06/04/12

Sulfate	ND	10.0	mg/L							
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LCS (B206015-BS1)

Prepared & Analyzed: 06/04/12

Sulfate	53.0	10.0	mg/L	50.0		106	85-115			
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LCS Dup (B206015-BSD1)

Prepared & Analyzed: 06/04/12

Sulfate	55.0	10.0	mg/L	50.0		110	85-115	3.70	20	
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Batch B206023 - General Prep - Wet Chem

Blank (B206023-BLK1)

Prepared & Analyzed: 05/31/12

Nitrate/Nitrite as N	ND	0.020	mg/L							
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LCS (B206023-BS1)

Prepared & Analyzed: 05/31/12

Nitrate/Nitrite as N	0.089	0.020	mg/L	0.100		89.2	85-115			
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LCS Dup (B206023-BSD1)

Prepared & Analyzed: 05/31/12

Nitrate/Nitrite as N	0.090	0.020	mg/L	0.100		89.6	85-115	0.447	20	
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Batch B206046 - General Prep - Wet Chem

Blank (B206046-BLK1)

Prepared & Analyzed: 06/07/12

Bromide	ND	0.100	mg/L							
---------	----	-------	------	--	--	--	--	--	--	--

Green Analytical Laboratories

Debbie Zufelt

Debbie Zufelt, Reports Manager

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LT Environmental
2243 MAIn Ave Suite 3
Durango CO, 81301

Project: Archuletta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/11/12 14:15

General Chemistry - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	--------------------	-------	----------------	------------------	------	----------------	-----	--------------	-------

Batch B206046 - General Prep - Wet Chem

LCS (B206046-BS1)

Prepared & Analyzed: 06/07/12

Bromide	0.560	0.100	mg/L	0.600	93.3	85-115
---------	-------	-------	------	-------	------	--------

LCS Dup (B206046-BSD1)

Prepared & Analyzed: 06/07/12

Bromide	0.567	0.100	mg/L	0.600	94.6	85-115	1.33	20
---------	-------	-------	------	-------	------	--------	------	----

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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LT Environmental
2243 MAIn Ave Suite 3
Durango CO, 81301

Project: Archuletta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/11/12 14:15

Dissolved Metals by ICP - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	--------------------	-------	----------------	------------------	------	----------------	-----	--------------	-------

Batch B205168 - Dissolved/Potentially Dissolved Metals

Blank (B205168-BLK1)

Prepared & Analyzed: 05/29/12

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 (B205168-BS1)

Prepared & Analyzed: 05/29/12

Calcium	5.31	1.00	mg/L	5.00	106	85-115
Iron	5.37	0.050	mg/L	5.00	107	85-115
Magnesium	27.3	1.00	mg/L	25.0	109	85-115
Potassium	10.5	1.00	mg/L	10.0	105	85-115
Sodium	8.42	1.00	mg/L	8.10	104	85-115

LCS Dup (B205168-BSD1)

Prepared & Analyzed: 05/29/12

Calcium	5.32	1.00	mg/L	5.00	106	85-115	0.309	20
Iron	5.39	0.050	mg/L	5.00	108	85-115	0.357	20
Magnesium	27.5	1.00	mg/L	25.0	110	85-115	0.371	20
Potassium	10.2	1.00	mg/L	10.0	102	85-115	2.89	20
Sodium	8.41	1.00	mg/L	8.10	104	85-115	0.111	20

Green Analytical Laboratories

Debbie Zufelt, Reports Manager

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LT Environmental
2243 MAIn Ave Suite 3
Durango CO, 81301

Project: Archuletta Springs
Project Name / Number: [none]
Project Manager: Sam LaRue

Reported:
06/11/12 14:15

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)

Green Analytical Laboratories

A handwritten signature in black ink that reads 'Debbie Zufelt'.

Debbie Zufelt, Reports Manager

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CHAIN OF CUSTODY RECORD

Page 1 of 1

Client: LTE

NOTES:

Contact: Sam LaBue

1) Ensure proper container packaging.

Address: Q243 MAIN AVE SUITE #3

2) Ship samples promptly following collection.

Phone Number: 970.619.0936

3) Designate Sample Reject Disposition.

FAX Number:

PO#

Project Name: Archuleta Springs

Project Name: Archuleta Springs

Samplers Signature: [Signature]

PyroGenesis

Table 1. - Matrix Type

1 = Surface Water, 2 = Ground Water

3 = Soil/Sediment, 4 = Rinse, 5 = Oil

6 = Waste, 7 = Other (Specify) SPRINGS

FOR GAL USE ONLY

GAL JOB #

1205-124

Lab Name: Green Analytical Laboratories

(970) 247-4220

FAX (970) 247-4227

Address: 75 Suttle Street, Durango, CO 81303

Analyses Required

#18

6.0°C on ice

Comments

SEE Attached

SEE Attached

Sample ID	Date	Time	Collected by: (Init.)	Matrix Type From Table 1	No. of Containers	Sample Filtered ? Y/N	Unpreserved (Ice Only)	Preservative(s)					Comments
								HNO3	HCL	H2SO4	NAOH	Other (Specify)	
01. <u>Petersen Gully #12</u>	<u>5-24</u>	<u>11:35</u>	<u>PZ</u>	<u>7</u>	<u>3</u>	<u>N</u>							
02. <u>Petersen Gully #3</u>	<u>5-24</u>	<u>12:15</u>	<u>PZ</u>	<u>7</u>	<u>3</u>	<u>N</u>							
03. <u>Bever Creek #11</u>	<u>5-24</u>	<u>14:05</u>	<u>PZ</u>	<u>7</u>	<u>3</u>	<u>N</u>							
4.													
5.													
6.													
7.													
8.													
9.													
10.													
Relinquished by: <u>[Signature]</u>	Date: <u>5/24/12</u>	Time: <u>16:45</u>	Received by: <u>[Signature]</u>	Date: <u>5-24-12</u>	Time: <u>1545</u>								
Relinquished by: <u>Brook Heras</u>	Date:	Time:	Received by:	Date:	Time:								

Archuleta County Analytes:

- Major cations [dissolved sodium (Na), calcium (Ca), magnesium (Mg), potassium (K), and iron (Fe)] by EPA method 200.7/4500;
- Alkalinity (carbonate/bicarbonate) by EPA method 2320B;
- Major Anions [chloride (Cl), sulfate (SO₄), bromide (Br), and fluoride (F)] by EPA method 200.7/4500;
- Total Dissolved Solids (TDS) by EPA method 2540C;
- pH by EPA method 150.1;
- SC by MCA method WW 120.1;
- Nitrate/Nitrite as Nitrogen (N) by EPA method 353.3;

APPENDIX C
CBM PRODUCTION WELL WATER LABORATORY ANALYTICAL REPORT



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

TO: TOM
FROM: Mike
as discussed
Thanks

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

GAL I.D.: 708-177-01

Date Received: 08/31/07

Date Reported: 09/12/07

QC Batches:

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 CaCO ₃	2320B	10	1700	1	mg/L
Bicarbonate as CaCO ₃	2320B	10	1700 ✓	1	mg/L
Carbonate as CaCO ₃	2320B	10	<10	1	mg/L
Hydroxide as CaCO ₃	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	4500SO ₄	10	<10 ✓	1	mg/L
TDS	2540C	10	6010 ✓	1	mg/L
Hardness, as CaCO ₃	Calc.	10	192	1	mg/L
CAB	Calc.	NA	3.60		%

Pargin Mt 9, 10, 11
water Analysis

api_c ounty code	api_seq_n um	twp	range	sec	m eri dia n	qtr	Name	DATE	DU P	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

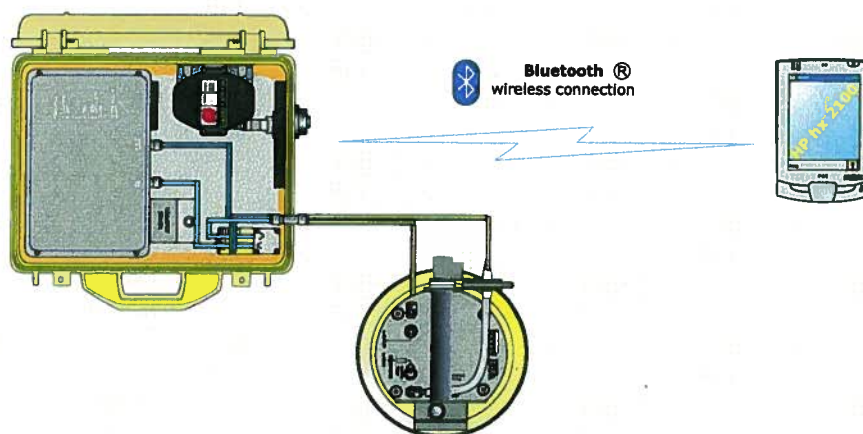
FE (mg/L)	HCO3 (mg/L)	K (mg/L)	MG (mg/L)	NA (mg/L)	pH (PH UNITS)	RESISTIVITY (ohm-m)	SO4 (mg/L)	TDS (mg/L)	TDS, Calc (mg/L)	lat	long	utm_x	utm_y
	3230	1	8	1830	7.19	1.64	0		6170	37.14528	-107.374	289181	4113423
	3392								5820	37.15243	-107.376	288986	4114221
	3392	13	17	1660	7.17	1.66	0		5820	37.15243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

APPENDIX D
EQUIPMENT SPECIFICATIONS



WEST Systems portable soil flux meter for Carbon dioxide, Methane and Hydrogen sulfide fluxes

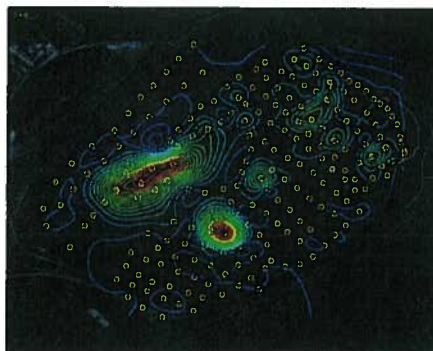
The WEST Systems Fluxmeter is a portable instrument for the measurement of soil gas diffuse degassing phenomena that uses the accumulation chamber method.



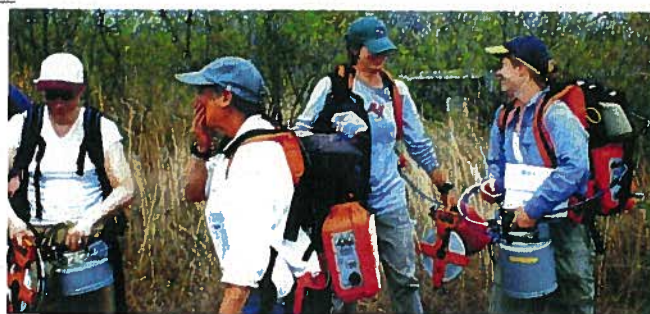
This method studied for soil respiration in agronomy (Parkinson) and for soil degassing in volcanic areas (R. Cioni et al.), has been designed by WEST Systems to obtain a portable instrument that allows the performance of measurements with very good accuracy in a short time. The instrument allows a wide 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 lines



a group of researchers during a flux mapping fieldwork, using the WS-LI820 flux meter
Courtesy of United States Geological Survey

West Systems Srl
Via Molise 3 - Zona Ind. Gello - 56025 Pontedera (PI) Italy
Phone +39 0587 294216 www.westsystems.com
Fax +39 0587 296068 g.virgili@westsystems.com

WEST
Systems

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").

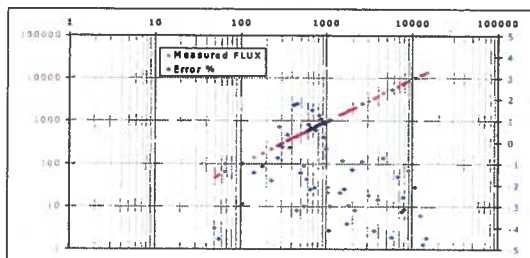
Software The instrument is supplied with a custom software, FluxManager, which allows recording and visualization of the increase in concentration of the target gas in the accumulation chamber, and then the flux calculations. The obtained measurements can be saved on the palmtop computer and then transferred 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

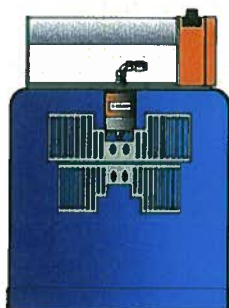
The standard flux meter configuration is supplied with a single gas detector, normally the carbon dioxide detector. The fluxmeter can host two sensors by the way special releases, based on specific customer request, it can be supplied with a maximum of 3 sensors.

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 landfill.

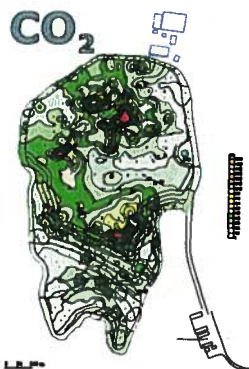


Accumulation Chamber Type B

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



CO₂ - LI820

LI820 based Carbon dioxide fluxmeter

The CO₂ 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 ± 5 ppm. 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

CO₂ 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: CO₂ 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/m² per day.

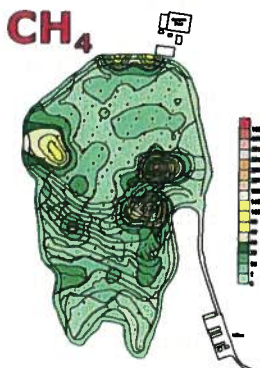
The precision depends on the measured flux:

range: 0.5 – 5 moles/m² per day 25% (Acc. chamber A)

5-350 moles/m²/day 10% (Acc. chamber B)

350-600 moles/m²/day 25% (Acc. chamber B)

600-1500 moles/m²/day 25% (Acc.Ch.B / F.S.=10%)



WS-HC CH₄

Methane fluxmeter

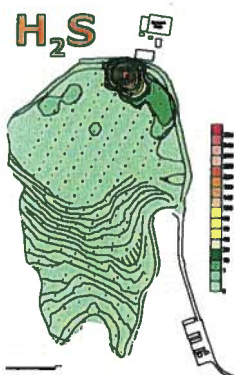
The methane sensor is an IR spectrometer. The full-scale range is 50000ppm, accuracy of 5% of reading, and repeatability is 2% of span. Detection limit 60 ppm, resolution 22 ppm. The detector was designed to measure the not controlled emissions of landfill, but it can be used to detect methane emission from coal or wherever the 0.2 moles/m²/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)



H₂S - 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%.

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

The precision depends on the measured flux:

0.0025 – 0.05 moles/m ² per day	$\pm 25\%$ (Acc. Chamber A)
0.05 – 0.5 moles/m ² per day	$\pm 10\%$ (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.

West Systems Srl
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Fax +39 0587 296068 g.virgili@westsystems.com

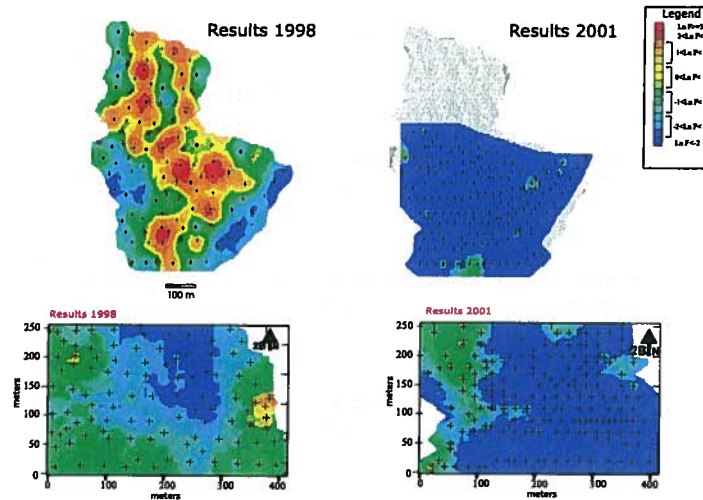
WEST
Systems

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 interventions 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.

West Systems Srl

Via Molise 3 - Zona Ind. Gello - 56025 Pontedera (PI) Italy
Phone +39 0587 294216 www.westsystems.com (or .it)
Fax +39 0587 296068 g.virgili@westsystems.com (or .it)

Japan

SHOKO CO., LTD.

7-13,1-chome, Shibakoen, Minato-ku Tokyo

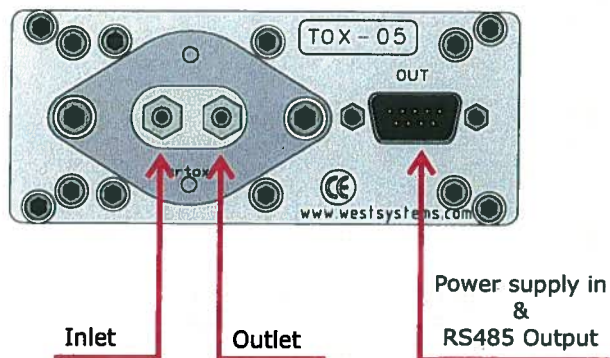
105-8432, Japan

TEL : 03-3459-5106 FAX : 03-3459-5081

WEB SITE <http://www.shoko.co.jp>

e-mail s-isotope@shoko.co.jp

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

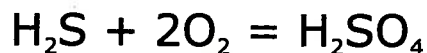
Factory calibration : 20 ppm

RMS Noise <= 0.02 ppm

Zero Offset <= 0.2 ppm

Max Overrange >= 200 ppm

The chemical cell reaction is:



the gas sample specific consumption is very low:

$$2.5 \times 10^{-10} \text{ moles/Sec per ppm}$$

Due to this consumption the H₂S flux is methodically underestimated 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%

Repeatability 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/m² 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/m²/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

CO₂ 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

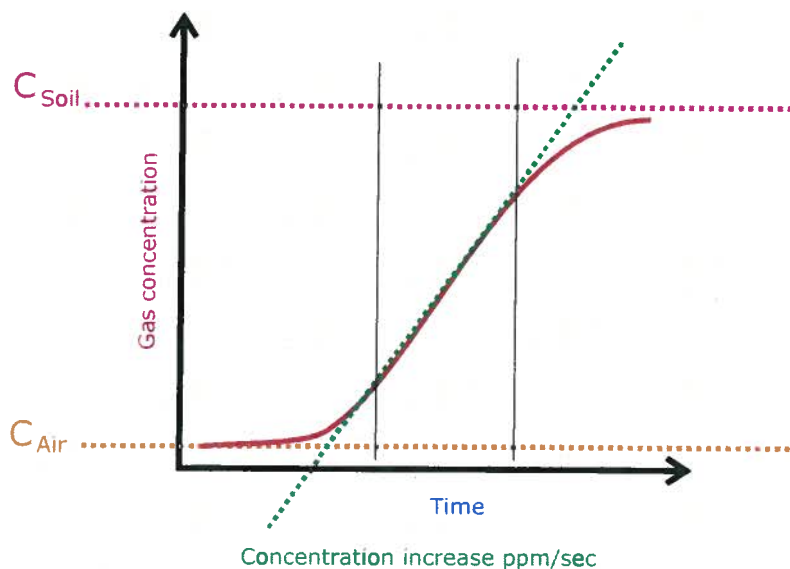
Relative Humidity Range: 0 to 95% RH, Non-Condensing

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
- **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

$$K = \frac{\text{moles} \cdot \text{meter}^{-2} \cdot \text{day}^{-1}}{\text{ppm} \cdot \text{sec}^{-1}}$$

In the table the conversion factors vs temperature and barometric pressure for the Accumulation Chamber Type A and B are reported.

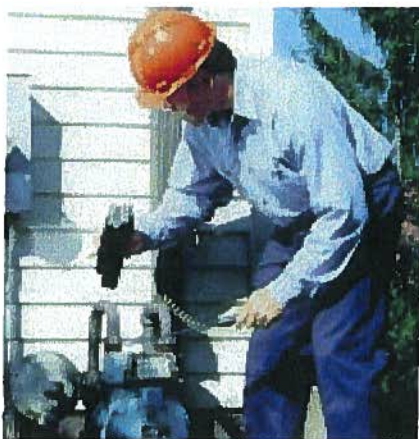
An example:

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.

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 ₂ S

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 ₂ S
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. Gasport Gas 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 ₂ S	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).

Note: This Data Sheet contains only a general description of the products shown. While uses and performance capabilities are described, under no circumstances shall the products be used by untrained or unqualified individuals and not until the product instructions including any warnings or cautions provided have been thoroughly read and understood. Only they contain the complete and detailed information concerning proper use and care of these products.

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Offices and representatives worldwide
For further information:



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

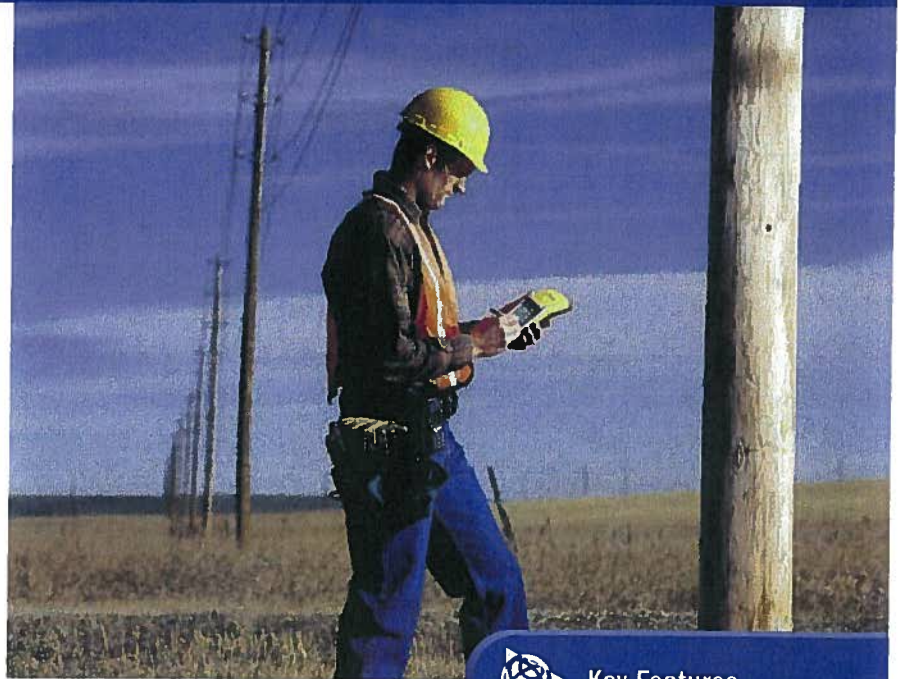
The GeoXT is optimized to provide the reliable, high-accuracy location data you need. Advanced features like EVEREST™ multipath rejection technology let you work under canopy, in urban canyons, or anywhere where accuracy is crucial.

Need submeter accuracy in real-time? Use corrections from a satellite-based augmentation system (SBAS) like WAAS¹ or EGNOS². 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



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

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.

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.



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 WAAS¹/EGNOS²
- 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 adaptor³
- Portable power kit³
- Hurricane antenna
- External patch antenna
- Pole-mountable ground plane
- Baseball cap with antenna sleeve
- Beacon-on-a-Belt (BoB™) differential correction receiver³
- Hard carry case
- Null modem cable³
- 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 WAAS¹ or EGNOS²

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

Postprocessed⁵ Submeter

Carrier postprocessed⁶

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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ULTRAMETER II™

OVER
50
YEARS



**MYRON L
COMPANY**
Water Quality Instrumentation
Accuracy • Reliability • Simplicity

ULTRAMETER II™

Advanced Design • Superior Performance



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



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 $\pm 1\%$ 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 $\square$ or $\square$ 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 $9.99\%/^{\circ}\text{C}$) 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.

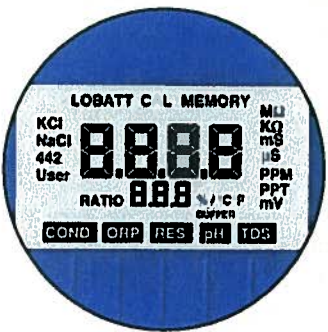
The advanced four-electrode cell for conductivity/resistivity/TDS eliminates polarization, allowing greater accuracy and stability with minimal maintenance.

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 mV/0.04 oz. Cond/TDS/Res: 5 mV/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: SS20Z, 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.

**MYRON L
COMPANY**
Water Quality Instrumentation
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.

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APPENDIX E
FLUX METER DATA



APPENDIX E
FLUX METER DATA

SitePt	Filename	Site	AreaAbbrev	Northing	Easting	Date	CH4flux	H2Sflux	CO2flux	ACCUMULATION CHAMBER:	PRESSURE (HPa):	TEMP DegC	TIME:	CH4slope	H2Sslope	CO2slope	Ack
abc070612_01	abc070612_01 06072012 092003.txt	abc070612	BC	1234755.21	2424965.075	7/6/2012	0	0.007651317	0.968261898	A	779.4	22.2	06-07-2012 09:20:03	-3.463000059	0.030999999	3.923000097	0.246816695
abc070612_02	abc070612_02 06072012 092430.txt	abc070612	BC	1234942.127	2424984.629	7/6/2012	0	0.004176225	0.006878487	A	778.9	23.4	06-07-2012 09:24:30	-1.600999951	0.017000001	0.028000001	0.245660245
abc070612_03	abc070612_03 06072012 092941.txt	abc070612	BC	1234971.632	2424753.613	7/6/2012	0	0.004660073	0.114049166	A	780.8	24.6	06-07-2012 09:29:41	0	0.018999999	0.465000004	0.245267019
abc070612_04	abc070612_04 06072012 093246.txt	abc070612	BC	1235174.08	2424778.702	7/6/2012	0	0.008070293	0.402536422	A	780.1	25.2	06-07-2012 09:32:46	-1.093000054	0.033	1.646000028	0.244554326
abc070612_05	abc070612_05 06072012 093636.txt	abc070612	BC	1235138.741	2424565.074	7/6/2012	0	0.002928158	0.205947101	A	780.2	25.9	06-07-2012 09:36:36	-1.786000013	0.012	0.843999982	0.244013116
abc070612_06	abc070612_06 06072012 094013.txt	abc070612	BC	1235168.029	2423468.889	7/6/2012	0	0.010463504	0.282514602	A	779.6	26.5	06-07-2012 09:40:13	-0.799000025	0.043000001	1.161000013	0.243337288
abc070612_07	abc070612_07 06072012 094339.txt	abc070612	BC	1235345.06	2423463.632	7/6/2012	0	0.007767246	0.179132089	A	779.2	27.1	06-07-2012 09:43:39	-1.179999948	0.032000002	0.737999976	0.242726415
abc070612_08	abc070612_08 06072012 094739.txt	abc070612	BC	1235568.29	2423467.603	7/6/2012	0	0.00823624	0.123059109	A	779.2	27.7	06-07-2012 09:47:39	-0.95599997	0.034000002	0.508000016	0.242242336
abc070612_09	abc070612_09 06072012 095135.txt	abc070612	BC	1235742.619	2423475.919	7/6/2012	0	0.005074249	0.12468154	A	779.3	28.5	06-07-2012 09:51:35	-1.5	0.021	0.515999973	0.241630897
abc070612_10	abc070612_10 06072012 095519.txt	abc070612	BC	1235757.55	2424577.015	7/6/2012	0	0.008427135	0.155059278	A	778.6	29.3	06-07-2012 09:55:19	-1.429999948	0.035	0.643999994	0.240775287
abc070612_11	abc070612_11 06072012 100001.txt	abc070612	BC	1235738.783	2424776.972	7/6/2012	0	0.001198609	0.190099373	A	777.5	30.2	06-07-2012 10:00:01	-1.282999992	0.005	0.792999983	0.23972179
abc070612_12	abc070612_12 06072012 100318.txt	abc070612	BC	1235745.771	2424980.842	7/6/2012	0	0.005492809	0.153321013	A	776.1	30.8	06-07-2012 10:03:18	-1.115000001	0.023	0.64200002	0.238817781
abc070612_13	abc070612_13 06072012 100702.txt	abc070612	BC	1235525.609	2424982.691	7/6/2012	0	0.005024355	0.079432666	A	778.8	31.3	06-07-2012 10:07:02	-1.572000027	0.021	0.331999987	0.239255026
abc070612_14	abc070612_14 06072012 101037.txt	abc070612	BC	1235560.511	2424789.863	7/6/2012	0	0.009084252	0.133397609	A	779.2	31.7	06-07-2012 10:10:37	-1.667000055	0.037999999	0.558000028	0.239063814
abc070612_15	abc070612_15 06072012 101446.txt	abc070612	BC	1235561.04	2424581.477	7/6/2012	0	0.007848896	0.048758294	A	776.5	32.2	06-07-2012 10:14:46	-0.958000004	0.033	0.204999998	0.237845346
abc070612_16	abc070612_16 06072012 101750.txt	abc070612	BC	1235356.083	2424589.992	7/6/2012	0	0.00643535	0.391364604	A	779.9	32.5	06-07-2012 10:17:50	-1.430999994	0.027000001	1.64199996	0.238346294
abc070612_17	abc070612_17 06072012 102129.txt	abc070612	BC	1235361.166	2424769.202	7/6/2012	0	0.004531429	0.247797608	A	779.9	32.7	06-07-2012 10:21:29	-1.570000052	0.018999999	1.039000034	0.238496244
abc070612_18	abc070612_18 06072012 102602.txt	abc070612	BC	1235356.059	2424978.974	7/6/2012	0	0.004045506	0.286279052	A	779.2	33.1	06-07-2012 10:26:02	-1.445000052	0.017000001	1.202999949	0.237970963
abc070612_19	abc070612_19 06072012 103106.txt	abc070612	BC	1235330.927	2425144.428	7/6/2012	0	0.005942276	0.199422777	A	779.3	33.5	06-07-2012 10:31:06	-2.295000076	0.025	0.838999987	0.237691045
abc070612_20	abc070612_20 06072012 103633.txt	abc070612	BC	1235565.302	2425185.92	7/6/2012	0	0.007839617	0.255619019	A	779.9	33.9	06-07-2012 10:36:33	-2.664999962	0.033	1.075999975	0.237564161
abc070612_21	abc070612_21 06072012 104011.txt	abc070612	BC	1235569.895	2425369.876	7/6/2012	0	0.004744819	0.170101792	A	779.6	34.2	06-07-2012 10:40:11	-1.333999991	0.02	0.717000008	0.237240985
abc070612_22	abc070612_22 06072012 104342.txt	abc070612	BC	1235364.977	2425367.628	7/6/2012	0	0.009010451	0.242570817	A	779.7	34.4	06-07-2012 10:43:42	-2.490999937	0.037999999	1.023000002	0.237171727
abc070612_23	abc070612_23 06072012 104804.txt	abc070612	BC	1235158.882	2425354.885	7/6/2012	0	0.003791635	0.218019024	A	780.0	34.7	06-07-2012 10:48:04	-1.875	0.016000001	0.920000017	0.236977719
abc070612_24	abc070612_24 06072012 105130.txt	abc070612	BC	1235159.982	2425177.194	7/6/2012	0	0.002843143	0.169167012	A	780.6	35.0	06-07-2012 10:51:30	-1.468999982	0.012	0.713999987	0.236928597
abc070612_25	abc070612_25 06072012 105520.txt	abc070612	BC	1235157.047	2424957.8	7/6/2012	0	0.004022323	0.099848233	A	780.3	35.3	06-07-2012 10:55:20	-1.184000015	0.017000001	0.421999991	0.236607194
abc070612_26	abc070612_26 06072012 105946.txt	abc070612	BC	1234916.014	2425189.615	7/6/2012	0	0.006377668	0.321717888	A	780.0	35.7	06-07-2012 10:59:46	-1.230999947	0.027000001	1.361999989	0.236209899
abc070612_27	abc070612_27 06072012 110324.txt	abc070612	BC	1234748.567	2425164.902	7/6/2012	0	0.004491377	0.610118151	A	781.6	36.1	06-07-2012 11:03:24	-1.899000049	0.018999999	2.58100009	0.236388281
abc070612_28	abc070612_28 06072012 110656.txt	abc070612	BC	1234755.963	2425348.287	7/6/2012	0	0.004488172	0.279211581	A	781.8	36.4	06-07-2012 11:06:56	-2.782999992	0.018999999	1.182000041	0.236219615
abc070612_29	abc070612_29 06072012 111103.txt	abc070612	BC	1234960.916	2425376.077	7/6/2012	0	0.014394567	0.903554082	A	781.5	36.6	06-07-2012 11:11:03	-1.741999984	0.061000001	3.828999996	0.235976517
abc070612_30	abc070612_30 06072012 112552.txt	abc070612	BC	1234752.468	2425565.882	7/6/2012	0	0.001884163	0.182528228	A	781.5	37.2	06-07-2012 11:25:52	-4.664000034	0.008	0.774999976	0.235520303
abc070612_31	abc070612_31 06072012 113221.txt	abc070612	BC	1234776.615	2425759.979	7/6/2012	0	0.00140435	0.347342461	A	777.9	37.7	06-07-2012 11:32:21	-0.601000011	0.006	1.483999968	0.234058276
abc070612_32	abc070612_32 06072012 113810.txt	abc070612	BC	1234763.623	2425954.611	7/6/2012	0	0.001641037	0.265613496	A	779.9	38.0	06-07-2012 11:38:10	0	0.007	1.133000016	0.2344338
abc070612_33	abc070612_33 06072012 114735.txt	abc070612	BC	1234552.705	2425948.144	7/6/2012	0	0.001634096	0.35459891	A	777.6	38.4	06-07-2012 11:47:35	-0.522000015	0.007	1.519000053	0.233442321
abc070612_34	abc070612_34 06072012 115408.txt	abc070612	BC	1234564.295	2426173.023	7/6/2012	0	0	0.28325671	A	778.1	38.5	06-07-2012 11:54:08	0	-0.001	1.213000059	0.233517483
abc070612_35	abc070612_35 06072012 120201.txt	abc070612	BC	1234549.557	2426376.566	7/6/2012	0	0.001633466	0.294257194	A	777.3	38.4	06-07-2012 12:02:01	0	0.007	1.261000037	0.233352259
abc070612_36	abc070612_36 06072012 121147.txt	abc070612	BC	1234563.147	2426548.642	7/6/2012	0	0.006275825	0.362603217	A	775.0	38.7	06-07-2012 12:11:47	0	0.027000001	1.559999943	0.232437968
abc070612_37	abc070612_37 06072012 121935.txt	abc070612	BC	1234708.24	2426608.058	7/6/2012	0	0	0.115247816	A	772.6	39.1	06-07-2012 12:19:35	-0.155000001	0	0.497999996	0.231421322
abc070612_38	abc070612_38 06072012 122937.txt	abc070612	BC	1234927.251	2426549.219	7/6/2012	0	0.000461955	0.206493869	A	772.6	39.7	06-07-2012 12:29:37	-0.643999994	0.002	0.893999994	0.230977491
abc070612_39	abc070612_39 06072012 123840.txt	abc070612	BC	1235159.481	2426590.735	7/6/2012	0	0.001381919	0.248515025	A	770.4	39.7	06-07-2012 12:38:40	-0.398000002	0.006	1.078999996	0.230319768
abc070612_40	abc070612_40 06072012 124805.txt	abc070612	BC	1235131.625	2426369.001	7/6/2012	0	0.00023032	0.085678957	A	770.4	39.7	06-07-2012 12:48:05	0	0.001	0.372000009	0.230319768
abc070612_41	abc070612_41 06072012 125513.txt	abc070612	BC	1234970.184	2426378.186	7/6/2012	0	0.00185356	0.315800279	A	775.0	39.7	06-07-2012 12:55:13	0	0.008	1.363000035	0.231694996
abc070612_42	abc070612_42 06072012 130552.txt	abc070612	BC	1234766.071	2426394.016	7/6/2012	0	0.002090766	0.226035073	A	776.8	39.6	06-07-2012 13:05:52	0	0.009	0.972999999	0.232307374
abc070612_43	abc070612_43 06072012 131359.txt	abc070612	BC	1234757.681	2426180.239	7/6/2012	0	0.002306765	0.274966419	A	771.1	39.5	06-07-2012 13:13:59	-0.643999994	0.01	1.192000031	0.230676517
abc070612_44	abc070612_44 06072012 132230.txt	abc070612	BC	1234961.288	2426162.335	7/6/2012	0	0.001159216	0.256186754	A	775.0	39.5	06-07-2012 13:22:30	-0.643999994	0.005	1.105000019	0.231843203
abc070612_45	abc070612_45 06072012 133206.txt	abc070612	BC	1235163.693	2426148.002	7/6/2012	0	0.003482832	0.190627009	A	776.9	39.8	06-07-2012 13:32:06	-2.089999914	0.015	0.82099998	0.232188806
abc070612_46	abc070612_46 06072012 133953.txt	abc070612	BC	1235133.123	2425943.561	7/6/2012	0	0.003010537	0.32907477	A	776.1	40.3	06-07-2012 13:39:53	0	0.013	1.421200004	0.231579721
abc070612_47	abc070612_47 06072012 134733.txt	abc070612	BC	1234997.143	2426010.171	7/6/2012	0	0.000696314	0.387382656	A	779.1	40.8	06-07-2012 13:47:33	0	0.003	1.66900003	0.232104644
abc070612_48	abc070612_48 06072012 135418.txt	abc07															

APPENDIX E
FLUX METER DATA

SitePt	Filename	Site	AreaAbbrev	Northing	Easting	Date	CH4flux	H2Sflux	CO2flux	ACCUMULATION CHAMBER:	PRESSURE (HPa):	TEMP DegC	TIME:	CH4slope	H2Sslope	CO2slope	Ack
fg071312_02	fg071312_02_13072012_151336.txt	fg071312	FG	1208136.354	2446970.944	7/13/2012	0	0.001644283	0.321104914	A	794.0	43.0	13-07-2012 15:13:36	0	0.007	1.366999984	0.234897524
fg071312_03	fg071312_03_13072012_151847.txt	fg071312	FG	1208114.941	2447172.732	7/13/2012	0	0.00282162	0.362107933	A	794.3	42.8	13-07-2012 15:18:47	0	0.012	1.539999962	0.235135019
fg071312_04	fg071312_04_13072012_152351.txt	fg071312	FG	1208123.593	2447351.546	7/13/2012	0	0.003760047	0.200457484	A	793.1	42.5	13-07-2012 15:23:51	0	0.016000001	0.852999985	0.23500292
fg071312_05	fg071312_05_13072012_152823.txt	fg071312	FG	1207970.629	2447800.226	7/13/2012	0	0.002454589	0.419625938	A	791.1	42.3	13-07-2012 15:28:23	0	0.01	1.789000034	0.234558925
fg071312_06	fg071312_06_13072012_153524.txt	fg071312	FG	1207924.537	2447159.922	7/13/2012	0	0.001645249	0.69500035	A	791.2	41.7	13-07-2012 15:35:24	0	0.007	2.957000017	0.235035628
fg071312_07	fg071312_07_13072012_154137.txt	fg071312	FG	1207753.062	2447187.674	7/13/2012	0	0.001410758	0.432632565	A	790.5	41.3	13-07-2012 15:41:37	0	0.006	1.840000033	0.235126391
fg071312_08	fg071312_08_13072012_154545.txt	fg071312	FG	1207760.932	2447370.46	7/13/2012	0	0.00178392	0.217295513	A	791.6	41.0	13-07-2012 15:45:45	0	0.005	0.921999993	0.235678434
fg071312_09	fg071312_09_13072012_155321.txt	fg071312	FG	1207761.496	2446957.936	7/13/2012	0	0.003056299	0.208533615	A	788.4	40.5	13-07-2012 15:53:21	0	0.013	0.887000024	0.235099897
fg071312_10	fg071312_10_13072012_155714.txt	fg071312	FG	1207954.818	2446977	7/13/2012	0	0.002122083	0.420408219	A	790.2	40.3	13-07-2012 15:57:14	0	0.009	1.782999992	0.235787004
fg072412_01	fg072412_01_24072012_132112.txt	fg072412	FG	1208300.37	2446770.202	7/24/2012	0	0.001902486	0.101307355	A	789.1	37.2	24-07-2012 13:21:12	-1.08099997	0.008	0.425999999	0.237810701
fg072412_02	fg072412_02_24072012_132711.txt	fg072412	FG	1208307.972	2446581.761	7/24/2012	0	0.002368667	0.164859191	A	788.5	38.2	24-07-2012 13:27:11	-1.621999979	0.01	0.69599998	0.236866668
fg072412_03	fg072412_03_24072012.TXT	fg072412	FG	1208323.169	2446378.749	7/24/2012	0	0.002124038	0.016284291	A	787.9	39.1	24-07-2012 13:31:41	0	0.009	0.068999998	0.236004218
fg072412_04	fg072412_04_24072012_133648.txt	fg072412	FG	1208528.612	2446572.52	7/24/2012	0	0.003298962	0.081060208	A	788.7	39.9	24-07-2012 13:36:48	0	0.014	0.344000012	0.235640123
fg072412_05	fg072412_05_24072012_134055.txt	fg072412	FG	1208529.127	2446385.283	7/24/2012	0	0.013881451	0.655957341	A	789.0	40.5	24-07-2012 13:40:55	-0.453999996	0.059	2.788000107	0.235278815
fg072412_06	fg072412_06_24072012_134601.txt	fg072412	FG	1208521.88	2446161.361	7/24/2012	0	0.012375778	0.209220707	A	784.8	41.2	24-07-2012 13:46:01	-0.481999993	0.052999999	0.896000028	0.233505249
fg072412_07	fg072412_07_24072012_135039.txt	fg072412	FG	1208548.78	2445987.56	7/24/2012	0	0.001632568	0.29969275	A	786.6	41.9	24-07-2012 13:50:39	-3.755000114	0.007	1.284999967	0.233232293
fg072412_08	fg072412_08_24072012_135440.txt	fg072412	FG	1208344.531	2445990.808	7/24/2012	0	0.004421705	0.44473049	A	785.4	42.5	24-07-2012 13:54:40	-1.251000097	0.018999999	1.911000013	0.232721344
fg072412_09	fg072412_09_24072012_135810.txt	fg072412	FG	1208326.169	2446171.916	7/24/2012	0	0.008150496	0	A	787.4	43.1	24-07-2012 13:58:10	-1.703999996	0.035	-0.050000001	0.232871309
fg072412_10	fg072412_10_24072012_140207.txt	fg072412	FG	1208114.69	2446182.444	7/24/2012	0	0.002548446	0.235383779	A	784.6	43.6	24-07-2012 14:02:07	-1.226999998	0.011	0.101600032	0.231676936
fg072412_11	fg072412_11_24072012_140612.txt	fg072412	FG	1208129.952	2446377.633	7/24/2012	0	0.00695389	0.044273097	A	785.5	43.8	24-07-2012 14:06:12	-1.824000001	0.029999999	0.191	0.231796324
fg072412_12	fg072412_12_24072012_140929.txt	fg072412	FG	1208131.477	2446569.476	7/24/2012	0	0.00255522	0.096055545	A	786.5	43.9	24-07-2012 14:09:29	-2.977999926	0.011	0.414000005	0.232018217
fg072412_13	fg072412_13_24072012_141420.txt	fg072412	FG	1208134.98	2446766.844	7/24/2012	0	0.001625879	0.70330894	A	787.1	43.8	24-07-2012 14:14:20	-2.151000023	0.007	3.028000116	0.232268468
fg072412_14	fg072412_14_24072012_141834.txt	fg072412	FG	1207924.212	2446763.002	7/24/2012	0	0.0016298	0.206751734	A	788.5	43.6	24-07-2012 14:18:34	-2.046000004	0.007	0.888000011	0.232828528
fg072412_15	fg072412_15_24072012_142251.txt	fg072412	FG	1207709.282	2446781.387	7/24/2012	0	0.001396613	0.163869232	A	787.8	43.4	24-07-2012 14:22:51	-1.398000002	0.006	0.703999996	0.232768804
fg072412_16	fg072412_16_24072012_142638.txt	fg072412	FG	1207723.954	2446617.198	7/24/2012	0	0.000698127	0.114725538	A	787.1	43.2	24-07-2012 14:26:38	-1.383999944	0.003	0.493000001	0.232709005
fg072412_17	fg072412_17_24072012_143129.txt	fg072412	FG	1207711.928	2446387.307	7/24/2012	0	0.000699145	0.134701893	A	787.5	42.9	24-07-2012 14:31:29	-1.228999972	0.003	0.578000009	0.23304826
fg072412_18	fg072412_18_24072012_143459.txt	fg072412	FG	1207930.892	2446374.003	7/24/2012	0	0.000465444	0	A	785.9	42.7	24-07-2012 14:34:59	-1.754999995	0.002	-0.071000002	0.232722044
fg072412_19	fg072412_19_24072012_143819.txt	fg072412	FG	1207929.151	2446566.084	7/24/2012	0	0.000932308	0.511836946	A	786.6	42.5	24-07-2012 14:38:19	-0.842000008	0.004	2.196000099	0.233076915
pg071612_01	pg071612_01_16072012_102844.txt	pg071612	PG	1205940.33	2454178.894	7/16/2012	0	0	0.576517165	A	787.9	23.4	16-07-2012 10:28:44	0	-0.003	2.319999933	0.248498797
pg071612_02	pg071612_02_16072012_103352.txt	pg071612	PG	1205942.125	2454364.244	7/16/2012	0	0.001482494	0.183335111	A	787.9	25.1	16-07-2012 10:33:52	0	0.006	0.741999984	0.247082368
pg071612_03	pg071612_03_16072012_103810.txt	pg071612	PG	1205747.816	2454362.381	7/16/2012	0	0.003453003	0.524116576	A	789.4	26.2	16-07-2012 10:38:10	0	0.014	2.125	0.246643096
pg071612_04	pg071612_04_16072012_104323.txt	pg071612	PG	1205750.369	2454591.502	7/16/2012	0	0.002207913	0.098129474	A	787.8	27.2	16-07-2012 10:43:23	0	0.009	0.400000006	0.245323673
pg071612_05	pg071612_05_16072012_104750.txt	pg071612	PG	1205740.519	2454794.54	7/16/2012	0	0.000981825	0.410893559	A	789.8	27.8	16-07-2012 10:47:50	-0.147	0.004	1.674000025	0.245456129
pg071612_06	pg071612_06_16072012_105359.txt	pg071612	PG	1205525.485	2454575.863	7/16/2012	0	0.000488929	0.322937518	A	788.7	28.6	16-07-2012 10:53:59	0	0.002	1.32099998	0.244464427
pg071612_07	pg071612_07_16072012_105739.txt	pg071612	PG	1205529.072	2454966.052	7/16/2012	0	0.002200718	0.291961879	A	790.2	29.1	16-07-2012 10:57:39	0	0.009	1.194000006	0.244524196
pg071612_08	pg071612_08_16072012_110107.txt	pg071612	PG	1205512.419	2455177.222	7/16/2012	0	0.00219158	0.233525008	A	787.7	29.4	16-07-2012 11:01:07	0	0.009	0.958999991	0.243508875
pg071612_09	pg071612_09_16072012_110416.txt	pg071612	PG	1205329.763	2455168.705	7/16/2012	0	0.003568743	0.122445934	A	789.8	29.7	16-07-2012 11:04:16	0	0.015	0.501999974	0.243916214
pg071612_10	pg071612_10_16072012_110756.txt	pg071612	PG	1205149.282	2455198.137	7/16/2012	0	0.00341205	0.241036952	A	790.2	30.1	16-07-2012 11:07:56	0	0.014	0.989000022	0.243717849
pg071612_100	pg071612_100_18072012_112859.txt	pg071612	PG	1204324.138	2456583.443	7/18/2012	0	0.003595128	0.262000352	A	793.6	36.5	18-07-2012 11:28:59	0	0.015	1.093000054	0.23970753
pg071612_101	pg071612_101_18072012_113257.txt	pg071612	PG	1204716.001	2456588.273	7/18/2012	0	0.000957593	0.127359882	A	793.6	36.9	18-07-2012 11:32:57	0	0.004	0.532000005	0.239398286
pg071612_102	pg071612_102_18072012_113743.txt	pg071612	PG	1204129.463	2456579.079	7/18/2012	0	0.004297894	0.33046031	A	792.8	37.4	18-07-2012 11:37:43	0	0.017999999	1.383999944	0.238771901
pg071612_103	pg071612_103_18072012_114047.txt	pg071612	PG	1204124.2	2456775.969	7/18/2012	0	0.00310456	0.141615674	A	793.7	37.7	18-07-2012 11:40:47	0	0.013	0.592999995	0.238812268
pg071612_104	pg071612_104_18072012_114338.txt	pg071612	PG	1203928.722	2456772.886	7/18/2012	0	0.004532487	0.225193039	A	793.6	38.0	18-07-2012 11:43:38	0	0.018999999	0.944000006	0.238551944
pg071612_105	pg071612_105_18072012_114657.txt	pg071612	PG	1203925.683	2456977.086	7/18/2012	0	0.003575283	0.271244794	A	793.7	38.3	18-07-2012 11:46:57	0	0.015	1.138000011	0.238352194
pg071612_106	pg071612_106_18072012_115033.txt	pg071612	PG	1204141.433	2456973.146	7/18/2012	0	0.002381228	0.23978968	A	793.7	38.6	18-07-2012 11:50:33	0	0.01	1.006999969	0.238122821
pg071612_107	pg071612_107_18072012_115507.txt	pg071612	PG	1203934.555	2457171.515	7/18/2012	0	0.002376355	0.221951529	A	793.6	39.2	18-07-2012 11:55:07	0	0.01	0.934000015	0.237653463
pg071612_108	pg071612_108_18072012_115803.txt	pg071612	PG	1203728.285	2457181.389	7/18/2012	0	0.004036435	0.175228775	A	793.7	39.5	18-07-2012 11:58:03	0	0.017000001	0.737999976	0.237437367
pg071612_109	pg071612_109_18072012_120134.txt	pg071612	PG	1203725.008	2457371.774	7/18/2012	0	0.003074791	0.120389886	A	791.4	39.8	18-07-2012 12:01:34	0	0.013	0.509000003	0.236522362
pg071612_11																	

APPENDIX E
FLUX METER DATA

SitePt	Filename	Site	AreaAbbrev	Northing	Easting	Date	CH4flux	H2Sflux	CO2flux	ACCUMULATION CHAMBER:	PRESSURE (HPa):	TEMP DegC	TIME:	CH4slope	H2Sslope	CO2slope	Ack
pg071612_132	pg071612_132_18072012_132744.txt	pg071612	PG	1201929.408	2460176.102	7/18/2012	0	0.004938421	0.329228103	A	795.4	43.2	18-07-2012 13:27:44	0	0.021	1.399999976	0.235162929
pg071612_133	pg071612_133_18072012_133437.txt	pg071612	PG	1201909.764	2459761.868	7/18/2012	0	0.00117633	0.075990908	A	796.0	43.3	18-07-2012 13:34:37	0	0.005	0.323000014	0.235265955
pg071612_134	pg071612_134_18072012_133453.txt	pg071612	PG	1202119.28	2459791.615	7/18/2012	0	0.00117633	0.075990908	A	796.0	43.3	18-07-2012 13:34:53	0	0.005	0.323000014	0.235265955
pg071612_135	pg071612_135_18072012_134416.txt	pg071612	PG	1202162.139	2459574.637	7/18/2012	0	0.002573295	0.298736095	A	792.0	43.5	18-07-2012 13:44:16	0	0.011	1.27699995	0.233935863
pg071612_136	pg071612_136_18072012_134723.txt	pg071612	PG	1202107.495	2459381.424	7/18/2012	0	0.001637258	0.233731434	A	792.1	43.5	18-07-2012 13:47:23	0	0.007	0.999000013	0.233965397
pg071612_137	pg071612_137_18072012_135050.txt	pg071612	PG	1202315.215	2459373.419	7/18/2012	0	0.001172633	0.174253255	A	794.0	43.5	18-07-2012 13:50:50	0	0.005	0.742999971	0.234526604
pg071612_138	pg071612_138_18072012_135431.txt	pg071612	PG	1202323.861	2459554.033	7/18/2012	0	0.001406096	0.07288266	A	794.4	43.5	18-07-2012 13:54:31	0	0.006	0.31099999	0.234349385
pg071612_139	pg071612_139_18072012_135749.txt	pg071612	PG	1202535.474	2459383.819	7/18/2012	0	0.002579793	0.206617936	A	794.0	43.5	18-07-2012 13:57:49	0	0.011	0.880999982	0.234526604
pg071612_14	pg071612_14_16072012_112225.txt	pg071612	PG	1204933.934	2455789.755	7/16/2012	0	0.004123023	0.275029838	A	790.5	31.7	16-07-2012 11:22:25	0	0.017000001	1.133999944	0.242530733
pg071612_140	pg071612_140_18072012_140531.txt	pg071612	PG	1205106.923	2455773.517	7/18/2012	0	0.001644278	0.293855965	A	794.5	43.2	18-07-2012 14:05:31	0	0.007	1.251000047	0.234896839
pg071612_141	pg071612_141_18072012_140935.txt	pg071612	PG	1202516.395	2458944.178	7/18/2012	0	0.001644697	0.220859274	A	794.2	43.0	18-07-2012 14:09:35	0	0.007	0.939999998	0.234956682
pg071612_142	pg071612_142_18072012_141304.txt	pg071612	PG	1202739.986	2458989.489	7/18/2012	0	0.003976914	0.259201169	A	790.5	42.9	18-07-2012 14:13:04	0	0.017000001	1.108000004	0.233936071
pg071612_143	pg071612_143_18072012_141730.txt	pg071612	PG	1202930.12	2458769.44	7/18/2012	0	0.001880017	0.126431167	A	793.6	42.7	18-07-2012 14:17:30	0	0.008	0.537999988	0.235002175
pg071612_144	pg071612_144_18072012_142143.txt	pg071612	PG	1202929.692	2458595.983	7/18/2012	0	0.002810787	0.206358612	A	791.0	42.7	18-07-2012 14:21:43	0	0.012	0.880999982	0.234232262
pg071612_145	pg071612_145_18072012_142521.txt	pg071612	PG	1203122.024	2458573.571	7/18/2012	0	0.004216977	0.308542192	A	791.4	42.8	18-07-2012 14:25:21	0	0.017999999	1.317000031	0.234276533
pg071612_146	pg071612_146_18072012_142827.txt	pg071612	PG	1203124.028	2458385.146	7/18/2012	0	0.002348239	0.191146627	A	793.5	42.9	18-07-2012 14:28:27	0	0.01	0.814000001	0.234823868
pg071612_147	pg071612_147_18072012_143147.txt	pg071612	PG	1203116.161	2458176.848	7/18/2012	0	0.003518581	0.240670799	A	792.9	43.0	18-07-2012 14:31:47	0	0.015	1.026000023	0.234572098
pg071612_148	pg071612_148_18072012_143538.txt	pg071612	PG	1203328.95	2458185.812	7/18/2012	0	0.00093774	0	A	792.6	43.2	18-07-2012 14:35:38	0	0.004	-0.046999998	0.234335095
pg071612_149	pg071612_149_18072012_143845.txt	pg071612	PG	1203330.507	2457982.714	7/18/2012	0	0.001874442	0.058342002	A	793.0	43.4	18-07-2012 14:38:45	0	0.008	0.248999998	0.234305233
pg071612_15	pg071612_15_16072012_112522.txt	pg071612	PG	1204959.174	2456003.548	7/16/2012	0	0.004603792	0.32517311	A	790.8	32.1	16-07-2012 11:25:22	0	0.018999999	1.342000008	0.242304847
pg071612_150	pg071612_150_18072012_144236.txt	pg071612	PG	1203347.628	2457792.84	7/18/2012	0	0.001633722	0.183910966	A	790.4	43.6	18-07-2012 14:42:36	0	0.007	0.787999988	0.233389556
pg071612_151	pg071612_151_18072012_144604.txt	pg071612	PG	1203547.546	2457775.964	7/18/2012	0	0.002105089	0.15976806	A	792.7	43.8	18-07-2012 14:46:04	0	0.009	0.683000028	0.233921006
pg071612_152	pg071612_152_18072012_144936.txt	pg071612	PG	1203524.302	2457587.872	7/18/2012	0	0.002104284	0.177445278	A	793.0	44.1	18-07-2012 14:49:36	0	0.009	0.759000003	0.233788237
pg071612_153	pg071612_153_18072012_145333.txt	pg071612	PG	1203518.172	2457387.607	7/18/2012	0	0.003969893	0.345847696	A	792.6	44.3	18-07-2012 14:53:33	0	0.017000001	1.480999947	0.233523101
pg071612_154	pg071612_154_18072012_145705.txt	pg071612	PG	1203537.404	2457185.327	7/18/2012	0	0.004432749	0.216971442	A	792.6	44.6	18-07-2012 14:57:05	0	0.018999999	0.930000007	0.233302623
pg071612_155	pg071612_155_18072012_150040.txt	pg071612	PG	1203741.308	2456978.448	7/18/2012	0	0.003251827	0.162591353	A	789.6	44.8	18-07-2012 15:00:40	0	0.014	0.699999988	0.232273737
pg071612_156	pg071612_156_18072012_150405.txt	pg071612	PG	1203720.343	2456791.084	7/18/2012	0	0.001396997	0.134111747	A	792.0	45.0	18-07-2012 15:04:05	0	0.006	0.575999975	0.232832909
pg071612_157	pg071612_157_18072012_150755.txt	pg071612	PG	1203928.894	2456579.506	7/18/2012	0	0.002559387	0.154028594	A	791.7	45.1	18-07-2012 15:07:55	0	0.011	0.662	0.232671589
pg071612_158	pg071612_158_18072012_151202.txt	pg071612	PG	1203944.233	2456378.951	7/18/2012	0	0.00511556	0.357856691	A	791.7	45.3	18-07-2012 15:12:02	0	0.022	1.1569000034	0.232525453
pg071612_159	pg071612_159_18072012_151433.txt	pg071612	PG	1204141.915	2456384.739	7/18/2012	0	0.006256756	0.267882735	A	789.0	45.6	18-07-2012 15:14:33	0	0.027000001	1.536000018	0.231732458
pg071612_16	pg071612_16_16072012_112840.txt	pg071612	PG	1204918.342	2456175.214	7/16/2012	0	0.004581152	0.093310826	A	788.2	32.6	16-07-2012 11:28:40	0	0.018999999	0.386999995	0.241113245
pg071612_160	pg071612_160_18072012_151811.txt	pg071612	PG	1204135.424	2456194.909	7/18/2012	0	0.001394797	0.033479434	A	791.6	45.3	18-07-2012 15:18:11	-2.066999912	0.006	0.143999994	0.232496083
pg071612_161	pg071612_161_18072012_152427.txt	pg071612	PG	1204321.123	2455783.271	7/18/2012	0	0.002557134	0.123904757	A	791.5	45.3	18-07-2012 15:24:27	0	0.011	0.532999992	0.232466713
pg071612_17	pg071612_17_16072012_113140.txt	pg071612	PG	1204729.31	2456186.699	7/16/2012	0	0.00289977	0.273758978	A	790.9	33.0	16-07-2012 11:31:40	0	0.012	1.133000016	0.241623089
pg071612_18	pg071612_18_16072012_113447.txt	pg071612	PG	1204728.462	2456385.019	7/16/2012	0	0.004587167	0.101400532	A	791.3	33.4	16-07-2012 11:34:47	0	0.018999999	0.419999987	0.24142985
pg071612_19	pg071612_19_16072012_113830.txt	pg071612	PG	1204529.137	2456375.334	7/16/2012	0	0.002169763	0.302561373	A	791.2	33.8	16-07-2012 11:38:30	0	0.009	1.254999995	0.241084754
pg071612_20	pg071612_20_16072012_114236.txt	pg071612	PG	1204522.42	2456598.41	7/16/2012	0	0.001440688	0.324154824	A	789.3	34.3	16-07-2012 11:42:36	0	0.006	1.350000024	0.240114689
pg071612_21	pg071612_21_16072012_114624.txt	pg071612	PG	1204519.835	2456782.57	7/16/2012	0	0.003608694	0.210747749	A	791.6	34.6	16-07-2012 11:46:24	0	0.015	0.875999987	0.24057962
pg071612_22	pg071612_22_16072012_115003.txt	pg071612	PG	1204334.966	2456771.438	7/16/2012	0	0.005047252	0.314852357	A	791.6	34.9	16-07-2012 11:50:03	0	0.021	1.309999943	0.240345329
pg071612_23	pg071612_23_16072012_115241.txt	pg071612	PG	1204345.705	2456971.557	7/16/2012	0	0.004323955	0.208270505	A	791.7	35.1	16-07-2012 11:52:41	0	0.017999999	0.866999984	0.240219727
pg071612_24	pg071612_24_16072012_115604.txt	pg071612	PG	1204342.927	2457163.657	7/16/2012	0	0.001680235	0.397495717	A	791.6	35.3	16-07-2012 11:56:04	0	0.007	1.656000018	0.240033641
pg071612_25	pg071612_25_16072012_120008.txt	pg071612	PG	1204142.047	2457182.126	7/16/2012	0	0.000959323	0.008873736	A	791.7	35.6	16-07-2012 12:00:08	0	0.004	0.037	0.239830703
pg071612_26	pg071612_26_16072012_120242.txt	pg071612	PG	1204118.351	2457381.815	7/16/2012	0	0.004315793	0.167117104	A	792.0	35.8	16-07-2012 12:02:42	0	0.017999999	0.697000027	0.23976627
pg071612_27	pg071612_27_16072012_120518.txt	pg071612	PG	1204132.792	2457575.823	7/16/2012	0	0.002875334	0.295200944	A	792.0	36.0	16-07-2012 12:05:18	0	0.012	1.231999993	0.239611164
pg071612_28	pg071612_28_16072012_120833.txt	pg071612	PG	1203928.846	2457566.604	7/16/2012	0	0.002155106	0.080936216	A	792.0	36.2	16-07-2012 12:08:33	0	0.009	0.338	0.239456251
pg071612_29	pg071612_29_16072012_121149.txt	pg071612	PG	1203937.646	2457775.009	7/16/2012	0	0.004068353	0.240032822	A	792.3	36.5	16-07-2012 12:11:49	0	0.017000001	1.003000021	0.239314869
pg071612_30	pg071612_30_16072012_121509.txt	pg071612	PG	1203936.145	2457966.002	7/16/2012	0	0.001913283	0.035634901	A	792.3	36.7	16-07-2012 12:15:09	0	0.008	0.149000004	0.239160404
pg071612_31	pg071612_31_16072012_121753.txt	pg071612	PG	1203941.252	2458162.638	7/16/2012	0	0.003812997	0.163243935	A	790.0	36.9	16-07-2012 12:17:53	0	0.016000001	0.685000002	0.238312304
pg071612_32	pg071612_32_16072012_122113.txt	pg071612	PG														

APPENDIX E
FLUX METER DATA

SitePt	Filename	Site	AreaAbbrev	Northing	Easting	Date	CH4flux	H2Sflux	CO2flux	ACCUMULATION CHAMBER:	PRESSURE (HPa):	TEMP DegC	TIME:	CH4slope	H2Sslope	CO2slope	Ack
pg071612 57	pg071612 57 16072012 134301.txt	pg071612	PG	1201531.984	2460959.696	7/16/2012	0	0.002122377	0.178751305	A	795.1	42.2	16-07-2012 13:43:01	0	0.009	0.758000016	0.235819668
pg071612 58	pg071612 58 16072012 134551.txt	pg071612	PG	1201333.318	2460962.199	7/16/2012	0	0.002827516	0.453345031	A	794.7	42.3	16-07-2012 13:45:51	0	0.012	1.924000025	0.23562631
pg071612 59	pg071612 59 16072012 134906.txt	pg071612	PG	1201115.927	2460953.828	7/16/2012	0	0.002591394	0.271625221	A	794.8	42.4	16-07-2012 13:49:06	0	0.011	1.152999997	0.235581279
pg071612 60	pg071612 60 16072012 135518.txt	pg071612	PG	1200942.56	2461016.007	7/16/2012	0	0.001884764	0.357398421	A	795.1	42.5	16-07-2012 13:55:18	0	0.008	1.516999996	0.235595539
pg071612 61	pg071612 61 16072012 140010.txt	pg071612	PG	1200905.45	2461163.758	7/16/2012	0	0.005182112	0.436710715	A	795.2	42.6	16-07-2012 14:00:10	0	0.022	1.853999972	0.235550553
pg071612 62	pg071612 62 16072012 141604.txt	pg071612	PG	1200745.32	2461189.53	7/16/2012	0	0.003296664	0.220170036	A	795.2	42.7	16-07-2012 14:16:04	0	0.014	0.935000002	0.235475972
pg071612 63	pg071612 63 16072012 142228.txt	pg071612	PG	1200520.324	2461172.066	7/16/2012	0	0.002355209	0.164003062	A	795.1	42.6	16-07-2012 14:22:28	0	0.01	2.607000113	0.235520929
pg071612 64	pg071612 64 16072012 142842.txt	pg071612	PG	1200530.514	2461354.31	7/16/2012	0	0.002357591	0.575252295	A	795.4	42.4	16-07-2012 14:28:42	0	0.01	2.440000057	0.235759124
pg071612 65	pg071612 65 16072012 143401.txt	pg071612	PG	1200336.828	2461384.503	7/16/2012	0	0.003062742	0.351744145	A	795.1	42.5	16-07-2012 14:34:01	0	0.013	1.493000031	0.235595539
pg071612 66	pg071612 66 16072012 143750.txt	pg071612	PG	1200161.703	2461377.973	7/16/2012	0	0.005181774	0.272749752	A	795.4	42.7	16-07-2012 14:37:50	0	0.022	1.157999992	0.235535204
pg071612 67	pg071612 67 16072012 144104.txt	pg071612	PG	1200122.018	2461581.195	7/16/2012	0	0.001884755	0.088583499	A	795.6	42.7	16-07-2012 14:41:04	-0.246999994	0.008	0.375999987	0.235594422
pg071612 68	pg071612 68 16072012 144622.txt	pg071612	PG	1199922.717	2461568.478	7/16/2012	0	0.002591539	0.546343446	A	795.6	42.7	16-07-2012 14:46:22	0	0.011	2.319000006	0.235594422
pg071612 69	pg071612 69 16072012 145156.txt	pg071612	PG	1199922.971	2461779.729	7/16/2012	0	0.001414725	0.005423113	A	796.0	42.6	16-07-2012 14:51:56	0	0.006	0.023	0.235787526
pg071612 70	pg071612 70 16072012 150211.txt	pg071612	PG	1200323.579	2461166.11	7/16/2012	0	0.002832158	0.213119864	A	795.5	42.1	16-07-2012 15:02:11	0	0.012	0.902999997	0.236013144
pg071612 71	pg071612 71 16072012 150524.txt	pg071612	PG	1200513.685	2460990.467	7/16/2012	0	0.001411008	0.232110843	A	792.4	42.0	16-07-2012 15:05:24	0	0.006	0.986999989	0.235168025
pg071612 72	pg071612 72 16072012 150916.txt	pg071612	PG	1200916.002	2460800.577	7/16/2012	0	0.00235303	0.288010836	A	792.1	41.7	16-07-2012 15:09:16	0	0.01	1.223999977	0.235302985
pg071612 73	pg071612 73 16072012 151156.txt	pg071612	PG	1201088.963	2460784.485	7/16/2012	0	0.001411553	0.219026014	A	791.7	41.6	16-07-2012 15:11:56	0	0.006	0.930999994	0.235258877
pg071612 74	pg071612 74 16072012 151722.txt	pg071612	PG	1201703.843	2460560.924	7/16/2012	0	0.001781666	0.11098323	A	791.7	41.1	16-07-2012 15:17:22	0	0.005	0.470999986	0.235633194
pg071612 75	pg071612 75 16072012 152057.txt	pg071612	PG	1201926.759	2460381.937	7/16/2012	0	0.001654444	0.235403702	A	793.6	40.9	16-07-2012 15:20:57	0	0.007	0.995999992	0.236349106
pg071612 76	pg071612 76 16072012 153934.txt	pg071612	PG	1203911.389	2457359.63	7/16/2012	0	0.006157666	0.272595108	A	793.2	40.1	16-07-2012 15:39:34	0	0.026000001	1.151000023	0.236833289
pg071612 77	pg071612 77 16072012 154908.txt	pg071612	PG	1204716.522	2455982.102	7/16/2012	0	0.001415719	0.265683264	A	790.0	40.0	16-07-2012 15:49:08	0	0.006	1.126000047	0.235953152
pg071612 78	pg071612 78 16072012 155141.txt	pg071612	PG	1204741.351	2455780.593	7/16/2012	0	0.00282642	0.15144901	A	788.6	40.0	16-07-2012 15:51:41	0	0.012	0.643000007	0.235535011
pg071612 79	pg071612 79 16072012 155451.txt	pg071612	PG	1204923.096	2455569.189	7/16/2012	0	0.001648536	0.143422633	A	788.5	40.0	16-07-2012 15:54:51	0	0.007	0.609000027	0.235505134
pg071612 80	pg071612 80 18072012 101726.txt	pg071612	PG	1205731.366	2454179.855	7/18/2012	0	0	0.246332765	A	787.9	28.7	18-07-2012 10:17:26	0	0	1.008999944	0.244135559
pg071612 81	pg071612 81 18072012 102134.txt	pg071612	PG	1205541.901	2454171.983	7/18/2012	0	0.000975272	0.066562317	A	788.7	29.4	18-07-2012 10:21:34	0	0.004	0.273000002	0.243818015
pg071612 82	pg071612 82 18072012 102550.txt	pg071612	PG	1205509.243	2454392.274	7/18/2012	0	0.002685514	0.815175474	A	791.3	30.0	18-07-2012 10:25:50	0	0.011	3.338999987	0.244137615
pg071612 83	pg071612 83 18072012 102848.txt	pg071612	PG	1205529.068	2454583.698	7/18/2012	0	0.003659087	0.21515435	A	791.7	30.4	18-07-2012 10:28:48	0	0.015	0.882000029	0.243999161
pg071612 84	pg071612 84 18072012 103249.txt	pg071612	PG	1205319.845	2454594.786	7/18/2012	0	0.000974596	0.375219285	A	791.8	30.8	18-07-2012 10:32:49	0	0.004	1.539999962	0.243648902
pg071612 85	pg071612 85 18072012 103546.txt	pg071612	PG	1205326.527	2454775.198	7/18/2012	0	0.002921642	0.364231348	A	792.0	31.1	18-07-2012 10:35:46	0	0.012	1.496000051	0.243470147
pg071612 86	pg071612 86 18072012 103911.txt	pg071612	PG	1205297.366	2454974.382	7/18/2012	0	0.001216612	0.188331574	A	792.3	31.4	18-07-2012 10:39:11	0	0.005	0.773999989	0.243322447
pg071612 87	pg071612 87 18072012 104309.txt	pg071612	PG	1205125.153	2454945.75	7/18/2012	0	0.005830167	0.385033935	A	792.3	31.9	18-07-2012 10:43:09	0	0.024	1.585000038	0.242923617
pg071612 88	pg071612 88 18072012 104653.txt	pg071612	PG	1204916.738	2454977.884	7/18/2012	0	0.001698111	0.333072394	A	792.5	32.4	18-07-2012 10:46:53	0	0.007	1.373000026	0.242587313
pg071612 89	pg071612 89 18072012 105006.txt	pg071612	PG	1204919.69	2455177.189	7/18/2012	0	0.002422702	0.186063483	A	792.5	32.8	18-07-2012 10:50:06	0	0.01	0.768000007	0.242270157
pg071612 90	pg071612 90 18072012 105315.txt	pg071612	PG	1204917.669	2455376.277	7/18/2012	0	0.001693765	0.291327596	A	792.8	33.3	18-07-2012 10:53:15	0	0.007	1.203999996	0.241966441
pg071612 91	pg071612 91 18072012 105705.txt	pg071612	PG	1204716.272	2455365.837	7/18/2012	0	0.00217431	0.362143487	A	792.6	33.7	18-07-2012 10:57:05	0	0.009	1.498999953	0.241590053
pg071612 92	pg071612 92 18072012 110039.txt	pg071612	PG	1204717.967	2455569.66	7/18/2012	0	0.003620046	0.354040533	A	792.8	34.1	18-07-2012 11:00:39	0	0.015	1.467000008	0.24133642
pg071612 93	pg071612 93 18072012 110336.txt	pg071612	PG	1204537.274	2455571.127	7/18/2012	0	0.002410042	0.254056364	A	792.6	34.4	18-07-2012 11:03:36	0	0.01	1.05400002	0.241040185
pg071612 94	pg071612 94 18072012 110727.txt	pg071612	PG	1204517.51	2455793.486	7/18/2012	0	0.000963586	0.1416471	A	792.9	34.7	18-07-2012 11:07:27	0	0.004	0.588	0.240896434
pg071612 95	pg071612 95 18072012 111239.txt	pg071612	PG	1204517.75	2455981.868	7/18/2012	0	0	0.06424398	A	793.0	35.1	18-07-2012 11:12:39	0	0	0.266999999	0.240614176
pg071612 96	pg071612 96 18072012 111601.txt	pg071612	PG	1204342.636	2455991.049	7/18/2012	0	0.003125731	0.238276899	A	793.2	35.4	18-07-2012 11:16:01	0	0.013	0.990999997	0.24044086
pg071612 97	pg071612 97 18072012 111928.txt	pg071612	PG	1204530.902	2456201.494	7/18/2012	0	0.001201037	0.159737855	A	793.2	35.7	18-07-2012 11:19:28	0	0.005	0.665000021	0.2402703
pg071612 98	pg071612 98 18072012 112253.txt	pg071612	PG	1204334.635	2456179.703	7/18/2012	0	0.002639716	0.224615842	A	793.2	36.0	18-07-2012 11:22:53	0	0.011	0.935999999	0.239974201
pg071612 99	pg071612 99 18072012 112556.txt	pg071612	PG	1204333.543	2456383.934	7/18/2012	0	0.002877987	0.212251529	A	793.5	36.3	18-07-2012 11:25:56	0	0.012	0.884999999	0.239832237
PG071912 01	PG071912 01 19072012 100757.txt	PG071912	PG	1205338.959	2454385.539	7/19/2012	0	0.00293509	0.122784607	A	791.2	29.4	19-07-2012 10:07:57	0	0.012	0.501999974	0.244590864
PG071912 02	PG071912 02 19072012 101604.txt	PG071912	PG	1205117.131	2454612.326	7/19/2012	0	0.001217321	0.428497136	A	791.2	30.8	19-07-2012 10:16:04	0	0.005	1.759999999	0.243464276
PG071912 03	PG071912 03 19072012 101913.txt	PG071912	PG	1205125.481	2454769.13	7/19/2012	0	0.001951151	0.502909184	A	793.9	31.3	19-07-2012 10:19:13	0	0.008	2.062000036	0.243893892
PG071912 04	PG071912 04 19072012 102246.txt	PG071912	PG	1204912.163	2454788.871	7/19/2012	0	0.001942309	0.508156478	A	791.6	31.8	19-07-2012 10:22:46	0	0.008	2.092999935	0.242788583
PG071912 05	PG071912 05 19072012 102726.txt	PG071912	PG	1204715.599	2454981.245	7/19/2012	0	0.003150054	0.353775263	A	791.6	32.4	19-07-2012 10:27:26	0	0.013	1.460000038	0.24231182
PG071912 06	PG071912 06 19072012 103128.txt	PG071912	PG	1204719.482	2455185.386	7/19/2012	0	0.001937183	0.375813514	A	792.1	32.8	19-07-2012 10:31:28	0	0.008	1.5520000	

APPENDIX E
FLUX METER DATA

SitePt	Filename	Site	AreaAbbrev	Northing	Easting	Date	CH4flux	H2Sflux	CO2flux	ACCUMULATION CHAMBER:	PRESSURE (HPa):	TEMP DegC	TIME:	CH4slope	H2Sslope	CO2slope	Ack
PG071912_28	PG071912_28_19072012_125045.txt	PG071912	PG	1199720.245	2461573.237	7/19/2012	0	0.004970937	0.474132687	A	797.6	42.0	19-07-2012 12:50:45	0	0.021	2.003000021	0.236711279
PG071912_29	PG071912_29_19072012_125604.txt	PG071912	PG	1199532.983	2461573.119	7/19/2012	0	0.000710395	0.379351079	A	798.4	42.2	19-07-2012 12:56:04	0	0.003	1.601999998	0.236798421
PG071912_30	PG071912_30_19072012_130151.txt	PG071912	PG	1199524.173	2461372.741	7/19/2012	0	0.002367669	0.06747856	A	798.8	42.4	19-07-2012 13:01:51	0	0.001	0.284999996	0.23676689
PG071912_31	PG071912_31_19072012_130527.txt	PG071912	PG	1199326.49	2461363.311	7/19/2012	0	0.002362163	0.250861704	A	797.7	42.7	19-07-2012 13:05:27	0	0.001	1.062000036	0.236216277
PG071912_32	PG071912_32_19072012_130829.txt	PG071912	PG	1199335.447	2461559.973	7/19/2012	0	0.00330825	0.29443422	A	798.5	42.9	19-07-2012 13:08:29	0	0.014	1.246000051	0.236303538
PG071912_33	PG071912_33_19072012_131246.txt	PG071912	PG	1199136.166	2461595.034	7/19/2012	0	0.000708729	0.084574938	A	798.8	43.1	19-07-2012 13:12:46	0	0.003	0.358000001	0.236242831
PG071912_34	PG071912_34_19072012_131644.txt	PG071912	PG	1199114.216	2461783.495	7/19/2012	0	0.001416738	0.086421043	A	798.9	43.3	19-07-2012 13:16:44	0	0.006	0.365999997	0.23612307
PG071912_35	PG071912_35_19072012_132059.txt	PG071912	PG	1199137.857	2461973.405	7/19/2012	0	0.001416553	0.077910393	A	799.3	43.5	19-07-2012 13:20:59	0	0.006	0.330000013	0.236092091
PG071912_36	PG071912_36_19072012_132611.txt	PG071912	PG	1198934.304	2461976.725	7/19/2012	0	0.004008283	0.175185516	A	798.5	43.6	19-07-2012 13:26:11	0	0.017000001	0.742999971	0.235781327
PG071912_37	PG071912_37_19072012_133134.txt	PG071912	PG	1198933.415	2461796.655	7/19/2012	0	0.003301137	0.146900579	A	798.8	43.7	19-07-2012 13:31:34	0	0.014	0.623000026	0.235795468
PG071912_38	PG071912_38_19072012_133745.txt	PG071912	PG	1198931.425	2461570.077	7/19/2012	0	0.002358686	0.090337679	A	799.3	43.8	19-07-2012 13:37:45	0	0.01	0.382999986	0.235868618
PG071912_39	PG071912_39_19072012_134059.txt	PG071912	PG	1198731.087	2461601.2	7/19/2012	0	0.002592763	0.152501598	A	799.0	43.9	19-07-2012 13:40:59	0	0.011	0.647000015	0.235705718
PG071912_40	PG071912_40_19072012_134426.txt	PG071912	PG	1198728.501	2461767.823	7/19/2012	0	0.003771292	0.250790894	A	799.0	43.9	19-07-2012 13:44:26	0	0.016000001	1.064000001	0.235705718
PG071912_41	PG071912_41_19072012_134802.txt	PG071912	PG	1198734.354	2461982.114	7/19/2012	0	0.001885995	0.061766334	A	799.4	44.0	19-07-2012 13:48:02	0	0.008	0.261999995	0.235749364
PG071912_42	PG071912_42_19072012_135159.txt	PG071912	PG	1198526.402	2461983.462	7/19/2012	0	0.002120142	0.31967029	A	799.3	44.2	19-07-2012 13:51:59	0	0.009	1.356999993	0.235571325
PG071912_43	PG071912_43_19072012_140013.txt	PG071912	PG	1198550.908	2461805.382	7/19/2012	0	0.002597104	0.292056173	A	801.6	44.4	19-07-2012 14:00:13	0	0.011	1.236999989	0.236100391
PG071912_44	PG071912_44_19072012_140033.txt	PG071912	PG	1198514.4	2461595.397	7/19/2012	0	0.002597104	0.292056173	A	801.6	44.4	19-07-2012 14:00:33	0	0.011	1.236999989	0.236100391
PG071912_45	PG071912_45_19072012_140657.txt	PG071912	PG	1198339.779	2461800.875	7/19/2012	0	0.00023529	0.084469087	A	799.1	44.5	19-07-2012 14:06:57	0	0.001	0.358999997	0.235289946
PG071912_46	PG071912_46_19072012_141516.txt	PG071912	PG	1198328.14	2461986.356	7/19/2012	0	0.001880906	0.261445969	A	798.5	44.5	19-07-2012 14:15:16	-0.014	0.008	1.111999989	0.235113293
PG071912_47	PG071912_47_19072012_142007.txt	PG071912	PG	1198331.056	2462179.982	7/19/2012	0	0.004236279	0.320074409	A	799.3	44.5	19-07-2012 14:20:07	0	0.017999999	1.360000014	0.235348836
PG071912_48	PG071912_48_19072012_142412.txt	PG071912	PG	1198134.407	2462184.473	7/19/2012	0	0.001882434	0.098357163	A	799.4	44.6	19-07-2012 14:24:12	0	0.008	0.418000013	0.235304207
PG071912_49	PG071912_49_19072012_142729.txt	PG071912	PG	1198121.089	2461987.09	7/19/2012	0	0.001881841	0.130317524	A	799.4	44.7	19-07-2012 14:27:29	0	0.008	0.554000002	0.235230178
PG071912_50	PG071912_50_19072012_143749.txt	PG071912	PG	1198100.656	2461787.171	7/19/2012	0	0.002116534	0.311130553	A	799.4	44.9	19-07-2012 14:37:49	-0.017000001	0.009	1.322999954	0.235170484
PG071912_51	PG071912_51_19072012_144928.txt	PG071912	PG	1199324.979	2461977.645	7/19/2012	0	0.002351268	0.052903526	A	799.3	44.8	19-07-2012 14:49:28	-0.01	0.01	0.224999994	0.235126778
PG071912_52	PG071912_52_19072012_145257.txt	PG071912	PG	1199348.099	2461789.814	7/19/2012	0	0.004223555	0.395136565	A	797.4	44.7	19-07-2012 14:52:57	0	0.017999999	1.684000015	0.234641656
PG071912_53	PG071912_53_19072012_145622.txt	PG071912	PG	1199513.266	2461774.026	7/19/2012	0	0.005165353	0.223518938	A	797.9	44.7	19-07-2012 14:56:22	0	0.022	0.952000022	0.23478879
PG071912_54	PG071912_54_19072012_145926.txt	PG071912	PG	1199735.215	2461760.514	7/19/2012	0	0.002582842	0.185025394	A	797.7	44.6	19-07-2012 14:59:26	-0.148000002	0.011	0.787999988	0.234803811
PG071912_55	PG071912_55_19072012_151438.txt	PG071912	PG	1201092.462	2460578.703	7/19/2012	0	0.007739769	0.326946616	A	797.3	44.8	19-07-2012 15:14:38	0	0.033	1.394000053	0.234538451
PG071912_56	PG071912_56_19072012_151729.txt	PG071912	PG	1201325.855	2460579.005	7/19/2012	0	0.002103301	0.401496798	A	794.7	44.9	19-07-2012 15:17:29	0	0.009	1.718000054	0.233700112
PG071912_57	PG071912_57_19072012_152008.txt	PG071912	PG	1201324.574	2460786.494	7/19/2012	0	0.003973152	0.382591188	A	795.0	45.0	19-07-2012 15:20:08	0	0.017000001	1.636999965	0.233714849
PG071912_58	PG071912_58_19072012_152344.txt	PG071912	PG	1201518.629	2460573.439	7/19/2012	0	0.003972903	0.349148065	A	795.2	45.1	19-07-2012 15:23:44	0	0.017000001	1.493999958	0.233700186
PG071912_59	PG071912_59_20072012_095357.txt	PG071912	PG	1197938.545	2461991.357	7/20/2012	0	0.001261141	0.196485743	A	803.5	24.8	20-07-2012 09:53:57	0	0.005	0.778999984	0.252228171
PG071912_60	PG071912_60_20072012_095759.txt	PG071912	PG	1197927.972	2462178.345	7/20/2012	0	0.002517359	0.479556918	A	805.7	26.2	20-07-2012 09:57:59	0	0.01	1.904999971	0.251735926
PG071912_61	PG071912_61_20072012_100259.txt	PG071912	PG	1197904.099	2462382.785	7/20/2012	0	0.002497449	0.055443376	A	803.6	27.8	20-07-2012 10:02:59	0	0.01	0.222000003	0.249744937
PG071912_62	PG071912_62_20072012_100743.txt	PG071912	PG	1197753.927	2462571.908	7/20/2012	0	0.001240676	0.100494772	A	802.4	29.3	20-07-2012 10:07:43	0	0.005	0.405000001	0.248135239
PG071912_63	PG071912_63_20072012_101328.txt	PG071912	PG	1197721.781	2462386.024	7/20/2012	0	0.004203724	0.178534597	A	802.8	30.5	20-07-2012 10:13:28	0	0.017000001	0.722000003	0.247277841
PG071912_64	PG071912_64_20072012_101718.txt	PG071912	PG	1197549.001	2462548.916	7/20/2012	0	0.0015457249	0.129893765	A	804.1	31.4	20-07-2012 10:17:18	0	0.014	0.526000023	0.24694632
PG071912_65	PG071912_65_20072012_102159.txt	PG071912	PG	1197517.465	2462371.959	7/20/2012	0	0.00123094	0.109553695	A	804.0	32.3	20-07-2012 10:21:59	0	0.005	0.444999993	0.246188089
PG071912_66	PG071912_66_20072012_102646.txt	PG071912	PG	1197530.119	2462165.286	7/20/2012	0	0.001473155	0.043458086	A	804.2	33.2	20-07-2012 10:26:46	0	0.006	0.177000001	0.245525897
PG071912_67	PG071912_67_20072012_103152.txt	PG071912	PG	1197719.861	2462162.294	7/20/2012	0	0.001710368	0.131209657	A	802.4	34.0	20-07-2012 10:31:52	0	0.007	0.537	0.244338274
PG071912_68	PG071912_68_20072012_103653.txt	PG071912	PG	1197742.571	2461956.622	7/20/2012	0	0.000731784	0.103913344	A	803.4	34.9	20-07-2012 10:36:53	0	0.003	0.425999999	0.243928045
PG071912_69	PG071912_69_20072012_104308.txt	PG071912	PG	1197337.619	2462182.091	7/20/2012	0	0.001212729	0.119332537	A	801.7	36.5	20-07-2012 10:43:08	0	0.005	0.492000014	0.242545798
PG071912_70	PG071912_70_20072012_104639.txt	PG071912	PG	1197326.19	2462368.579	7/20/2012	0	0.001942308	0.146158651	A	803.8	36.0	20-07-2012 10:46:39	0	0.008	0.601999998	0.242788449
PG071912_71	PG071912_71_20072012_105039.txt	PG071912	PG	1197330.257	2462573.723	7/20/2012	0	0.00121289	0.032262873	A	804.4	37.0	20-07-2012 10:50:39	0	0.005	0.133000001	0.242577985
PG071912_72	PG071912_72_20072012_105330.txt	PG071912	PG	1197135.357	2462592.111	7/20/2012	0	0.001451531	0.079350352	A	803.0	37.3	20-07-2012 10:53:30	0	0.006	0.328000009	0.241921797
PG071912_73	PG071912_73_20072012_105701.txt	PG071912	PG	1197126.91	2462384.45	7/20/2012	0	0.001934466	0.122596987	A	803.4	37.6	20-07-2012 10:57:01	0	0.008	0.507000029	0.241808638
PG071912_74	PG071912_74_20072012_110017.txt	PG071912	PG	1197123.926	2462167.725	7/20/2012	0	0.003386687	0.187477291	A	804.5	37.9	20-07-2012 11:00:17	0	0.014	0.774999976	0.241906181
PG071912_75	PG071912_75_20072012_110356.txt	PG071912	PG	1196919.797	2462190.071	7/20/2012	0	0.001208002	0.244982898	A	804.0	38.1	20-07-2012 11:03:56	0	0.005	1.014000058	0.241600484
PG071912_76	PG071912_76_20072012_110757.txt	PG071912	PG	1196960.185	2462378.162	7/20/2012	0	0.00434									

APPENDIX E
FLUX METER DATA

SitePt	Filename	Site	AreaAbbrev	Northing	Easting	Date	CH4flux	H2Sflux	CO2flux	ACCUMULATION CHAMBER:	PRESSURE (HPa):	TEMP DegC	TIME:	CH4slope	H2Sslope	CO2slope	Ack
sc071112_02	sc071112_02_11072012_091743.txt	sc071112	SQC	1213735.967	2439151.697	7/11/2012	0	0.001231622	0.277361363	A	786.8	25.6	11-07-2012 09:17:43	-0.012	0.005	1.126000047	0.246324465
sc071112_03	sc071112_03_11072012_092243.txt	sc071112	SQC	1213919.265	2439178.685	7/11/2012	0	0.000736754	0.645396411	A	786.8	26.5	11-07-2012 09:22:43	0	0.003	2.628000021	0.245584622
sc071112_04	sc071112_04_11072012_092826.txt	sc071112	SQC	1214126.616	2439179.549	7/11/2012	0	0.0020202976	0.105987608	A	786.3	27.3	11-07-2012 09:28:26	-0.025	0.009	0.432999998	0.244775072
sc071112_05	sc071112_05_11072012_093315.txt	sc071112	SQC	1214117.928	2439359.781	7/11/2012	0	0.001956783	0.190297157	A	787.3	27.9	11-07-2012 09:33:15	0	0.008	0.777999997	0.244597897
sc071112_06	sc071112_06_11072012_094052.txt	sc071112	SQC	1213923.873	2439363.329	7/11/2012	0	0.000243745	0.88966912	A	786.9	28.8	11-07-2012 09:40:52	0	0.001	3.650000095	0.243744954
sc071112_07	sc071112_07_11072012_094064.txt	sc071112	SQC	1213715.813	2439376.09	7/11/2012	0	0.000728616	0.514403224	A	785.9	29.5	11-07-2012 09:40:64	0	0.003	2.118000031	0.242872149
sc071112_08	sc071112_08_11072012_095200.txt	sc071112	SQC	1213728.433	2439562.185	7/11/2012	0	0.001215906	0.598712027	A	788.2	30.0	11-07-2012 09:52:00	0	0.005	2.461999893	0.243181184
sc071112_09	sc071112_09_11072012_095553.txt	sc071112	SQC	1213917.499	2439563.792	7/11/2012	0	0.002425752	0.612139463	A	786.6	30.2	11-07-2012 09:55:53	0	0.01	2.523999929	0.242527054
sc071112_10	sc071112_10_11072012_100244.txt	sc071112	SQC	1214130.022	2439598.882	7/11/2012	0	0.000726902	0.38356173	A	786.9	30.6	11-07-2012 10:02:44	0	0.003	1.582999945	0.24230054
sc071112_100	sc071112_100_12072012_141625.txt	sc071112	SQC	1209349.118	2444171.91	7/12/2012	0	0	0	A	661.1	44.6	12-07-2012 14:16:25	0	-0.003	0	0.194595456
sc071112_101	sc071112_101_12072012_142026.txt	sc071112	SQC	1209318.477	2443974.843	7/12/2012	0	0.003893134	0	A	661.1	44.5	12-07-2012 14:20:26	0	0.02	0	0.19465673
sc071112_102	sc071112_102_12072012_142646.txt	sc071112	SQC	1209132.459	2443964.927	7/12/2012	0	0.004287847	0	A	661.1	44.1	12-07-2012 14:26:46	0	0.022	0	0.194902152
sc071112_103	sc071112_103_12072012_143520.txt	sc071112	SQC	1208910.369	2443971.53	7/12/2012	0	0.002732937	0	A	661.1	43.6	12-07-2012 14:35:20	0	0.014	0	0.195209816
sc071112_104	sc071112_104_12072012_144100.txt	sc071112	SQC	1208908.595	2444183.581	7/12/2012	0	0.001368197	0	A	661.1	43.2	12-07-2012 14:41:00	0	0.007	0	0.195456639
sc071112_105	sc071112_105_12072012_144633.txt	sc071112	SQC	1208909.877	244354.483	7/12/2012	0	0.002152064	0	A	661.1	42.9	12-07-2012 14:46:33	0	0.011	0	0.195642173
sc071112_106	sc071112_106_12072012_145400.txt	sc071112	SQC	1208919.141	2444565.674	7/12/2012	0	0.00093278	0.183990881	A	786.5	42.3	12-07-2012 14:54:00	0	0.004	0.788999975	0.233195037
sc071112_107	sc071112_107_12072012_150310.txt	sc071112	SQC	1209129.148	2444595.798	7/12/2012	0	0.001168197	0.307469487	A	786.5	41.7	12-07-2012 15:03:10	0	0.005	1.315999985	0.233639434
sc071112_108	sc071112_108_12072012_151109.txt	sc071112	SQC	1209124.679	2444389.722	7/12/2012	0	0.004233445	0.221026987	A	788.6	41.2	12-07-2012 15:11:09	0	0.017999999	0.941999972	0.234635875
sc071112_109	sc071112_109_12072012_151900.txt	sc071112	SQC	1209136.119	2444162.842	7/12/2012	0	0.002819218	0.496182352	A	788.6	40.8	12-07-2012 15:19:00	0	0.012	2.111999989	0.234934822
sc071112_11	sc071112_11_11072012_100852.txt	sc071112	SQC	1213931.623	2439793.173	7/11/2012	0	0.00048341	0.376576573	A	786.0	31.0	11-07-2012 10:08:52	0	0.002	1.557999969	0.24170512
sc071112_110	sc071112_110_12072012_152424.txt	sc071112	SQC	1209331.589	2444372.512	7/12/2012	0	0.002830145	0.42853108	A	790.9	40.5	12-07-2012 15:24:24	0	0.012	1.817000031	0.235845387
sc071112_111	sc071112_111_12072012_152822.txt	sc071112	SQC	1209325.143	2444566.199	7/12/2012	0	0.00263986	0.250456095	A	793.6	40.4	12-07-2012 15:28:22	0	0.011	1.057999969	0.236726001
sc071112_112	sc071112_112_13072012_095300.txt	sc071112	SQC	1209546.846	2444000.7	7/13/2012	0	0.001252064	0.48468864	A	793.7	29.8	13-07-2012 09:53:00	0	0.005	1.978000045	0.245039746
sc071112_113	sc071112_113_13072012_100056.txt	sc071112	SQC	1209741.489	2443797.619	7/13/2012	0	0.004625221	0.448402971	A	793.7	31.8	13-07-2012 10:00:56	0	0.018999999	1.842000008	0.243432671
sc071112_114	sc071112_114_13072012_100720.txt	sc071112	SQC	1209892.067	2443600.216	7/13/2012	0	0.002189015	0.581305146	A	796.4	33.1	13-07-2012 10:07:20	0	0.009	2.390000105	0.243223906
sc071112_115	sc071112_115_13072012_101516.txt	sc071112	SQC	1209911.51	2443388.133	7/13/2012	0	0.001693631	1.254980206	A	796.1	34.6	13-07-2012 10:15:16	0	0.007	5.186999798	0.241947234
sc071112_116	sc071112_116_13072012_101935.txt	sc071112	SQC	1209560.939	2443760.093	7/13/2012	0	0.004818682	0.37151204	A	795.6	35.7	13-07-2012 10:19:35	0	0.02	1.542000055	0.240934104
sc071112_117	sc071112_117_13072012_102852.txt	sc071112	SQC	1209337.52	2443803.181	7/13/2012	0	0.000239615	0.190973297	A	795.6	37.4	13-07-2012 10:28:52	0	0.001	0.796999991	0.239615187
sc071112_118	sc071112_118_13072012_103442.txt	sc071112	SQC	1209139.352	2443776.685	7/13/2012	0	0.003098364	0.302448064	A	793.9	38.4	13-07-2012 10:34:42	0	0.013	1.269000053	0.238335729
sc071112_119	sc071112_119_13072012_103940.txt	sc071112	SQC	1209127.379	2443568.702	7/13/2012	0	0.002858486	0.18937473	A	795.0	39.0	13-07-2012 10:39:40	0	0.012	0.795000017	0.238207206
sc071112_12	sc071112_12_11072012_101553.txt	sc071112	SQC	1213730.212	2439751.178	7/11/2012	0	0.004337557	0.071328722	A	784.4	31.3	11-07-2012 10:15:53	0	0.017999999	0.296000004	0.24097541
sc071112_120	sc071112_120_13072012_104311.txt	sc071112	SQC	1208928.582	2443585.502	7/13/2012	0	0.003090786	0.344741464	A	794.5	39.4	13-07-2012 10:43:11	0	0.013	1.450000048	0.237752736
sc071112_121	sc071112_121_13072012_105307.txt	sc071112	SQC	1208895.262	2443787.614	7/13/2012	0	0.001419293	0.263278782	A	792.5	40.2	13-07-2012 10:53:09	-0.052999999	0.006	1.113000035	0.236548766
sc071112_122	sc071112_122_13072012_100009.txt	sc071112	SQC	1208734.446	2443788.436	7/13/2012	0	0.000948749	0.35862717	A	795.4	40.5	13-07-2012 11:00:07	0	0.004	1.511999965	0.237187281
sc071112_123	sc071112_123_13072012_110707.txt	sc071112	SQC	1208685.793	2443588.925	7/13/2012	0	0.003077596	0.184892491	A	794.4	40.7	13-07-2012 11:07:07	0	0.013	0.781000018	0.23673813
sc071112_124	sc071112_124_13072012_111210.txt	sc071112	SQC	1208700.538	2443359.816	7/13/2012	0	0.003785426	0.63973695	A	793.9	40.7	13-07-2012 11:12:10	0	0.016000001	2.703999996	0.236589119
sc071112_125	sc071112_125_13072012_112002.txt	sc071112	SQC	1208923.932	2443369.28	7/13/2012	0	0.002130643	0.163349316	A	794.4	40.7	13-07-2012 11:20:02	0	0.009	0.689999998	0.23673813
sc071112_126	sc071112_126_13072012_113412.txt	sc071112	SQC	1209152.511	2443357.791	7/13/2012	0	0.015371348	0.318778127	A	794.3	41.0	13-07-2012 11:34:12	0	0.064999998	1.34800005	0.236482278
sc071112_127	sc071112_127_13072012_113812.txt	sc071112	SQC	1209332.216	2443349.466	7/13/2012	0	0.002819375	0.249514714	A	789.9	41.3	13-07-2012 11:38:12	0	0.012	1.062000036	0.234947935
sc071112_128	sc071112_128_13072012_114447.txt	sc071112	SQC	1209333.201	2443547.056	7/13/2012	0	0.002349755	0.222991735	A	791.5	41.9	13-07-2012 11:44:47	0	0.01	0.949000001	0.234975487
sc071112_129	sc071112_129_13072012_114957.txt	sc071112	SQC	1209532.708	2443371.929	7/13/2012	0	0.001176726	0.00964915	A	793.5	42.2	13-07-2012 11:49:57	0	0.005	0.041000001	0.235341525
sc071112_13	sc071112_13_11072012_102417.txt	sc071112	SQC	1210129.975	2443169.369	7/11/2012	0	0.008166174	0.318961114	A	783.1	31.8	11-07-2012 10:24:17	0	0.034000002	1.327999949	0.24018158
sc071112_130	sc071112_130_13072012_115512.txt	sc071112	SQC	1209532.834	2443559.881	7/13/2012	0	0.003753409	0.336633891	A	791.7	42.5	13-07-2012 11:55:12	0	0.016000001	1.434999943	0.234588087
sc071112_131	sc071112_131_13072012_120246.txt	sc071112	SQC	1209725.113	2443547.339	7/13/2012	0	0.003525033	0.119381107	A	793.6	42.7	13-07-2012 12:02:46	0	0.015	0.508000016	0.235002175
sc071112_132	sc071112_132_13072012_121055.txt	sc071112	SQC	1209759.239	2443403.512	7/13/2012	0	0.004004098	0.341997117	A	795.4	42.7	13-07-2012 12:10:55	0	0.017000001	1.452000022	0.235535204
sc071112_133	sc071112_133_13072012_121659.txt	sc071112	SQC	1209751.135	2443166.375	7/13/2012	0	0.002352095	0.221802533	A	794.3	42.7	13-07-2012 12:16:59	-0.057	0.01	0.943000019	0.235209465
sc071112_134	sc071112_134_13072012_121730.txt	sc071112	SQC	1209926.662	2442995.105	7/13/2012	0	0.002343803	0.221020639	A	791.5	42.7	13-07-2012 12:17:30	-0.057	0.01	0.943000019	0.23438032
sc071112_135	sc071112_135_13072012_122542.txt	sc071112	SQC	1209933.696	2443170.902	7/13/2012	0	0.00073036	0.19319056	A	791.5	42.6	13-07-2012 12:25:42	0	0.003	0.824000001	0.234454557
sc071112_136	sc071112_136_13072012_124509.txt	sc071112	SQC	1210129.975	2443169.369	7/13/2012	0	0.005381889	0.321977347	A	791.2	43.1	13-07-201				

APPENDIX E
FLUX METER DATA

SitePt	Filename	Site	AreaAbbrev	Northing	Easting	Date	CH4flux	H2Sflux	CO2flux	ACCUMULATION CHAMBER:	PRESSURE (HPa):	TEMP DegC	TIME:	CH4slope	H2Sslope	CO2slope	Ack
sc071112 18	sc071112 18 11072012 111054.txt	sc071112	SQC	1213506.248	2439770.246	7/11/2012	0	0.004773844	2.993438721	A	785.9	34.8	11-07-2012 11:10:54	0	0.02	12.54100037	0.238692179
sc071112 19	sc071112 19 11072012 111731.txt	sc071112	SQC	1213511.316	2439594.781	7/11/2012	0	0.002145566	0.319689333	A	786.2	35.3	11-07-2012 11:17:31	0	0.009	1.340999961	0.238396227
sc071112 20	sc071112 20 11072012 112357.txt	sc071112	SQC	1213526.273	2439379.802	7/11/2012	0	0.002861375	0.212933958	A	787.9	35.9	11-07-2012 11:23:57	0	0.012	0.893000007	0.238447875
sc071112 21	sc071112 21 11072012 113925.txt	sc071112	SQC	1213318.827	2439567.992	7/11/2012	0	0.007606086	0.069643222	A	788.7	37.2	11-07-2012 11:39:25	0	0.032000002	0.293000013	0.237690166
sc071112 22	sc071112 22 11072012 114413.txt	sc071112	SQC	1213137.203	2439781.705	7/11/2012	0	0.012085103	0.064927809	A	787.3	37.6	11-07-2012 11:44:13	-0.012	0.050999999	0.273999989	0.236962825
sc071112 23	sc071112 23 11072012 114823.txt	sc071112	SQC	1212946.2	2440007.731	7/11/2012	0	0.008076569	0.166757405	A	790.0	37.9	11-07-2012 11:48:23	0	0.034000002	0.702000022	0.237546146
sc071112 24	sc071112 24 11072012 115316.txt	sc071112	SQC	1212718.088	2440360.349	7/11/2012	0	0.005457926	0.084716499	A	790.2	38.3	11-07-2012 11:53:16	0	0.023	0.356999999	0.237301126
sc071112 25	sc071112 25 11072012 120049.txt	sc071112	SQC	1212928.627	2440367.725	7/11/2012	0	0.004981003	0.561667383	A	791.1	38.8	11-07-2012 12:00:49	-0.085000001	0.021	2.368000031	0.237190619
sc071112 26	sc071112 26 11072012 120548.txt	sc071112	SQC	1213121.539	2440376.166	7/11/2012	0	0.004951659	0.386465192	A	787.7	39.3	11-07-2012 12:05:48	0	0.021	1.639000058	0.235793278
sc071112 27	sc071112 27 11072012 121542.txt	sc071112	SQC	1213318.284	2440374.112	7/11/2012	0	0.004712205	0.579129994	A	788.6	39.9	11-07-2012 12:15:42	0	0.02	2.457999945	0.235610247
sc071112 28	sc071112 28 11072012 122150.txt	sc071112	SQC	1213331.101	2440177.886	7/11/2012	0	0.001408544	0.01971961	A	787.0	40.4	11-07-2012 12:21:50	-0.017000001	0.006	0.083999999	0.234757259
sc071112 29	sc071112 29 11072012 123007.txt	sc071112	SQC	1213341.919	2439983.983	7/11/2012	0	0.000470709	0.037427817	A	790.9	41.1	11-07-2012 12:30:07	-0.028000001	0.002	0.158999994	0.235395089
sc071112 30	sc071112 30 11072012 123804.txt	sc071112	SQC	1213327.805	2439777.732	7/11/2012	0	0.001643794	0.112717286	A	790.5	41.7	11-07-2012 12:38:04	0	0.007	0.479999989	0.234827682
sc071112 31	sc071112 31 11072012 125008.txt	sc071112	SQC	1213135.374	2439911.068	7/11/2012	0	0.00465412	0.131711692	A	785.1	42.4	11-07-2012 12:50:08	0	0.002	0.565999985	0.232706174
sc071112 32	sc071112 32 11072012 125332.txt	sc071112	SQC	1213132.158	2439958.043	7/11/2012	0	0.000703852	0.039884929	A	792.3	42.7	11-07-2012 12:53:32	0	0.003	0.170000002	0.234617218
sc071112 33	sc071112 33 11072012 125857.txt	sc071112	SQC	1213135.079	2440157.374	7/11/2012	0	0	0.026705261	A	784.7	42.9	11-07-2012 12:58:57	0	-0.001	0.115000002	0.232219651
sc071112 34	sc071112 34 11072012 130356.txt	sc071112	SQC	1212943.018	2440182.865	7/11/2012	0	0	0.003046935	A	792.5	43.1	11-07-2012 13:03:56	0	-0.011	0.013	0.234379619
sc071112 35	sc071112 35 11072012 131051.txt	sc071112	SQC	1212740.379	2440162.403	7/11/2012	0	0.012434633	0.441546768	A	793.8	43.3	11-07-2012 13:10:51	-0.018999999	0.052999999	1.881999969	0.234615713
sc071112 36	sc071112 36 11072012 131544.txt	sc071112	SQC	1212545.545	2440387.974	7/11/2012	0	0.009541098	0.11588943	A	787.6	43.4	11-07-2012 13:15:44	0	0.041000001	0.497999996	0.232709706
sc071112 37	sc071112 37 11072012 132136.txt	sc071112	SQC	1212511.428	2440554.633	7/11/2012	0	0.004672216	0.354387581	A	790.4	43.3	11-07-2012 13:21:36	0	0.02	1.51699996	0.233610809
sc071112 38	sc071112 38 11072012 132603.txt	sc071112	SQC	1212361.575	2440564.999	7/11/2012	0	0.005141389	0.746669829	A	790.7	43.3	11-07-2012 13:26:03	0	0.022	3.194999933	0.233699486
sc071112 39	sc071112 39 11072012 133629.txt	sc071112	SQC	1212321.098	2440379.422	7/11/2012	0	0.006999457	0.021216875	A	788.6	43.2	11-07-2012 13:36:29	0	0.003	0.090999998	0.233152479
sc071112 40	sc071112 40 11072012 134456.txt	sc071112	SQC	1212340.323	2440167.582	7/11/2012	0	0.002105425	0.58881706	A	790.5	42.9	11-07-2012 13:44:56	0	0.009	2.51699996	0.233936071
sc071112 41	sc071112 41 11072012 135956.txt	sc071112	SQC	1212326.555	2439961.825	7/11/2012	0	0.001170944	0.419432282	A	788.6	41.8	11-07-2012 13:59:56	-0.018999999	0.005	1.791000009	0.234188884
sc071112 42	sc071112 42 11072012 141208.txt	sc071112	SQC	1212522.495	2439779.314	7/11/2012	0	0.003275323	0.524285555	A	785.8	41.0	11-07-2012 14:12:08	0	0.014	2.240999937	0.233951628
sc071112 43	sc071112 43 11072012 141708.txt	sc071112	SQC	1212545.859	2439960.404	7/11/2012	0	0.002104761	0.34705165	A	785.5	41.0	11-07-2012 14:17:08	0	0.009	1.483999968	0.233862311
sc071112 44	sc071112 44 11072012 142410.txt	sc071112	SQC	1212517.311	2440161.218	7/11/2012	0	0.001877563	0.439819157	A	788.8	41.2	11-07-2012 14:24:10	0	0.008	1.873999953	0.23469539
sc071112 45	sc071112 45 11072012 143447.txt	sc071112	SQC	1212715.567	2439936.556	7/11/2012	0	0.002810989	0.753110766	A	787.3	41.2	11-07-2012 14:34:47	0	0.012	3.214999914	0.234249085
sc071112 46	sc071112 46 11072012 143952.txt	sc071112	SQC	1212748.013	2439768.515	7/11/2012	0	0.001174148	0.486097246	A	789.0	41.1	11-07-2012 14:39:52	0	0.005	2.069999933	0.23482959
sc071112 47	sc071112 47 11072012 144616.txt	sc071112	SQC	1212760.049	2439590.702	7/11/2012	0	0.006106361	0.375306308	A	788.6	40.9	11-07-2012 14:46:16	0	0.026000001	1.569900005	0.234860018
sc071112 48	sc071112 48 11072012 145506.txt	sc071112	SQC	1212936.923	2439358.401	7/11/2012	0	0.001408719	0.552452564	A	787.6	40.6	11-07-2012 14:55:06	0	0.006	2.352999926	0.234786481
sc071112 49	sc071112 49 11072012 150101.txt	sc071112	SQC	1212915.517	2439571.533	7/11/2012	0	0.002112547	0.607005119	A	786.9	40.4	11-07-2012 15:01:01	0	0.009	2.585999966	0.234727427
sc071112 50	sc071112 50 11072012 150734.txt	sc071112	SQC	1212930.554	2439740.687	7/11/2012	0	0.001172223	0.546724916	A	785.2	40.1	11-07-2012 15:07:34	0	0.005	2.332000017	0.234446468
sc071112 51	sc071112 51 11072012 151416.txt	sc071112	SQC	1213089.974	2439558.902	7/11/2012	0	0.002121299	0.208122998	A	788.9	39.9	11-07-2012 15:14:16	0	0.009	0.883000016	0.235699877
sc071112 52	sc071112 52 11072012 151840.txt	sc071112	SQC	1213126.417	2439372.61	7/11/2012	0	0.001649698	0.211161375	A	788.3	39.7	11-07-2012 15:18:40	0	0.007	0.896000028	0.235671178
sc071112 53	sc071112 53 11072012 152441.txt	sc071112	SQC	1213271.279	2439413.567	7/11/2012	0	0.000235553	0.756830812	A	787.4	39.5	11-07-2012 15:24:41	0	0.001	3.213000059	0.235552698
sc071112 54	sc071112 54 11072012 153016.txt	sc071112	SQC	1213113.197	2439206.067	7/11/2012	0	0.00302783	0.311641097	A	788.1	39.3	11-07-2012 15:30:16	0	0.014	1.32099998	0.235913023
sc071112 55	sc071112 55 11072012 153634.txt	sc071112	SQC	1213145.826	2439008.961	7/11/2012	0	0.000706755	0.286235631	A	786.5	39.1	11-07-2012 15:36:34	0	0.003	1.215000033	0.235558487
sc071112 56	sc071112 56 11072012 154622.txt	sc071112	SQC	1213314.615	2438977.075	7/11/2012	0	0.000941389	0.380085707	A	784.7	38.7	11-07-2012 15:46:22	0	0.004	1.615000001	0.235347817
sc071112 57	sc071112 57 11072012 155503.txt	sc071112	SQC	1213538.012	2438982.95	7/11/2012	0	0.002590823	0.635693669	A	784.3	38.3	11-07-2012 15:55:03	0	0.011	2.698999882	0.235529333
sc071112 58	sc071112 58 11072012 160004.txt	sc071112	SQC	1213497.112	2439160.408	7/11/2012	0	0.004956701	0.763299227	A	786.9	38.1	11-07-2012 16:00:04	0	0.021	3.227999926	0.236461967
sc071112 59	sc071112 59 11072012 160959.txt	sc071112	SQC	1213326.698	2439254.287	7/11/2012	0	0	0.308863044	A	786.0	37.7	11-07-2012 16:09:59	0	-0.002	1.305999994	0.23649545
sc071112 60	sc071112 60 12072012 085909.txt	sc071112	SQC	1212356.122	2440777.901	7/12/2012	0	0	0.914999723	A	789.7	23.1	12-07-2012 08:59:09	0	0	3.670000076	0.249318719
sc071112 61	sc071112 61 12072012 090514.txt	sc071112	SQC	1212305.836	2440969.973	7/12/2012	0	0.000248229	0.129575774	A	789.7	24.4	12-07-2012 09:05:14	0	0.001	0.522000015	0.248229444
sc071112 62	sc071112 62 12072012 091041(1).txt	sc071112	SQC	1212143.191	2440977.671	7/12/2012	0	0	0.155453965	A	792.0	26.1	12-07-2012 09:16:44	0	0	0.628000021	0.247538149
sc071112 63	sc071112 63 12072012 091719.txt	sc071112	SQC	1211984.573	2440962.854	7/12/2012	0	0	0.155453965	A	792.0	26.1	12-07-2012 09:17:19	-0.012	0	0.628000021	0.247538149
sc071112 64	sc071112 64 12072012 092230.txt	sc071112	SQC	1211921.799	2441138.883	7/12/2012	0	0.001234802	0.259802431	A	792.0	26.8	12-07-2012 09:22:30	0	0.005	1.052000046	0.246960461
sc071112 65	sc071112 65 12072012 092618.txt	sc071112	SQC	1211760.351	2441186.62	7/12/2012	0	0.000986696	0.199805945	A	792.4	27.3	12-07-2012 09:26:18	0	0.004	0.810000002	0.246674001
sc071112 66	sc071112 66 12072012 093039.txt	sc071112	SQC	1211736.538	2441348.449	7/12/2012	0	0.002948691	0.336887985	A	790.4						

APPENDIX E
FLUX METER DATA

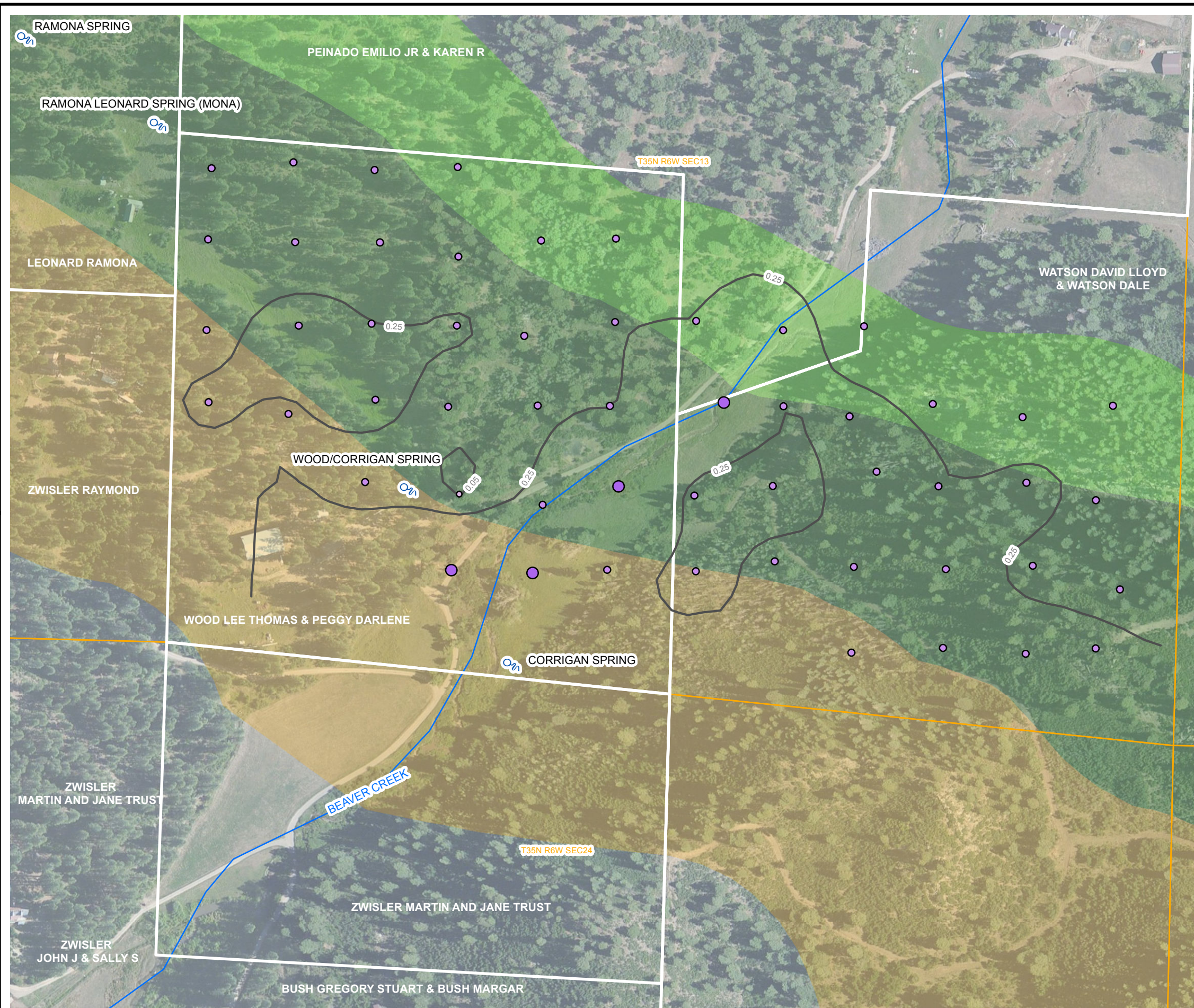
SitePt	Filename	Site	AreaAbbrev	Northing	Easting	Date	CH4flux	H2Sflux	CO2flux	ACCUMULATION CHAMBER:	PRESSURE (HPa):	TEMP DegC	TIME:	CH4slope	H2Sslope	CO2slope	Ack
sc071112_91	sc071112_91_12072012_124452.txt	sc071112	SQC	1211741.219	2440741.951	7/12/2012	0	0.001884828	0.342803001	A	791.6	41.1	12-07-2012 12:44:52	0	0.008	1.455000043	0.235603437
sc071112_92	sc071112_92_12072012_125146.txt	sc071112	SQC	1211731.209	2440580.555	7/12/2012	0	0.006107855	0.630988419	A	790.3	41.5	12-07-2012 12:51:46	0	0.026000001	2.686000109	0.234917492
sc071112_93	sc071112_93_12072012_125650.txt	sc071112	SQC	1211898.641	2440562.754	7/12/2012	0	0.001874939	0.577012539	A	788.7	41.6	12-07-2012 12:56:50	0	0.008	2.461999893	0.2343674
sc071112_94	sc071112_94_12072012_130148.txt	sc071112	SQC	1211919.346	2440750.068	7/12/2012	0	0.004686153	0.530003965	A	789.0	41.8	12-07-2012 13:01:48	0	0.02	2.262000084	0.234307662
sc071112_95	sc071112_95_12072012_130833.txt	sc071112	SQC	1212108.164	2440769.051	7/12/2012	0	0.001405844	0.179010823	A	789.5	42.0	12-07-2012 13:08:33	0	0.006	0.763999999	0.234307364
sc071112_96	sc071112_96_12072012_131701.txt	sc071112	SQC	1212118.469	2440575.292	7/12/2012	0	0.002808836	0.091053084	A	789.7	42.4	12-07-2012 13:17:01	0	0.012	0.388999999	0.234069631
sc071112_97	sc071112_97_12072012_132058.txt	sc071112	SQC	1212122.13	2440362.742	7/12/2012	0	0.003253963	0.140617684	A	784.9	42.7	12-07-2012 13:20:58	-0.061000001	0.014	0.605000019	0.232425913
sc071112_98	sc071112_98_12072012_132621.txt	sc071112	SQC	1212132.658	2440170.754	7/12/2012	0	0.005262069	0.236176223	A	787.3	43.0	12-07-2012 13:26:21	0	0.011	1.014000058	0.232915687
sc071112_99	sc071112_99_12072012_140800.txt	sc071112	SQC	1209536.399	2444174.924	7/12/2012	0	0.009343524	0	A	661.1	44.5	12-07-2012 14:08:00	0	0.048	0	0.194655373
sc072312_01	sc072312_01_23072012_084948.txt	sc072312	STC	1184918.511	2468971.124	7/23/2012	0	0.001011263	0.135003656	A	812.4	27.4	23-07-2012 08:49:48	0	0.004	0.533999979	0.252815843
sc072312_02	sc072312_02_23072012_085314.txt	sc072312	STC	1184936.396	2469173.823	7/23/2012	0	0.001512552	0.294947714	A	812.5	28.3	23-07-2012 08:53:14	0	0.006	1.169999957	0.252092063
sc072312_03	sc072312_03_23072012_085715.txt	sc072312	STC	1184942.566	2469406.841	7/23/2012	0	0	0.08189705	A	812.1	29.2	23-07-2012 08:57:15	0	0	0.326000005	0.251217932
sc072312_04	sc072312_04_23072012_090029.txt	sc072312	STC	1184944.488	2469573.655	7/23/2012	0	0.002002959	0.24360989	A	811.5	30.0	23-07-2012 09:00:29	-0.414000005	0.008	0.972999999	0.250369877
sc072312_05	sc072312_05_23072012_090512.txt	sc072312	STC	1184932.697	2469751.801	7/23/2012	0	0.000249547	0.036683362	A	811.5	31.0	23-07-2012 09:05:12	0	0.001	0.147	0.249546692
sc072312_06	sc072312_06_23072012_090904.txt	sc072312	STC	1184935.652	2469968.877	7/23/2012	0	0.000745572	0.086734869	A	810.3	31.8	23-07-2012 09:09:04	0	0.003	0.349000007	0.24852398
sc072312_07	sc072312_07_23072012_091239.txt	sc072312	STC	1185134.338	2469984.79	7/23/2012	0	0.002233521	0.088348173	A	811.0	32.5	23-07-2012 09:12:39	0	0.009	0.356000006	0.24816902
sc072312_08	sc072312_08_23072012_091542.txt	sc072312	STC	1185147.833	2470176.292	7/23/2012	0	0.000741555	0.080334552	A	809.1	33.0	23-07-2012 09:15:42	0	0.003	0.324999988	0.247183248
sc072312_09	sc072312_09_23072012_091828.txt	sc072312	STC	1185346.058	2470161.792	7/23/2012	0	0.001479999	0.060431264	A	808.7	33.5	23-07-2012 09:18:28	0	0.006	0.245000005	0.246658721
sc072312_10	sc072312_10_23072012_092208.txt	sc072312	STC	1185337.666	2470386.643	7/23/2012	0	0.001968925	0.091801137	A	808.5	34.1	23-07-2012 09:22:08	0	0.008	0.372999996	0.246115655
sc072312_100	sc072312_100_24072012_102302.txt	sc072312	STC	1186313.935	2468736.893	7/24/2012	0	0.000714366	0.046195671	A	807.7	44.1	24-07-2012 10:23:02	-0.717999995	0.003	0.194000006	0.238122016
sc072312_101	sc072312_101_24072012_103915.txt	sc072312	STC	1186127.986	2468536.579	7/24/2012	0	0.001435516	0.032770764	A	812.9	44.7	24-07-2012 10:39:15	0	0.006	0.136999995	0.239202663
sc072312_102	sc072312_102_24072012_104235.txt	sc072312	STC	1186130.366	2468385.296	7/24/2012	0	0.00190089	0.093856461	A	808.0	44.9	24-07-2012 10:42:35	0	0.008	0.395000011	0.237611294
sc072312_103	sc072312_103_24072012_104615.txt	sc072312	STC	1185935.213	2468362.457	7/24/2012	0	0.001424338	0.153591082	A	807.5	45.0	24-07-2012 10:46:15	0	0.006	0.647000015	0.237389609
sc072312_104	sc072312_104_24072012_105235.txt	sc072312	STC	1185730.438	2468363.912	7/24/2012	0	0.000474454	0.01731756	A	807.2	45.1	24-07-2012 10:52:35	0	0.002	0.072999999	0.237226859
sc072312_105	sc072312_105_24072012_105921.txt	sc072312	STC	1185512.204	2468396.828	7/24/2012	0	0.000714653	0.044307064	A	810.8	45.2	24-07-2012 10:59:21	0	0.003	0.186000004	0.238210008
sc072312_106	sc072312_106_24072012_110437.txt	sc072312	STC	1185535.158	2468160.298	7/24/2012	0	0.001901792	0.220845625	A	809.4	45.3	24-07-2012 11:04:37	0	0.008	0.929000002	0.237724021
sc072312_107	sc072312_107_24072012_110927.txt	sc072312	STC	1185727.478	2468183.989	7/24/2012	0	0.00190634	0.092934087	A	812.1	45.6	24-07-2012 11:09:27	0	0.008	0.389999986	0.23829253
sc072312_108	sc072312_108_24072012_111431.txt	sc072312	STC	1185549.576	2467960.412	7/24/2012	0	0.004499611	0.292474717	A	808.1	46.0	24-07-2012 11:14:31	0	0.018999999	1.235000014	0.236821637
sc072312_109	sc072312_109_24072012_111818.txt	sc072312	STC	1185519.783	2467793.318	7/24/2012	0	0.000236892	0.088123828	A	809.1	46.3	24-07-2012 11:18:18	0	0.001	0.372000009	0.236892015
sc072312_11	sc072312_11_23072012_092547.txt	sc072312	STC	1185523.169	2470578.599	7/23/2012	0	0.000736908	0.041266844	A	808.5	34.7	23-07-2012 09:25:47	0	0.003	0.167999998	0.245635971
sc072312_110	sc072312_110_24072012_112552.txt	sc072312	STC	1185361.752	2467768.204	7/24/2012	0	0.003089636	0.406643569	A	812.5	46.6	24-07-2012 11:25:52	0	0.013	1.710999966	0.237664282
sc072312_111	sc072312_111_24072012_113529.txt	sc072312	STC	1185182.15	2467878.11	7/24/2012	0	0.00379402	0.803146601	A	809.9	46.3	24-07-2012 11:35:29	-3.601000071	0.016000001	3.387000084	0.237126246
sc072312_112	sc072312_112_24072012_114117.txt	sc072312	STC	1185360.044	2467978.737	7/24/2012	0	0.00689881	0.160099983	A	812.0	46.1	24-07-2012 11:41:17	-5.611999989	0.028999999	0.672999978	0.23789002
sc072312_113	sc072312_113_24072012_114701.txt	sc072312	STC	1185133.385	2468166.419	7/24/2012	0	0.001897027	0.275305957	A	809.4	46.1	24-07-2012 11:47:01	-2.489000082	0.008	1.161000013	0.237128302
sc072312_114	sc072312_114_24072012_115320.txt	sc072312	STC	1185327.726	2468175.136	7/24/2012	0	0.007585294	0.2609815	A	809.1	46.1	24-07-2012 11:53:20	-2.533999992	0.032000002	1.100999951	0.237040415
sc072312_115	sc072312_115_24072012_115700.txt	sc072312	STC	1185330.017	2468392.167	7/24/2012	0	0.000948513	0.391973078	A	809.4	46.1	24-07-2012 11:57:00	-2.164000034	0.004	1.652999997	0.237128302
sc072312_116	sc072312_116_24072012_120318.txt	sc072312	STC	1185499.731	2465888.507	7/24/2012	0	0.000713542	0.368901223	A	811.6	46.0	24-07-2012 12:03:18	-5.625999928	0.003	1.550999999	0.237847343
sc072312_117	sc072312_117_24072012_120803.txt	sc072312	STC	1185343.068	2468568.447	7/24/2012	0	0.006638391	0.169278964	A	809.0	46.0	24-07-2012 12:08:03	-4.300000191	0.028000001	0.713999987	0.237085387
sc072312_118	sc072312_118_24072012_121231.txt	sc072312	STC	1185132.311	2468390.169	7/24/2012	0	0.002133504	0.114023976	A	808.9	46.0	24-07-2012 12:12:31	-5.390999794	0.009	0.481000006	0.237056077
sc072312_119	sc072312_119_24072012_121527.txt	sc072312	STC	1185126.49	2468597.191	7/24/2012	0	0.002144319	0.104833357	A	813.0	46.0	24-07-2012 12:15:27	-2.055000067	0.009	0.439999998	0.238257632
sc072312_12	sc072312_12_23072012_092833.txt	sc072312	STC	1185524.456	2470355.425	7/23/2012	0	0.001226246	0.058859792	A	808.8	35.3	23-07-2012 09:28:33	0	0.005	0.239999995	0.245249137
sc072312_120	sc072312_120_24072012_121922.txt	sc072312	STC	1184935.198	2468573.545	7/24/2012	0	0.001191075	0.10838785	A	812.6	45.9	24-07-2012 12:19:22	-7.353000164	0.005	0.455000013	0.238215044
sc072312_121	sc072312_121_24072012_122311.txt	sc072312	STC	1184935.226	2468389.582	7/24/2012	0	0.000474171	0.109296359	A	809.0	46.0	24-07-2012 12:23:11	-3.007999897	0.002	0.460999995	0.237085387
sc072312_122	sc072312_122_24072012_122631.txt	sc072312	STC	1184904.975	2468182.342	7/24/2012	0	0.001184987	0.048110485	A	808.7	46.0	24-07-2012 12:26:31	-3.757999897	0.005	0.202999994	0.23699747
sc072312_13	sc072312_13_23072012_093201.txt	sc072312	STC	1185742.831	2470342.603	7/23/2012	0	0.001711928	0.142579153	A	808.1	35.9	23-07-2012 09:32:01	0	0.007	0.583000004	0.244561151
sc072312_14	sc072312_14_23072012_093552.txt	sc072312	STC	1185923.267	2470171.371	7/23/2012	0	0.002692856	4.559494972	A	811.0	36.7	23-07-2012 09:35:52	-0.153999999	0.011	18.625	0.244805098
sc072312_15	sc072312_15_23072012_094033.txt	sc072312	STC	1185735.893	2470166.114	7/23/2012	0	0.000971617	0.110035643	A	807.3	37.7	23-07-2012 09:40:33	0	0.004	0.453000009	0.242904291
sc072312_16	sc072312_16_23072012_094349.txt	sc072312	STC	1185526.936	2470185.92	7/23/2012	0	0.002178525	0.091498047	A	806.3	38.4	23-07-2012 09:43:49	0			

APPENDIX E
FLUX METER DATA

SitePt	Filename	Site	AreaAbbrev	Northing	Easting	Date	CH4flux	H2Sflux	CO2flux	ACCUMULATION CHAMBER:	PRESSURE (HPa):	TEMP DegC	TIME:	CH4slope	H2Sslope	CO2slope	Ack
sc072312_42	sc072312_42_23072012_115410.txt	sc072312	STC	1187539.627	2469355.802	7/23/2012	0	0.005212226	0.226021066	A	809.7	46.5	23-07-2012 11:54:10	-4.665999889	0.022	0.953999996	0.236919358
sc072312_43	sc072312_43_23072012_120447.txt	sc072312	STC	1187331.36	2469186.039	7/23/2012	0	0.006894032	0.110779956	A	812.2	46.4	23-07-2012 12:04:47	-4.527999878	0.028999999	0.465999991	0.237725228
sc072312_44	sc072312_44_23072012_120854.txt	sc072312	STC	1187533.177	2469138.193	7/23/2012	0	0.00213742	0.16339387	A	811.4	46.4	23-07-2012 12:08:54	-2.098999977	0.009	0.688000023	0.237491071
sc072312_45	sc072312_45_23072012_121206.txt	sc072312	STC	1187520.032	2468976.663	7/23/2012	0	0.008055424	0.430232674	A	807.2	46.4	23-07-2012 12:12:06	-2.950999975	0.035999998	1.820999998	0.23626177
sc072312_46	sc072312_46_23072012_121506.txt	sc072312	STC	1187315.422	2468981.543	7/23/2012	0	0.003547339	0.588401794	A	808.0	46.4	23-07-2012 12:15:06	-3.950000048	0.015	2.487999916	0.236495912
sc072312_47	sc072312_47_23072012_122251.txt	sc072312	STC	1187308.689	2468776.385	7/23/2012	0	0.001656605	1.401723981	A	808.3	46.3	23-07-2012 12:22:51	-2.823999882	0.007	5.922999859	0.236657783
sc072312_48	sc072312_48_23072012_122645.txt	sc072312	STC	1187128.473	2468563.992	7/23/2012	0	0.002596304	0.072224446	A	806.4	46.4	23-07-2012 12:26:45	-2.732000113	0.011	0.305999994	0.236027613
sc072312_49	sc072312_49_23072012_123005.txt	sc072312	STC	1187119.987	2468776.178	7/23/2012	0	0.014610121	0.626350045	A	805.1	46.4	23-07-2012 12:30:05	-1.496999979	0.061999999	2.657999992	0.235647112
sc072312_50	sc072312_50_23072012_123259.txt	sc072312	STC	1187118.268	2468969.021	7/23/2012	0	0.002132415	0	A	809.5	46.4	23-07-2012 12:32:59	-8.744999886	0.009	-2.413000107	0.23693496
sc072312_51	sc072312_51_23072012_123604.txt	sc072312	STC	1187116.187	2469172.92	7/23/2012	0	0.009451025	0.10490638	A	807.5	46.5	23-07-2012 12:36:04	-6.170000076	0.039999999	0.444000006	0.236275628
sc072312_52	sc072312_52_23072012_124321.txt	sc072312	STC	1186916.069	2469173.228	7/23/2012	0	0.001655978	0.240826458	A	808.5	46.5	23-07-2012 12:43:21	-4.960000038	0.007	1.018000007	0.236568227
sc072312_53	sc072312_53_23072012_124950.txt	sc072312	STC	1186750.886	2469166.688	7/23/2012	0	0.002604654	0.273251921	A	809.5	46.6	23-07-2012 12:49:50	-2.744999886	0.011	1.154000044	0.236786753
sc072312_54	sc072312_54_23072012_125410.txt	sc072312	STC	1186533.179	2469369.245	7/23/2012	0	0.002841254	0.305198103	A	809.7	46.7	23-07-2012 12:54:10	-6.531000137	0.012	1.289000034	0.236771211
sc072312_55	sc072312_55_23072012_130002.txt	sc072312	STC	1186315.118	2469382.792	7/23/2012	0	0.002832649	0.146825641	A	807.5	46.8	23-07-2012 13:00:02	-2.631999969	0.012	0.621999979	0.236054093
sc072312_56	sc072312_56_23072012_130325.txt	sc072312	STC	1186124.469	2469380.965	7/23/2012	0	0.001885393	0.075887047	A	806.2	46.8	23-07-2012 13:03:25	-1.633999944	0.008	0.321999997	0.235674068
sc072312_57	sc072312_57_23072012_130622.txt	sc072312	STC	1185919.785	2469372.689	7/23/2012	0	0.008014906	0.159590915	A	806.4	46.8	23-07-2012 13:06:22	-3.177000046	0.034000002	0.676999986	0.235732526
sc072312_58	sc072312_58_23072012_130958.txt	sc072312	STC	1185716.817	2469383.512	7/23/2012	0	0.003540811	0.104099855	A	807.5	46.8	23-07-2012 13:09:58	-2.180999994	0.015	0.441000015	0.236054093
sc072312_59	sc072312_59_23072012_131340.txt	sc072312	STC	1185509.718	2469378.212	7/23/2012	0	0.001654953	0.219107419	A	808.3	46.7	23-07-2012 13:13:40	-2.367000103	0.007	0.926999986	0.236361831
sc072312_60	sc072312_60_23072012_131709.txt	sc072312	STC	1185317.837	2469390.651	7/23/2012	0	0.001419668	0	A	808.9	46.6	23-07-2012 13:17:09	-3.434000015	0.006	-0.159999996	0.236611247
sc072312_61	sc072312_61_23072012_132003.txt	sc072312	STC	1185128.856	2469369.821	7/23/2012	0	0.010652154	0.545863688	A	809.0	46.5	23-07-2012 13:20:03	-2.944000006	0.045000002	2.305999994	0.236714527
sc072312_62	sc072312_62_23072012_132246.txt	sc072312	STC	1185121.019	2469174.059	7/23/2012	0	0.002614159	0.249058098	A	812.2	46.5	23-07-2012 13:22:46	-4.190999985	0.011	1.047999978	0.237650856
sc072312_63	sc072312_63_23072012_132513.txt	sc072312	STC	1185323.538	2469172.592	7/23/2012	0	0.000710231	0.164063454	A	809.1	46.5	23-07-2012 13:25:13	-2.601999998	0.003	0.693000019	0.236743793
sc072312_64	sc072312_64_23072012_132810.txt	sc072312	STC	1185537.354	2469171.864	7/23/2012	0	0.00189395	0.226563811	A	809.1	46.5	23-07-2012 13:28:10	-1.4495999813	0.008	0.957000017	0.236743793
sc072312_65	sc072312_65_23072012_133055.txt	sc072312	STC	1185730.471	2469181.282	7/23/2012	0	0.000236715	0.156468302	A	809.0	46.5	23-07-2012 13:30:55	-3.332000017	0.001	0.661000013	0.236714527
sc072312_66	sc072312_66_23072012_133429.txt	sc072312	STC	1185926.215	2469171.707	7/23/2012	0	0.002366405	0.071228787	A	809.0	46.6	23-07-2012 13:34:29	-2.246999979	0.01	0.300999999	0.236640498
sc072312_67	sc072312_67_23072012_133744.txt	sc072312	STC	1186116.983	2469168.744	7/23/2012	0	0.00425634	0.528732061	A	808.9	46.8	23-07-2012 13:37:44	-2.635999918	0.017999999	2.236000061	0.236463353
sc072312_68	sc072312_68_23072012_134251.txt	sc072312	STC	1186311.128	2469178.934	7/23/2012	0	0.001889959	0.038028002	A	808.5	47.0	23-07-2012 13:42:51	-3.295000076	0.008	0.160999998	0.236198768
sc072312_69	sc072312_69_23072012_134620.txt	sc072312	STC	1186526.874	2469174.853	7/23/2012	0	0.012260213	0.046211574	A	807.8	47.3	23-07-2012 13:46:20	-1.792999983	0.052000001	0.195999995	0.23577334
sc072312_70	sc072312_70_23072012_135044.txt	sc072312	STC	1186317.81	2468969.752	7/23/2012	0	0.001415158	0.093164548	A	808.6	47.5	23-07-2012 13:50:44	-3.657999992	0.006	0.395000011	0.235859618
sc072312_71	sc072312_71_23072012_135345.txt	sc072312	STC	1186123.467	2468982.07	7/23/2012	0	0.001178563	0.100413568	A	808.6	47.7	23-07-2012 13:53:45	-3.022000074	0.005	0.425999999	0.235712603
sc072312_72	sc072312_72_23072012_135639.txt	sc072312	STC	1185926.202	2468979.95	7/23/2012	0	0.002357417	0.342532754	A	808.7	47.7	23-07-2012 13:56:39	-5.434000015	0.01	1.452999949	0.235741749
sc072312_73	sc072312_73_23072012_135942.txt	sc072312	STC	1185705.52	2468977.608	7/23/2012	0	0.003064264	0.206955671	A	808.6	47.7	23-07-2012 13:59:42	-2.522000074	0.013	0.878000021	0.235712603
sc072312_74	sc072312_74_23072012_140250.txt	sc072312	STC	1185504.731	2468972.784	7/23/2012	0	0.012022829	0.162897542	A	808.7	47.7	23-07-2012 14:02:50	-2.779000044	0.050999999	0.690999985	0.235741749
sc072312_75	sc072312_75_23072012_140646.txt	sc072312	STC	1185292.968	2468967.973	7/23/2012	0	0.004717776	0.794001639	A	808.7	47.5	23-07-2012 14:06:46	-7.274000168	0.02	3.365999937	0.235888794
sc072312_76	sc072312_76_23072012_140928.txt	sc072312	STC	1185130.028	2468968.419	7/23/2012	0	0.00401136	0.196556658	A	808.7	47.4	23-07-2012 14:09:28	-4.986000061	0.017000001	0.833000004	0.235962376
sc072312_77	sc072312_77_24072012_083913.txt	sc072312	STC	1184936.852	2468782.309	7/24/2012	0	0.002039832	0.425814956	A	810.9	24.3	24-07-2012 08:39:13	0	0.008	1.669999957	0.254979014
sc072312_78	sc072312_78_24072012_084239.txt	sc072312	STC	1185112.239	2468806.944	7/24/2012	0	0.002542637	0.321643621	A	810.8	25.1	24-07-2012 08:42:39	0	0.01	1.264999986	0.254263729
sc072312_79	sc072312_79_24072012_084607.txt	sc072312	STC	1185324.957	2468775.291	7/24/2012	0	0.00202799	0.279355645	A	810.8	26.0	24-07-2012 08:46:07	0	0.008	1.101999998	0.253498763
sc072312_80	sc072312_80_24072012_084858.txt	sc072312	STC	1185520.394	2468778.52	7/24/2012	0	0.003285599	0.375821978	A	810.8	26.9	24-07-2012 08:48:58	0	0.013	1.486999989	0.252738386
sc072312_81	sc072312_81_24072012_085137.txt	sc072312	STC	1185721.785	2468777.737	7/24/2012	0	0.00101212	0	A	813.9	27.7	24-07-2012 08:51:37	0	0.004	-0.703999996	0.253030062
sc072312_82	sc072312_82_24072012_085546.txt	sc072312	STC	1185927.863	2468785.059	7/24/2012	0	0.000251148	0.100961514	A	810.8	28.8	24-07-2012 08:55:46	0	0.001	0.402000001	0.251148045
sc072312_83	sc072312_83_24072012_085945.txt	sc072312	STC	1185717.331	2468578.035	7/24/2012	0	0.001999253	0.124953292	A	810.8	30.3	24-07-2012 08:59:45	0	0.008	0.5	0.249906585
sc072312_84	sc072312_84_24072012_090318.txt	sc072312	STC	1185923.062	2468582.532	7/24/2012	0	0.001244866	0.359766364	A	810.7	31.4	24-07-2012 09:03:18	0	0.005	1.445000052	0.24897325
sc072312_85	sc072312_85_24072012_090723.txt	sc072312	STC	1186130.959	2468803.367	7/24/2012	0	0.001735759	0.356078446	A	810.6	32.6	24-07-2012 09:07:23	0	0.007	1.435999999	0.247965485
sc072312_86	sc072312_86_24072012_091614.txt	sc072312	STC	1186544.08	2469000.813	7/24/2012	0	0	0.234452844	A	810.6	34.7	24-07-2012 09:16:14	0	0	0.952000022	0.246273994
sc072312_87	sc072312_87_24072012_092239.txt	sc072312	STC	1186704.056	2468996.223	7/24/2012	0	0.000980591	0.164984345	A	810.3	36.0	24-07-2012 09:22:39	0	0.004	0.672999978	0.245147631
sc072312_88	sc072312_88_24072012_092637.txt	sc072312	STC	1186929.337	2468982.517	7/24/2012	0	0.00342051	0.123871326	A	809.4	36.7	24-07-2012 09:26:37	0	0.014	0.507000029	0.244322136
sc072312_89	sc072312_89_240720																

APPENDIX F
CARBON DIOXIDE FLUX CONTOUR FIGURES





LEGEND

- NATURAL SPRING
- ABANDONED PRODUCTION WELL
- CARBON DIOXIDE FLUX MEASUREMENT ($\text{mol/m}^2 \cdot \text{day}$)**
 - 0.0000 - 0.0100
 - 0.0101 - 0.5000
 - 0.5001 - 1.0000
 - 1.0001 - 5.0000
 - 5.0001 - 10.0000
- $\text{mol/m}^2 \cdot \text{day}$: MOLES PER SQUARE METER PER DAY
- CARBON DIOXIDE FLUX CONTOUR ($\text{mol/m}^2 \cdot \text{day}$)
CONTOUR INTERVAL VARIES
- SURFACE WATER
- PROPERTY BOUNDARY & OWNER (WHITE)
- SECTION
- GEOLOGY**
 - KIRTLAND FORMATION (Kk)
 - FRUITLAND FORMATION (Kf)
 - PICTURED CLIFFS FORMATION (Kpc)
- IMAGE COURTESY OF ESRI/BING MAPS

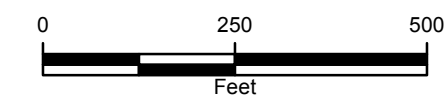
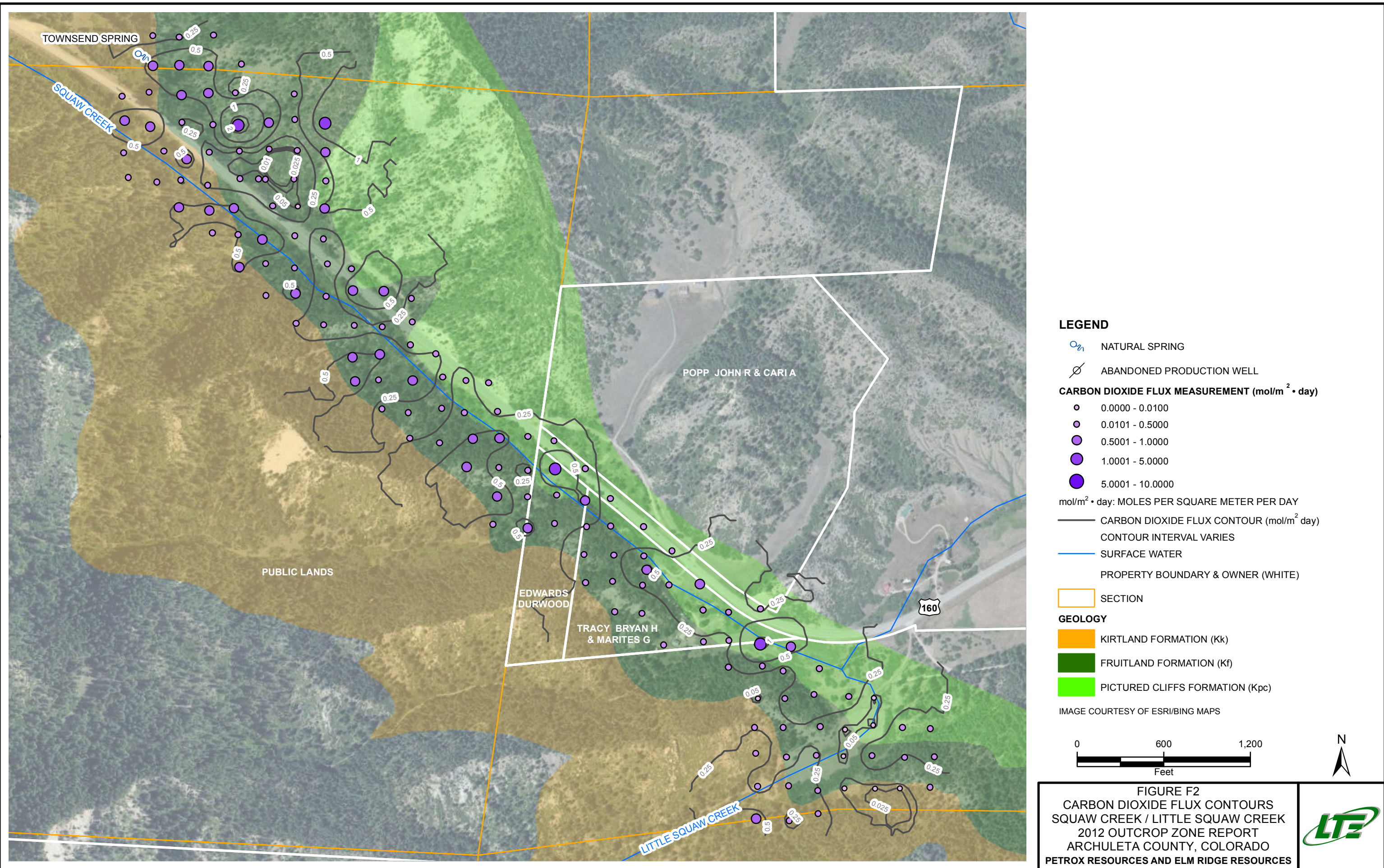
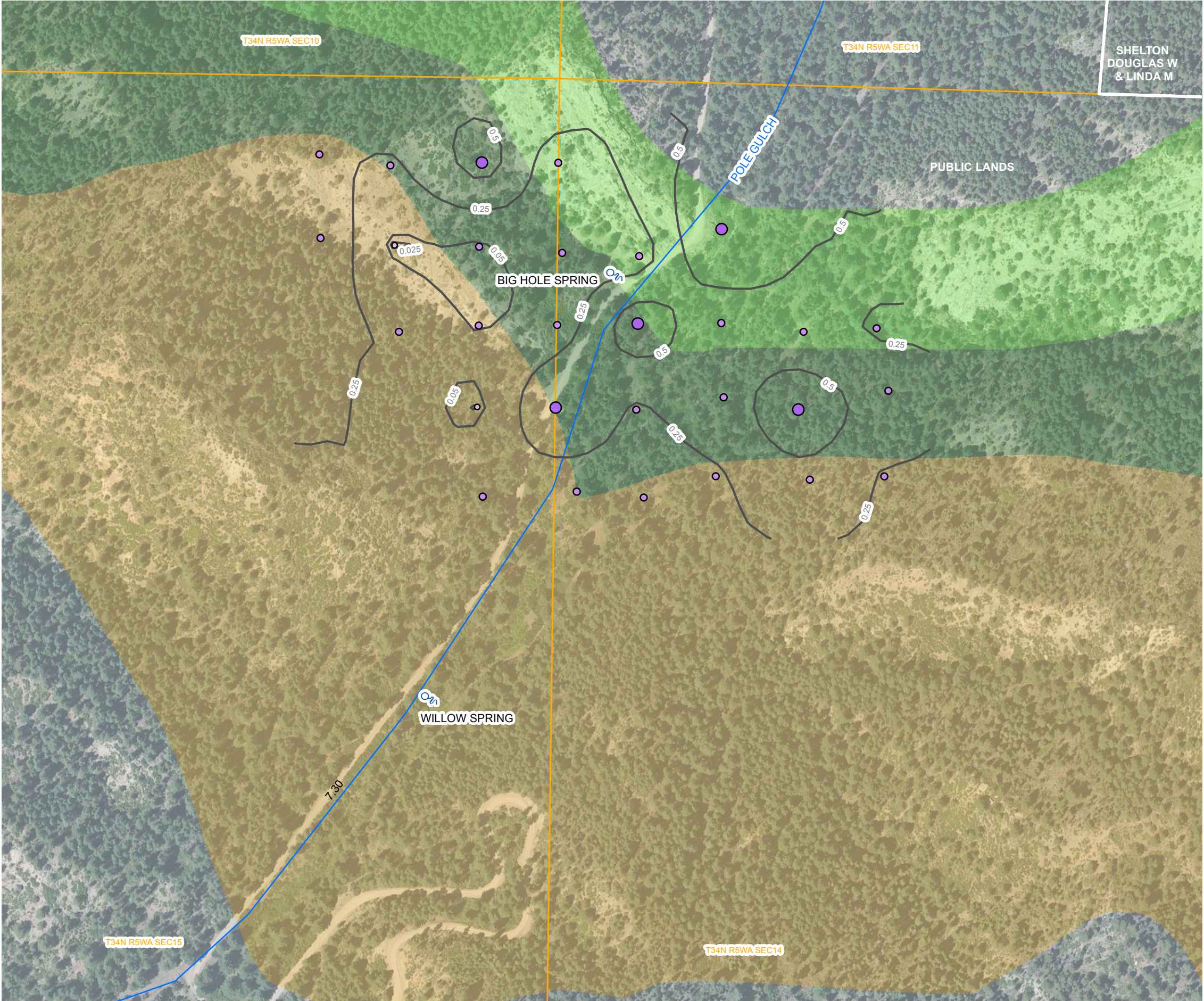


FIGURE F1
CARBON DIOXIDE FLUX CONTOURS
BEAVER CREEK
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES







LEGEND

NATURAL SPRING

ABANDONED PRODUCTION WELL

CARBON DIOXIDE FLUX MEASUREMENT ($\text{mol/m}^2 \cdot \text{day}$)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 10.0000

$\text{mol/m}^2 \cdot \text{day}$: MOLES PER SQUARE METER PER DAY

CARBON DIOXIDE FLUX CONTOUR ($\text{mol/m}^2 \cdot \text{day}$)
CONTOUR INTERVAL VARIES

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY

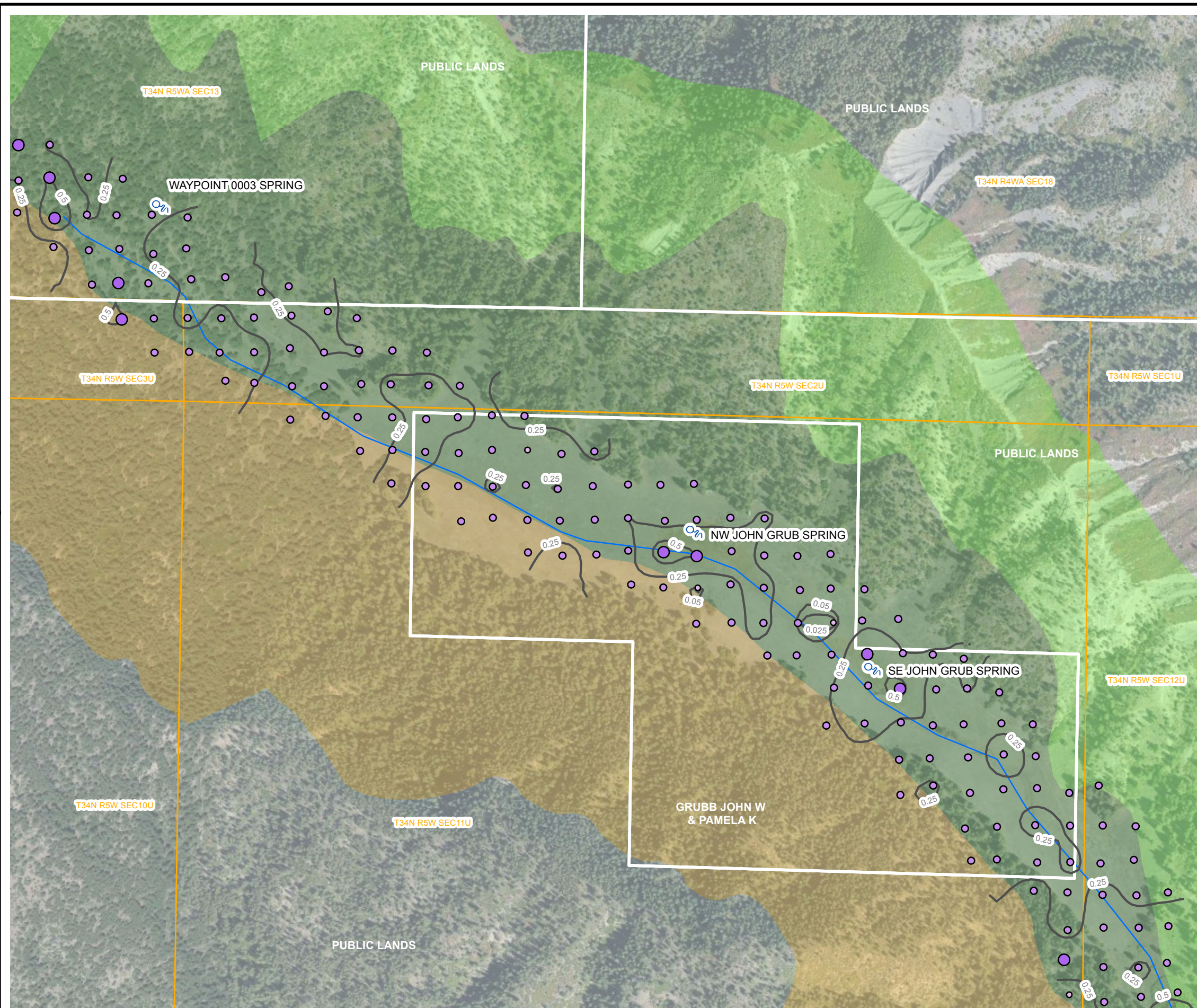
- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS



FIGURE F3
CARBON DIOXIDE FLUX CONTOURS
POLE GULCH
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

 NATURAL SPRING

 ABANDONED PRODUCTION WELL

CARBON DIOXIDE FLUX MEASUREMENT ($\text{mol/m}^2 \cdot \text{day}$)

-  0.0000 - 0.0100
-  0.0101 - 0.5000
-  0.5001 - 1.0000
-  1.0001 - 5.0000
-  5.0001 - 10.0000

$\text{mol/m}^2 \cdot \text{day}$: MOLES PER SQUARE METER PER DAY

 CARBON DIOXIDE FLUX CONTOUR ($\text{mol/m}^2 \cdot \text{day}$)

CONTOUR INTERVAL VARIES

 SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

 SECTION

GEOLOGY

 KIRTLAND FORMATION (Kk)

 FRUITLAND FORMATION (Kf)

 PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

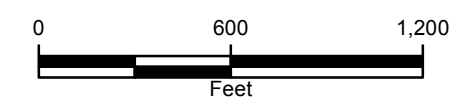
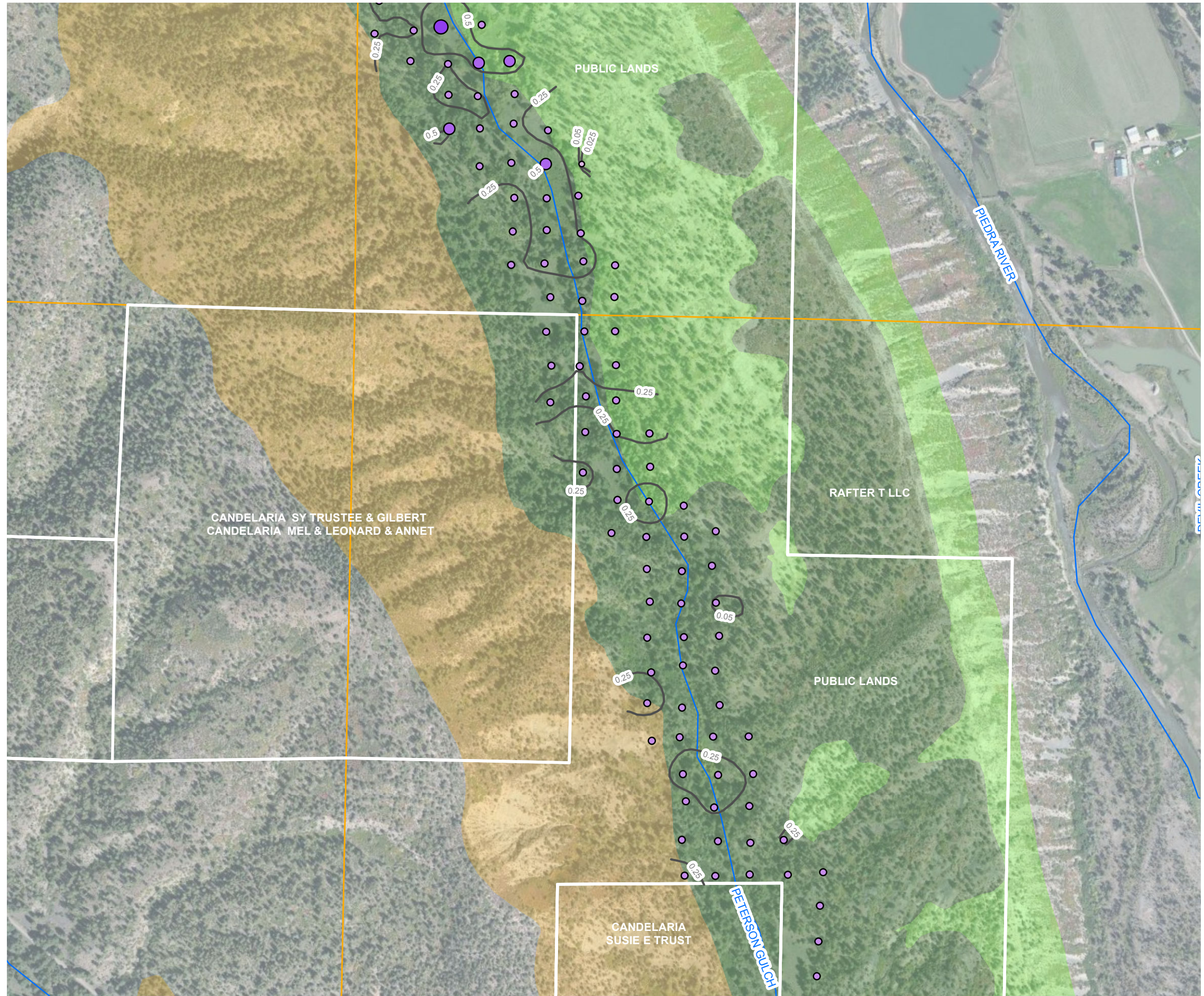


FIGURE F4
CARBON DIOXIDE FLUX CONTOURS
PETERSON GULCH WEST
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

- NATURAL SPRING
- ABANDONED PRODUCTION WELL
- CARBON DIOXIDE FLUX MEASUREMENT (mol/m² • day)**
 - 0.0000 - 0.0100
 - 0.0101 - 0.5000
 - 0.5001 - 1.0000
 - 1.0001 - 5.0000
 - 5.0001 - 10.0000
- mol/m² • day: MOLES PER SQUARE METER PER DAY
- CARBON DIOXIDE FLUX CONTOUR (mol/m² day)
CONTOUR INTERVAL VARIES
- SURFACE WATER
- PROPERTY BOUNDARY & OWNER (WHITE)
- SECTION
- GEOLOGY**
 - KIRTLAND FORMATION (Kk)
 - FRUITLAND FORMATION (Kf)
 - PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

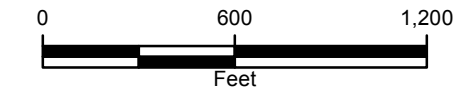
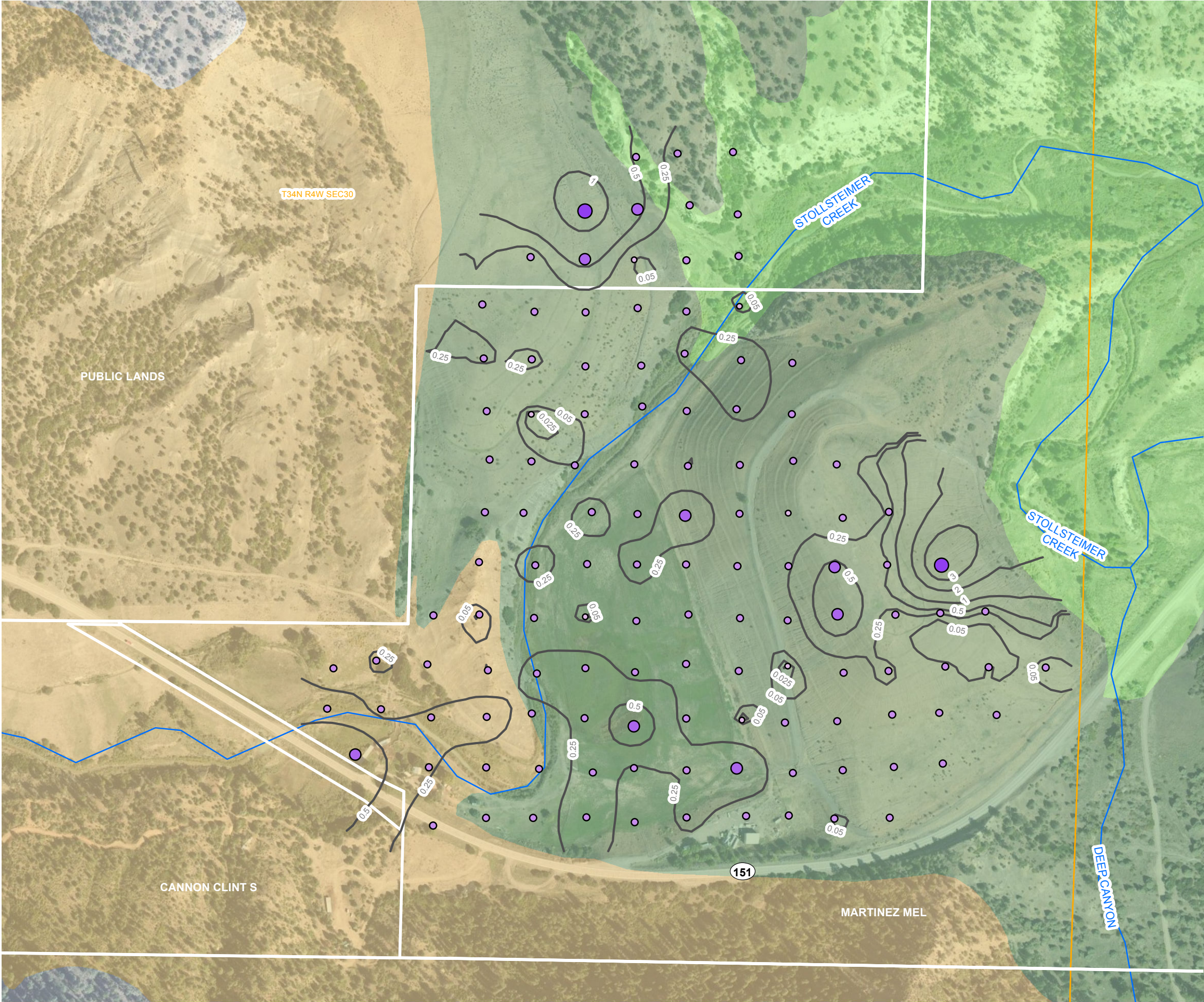


FIGURE F5
CARBON DIOXIDE FLUX CONTOURS
PETERSON GULCH EAST
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

NATURAL SPRING

ABANDONED PRODUCTION WELL

CARBON DIOXIDE FLUX MEASUREMENT (mol/m² · day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 10.0000

mol/m² · day: MOLES PER SQUARE METER PER DAY

CARBON DIOXIDE FLUX CONTOUR (mol/m² day)

CONTOUR INTERVAL VARIES

SURFACE WATER

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

GEOLOGY

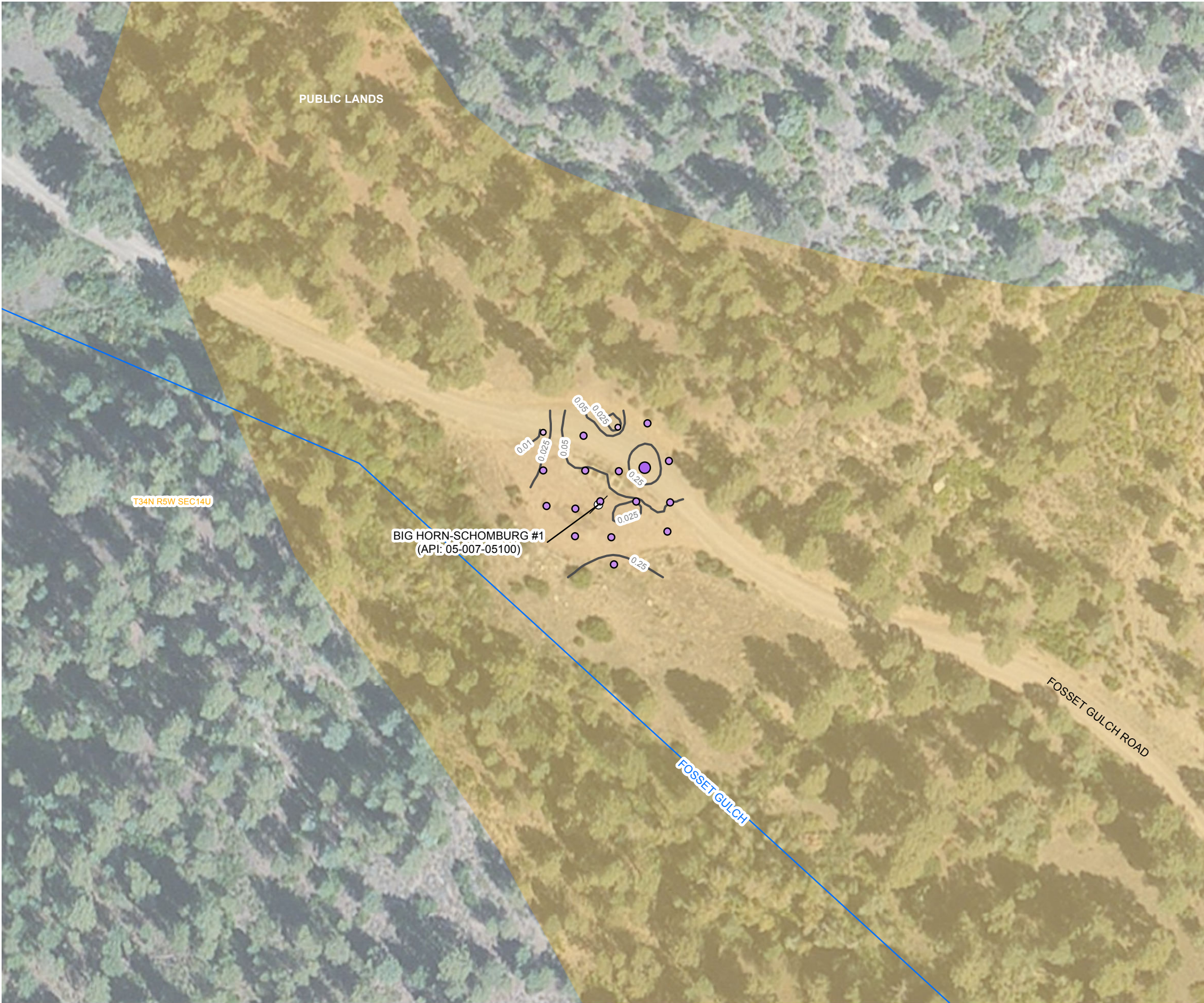
- KIRTLAND FORMATION (Kk)
- FRUITLAND FORMATION (Kf)
- PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS



FIGURE F6
CARBON DIOXIDE FLUX CONTOURS
STOLLSTEIMER CREEK
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES





LEGEND

- NATURAL SPRING
- ABANDONED PRODUCTION WELL
- CARBON DIOXIDE FLUX MEASUREMENT ($\text{mol/m}^2 \cdot \text{day}$)**
 - 0.0000 - 0.0100
 - 0.0101 - 0.5000
 - 0.5001 - 1.0000
 - 1.0001 - 5.0000
 - 5.0001 - 10.0000
- $\text{mol/m}^2 \cdot \text{day}$: MOLES PER SQUARE METER PER DAY
- CARBON DIOXIDE FLUX CONTOUR ($\text{mol/m}^2 \cdot \text{day}$)
CONTOUR INTERVAL VARIES
- SURFACE WATER
- PROPERTY BOUNDARY & OWNER (WHITE)
- SECTION
- GEOLOGY**
 - KIRTLAND FORMATION (Kk)
 - FRUITLAND FORMATION (Kf)
 - PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF ESRI/BING MAPS

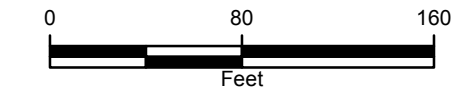


FIGURE F7
CARBON DIOXIDE FLUX CONTOURS
BIG HORN-SCHOMBURG #1
2012 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES



APPENDIX G
ABANDONED COAL MINE SUBSURFACE SOIL GAS AND SURFACE
TEMPERATURE MEASUREMENTS



APPENDIX G
ABANDONED COAL MINE SOIL GAS AND TEMPERATURE MEASUREMENTS

COMMENTS	Max_PDOP	Corr_Type	GPS_Date	GPS_Time	Datafile	Northing	Easting	CH ₄	O ₂	CO	CO ₂	H ₂ S	TEMP
GPS 072612	5.5	Postprocessed Code	8/1/2012	08:21:57am	CHIMNEY ROCK MINE1_0	1185976.072154	2469881.374194	0.000000	19.400000	0.000000	7000.000000	0.000000	10.000000
GPS 072612	3.7	Postprocessed Code	8/1/2012	08:25:07am	CHIMNEY ROCK MINE1_0	1185914.983714	2469875.107495	0.000000	19.900000	0.000000	2000.000000	0.000000	11.000000
GPS 072612	4.5	Postprocessed Code	8/1/2012	08:28:34am	CHIMNEY ROCK MINE1_0	1185868.256643	2469878.468792	0.000000	18.500000	0.000000	12000.000000	0.000000	10.000000
GPS 072612	3.7	Postprocessed Code	8/1/2012	08:33:15am	CHIMNEY ROCK MINE1_0	1185824.081236	2469879.998304	0.000000	19.200001	0.000000	6000.000000	0.000000	10.000000
GPS 072612	4.6	Postprocessed Code	8/1/2012	08:35:25am	CHIMNEY ROCK MINE1_0	1185820.754121	2469928.061806	0.000000	19.200001	0.000000	5000.000000	0.000000	11.000000
GPS 072612	4.5	Postprocessed Code	8/1/2012	08:37:53am	CHIMNEY ROCK MINE1_0	1185769.530425	2469879.542363	0.000000	19.799999	0.000000	1000.000000	0.000000	10.000000
GPS 072612	3.3	Postprocessed Code	8/1/2012	08:40:40am	CHIMNEY ROCK MINE1_0	1185714.566039	2469885.176045	0.000000	18.799999	0.000000	8000.000000	0.000000	11.000000
GPS 072612	2.6	Postprocessed Code	8/1/2012	08:43:30am	CHIMNEY ROCK MINE1_0	1185618.938950	2469877.346731	0.000000	19.299999	0.000000	3000.000000	0.000000	10.000000
GPS 072612	2.8	Postprocessed Code	8/1/2012	08:46:42am	CHIMNEY ROCK MINE1_0	1185622.274222	2469832.459728	0.000000	17.700001	0.000000	12000.000000	0.000000	11.000000
GPS 072612	3.6	Postprocessed Code	8/1/2012	08:48:48am	CHIMNEY ROCK MINE1_0	1185623.206900	2469777.631720	0.000000	18.600000	0.000000	7000.000000	0.000000	11.000000
GPS 072612	4.1	Postprocessed Code	8/1/2012	08:52:10am	CHIMNEY ROCK MINE1_0	1185667.233944	2469781.883917	0.000000	18.299999	0.000000	9000.000000	0.000000	10.000000
GPS 072612	2.4	Postprocessed Code	8/1/2012	08:54:42am	CHIMNEY ROCK MINE1_0	1185671.928021	2469832.177847	0.000000	18.200001	0.000000	9000.000000	0.000000	12.000000
GPS 072612	2.3	Postprocessed Code	8/1/2012	08:58:13am	CHIMNEY ROCK MINE1_0	1185722.349567	2469829.429367	0.000000	18.000000	0.000000	10000.000000	0.000000	12.000000
GPS 072612	4.3	Postprocessed Code	8/1/2012	09:01:23am	CHIMNEY ROCK MINE1_0	1185770.540257	2469831.070170	0.000000	19.299999	0.000000	2000.000000	0.000000	12.000000
GPS 072612	2.7	Postprocessed Code	8/1/2012	09:05:26am	CHIMNEY ROCK MINE1_0	1185767.676217	2469778.685221	0.000000	17.299999	0.000000	11000.000000	0.000000	9.000000
GPS 072612	3.9	Postprocessed Code	8/1/2012	09:08:31am	CHIMNEY ROCK MINE1_0	1185722.173923	2469779.445642	0.000000	17.600000	0.000000	7000.000000	0.000000	12.000000
GPS 072612	2.5	Postprocessed Code	8/1/2012	09:11:41am	CHIMNEY ROCK MINE1_0	1185770.774958	2469731.971590	0.000000	16.600000	0.000000	11000.000000	0.000000	9.000000
GPS 072612	2.4	Postprocessed Code	8/1/2012	09:15:41am	CHIMNEY ROCK MINE1_0	1185770.733948	2469680.798396	0.000000	18.000000	0.000000	4000.000000	0.000000	9.000000
GPS 072612	4.5	Postprocessed Code	8/1/2012	09:17:12am	CHIMNEY ROCK MINE1_0	1185822.000887	2469680.586168	0.000000	17.600000	0.000000	4000.000000	0.000000	10.000000
GPS 072612	4.8	Postprocessed Code	8/1/2012	09:21:23am	CHIMNEY ROCK MINE1_0	1185817.254650	2469728.405091	0.000000	16.900000	0.000000	7000.000000	0.000000	10.000000
GPS 072612	6.8	Postprocessed Code	8/1/2012	09:24:11am	CHIMNEY ROCK MINE1_0	1185819.048398	2469781.638642	0.000000	15.900000	0.000000	11000.000000	0.000000	11.000000
GPS 072612	4.8	Postprocessed Code	8/1/2012	09:26:43am	CHIMNEY ROCK MINE1_0	1185815.683203	2469832.754253	0.000000	16.299999	0.000000	8000.000000	0.000000	12.000000
GPS 072612	6.6	Postprocessed Code	8/1/2012	09:30:50am	CHIMNEY ROCK MINE1_0	1185867.006780	2469825.887038	0.000000	17.400000	0.000000	1000.000000	0.000000	10.000000
GPS 072612	5.0	Postprocessed Code	8/1/2012	09:34:53am	CHIMNEY ROCK MINE1_0	1185916.193694	2469828.804411	0.000000	16.200001	0.000000	10000.000000	0.000000	14.000000
GPS 072612	4.8	Postprocessed Code	8/1/2012	09:37:03am	CHIMNEY ROCK MINE1_0	1185967.982284	2469831.412964	0.000000	17.200001	0.000000	3000.000000	0.000000	13.000000
GPS 072612	5.0	Postprocessed Code	8/1/2012	09:49:54am	CHIMNEY ROCK MINE1_0	1186021.995104	2469875.451989	0.000000	16.100000	0.000000	10000.000000	0.000000	15.000000
GPS 072612	6.5	Postprocessed Code	8/1/2012	09:52:15am	CHIMNEY ROCK MINE1_0	1186019.522103	2469822.105590	0.000000	17.400000	0.000000	1000.000000	0.000000	14.000000
GPS 072612	3.5	Postprocessed Code	8/1/2012	09:58:55am	CHIMNEY ROCK MINE1_0	1186023.199074	2469773.276075	0.000000	16.299999	0.000000	11000.000000	0.000000	15.000000
GPS 072612	6.0	Postprocessed Code	8/1/2012	10:02:09am	CHIMNEY ROCK MINE1_0	1185975.177132	2469783.706364	0.000000	17.500000	0.000000	1000.000000	0.000000	17.000000
GPS 072612	6.8	Postprocessed Code	8/1/2012	10:04:08am	CHIMNEY ROCK MINE1_0	1185918.871928	2469785.816445	0.000000	15.200000	0.000000	15000.000000	0.000000	18.000000
GPS 072612	6.5	Postprocessed Code	8/1/2012	10:07:37am	CHIMNEY ROCK MINE1_0	1185870.424922	2469776.470607	0.000000	16.900000	0.000000	6000.000000	0.000000	18.000000
GPS 072612	4.5	Postprocessed Code	8/1/2012	10:12:13am	CHIMNEY ROCK MINE1_0	1185872.275299	2469730.289886	0.000000	15.600000	0.000000	1400.000000	0.000000	10.000000
GPS 072612	5.8	Postprocessed Code	8/1/2012	10:17:07am	CHIMNEY ROCK MINE1_0	1185870.031455	2469672.076721	0.000000	15.900000	0.000000	11000.000000	0.000000	12.000000
GPS 072612	16.0	Postprocessed Code	8/1/2012	10:20:28am	CHIMNEY ROCK MINE1_0	1185918.243223	2469680.149894	0.000000	17.500000	0.000000	2000.000000	0.000000	17.000000
GPS 072612	6.3	Postprocessed Code	8/1/2012	10:26:54am	CHIMNEY ROCK MINE1_0	1185918.330343	2469725.750226	0.000000	14.200000	0.000000	21000.000000	0.000000	11.000000
GPS 072612	5.9	Postprocessed Code	8/1/2012	10:29:29am	CHIMNEY ROCK MINE1_0	1185976.283122	2469726.470011	0.000000	16.000000	0.000000	12000.000000	0.000000	16.000000
GPS 072612	5.0	Postprocessed Code	8/1/2012	10:33:39am	CHIMNEY ROCK MINE1_0	1185969.345220	2469680.353148	0.000000	14.900000	0.000000	16000.000000	0.000000	14.000000
GPS 072612	5.3	Postprocessed Code	8/1/2012	10:37:59am	CHIMNEY ROCK MINE1_0	1186021.547400	2469675.668639	0.000000	15.700000	0.000000	13000.000000	0.000000	10.000000
GPS 072612	5.6	Postprocessed Code	8/1/2012	10:46:56am	CHIMNEY ROCK MINE1_0	1186025.714591	2469729.393002	0.000000	17.900000	0.000000	1000.000000	0.000000	22.000000
GPS 072612	5.1	Postprocessed Code	8/1/2012	10:52:00am	CHIMNEY ROCK MINE1_0	1186072.478053	2469676.160087	0.000000	17.400000	0.000000	3000.000000	0.000000	17.000000
GPS 072612	4.3	Postprocessed Code	8/1/2012	10:55:09am	CHIMNEY ROCK MINE1_0	1186066.331999	2469727.681315	0.000000	17.400000	0.000000	3000.000000	0.000000	16.000000
GPS 072612	4.1	Postprocessed Code	8/1/2012	10:58:04am	CHIMNEY ROCK MINE1_0	1186071.658181	2469777.031709	0.000000	17.900000	0.000000	1000.000000	0.000000	20.000000
GPS 072612	4.6	Postprocessed Code	8/1/2012	11:00:41am	CHIMNEY ROCK MINE1_0	1186068.912035	2469833.218919	0.000000	17.799999	0.000000	0.000000	0.000000	22.000000
GPS 072612	3.5	Postprocessed Code	8/1/2012	11:05:14am	CHIMNEY ROCK MINE1_0	1186070.113310	2469874.709294	0.000000	17.600000	0.000000	1000.000000	0.000000	15.000000
GPS 072612	5.2	Postprocessed Code	8/1/2012	11:49:59am	CHIMNEY ROCK MINE1_0	1186020.789161	2469929.032588	0.000000	18.299999	0.000000	2000.000000	0.000000	20.000000
GPS 072612	5.1	Postprocessed Code	8/1/2012	11:51:56am	CHIMNEY ROCK MINE1_0	1185982.844160	2469926.860267	0.000000	17.900000	0.000000	1000.000000	0.000000	18.000000
GPS 072612	4.1	Postprocessed Code	8/1/2012	11:55:13am	CHIMNEY ROCK MINE1_0	1185927.442210	2469926.140246	0.000000	17.900000	0.000000	3000.000000	0.000000	20.000000
GPS 072612	4.7	Postprocessed Code	8/1/2012	11:57:18am	CHIMNEY ROCK MINE1_0	1185871.385485	2469928.523301	0.000000	17.500000	0.000000	4000.000000	0.000000	17.000000
GPS 072612	4.3	Postprocessed Code	8/1/2012	11:59:25am	CHIMNEY ROCK MINE1_0	1185873.607110	2469978.397422	0.000000	17.600000	0.000000	4000.000000	0.000000	20.000000
GPS 072612	4.3	Postprocessed Code	8/1/2012	12:01:42pm	CHIMNEY ROCK MINE1_0	1185875.272916	2470026.679826	0.000000	17.100000	0.000000	6000.000000	0.000000	22.000000
GPS 072612	2.6	Postprocessed Code	8/1/2012	12:04:03pm	CHIMNEY ROCK MINE1_0	1185927.099600	2469975.493515	0.000000	17.799999	0.000000	1000.000000	0.000000	22.000000
GPS 072612	4.4	Postprocessed Code	8/1/2012	12:06:35pm	CHIMNEY ROCK MINE1_0	1185979.144562	2469976.796660	0.000000	17.100000	0.000000	5000.000000	0.000000	16.000000
GPS 072612	4.2	Postprocessed Code	8/1/2012	12:08:56pm	CHIMNEY ROCK MINE1_0	1186028.253920	2469979.996783	0.000000	14.100000	0.000000	24000.000000	0.000000	18.000000
GPS 072612	5.2	Postprocessed Code	8/1/2012	12:12:12pm	CHIMNEY ROCK MINE1_0	1186077.232631	2469977.991901	0.000000	15.600000	0.000000	15000.000000	0.000000	16.000000
GPS 072612	4.4	Postprocessed Code	8/1/2012	12:16:26pm	CHIMNEY ROCK MINE1_0	1186072.319628	2470024.382602	0.000000	16.900000	0.000000	7000.000000	0.000000	16.000000
GPS 072612	4.0	Postprocessed Code	8/1/2012	12:19:54pm	CHIMNEY ROCK MINE1_0	1186021.510053	2470027.936573	0.000000	16.000000	0.000000	14000.000000	0.000000	18.000000
GPS 072612	3.1	Postprocessed Code	8/1/2012	12:22:38pm	CHIMNEY ROCK MINE1_0	1185978.157219	2470024.280964	0.000000	16.000000	0.000000	12000.000000	0.000000	18.000000
GPS 072612	3.2	Postprocessed Code	8/1/2012	12:26:19pm	CHIMNEY ROCK MINE1_0	1185925.350311	2470029.567182	0.000000	16.400000	0.000000	9000.000000	0.000000	18.000000
GPS 072612	5.4	Postprocessed Code	8/1/2012	12:28:42pm	CHIMNEY ROCK MINE1_0	1185869.000931	2470080.617046	0.000000	16.299999	0.000000	9000.000000	0.000000	24.000000
GPS 072612	2.9	Postprocessed Code	8/1/2012	12:31:31pm	CHIMNEY ROCK MINE1_0	1185924.944025	2470074.982285	0.000000	15.800000	0.000000	12000.000000	0.000000	24.000000
GPS 072612	4.5	Postprocessed Code	8/1/2012	12:34:17pm	CHIMNEY ROCK MINE1_0	1185975.054992	2470077.924679	0.000000	15.600000	0.000000	13000.000000	0.000000	26.000000
GPS 072612	3.2	Postprocessed Code	8/1/2012	12:38:25pm	CHIMNEY ROCK MINE1_0	1186023.457798	2470075.755669	0.000000	16.799999	0.000000	5000.000000	0.000000	22.000000

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND TEMPERATURE MEASUREMENTS

COMMENTS	Max_PDOP	Corr_Type	GPS_Date	GPS_Time	Datafile	Northing	Easting	CH ₄	O ₂	CO	CO ₂	H ₂ S	TEMP
GPS 072612	4.7	Postprocessed Code	8/1/2012	01:06:47pm	CHIMNEY ROCK MINE1_0	1186018.646609	2470172.725141	0.000000	17.000000	0.000000	2000.000000	0.000000	20.000000
GPS 072612	2.9	Postprocessed Code	8/1/2012	01:11:14pm	CHIMNEY ROCK MINE1_0	1186126.501493	2470127.372584	0.000000	17.100000	0.000000	2000.000000	0.000000	28.000000
GPS 072612	3.2	Postprocessed Code	8/1/2012	01:16:15pm	CHIMNEY ROCK MINE1_0	1186119.934851	2470074.324296	0.000000	17.400000	0.000000	1000.000000	0.000000	22.000000
GPS 072612	4.6	Postprocessed Code	8/1/2012	01:18:32pm	CHIMNEY ROCK MINE1_0	1186117.237935	2470022.623861	0.000000	16.900000	0.000000	2000.000000	0.000000	24.000000
GPS 072612	4.5	Postprocessed Code	8/1/2012	01:20:46pm	CHIMNEY ROCK MINE1_0	1186120.340345	2469974.232712	0.000000	16.900000	0.000000	3000.000000	0.000000	30.000000
GPS 072612	6.1	Postprocessed Code	8/1/2012	01:23:09pm	CHIMNEY ROCK MINE1_0	1186115.436079	2469922.113707	0.000000	16.900000	0.000000	4000.000000	0.000000	28.000000
GPS 072612	4.2	Postprocessed Code	8/1/2012	01:25:27pm	CHIMNEY ROCK MINE1_0	1186068.843117	2469923.912399	0.000000	17.200001	0.000000	2000.000000	0.000000	28.000000
GPS 072612	5.7	Postprocessed Code	8/1/2012	01:27:33pm	CHIMNEY ROCK MINE1_0	1186118.789272	2469874.268599	0.000000	16.900000	0.000000	4000.000000	0.000000	24.000000
GPS 072612	4.4	Postprocessed Code	8/1/2012	01:30:04pm	CHIMNEY ROCK MINE1_0	1186121.035473	2469821.930201	0.000000	17.400000	0.000000	0.000000	0.000000	24.000000
GPS 072612	4.1	Postprocessed Code	8/1/2012	01:32:17pm	CHIMNEY ROCK MINE1_0	1186126.636654	2469780.134126	0.000000	17.200001	0.000000	2000.000000	0.000000	28.000000
GPS 072612	4.0	Postprocessed Code	8/1/2012	01:33:57pm	CHIMNEY ROCK MINE1_0	1186120.106150	2469723.168732	0.000000	16.700001	0.000000	6000.000000	0.000000	30.000000
GPS 072612	5.2	Postprocessed Code	8/1/2012	01:36:08pm	CHIMNEY ROCK MINE1_0	1186116.409185	2469678.431976	0.000000	11.500000	0.000000	36000.000000	0.000000	28.000000
GPS 072612	3.9	Postprocessed Code	8/1/2012	01:40:11pm	CHIMNEY ROCK MINE1_0	1186117.869094	2469621.917338	0.000000	14.300000	0.000000	16000.000000	0.000000	22.000000
GPS 072612	4.3	Postprocessed Code	8/1/2012	01:42:05pm	CHIMNEY ROCK MINE1_0	1186114.893194	2469581.969645	0.000000	17.299999	0.000000	2000.000000	0.000000	22.000000
GPS 072612	4.5	Postprocessed Code	8/1/2012	01:43:56pm	CHIMNEY ROCK MINE1_0	1186119.933909	2469521.909507	0.000000	17.600000	0.000000	1000.000000	0.000000	20.000000
GPS 072612	6.0	Postprocessed Code	8/1/2012	01:46:43pm	CHIMNEY ROCK MINE1_0	1186133.651603	2469479.128691	0.000000	17.400000	0.000000	3000.000000	0.000000	20.000000
GPS 072612	5.1	Postprocessed Code	8/1/2012	01:49:17pm	CHIMNEY ROCK MINE1_0	1186172.603673	2469475.754807	0.000000	17.799999	0.000000	0.000000	0.000000	15.000000
GPS 072612	4.8	Postprocessed Code	8/1/2012	01:52:14pm	CHIMNEY ROCK MINE1_0	1186224.266632	2469474.199570	0.000000	17.500000	0.000000	2000.000000	0.000000	12.000000
GPS 072612	5.0	Postprocessed Code	8/1/2012	01:54:04pm	CHIMNEY ROCK MINE1_0	1186275.219863	2469479.576156	0.000000	17.500000	0.000000	2000.000000	0.000000	12.000000
GPS 072612	4.2	Postprocessed Code	8/1/2012	01:56:24pm	CHIMNEY ROCK MINE1_0	1186269.819077	2469524.416688	0.000000	17.200001	0.000000	2000.000000	0.000000	12.000000
GPS 072612	4.7	Postprocessed Code	8/1/2012	01:59:14pm	CHIMNEY ROCK MINE1_0	1186220.194624	2469527.836859	0.000000	16.900000	0.000000	7000.000000	0.000000	23.000000
GPS 072612	4.4	Postprocessed Code	8/1/2012	02:01:53pm	CHIMNEY ROCK MINE1_0	1186168.556671	2469526.112510	0.000000	17.600000	0.000000	3000.000000	0.000000	16.000000
GPS 072612	5.0	Postprocessed Code	8/1/2012	02:04:24pm	CHIMNEY ROCK MINE1_0	1186167.213685	2469575.185817	0.000000	17.000000	0.000000	6000.000000	0.000000	38.000000
GPS 072612	4.1	Postprocessed Code	8/1/2012	02:06:42pm	CHIMNEY ROCK MINE1_0	1186219.562432	2469575.993335	0.000000	17.600000	0.000000	3000.000000	0.000000	25.000000
GPS 072612	4.8	Postprocessed Code	8/1/2012	02:09:24pm	CHIMNEY ROCK MINE1_0	1186276.013170	2469571.982150	0.000000	16.200001	0.000000	11000.000000	0.000000	30.000000
GPS 072612	6.0	Postprocessed Code	8/1/2012	02:11:36pm	CHIMNEY ROCK MINE1_0	1186318.933151	2469628.706120	0.000000	17.900000	0.000000	1000.000000	0.000000	18.000000
GPS 072612	2.0	Postprocessed Code	8/1/2012	02:15:37pm	CHIMNEY ROCK MINE1_0	1186319.627143	2469678.102306	0.000000	17.799999	0.000000	0.000000	0.000000	28.000000
GPS 072612	4.0	Postprocessed Code	8/1/2012	02:16:36pm	CHIMNEY ROCK MINE1_0	1186273.875394	2469627.431225	0.000000	16.100000	0.000000	11000.000000	0.000000	30.000000
GPS 072612	4.9	Postprocessed Code	8/1/2012	02:19:37pm	CHIMNEY ROCK MINE1_0	1186220.262572	2469632.903325	0.000000	18.000000	0.000000	1000.000000	0.000000	32.000000
GPS 072612	6.4	Postprocessed Code	8/2/2012	09:15:06am	CHIMNEY ROCK MINE1_0	1186176.482846	2469776.344957	0.000000	19.600000	0.000000	3000.000000	0.000000	13.000000
GPS 072612	7.0	Postprocessed Code	8/2/2012	09:17:16am	CHIMNEY ROCK MINE1_0	1186176.410521	2469717.731575	22500.000000	18.700001	0.000000	10000.000000	0.000000	13.000000
GPS 072612	6.7	Uncorrected	8/2/2012	09:19:28am	CHIMNEY ROCK MINE1_0	1186171.458221	2469667.280953	0.000000	18.700001	0.000000	11000.000000	0.000000	12.000000
GPS 072612	5.2	Postprocessed Code	8/2/2012	09:23:19am	CHIMNEY ROCK MINE1_0	1186171.841214	2469617.952490	0.000000	17.799999	0.000000	19000.000000	0.000000	11.000000
GPS 072612	2.9	Postprocessed Code	8/2/2012	09:25:30am	CHIMNEY ROCK MINE1_0	1186215.220998	2469667.836434	0.000000	17.400000	0.000000	13000.000000	0.000000	12.000000
GPS 072612	3.2	Postprocessed Code	8/2/2012	09:29:01am	CHIMNEY ROCK MINE1_0	1186273.338608	2469675.664544	0.000000	18.900000	0.000000	6000.000000	0.000000	12.000000
GPS 072612	3.7	Postprocessed Code	8/2/2012	09:31:44am	CHIMNEY ROCK MINE1_0	1186269.243552	2469727.072339	0.000000	19.299999	0.000000	3000.000000	0.000000	10.000000
GPS 072612	3.1	Postprocessed Code	8/2/2012	09:34:12am	CHIMNEY ROCK MINE1_0	1186268.969327	2469766.013661	0.000000	19.400000	0.000000	3000.000000	0.000000	13.000000
GPS 072612	4.7	Postprocessed Code	8/2/2012	09:36:21am	CHIMNEY ROCK MINE1_0	1186269.930853	2469817.542623	0.000000	19.299999	0.000000	5000.000000	0.000000	14.000000
GPS 072612	4.5	Postprocessed Code	8/2/2012	09:39:05am	CHIMNEY ROCK MINE1_0	1186268.977869	2469874.668537	0.000000	19.400000	0.000000	3000.000000	0.000000	16.000000
GPS 072612	4.3	Postprocessed Code	8/2/2012	09:41:40am	CHIMNEY ROCK MINE1_0	1186269.483386	2469922.204970	0.000000	19.400000	0.000000	3000.000000	0.000000	14.000000
GPS 072612	2.5	Postprocessed Code	8/2/2012	09:44:56am	CHIMNEY ROCK MINE1_0	1186271.955112	2469966.943626	0.000000	19.400000	0.000000	2000.000000	0.000000	14.000000
GPS 072612	3.1	Postprocessed Code	8/2/2012	09:47:14am	CHIMNEY ROCK MINE1_0	1186268.618646	2470016.698581	0.000000	19.200001	0.000000	2000.000000	0.000000	18.000000
GPS 072612	3.8	Postprocessed Code	8/2/2012	09:50:48am	CHIMNEY ROCK MINE1_0	1186263.977295	2470070.060503	0.000000	19.200001	0.000000	2000.000000	0.000000	20.000000
GPS 072612	3.4	Postprocessed Code	8/2/2012	09:52:55am	CHIMNEY ROCK MINE1_0	1186223.309713	2470076.499294	0.000000	18.400000	0.000000	3000.000000	0.000000	22.000000
GPS 072612	3.6	Postprocessed Code	8/2/2012	09:55:50am	CHIMNEY ROCK MINE1_0	1186222.959090	2470120.697047	0.000000	19.799999	0.000000	1000.000000	0.000000	18.000000
GPS 072612	6.1	Postprocessed Code	8/2/2012	09:57:43am	CHIMNEY ROCK MINE1_0	1186172.031425	2470118.999404	0.000000	18.400000	0.000000	1000.000000	0.000000	20.000000
GPS 072612	3.9	Postprocessed Code	8/2/2012	10:01:22am	CHIMNEY ROCK MINE1_0	1186167.418514	2470066.666872	0.000000	17.700001	0.000000	4000.000000	0.000000	20.000000
GPS 072612	6.5	Postprocessed Code	8/2/2012	10:03:23am	CHIMNEY ROCK MINE1_0	1186169.368877	2470016.062009	0.000000	17.299999	0.000000	4000.000000	0.000000	16.000000
GPS 072612	4.3	Postprocessed Code	8/2/2012	10:07:04am	CHIMNEY ROCK MINE1_0	1186222.497154	2470018.223608	0.000000	16.799999	0.000000	5000.000000	0.000000	17.000000
GPS 072612	4.5	Postprocessed Code	8/2/2012	10:09:44am	CHIMNEY ROCK MINE1_0	1186215.410728	2469968.297723	0.000000	17.200001	0.000000	1000.000000	0.000000	18.000000
GPS 072612	5.1	Postprocessed Code	8/2/2012	10:11:59am	CHIMNEY ROCK MINE1_0	1186163.312580	2469974.715357	0.000000	17.299999	0.000000	2000.000000	0.000000	15.000000
GPS 072612	2.4	Postprocessed Code	8/2/2012	10:14:31am	CHIMNEY ROCK MINE1_0	1186165.552966	2469919.105591	0.000000	17.200001	0.000000	1000.000000	0.000000	18.000000
GPS 072612	4.9	Postprocessed Code	8/2/2012	10:16:40am	CHIMNEY ROCK MINE1_0	1186218.453282	2469923.900752	0.000000	17.200001	0.000000	2000.000000	0.000000	16.000000
GPS 072612	6.5	Postprocessed Code	8/2/2012	10:19:27am	CHIMNEY ROCK MINE1_0	1186221.837164	2469871.686161	0.000000	17.299999	0.000000	2000.000000	0.000000	22.000000
GPS 072612	2.7	Postprocessed Code	8/2/2012	10:22:44am	CHIMNEY ROCK MINE1_0	1186170.745179	2469868.132263	0.000000	17.200001	0.000000	3000.000000	0.000000	14.000000
GPS 072612	5.9	Postprocessed Code	8/2/2012	10:25:05am	CHIMNEY ROCK MINE1_0	1186168.968797	2469816.296559	0.000000	17.299999	0.000000	2000.000000	0.000000	18.000000
GPS 072612	5.7	Postprocessed Code	8/2/2012	10:27:30am	CHIMNEY ROCK MINE1_0	1186216.410659	2469822.276199	0.000000	17.400000	0.000000	2000.000000	0.000000	22.000000
GPS 072612	5.6	Postprocessed Code	8/2/2012	10:29:23am	CHIMNEY ROCK MINE1_0	1186217.943313	2469767.534859	0.000000	17.500000	0.000000	1000.000000	0.000000	20.000000
GPS 072612	5.4	Postprocessed Code	8/2/2012	10:31:36am	CHIMNEY ROCK MINE1_0	1186212.536789	2469723.986157	0.000000	17.100000	0.000000	5000.000000	0.000000	21.000000
GPS 072612	6.6	Postprocessed Code	7/30/2012	10:52:16am	SCMINE2_073012.cor	1186013.859844	2471589.144230	0.000000	19.500000	0.000000	3000.000000	0.000000	9.000000
GPS 072612	5.9	Postprocessed Code	7/30/2012	10:59:08am	SCMINE2_073012.cor	1186063.496358	2471577.891331	0.000000	19.600000	0.000000	1000.000000	0.000000	9.000000
GPS 072612	3.9	Postprocessed Code	7/30/2012	11:04:12am	SCMINE2_073012.cor	1186119.471144	2471575.255090	0.000000	19.400000	0.000000	3000.000000	0.000000	13.000000

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND TEMPERATURE MEASUREMENTS

COMMENTS	Max_PDOP	Corr_Type	GPS_Date	GPS_Time	Datafile	Northing	Easting	CH ₄	O ₂	CO	CO ₂	H ₂ S	TEMP
GPS 072612	5.7	Postprocessed Code	7/30/2012	11:48:06am	SCMINE2_073012.cor	1186168.304622	2472035.830114	0.000000	16.900000	0.000000	2000.000000	0.000000	16.000000
GPS 072612	5.3	Postprocessed Code	7/30/2012	11:52:15am	SCMINE2_073012.cor	1186127.569155	2472032.263140	0.000000	17.000000	0.000000	1000.000000	0.000000	17.000000
GPS 072612	5.2	Postprocessed Code	7/30/2012	11:58:08am	SCMINE2_073012.cor	1186112.094793	2471986.352428	0.000000	16.799999	0.000000	2000.000000	0.000000	18.000000
GPS 072612	5.5	Postprocessed Code	7/30/2012	12:02:50pm	SCMINE2_073012.cor	1186115.766734	2471932.630180	0.000000	17.000000	0.000000	1000.000000	0.000000	16.000000
GPS 072612	3.9	Postprocessed Code	7/30/2012	12:08:26pm	SCMINE2_073012.cor	1186101.565554	2471879.235466	0.000000	16.799999	0.000000	4000.000000	0.000000	19.000000
GPS 072612	6.6	Postprocessed Code	7/30/2012	12:13:20pm	SCMINE2_073012.cor	1186126.785086	2471882.409855	0.000000	17.000000	0.000000	2000.000000	0.000000	19.000000
GPS 072612	5.1	Postprocessed Code	7/30/2012	12:17:51pm	SCMINE2_073012.cor	1186121.433240	2471827.194184	0.000000	17.000000	0.000000	1000.000000	0.000000	20.000000
GPS 072612	5.2	Postprocessed Code	7/30/2012	12:22:36pm	SCMINE2_073012.cor	1186117.544339	2471779.112188	0.000000	17.200001	0.000000	1000.000000	0.000000	14.000000
GPS 072612	5.9	Postprocessed Code	7/30/2012	12:27:06pm	SCMINE2_073012.cor	1186118.821474	2471729.965997	0.000000	16.900000	0.000000	4000.000000	0.000000	21.000000
GPS 072612	4.5	Postprocessed Code	7/30/2012	12:32:27pm	SCMINE2_073012.cor	1186125.798072	2471675.303866	0.000000	17.000000	0.000000	1000.000000	0.000000	19.000000
GPS 072612	5.4	Postprocessed Code	7/30/2012	12:36:54pm	SCMINE2_073012.cor	1186120.249880	2471635.650564	0.000000	17.100000	0.000000	2000.000000	0.000000	17.000000
GPS 072612	5.2	Postprocessed Code	7/30/2012	12:40:26pm	SCMINE2_073012.cor	1186070.217901	2471625.288138	0.000000	17.000000	0.000000	3000.000000	0.000000	20.000000
GPS 072612	5.5	Uncorrected	7/30/2012	12:44:30pm	SCMINE2_073012.cor	1186079.113098	2471674.501252	0.000000	17.000000	0.000000	4000.000000	0.000000	19.000000
GPS 072612	5.3	Postprocessed Code	7/30/2012	12:49:19pm	SCMINE2_073012.cor	1186066.557949	2471725.514812	0.000000	17.000000	0.000000	4000.000000	0.000000	18.000000
GPS 072612	6.1	Postprocessed Code	7/30/2012	12:54:24pm	SCMINE2_073012.cor	1186063.628265	2471769.898579	0.000000	17.299999	0.000000	1000.000000	0.000000	21.000000
GPS 072612	2.9	Postprocessed Code	7/30/2012	12:58:16pm	SCMINE2_073012.cor	1186065.799498	2471827.078872	0.000000	17.299999	0.000000	0.000000	0.000000	22.000000
GPS 072612	7.0	Postprocessed Code	7/30/2012	01:02:47pm	SCMINE2_073012.cor	1186076.377405	2471879.194076	0.000000	17.100000	0.000000	3000.000000	0.000000	17.000000
GPS 072612	6.8	Postprocessed Code	7/30/2012	01:09:35pm	SCMINE2_073012.cor	1186047.631494	2471878.691276	0.000000	16.799999	0.000000	7000.000000	0.000000	16.000000
GPS 072612	6.5	Postprocessed Code	7/30/2012	01:14:50pm	SCMINE2_073012.cor	1186067.722010	2471928.943077	0.000000	17.100000	0.000000	2000.000000	0.000000	19.000000
GPS 072612	6.0	Postprocessed Code	7/30/2012	01:19:37pm	SCMINE2_073012.cor	1186070.666720	2471983.656612	0.000000	17.200001	0.000000	2000.000000	0.000000	19.000000
GPS 072612	6.4	Postprocessed Code	7/30/2012	01:23:25pm	SCMINE2_073012.cor	1186075.369351	2472022.548280	0.000000	17.000000	0.000000	2000.000000	0.000000	19.000000
GPS 072612	5.0	Postprocessed Code	7/30/2012	01:28:36pm	SCMINE2_073012.cor	1186026.275235	2472025.201810	0.000000	17.000000	0.000000	6000.000000	0.000000	18.000000
GPS 072612	6.6	Uncorrected	7/30/2012	01:33:04pm	SCMINE2_073012.cor	1186017.270653	2471976.222410	0.000000	17.100000	0.000000	5000.000000	0.000000	17.000000
GPS 072612	5.3	Postprocessed Code	7/30/2012	01:40:45pm	SCMINE2_073012.cor	1186014.932205	2471922.423149	0.000000	17.100000	0.000000	4000.000000	0.000000	16.000000
GPS 072612	5.1	Postprocessed Code	7/30/2012	01:43:51pm	SCMINE2_073012.cor	1186019.329344	2471875.149711	0.000000	17.200001	0.000000	1000.000000	0.000000	22.000000
GPS 072612	5.4	Postprocessed Code	7/30/2012	01:47:03pm	SCMINE2_073012.cor	1186016.589780	2471824.272351	0.000000	17.200001	0.000000	2000.000000	0.000000	20.000000
GPS 072612	4.4	Postprocessed Code	7/30/2012	01:50:49pm	SCMINE2_073012.cor	1186017.312729	2471773.775858	0.000000	17.100000	0.000000	4000.000000	0.000000	20.000000
GPS 072612	5.2	Postprocessed Code	7/30/2012	01:54:37pm	SCMINE2_073012.cor	1186021.826521	2471724.118912	0.000000	17.200001	0.000000	2000.000000	0.000000	19.000000
GPS 072612	6.3	Postprocessed Code	7/30/2012	01:59:26pm	SCMINE2_073012.cor	1186020.258916	2471678.012059	0.000000	17.400000	0.000000	2000.000000	0.000000	14.000000
GPS 072612	6.5	Postprocessed Code	7/30/2012	02:19:11pm	SCMINE2_073012.cor	1186025.905804	2471620.356823	0.000000	16.600000	0.000000	11000.000000	0.000000	16.000000
GPS 072612	6.4	Postprocessed Code	7/30/2012	02:24:27pm	SCMINE2_073012.cor	1185969.424743	2471576.348595	0.000000	17.100000	0.000000	3000.000000	0.000000	14.000000
GPS 072612	4.3	Postprocessed Code	7/30/2012	02:28:51pm	SCMINE2_073012.cor	1185970.324288	2471637.697384	0.000000	17.000000	0.000000	5000.000000	0.000000	20.000000
GPS 072612	6.0	Postprocessed Code	7/30/2012	02:33:10pm	SCMINE2_073012.cor	1185974.404518	2471678.237416	0.000000	17.200001	0.000000	1000.000000	0.000000	22.000000
GPS 072612	6.5	Postprocessed Code	7/30/2012	02:37:16pm	SCMINE2_073012.cor	1185975.735681	2471725.263819	0.000000	17.299999	0.000000	2000.000000	0.000000	20.000000
GPS 072612	4.0	Postprocessed Code	7/30/2012	02:41:35pm	SCMINE2_073012.cor	1185972.151336	2471770.480476	0.000000	17.200001	0.000000	4000.000000	0.000000	21.000000
GPS 072612	5.0	Postprocessed Code	7/30/2012	02:45:41pm	SCMINE2_073012.cor	1185966.047127	2471827.371062	0.000000	17.200001	0.000000	3000.000000	0.000000	15.000000
GPS 072612	6.0	Postprocessed Code	7/30/2012	02:49:50pm	SCMINE2_073012.cor	1185999.767775	2471874.112787	0.000000	17.100000	0.000000	2000.000000	0.000000	20.000000
GPS 072612	3.6	Postprocessed Code	7/30/2012	02:53:15pm	SCMINE2_073012.cor	1185973.699173	2471872.410296	0.000000	17.299999	0.000000	1000.000000	0.000000	20.000000
GPS 072612	5.0	Postprocessed Code	7/30/2012	02:57:17pm	SCMINE2_073012.cor	1185969.750573	2471930.648133	0.000000	17.299999	0.000000	2000.000000	0.000000	12.000000
GPS 072612	6.2	Postprocessed Code	7/30/2012	03:00:43pm	SCMINE2_073012.cor	1185971.628728	2471976.260433	0.000000	17.100000	0.000000	4000.000000	0.000000	11.000000
GPS 072612	4.5	Postprocessed Code	7/30/2012	03:04:23pm	SCMINE2_073012.cor	1185970.458251	2472022.188141	0.000000	17.400000	0.000000	1000.000000	0.000000	11.000000
GPS 072612	5.1	Postprocessed Code	7/30/2012	03:07:46pm	SCMINE2_073012.cor	1185920.708443	2472024.796405	0.000000	17.100000	0.000000	4000.000000	0.000000	17.000000
GPS 072612	4.7	Postprocessed Code	7/30/2012	03:11:42pm	SCMINE2_073012.cor	1185911.461054	2471971.710115	0.000000	17.200001	0.000000	2000.000000	0.000000	16.000000
GPS 072612	5.3	Postprocessed Code	7/30/2012	03:15:22pm	SCMINE2_073012.cor	1185918.171446	2471921.228213	0.000000	17.000000	0.000000	2000.000000	0.000000	20.000000
GPS 072612	5.8	Postprocessed Code	7/30/2012	03:19:45pm	SCMINE2_073012.cor	1185914.601124	2471872.664940	0.000000	17.200001	0.000000	1000.000000	0.000000	15.000000
GPS 072612	4.2	Postprocessed Code	7/30/2012	03:24:16pm	SCMINE2_073012.cor	1185916.196520	2471824.494828	0.000000	16.799999	0.000000	4000.000000	0.000000	9.000000
GPS 072612	6.2	Uncorrected	7/30/2012	03:28:29pm	SCMINE2_073012.cor	1185921.086042	2471777.877701	0.000000	17.000000	0.000000	4000.000000	0.000000	20.000000
GPS 072612	5.3	Postprocessed Code	7/30/2012	03:32:49pm	SCMINE2_073012.cor	1185930.935591	2471727.520333	0.000000	17.100000	0.000000	2000.000000	0.000000	19.000000
GPS 072612	6.6	Postprocessed Code	7/31/2012	10:07:00am	SCMINE2_073012.cor	1185913.528203	2471576.737479	0.000000	19.600000	0.000000	5000.000000	0.000000	14.000000
GPS 072612	6.6	Postprocessed Code	7/31/2012	10:12:09am	SCMINE2_073012.cor	1185873.525822	2471578.132950	0.000000	19.500000	0.000000	6000.000000	0.000000	9.000000
GPS 072612	7.6	Postprocessed Code	7/31/2012	10:16:12am	SCMINE2_073012.cor	1185868.397598	2471627.215471	0.000000	19.299999	0.000000	7000.000000	0.000000	10.000000
GPS 072612	5.9	Postprocessed Code	7/31/2012	10:34:09am	SCMINE2_073012.cor	1185922.956917	2471632.429883	0.000000	19.400000	0.000000	5000.000000	0.000000	12.000000
GPS 072612	6.4	Postprocessed Code	7/31/2012	10:37:53am	SCMINE2_073012.cor	1185914.980087	2471685.769735	0.000000	19.500000	0.000000	3000.000000	0.000000	13.000000
GPS 072612	6.7	Postprocessed Code	7/31/2012	10:41:53am	SCMINE2_073012.cor	1185870.985345	2471684.074650	0.000000	19.299999	0.000000	7000.000000	0.000000	6.000000
GPS 072612	6.8	Postprocessed Code	7/31/2012	10:46:12am	SCMINE2_073012.cor	1185871.132748	2471724.177742	0.000000	19.200001	0.000000	6000.000000	0.000000	8.000000
GPS 072612	6.8	Postprocessed Code	7/31/2012	10:51:25am	SCMINE2_073012.cor	1185867.061795	2471778.321388	0.000000	19.299999	0.000000	2000.000000	0.000000	11.000000
GPS 072612	2.6	Postprocessed Code	7/31/2012	10:55:30am	SCMINE2_073012.cor	1185870.401347	2471827.601963	0.000000	18.600000	0.000000	3000.000000	0.000000	6.000000
GPS 072612	4.5	Postprocessed Code	7/31/2012	11:00:13am	SCMINE2_073012.cor	1185872.218530	2471879.068589	0.000000	17.900000	0.000000	8000.000000	0.000000	8.000000
GPS 072612	4.7	Postprocessed Code	7/31/2012	11:07:33am	SCMINE2_073012.cor	1185867.383544	2471931.337975	0.000000	17.799999	0.000000	1000.000000	0.000000	12.000000
GPS 072612	4.8	Postprocessed Code	7/31/2012	11:12:35am	SCMINE2_073012.cor	1185869.383196	2471987.205588	0.000000	17.299999	0.000000	1000.000000	0.000000	11.000000
GPS 072612	5.9	Postprocessed Code	7/31/2012	11:16:35am	SCMINE2_073012.cor	1185868.963500	2472025.576191	0.000000	17.200001	0.000000	5000.000000	0.00	

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND TEMPERATURE MEASUREMENTS

COMMENTS	Max_PDOP	Corr_Type	GPS_Date	GPS_Time	Datafile	Northing	Easting	CH ₄	O ₂	CO	CO ₂	H ₂ S	TEMP
GPS 072612	5.3	Postprocessed Code	7/31/2012	12:06:00pm	SCMINE2_073012.cor	1185773.412495	2471572.485002	0.000000	16.799999	0.000000	8000.000000	0.000000	14.000000
GPS 072612	5.1	Postprocessed Code	7/31/2012	12:11:49pm	SCMINE2_073012.cor	1185763.759227	2471626.384580	0.000000	17.100000	0.000000	3000.000000	0.000000	10.000000
GPS 072612	6.6	Postprocessed Code	7/31/2012	12:16:17pm	SCMINE2_073012.cor	1185761.809667	2471676.975451	0.000000	17.299999	0.000000	1000.000000	0.000000	11.000000
GPS 072612	4.4	Postprocessed Code	7/31/2012	12:21:18pm	SCMINE2_073012.cor	1185767.148977	2471732.243220	0.000000	17.400000	0.000000	2000.000000	0.000000	11.000000
GPS 072612	3.3	Postprocessed Code	7/31/2012	12:28:04pm	SCMINE2_073012.cor	1185756.112429	2471772.157529	0.000000	17.100000	0.000000	3000.000000	0.000000	10.000000
GPS 072612	5.7	Postprocessed Code	7/31/2012	12:30:45pm	SCMINE2_073012.cor	1185760.800862	2471823.043496	0.000000	17.400000	0.000000	3000.000000	0.000000	13.000000
GPS 072612	4.5	Postprocessed Code	7/31/2012	12:34:41pm	SCMINE2_073012.cor	1185765.886823	2471873.835554	0.000000	17.400000	0.000000	2000.000000	0.000000	7.000000
GPS 072612	7.0	Postprocessed Code	7/31/2012	12:40:05pm	SCMINE2_073012.cor	1185759.149823	2471922.292921	0.000000	17.200001	0.000000	1000.000000	0.000000	19.000000
GPS 072612	5.4	Postprocessed Code	7/31/2012	12:44:58pm	SCMINE2_073012.cor	1185770.826296	2471978.146028	0.000000	17.400000	0.000000	1000.000000	0.000000	19.000000
GPS 072612	6.1	Postprocessed Code	7/31/2012	12:49:29pm	SCMINE2_073012.cor	1185774.932221	2472019.266044	0.000000	17.299999	0.000000	2000.000000	0.000000	14.000000
GPS 072612	6.3	Postprocessed Code	7/31/2012	12:53:26pm	SCMINE2_073012.cor	1185718.757913	2472025.158476	0.000000	17.200001	0.000000	3000.000000	0.000000	11.000000
GPS 072612	5.7	Postprocessed Code	7/31/2012	12:58:18pm	SCMINE2_073012.cor	1185719.590387	2471972.455589	0.000000	17.100000	0.000000	3000.000000	0.000000	14.000000
GPS 072612	5.2	Postprocessed Code	7/31/2012	01:03:31pm	SCMINE2_073012.cor	1185722.802527	2471931.620742	0.000000	17.200001	0.000000	2000.000000	0.000000	20.000000
GPS 072612	6.8	Postprocessed Code	7/31/2012	01:07:32pm	SCMINE2_073012.cor	1185716.290399	2471875.582131	0.000000	17.400000	0.000000	5000.000000	0.000000	10.000000
GPS 072612	5.4	Postprocessed Code	7/31/2012	01:13:15pm	SCMINE2_073012.cor	1185726.255996	2471818.802465	0.000000	17.000000	0.000000	10000.000000	0.000000	20.000000
GPS 072612	5.2	Postprocessed Code	7/31/2012	01:18:59pm	SCMINE2_073012.cor	1185717.559005	2471770.780564	0.000000	17.299999	0.000000	4000.000000	0.000000	16.000000
GPS 072612	5.5	Postprocessed Code	7/31/2012	01:22:38pm	SCMINE2_073012.cor	1185723.325758	2471726.435997	0.000000	17.500000	0.000000	1000.000000	0.000000	11.000000
GPS 072612	328.6	Postprocessed Code	7/31/2012	01:27:09pm	SCMINE2_073012.cor	1185730.272407	2471676.770806	0.000000	17.500000	0.000000	1000.000000	0.000000	12.000000
GPS 072612	5.8	Postprocessed Code	7/31/2012	01:31:03pm	SCMINE2_073012.cor	1185721.533279	2471619.572739	0.000000	17.299999	0.000000	4000.000000	0.000000	7.000000
GPS 072612	6.1	Postprocessed Code	7/31/2012	01:34:54pm	SCMINE2_073012.cor	1185723.299433	2471575.400724	0.000000	17.299999	0.000000	6000.000000	0.000000	4.000000
GPS 072612	6.6	Postprocessed Code	7/27/2012	10:35:34am	TSM072712.cor	1234992.547272	2425220.308041	0.000000	19.100000	0.000000	4000.000000	0.000000	12.000000
GPS 072612	7.0	Postprocessed Code	7/27/2012	10:43:47am	TSM072712.cor	1235033.632752	2425219.764185	0.000000	18.600000	0.000000	7000.000000	0.000000	10.000000
GPS 072612	6.7	Postprocessed Code	7/27/2012	10:50:42am	TSM072712.cor	1235099.688399	2425215.667967	0.000000	18.600000	1.000000	4000.000000	0.000000	10.000000
GPS 072612	5.9	Postprocessed Code	7/27/2012	10:58:07am	TSM072712.cor	1235144.144884	2425221.318771	0.000000	18.299999	1.000000	6000.000000	0.000000	8.000000
GPS 072612	5.0	Postprocessed Code	7/27/2012	11:02:39am	TSM072712.cor	1235196.619880	2425224.474169	0.000000	18.200001	0.000000	9000.000000	0.000000	8.000000
GPS 072612	6.2	Postprocessed Code	7/27/2012	11:07:32am	TSM072712.cor	1235195.361914	2425276.042577	0.000000	18.200001	0.000000	6000.000000	0.000000	8.000000
GPS 072612	5.7	Postprocessed Code	7/27/2012	11:12:20am	TSM072712.cor	1235243.318728	2425278.965985	0.000000	17.500000	0.000000	15000.000000	0.000000	8.000000
GPS 072612	7.0	Postprocessed Code	7/27/2012	11:15:24am	TSM072712.cor	1235296.032086	2425269.413307	0.000000	18.100000	1.000000	6000.000000	0.000000	8.000000
GPS 072612	7.5	Postprocessed Code	7/27/2012	11:21:28am	TSM072712.cor	1235355.121428	2425275.437660	0.000000	17.799999	0.000000	9000.000000	0.000000	10.000000
GPS 072612	4.0	Postprocessed Code	7/27/2012	11:25:19am	TSM072712.cor	1235353.903121	2425333.262906	0.000000	17.900000	0.000000	6000.000000	0.000000	10.000000
GPS 072612	4.4	Postprocessed Code	7/27/2012	11:29:50am	TSM072712.cor	1235362.281278	2425369.517020	0.000000	17.600000	2.000000	7000.000000	0.000000	13.000000
GPS 072612	4.2	Postprocessed Code	7/27/2012	11:34:25am	TSM072712.cor	1235353.585960	2425423.776519	0.000000	17.299999	2.000000	7000.000000	0.000000	15.000000
GPS 072612	6.8	Postprocessed Code	7/27/2012	11:39:10am	TSM072712.cor	1235359.723633	2425472.864060	0.000000	16.799999	2.000000	11000.000000	0.000000	10.000000
GPS 072612	5.0	Uncorrected	7/27/2012	11:43:04am	TSM072712.cor	1235346.030299	2425524.489577	0.000000	17.299999	0.000000	2000.000000	0.000000	9.000000
GPS 072612	5.6	Postprocessed Code	7/27/2012	11:49:02am	TSM072712.cor	1235360.051219	2425581.948538	0.000000	17.200001	2.000000	2000.000000	0.000000	8.000000
GPS 072612	35.9	Uncorrected	7/27/2012	11:54:45am	TSM072712.cor	1235341.290421	2425632.188411	0.000000	17.100000	3.000000	4000.000000	0.000000	10.000000
GPS 072612	4.3	Postprocessed Code	7/27/2012	12:00:13pm	TSM072712.cor	1235299.483812	2425620.856152	0.000000	17.100000	1.000000	4000.000000	0.000000	8.000000
GPS 072612	5.8	Postprocessed Code	7/27/2012	12:07:31pm	TSM072712.cor	1235300.663736	2425576.363370	0.000000	17.000000	0.000000	6000.000000	0.000000	8.000000
GPS 072612	5.3	Postprocessed Code	7/27/2012	12:12:35pm	TSM072712.cor	1235297.101632	2425520.201207	0.000000	17.200001	1.000000	2000.000000	0.000000	10.000000
GPS 072612	3.0	Postprocessed Code	7/27/2012	12:16:44pm	TSM072712.cor	1235315.509847	2425472.338107	0.000000	16.799999	0.000000	9000.000000	0.000000	10.000000
GPS 072612	4.9	Postprocessed Code	7/27/2012	12:20:31pm	TSM072712.cor	1235313.523710	2425431.523822	0.000000	16.600000	2.000000	6000.000000	0.000000	8.000000
GPS 072612	5.3	Postprocessed Code	7/27/2012	12:24:54pm	TSM072712.cor	1235312.880422	2425378.208367	0.000000	17.299999	3.000000	5000.000000	0.000000	8.000000
GPS 072612	4.3	Postprocessed Code	7/27/2012	12:30:39pm	TSM072712.cor	1235304.430016	2425322.304012	0.000000	17.000000	0.000000	9000.000000	0.000000	9.000000
GPS 072612	4.4	Postprocessed Code	7/27/2012	12:34:23pm	TSM072712.cor	1235263.793305	2425331.364401	0.000000	17.000000	0.000000	9000.000000	0.000000	9.000000
GPS 072612	5.7	Uncorrected	7/27/2012	12:39:29pm	TSM072712.cor	1235216.888655	2425330.151816	0.000000	17.000000	0.000000	5000.000000	0.000000	11.000000
GPS 072612	6.2	Postprocessed Code	7/27/2012	12:42:40pm	TSM072712.cor	1235148.966762	2425310.377265	0.000000	16.799999	1.000000	9000.000000	0.000000	13.000000
GPS 072612	4.5	Postprocessed Code	7/27/2012	12:48:30pm	TSM072712.cor	1235156.999439	2425269.363763	0.000000	17.000000	2.000000	8000.000000	0.000000	13.000000
GPS 072612	5.7	Postprocessed Code	7/27/2012	12:57:50pm	TSM072712.cor	1235095.955127	2425282.988915	0.000000	17.000000	3.000000	6000.000000	0.000000	19.000000
GPS 072612	3.8	Postprocessed Code	7/27/2012	01:04:01pm	TSM072712.cor	1235058.325834	2425278.251847	0.000000	17.100000	0.000000	3000.000000	0.000000	15.000000
GPS 072612	6.2	Postprocessed Code	7/27/2012	01:07:35pm	TSM072712.cor	1234994.956628	2425273.825589	0.000000	17.000000	0.000000	5000.000000	0.000000	14.000000
GPS 072612	2.7	Postprocessed Code	7/27/2012	01:13:30pm	TSM072712.cor	1234994.507424	2425309.135492	0.000000	16.600000	2.000000	8000.000000	0.000000	14.000000
GPS 072612	5.4	Postprocessed Code	7/27/2012	01:15:20pm	TSM072712.cor	1235056.353617	2425324.601678	0.000000	16.799999	0.000000	4000.000000	0.000000	19.000000
GPS 072612	6.9	Postprocessed Code	7/27/2012	01:20:35pm	TSM072712.cor	1235110.684040	2425330.363488	0.000000	17.000000	0.000000	3000.000000	0.000000	16.000000
GPS 072612	6.3	Postprocessed Code	7/27/2012	01:24:32pm	TSM072712.cor	1235109.557551	2425375.152274	0.000000	17.000000	0.000000	2000.000000	0.000000	16.000000
GPS 072612	5.5	Postprocessed Code	7/27/2012	01:28:03pm	TSM072712.cor	1235111.696281	2425423.948402	0.000000	16.900000	0.000000	7000.000000	0.000000	10.000000
GPS 072612	6.8	Postprocessed Code	7/27/2012	01:32:06pm	TSM072712.cor	1235095.359355	2425475.980844	0.000000	16.200001	0.000000	15000.000000	0.000000	15.000000
GPS 072612	5.8	Uncorrected	7/27/2012	01:37:06pm	TSM072712.cor	1235048.830365	2425424.342474	0.000000	17.200001	0.000000	4000.000000	0.000000	14.000000
GPS 072612	7.0	Postprocessed Code	7/27/2012	01:42:32pm	TSM072712.cor	1235041.651469	2425371.433840	0.000000	16.299999	0.000000	15000.000000	0.000000	14.000000
GPS 072612	4.9	Postprocessed Code	7/27/2012	01:50:06pm	TSM072712.cor	1235001.032363	2425368.506157	0.000000	17.100000	0.000000	6000.000000	0.000000	9.000000
GPS 072612	5.5	Postprocessed Code	7/27/2012	01:54:22pm	TSM072712.cor	1234997.036523	2425427.783900	0.000000	17.000000	0.000000	8000.000000	0.000000	11.000000
GPS 072612	17.4	Uncorrected	7/27/2012	01:58:02pm	TSM072712.cor	1234997.217270	2425477.869142	0.000000	17.299999	0.000000	4000.000000	0.000000	10.000000
GPS 072612	6.6	Postprocessed Code	7/27/2012	02:02:03pm	TSM072712.cor	1234999.309034	2425522.452176	0.000000	17.299999	0			

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND TEMPERATURE MEASUREMENTS

COMMENTS	Max_PDOP	Corr_Type	GPS_Date	GPS_Time	Datafile	Northing	Easting	CH ₄	O ₂	CO	CO ₂	H ₂ S	TEMP
GPS 072612	5.5	Postprocessed Code	7/27/2012	02:57:16pm	TSM072712.cor	1235266.075775	2425634.694400	0.000000	17.600000	0.000000	1000.000000	0.000000	11.000000
GPS 072612	6.8	Postprocessed Code	7/27/2012	03:00:24pm	TSM072712.cor	1235251.148177	2425624.487690	0.000000	17.000000	0.000000	8000.000000	0.000000	0.000000
GPS 072612	3.7	Postprocessed Code	7/27/2012	03:05:02pm	TSM072712.cor	1235201.229956	2425614.211909	0.000000	17.100000	0.000000	5000.000000	0.000000	15.000000
GPS 072612	5.3	Postprocessed Code	7/27/2012	03:07:34pm	TSM072712.cor	1235199.741050	2425573.675151	0.000000	17.400000	0.000000	3000.000000	0.000000	12.000000
GPS 072612	4.0	Postprocessed Code	7/27/2012	03:11:31pm	TSM072712.cor	1235151.208613	2425416.691761	0.000000	17.299999	0.000000	3000.000000	0.000000	9.000000
GPS 072612	6.8	Postprocessed Code	7/27/2012	03:15:10pm	TSM072712.cor	1235159.770287	2425374.005343	0.000000	17.600000	0.000000	2000.000000	0.000000	7.000000
GPS 072612	7.0	Uncorrected	7/27/2012	03:17:38pm	TSM072712.cor	1235196.829608	2425381.254129	0.000000	17.000000	0.000000	8000.000000	0.000000	11.000000
GPS 072612	6.2	Postprocessed Code	7/27/2012	03:23:55pm	TSM072712.cor	1235250.993420	2425365.153642	0.000000	17.100000	0.000000	7000.000000	0.000000	15.000000
GPS 072612	4.7	Postprocessed Code	7/27/2012	03:27:49pm	TSM072712.cor	1235250.676141	2425421.232140	0.000000	17.400000	0.000000	3000.000000	0.000000	11.000000
GPS 072612	5.8	Postprocessed Code	7/27/2012	03:31:07pm	TSM072712.cor	1235254.175399	2425468.755781	0.000000	17.400000	0.000000	5000.000000	0.000000	12.000000
GPS 072612	5.9	Postprocessed Code	7/27/2012	03:35:20pm	TSM072712.cor	1235201.382853	2425413.925939	0.000000	17.200001	0.000000	4000.000000	0.000000	12.000000
GPS 072612 -2	4.9	Postprocessed Code	7/26/2012	10:05:59am	TSM072612.cor	1235003.980255	2425171.166031	0.000000	15.600000	0.000000	0.000000	0.000000	7.000000
GPS 072612 -2	4.8	Uncorrected	7/26/2012	10:13:17am	TSM072612.cor	1235054.290192	2425174.452285	0.000000	13.000000	0.000000	5000.000000	0.000000	10.000000
GPS 072612 -2	7.7	Postprocessed Code	7/26/2012	10:24:16am	TSM072612.cor	1235098.461146	2425176.815122	0.000000	15.100000	0.000000	5000.000000	0.000000	15.000000
GPS 072612 -2	9.6	Postprocessed Code	7/26/2012	10:34:44am	TSM072612.cor	1235152.670332	2425172.885359	0.000000	15.400000	0.000000	2000.000000	0.000000	15.000000
GPS 072612 -2	10.3	Postprocessed Code	7/26/2012	10:40:43am	TSM072612.cor	1235195.085961	2425181.675597	0.000000	15.500000	0.000000	1000.000000	0.000000	15.000000
GPS 072612 -2	6.3	Postprocessed Code	7/26/2012	10:50:32am	TSM072612.cor	1235256.179227	2425180.274982	0.000000	15.700000	9.000000	1000.000000	0.000000	15.000000
GPS 072612 -2	6.4	Postprocessed Code	7/26/2012	10:57:23am	TSM072612.cor	1235305.343883	2425177.289512	0.000000	15.700000	0.000000	4000.000000	0.000000	14.000000
GPS 072612 -2	6.9	Postprocessed Code	7/26/2012	11:00:37am	TSM072612.cor	1235358.093383	2425171.845808	0.000000	15.900000	0.000000	3000.000000	0.000000	18.000000
GPS 072612 -2	6.6	Postprocessed Code	7/26/2012	11:11:38am	TSM072612.cor	1235402.724034	2425170.667446	0.000000	16.000000	0.000000	5000.000000	0.000000	7.000000
GPS 072612 -2	5.6	Postprocessed Code	7/26/2012	11:18:05am	TSM072612.cor	1235456.267372	2425175.578649	0.000000	16.200001	0.000000	3000.000000	0.000000	10.000000
GPS 072612 -2	3.9	Postprocessed Code	7/26/2012	11:25:48am	TSM072612.cor	1235445.992804	2425233.411577	0.000000	16.500000	0.000000	0.000000	0.000000	12.000000
GPS 072612 -2	6.1	Postprocessed Code	7/26/2012	11:28:11am	TSM072612.cor	1235447.969260	2425274.481059	0.000000	16.600000	0.000000	1000.000000	0.000000	13.000000
GPS 072612 -2	6.1	Postprocessed Code	7/26/2012	11:32:59am	TSM072612.cor	1235449.684947	2425325.288166	0.000000	16.500000	0.000000	3000.000000	0.000000	12.000000
GPS 072612 -2	4.1	Postprocessed Code	7/26/2012	11:38:24am	TSM072612.cor	1235466.026605	2425369.668240	0.000000	16.000000	0.000000	8000.000000	0.000000	12.000000
GPS 072612 -2	6.0	Postprocessed Code	7/26/2012	11:43:35am	TSM072612.cor	1235449.134033	2425431.014406	0.000000	0.000000	0.000000	2000.000000	0.000000	6.000000
GPS 072612 -2	6.7	Postprocessed Code	7/26/2012	11:50:37am	TSM072612.cor	1235453.326539	2425468.264524	0.000000	16.900000	0.000000	0.000000	0.000000	10.000000
GPS 072612 -2	5.4	Postprocessed Code	7/26/2012	11:56:25am	TSM072612.cor	1235449.810132	2425522.840487	0.000000	16.700001	0.000000	1000.000000	0.000000	12.000000
GPS 072612 -2	6.1	Postprocessed Code	7/26/2012	11:59:55am	TSM072612.cor	1235457.661522	2425580.987018	0.000000	16.600000	0.000000	1000.000000	0.000000	13.000000
GPS 072612 -2	3.3	Postprocessed Code	7/26/2012	12:05:32pm	TSM072612.cor	1235449.467688	2425624.529147	0.000000	16.500000	0.000000	1000.000000	0.000000	18.000000
GPS 072612 -2	4.4	Postprocessed Code	7/26/2012	12:08:37pm	TSM072612.cor	1235409.549659	2425631.314567	0.000000	16.600000	0.000000	0.000000	0.000000	20.000000
GPS 072612 -2	5.8	Postprocessed Code	7/26/2012	12:11:26pm	TSM072612.cor	1235410.743286	2425573.348784	0.000000	16.600000	0.000000	1000.000000	0.000000	15.000000
GPS 072612 -2	5.7	Postprocessed Code	7/26/2012	12:16:14pm	TSM072612.cor	1235399.394550	2425529.116949	0.000000	16.500000	0.000000	2000.000000	0.000000	15.000000
GPS 072612 -2	6.7	Postprocessed Code	7/26/2012	12:21:37pm	TSM072612.cor	1235405.399474	2425484.793586	0.000000	16.500000	0.000000	3000.000000	0.000000	13.000000
GPS 072612 -2	4.3	Uncorrected	7/26/2012	12:28:34pm	TSM072612.cor	1235404.597114	2425430.018988	0.000000	16.799999	0.000000	2000.000000	0.000000	8.000000
GPS 072612 -2	5.9	Postprocessed Code	7/26/2012	12:32:44pm	TSM072612.cor	1235418.971286	2425371.177125	0.000000	16.799999	0.000000	1000.000000	0.000000	12.000000
GPS 072612 -2	5.5	Postprocessed Code	7/26/2012	12:36:41pm	TSM072612.cor	1235415.432146	2425330.981121	0.000000	16.700001	0.000000	3000.000000	0.000000	12.000000
GPS 072612 -2	5.2	Postprocessed Code	7/26/2012	12:42:08pm	TSM072612.cor	1235404.956047	2425272.836737	0.000000	16.700001	1.000000	2000.000000	0.000000	16.000000
GPS 072612 -2	6.3	Postprocessed Code	7/26/2012	01:08:06pm	TSM072612.cor	1235411.396979	2425230.539274	0.000000	15.000000	0.000000	1000.000000	0.000000	20.000000
GPS 072612 -2	6.2	Postprocessed Code	7/26/2012	01:11:37pm	TSM072612.cor	1235356.698374	2425225.943167	0.000000	16.700001	0.000000	0.000000	0.000000	20.000000
GPS 072612 -2	4.8	Postprocessed Code	7/26/2012	01:21:58pm	TSM072612.cor	1235298.984038	2425231.879085	0.000000	16.799999	0.000000	1000.000000	0.000000	10.000000
GPS 072612 -2	5.9	Postprocessed Code	7/26/2012	01:27:17pm	TSM072612.cor	1235256.369445	2425227.290897	0.000000	16.799999	0.000000	0.000000	0.000000	18.000000
GPS 073112	6.2	Postprocessed Code	7/31/2012	02:13:26pm	CHIMNEY ROCK MINE1_0	1185732.820766	2470120.507851	0.000000	16.900000	0.000000	5000.000000	0.000000	20.000000
GPS 073112	3.3	Postprocessed Code	7/31/2012	02:16:10pm	CHIMNEY ROCK MINE1_0	1185779.708326	2470124.562972	0.000000	16.600000	0.000000	5000.000000	0.000000	20.000000
GPS 073112	5.5	Postprocessed Code	7/31/2012	02:18:58pm	CHIMNEY ROCK MINE1_0	1185830.128069	2470123.385850	0.000000	16.600000	0.000000	8000.000000	0.000000	24.000000
GPS 073112	4.9	Postprocessed Code	7/31/2012	02:22:27pm	CHIMNEY ROCK MINE1_0	1185825.964744	2470075.450513	0.000000	14.500000	0.000000	20000.000000	0.000000	24.000000
GPS 073112	6.6	Postprocessed Code	7/31/2012	02:26:06pm	CHIMNEY ROCK MINE1_0	1185782.874910	2470076.506016	0.000000	16.799999	0.000000	8000.000000	0.000000	26.000000
GPS 073112	5.9	Postprocessed Code	7/31/2012	02:29:31pm	CHIMNEY ROCK MINE1_0	1185730.047371	2470079.418886	0.000000	17.200001	0.000000	2000.000000	0.000000	27.000000
GPS 073112	5.1	Postprocessed Code	7/31/2012	02:33:08pm	CHIMNEY ROCK MINE1_0	1185731.572616	2470023.609857	0.000000	17.000000	0.000000	4000.000000	0.000000	26.000000
GPS 073112	5.7	Postprocessed Code	7/31/2012	02:36:32pm	CHIMNEY ROCK MINE1_0	1185774.493194	2470025.829746	0.000000	17.200001	0.000000	3000.000000	0.000000	27.000000
GPS 073112	5.5	Postprocessed Code	7/31/2012	02:39:26pm	CHIMNEY ROCK MINE1_0	1185816.599849	2470025.986277	0.000000	17.600000	0.000000	1000.000000	0.000000	24.000000
GPS 073112	4.5	Postprocessed Code	7/31/2012	02:42:37pm	CHIMNEY ROCK MINE1_0	1185825.104395	2469973.602627	0.000000	16.799999	0.000000	5000.000000	0.000000	22.000000
GPS 073112	4.2	Postprocessed Code	7/31/2012	02:45:55pm	CHIMNEY ROCK MINE1_0	1185770.817877	2469978.808151	0.000000	17.000000	0.000000	4000.000000	0.000000	20.000000
GPS 073112	4.7	Postprocessed Code	7/31/2012	02:49:08pm	CHIMNEY ROCK MINE1_0	1185768.639173	2469925.375046	0.000000	16.900000	0.000000	4000.000000	0.000000	26.000000
GPS 073112	5.3	Postprocessed Code	7/31/2012	02:52:01pm	CHIMNEY ROCK MINE1_0	1185725.169185	2469926.292174	0.000000	17.000000	0.000000	6000.000000	0.000000	28.000000
GPS 073112	3.9	Postprocessed Code	7/31/2012	02:55:12pm	CHIMNEY ROCK MINE1_0	1185673.593918	2469926.633315	0.000000	17.000000	0.000000	4000.000000	0.000000	18.000000
GPS 073112	6.2	Postprocessed Code	7/31/2012	02:58:49pm	CHIMNEY ROCK MINE1_0	1185669.630419	2469876.254285	0.000000	16.500000	0.000000	8000.000000	0.000000	28.000000
GPS 073112	5.8	Postprocessed Code	8/2/2012	11:40:14am	COLUMBINEMINE_080212	1229379.103218	2432150.005620	0.000000	17.000000	0.000000	5000.000000	0.000000	12.000000
GPS 073112	5.8	Postprocessed Code	8/2/2012	11:42:16am	COLUMBINEMINE_080212	1229381.710826	2432100.969558	0.000000	17.299999	0.000000	5000.000000	0.000000	10.000000
GPS 073112	5.7	Postprocessed Code	8/2/2012	11:44:16am	COLUMBINEMINE_080212	1229380.300725	2432049.624615	0.000000	17.200001	0.000000	3000.000000	0.000000	16.000000
GPS 073112	5.7	Postprocessed Code	8/2/2012	11:47:15am	COLUMBINEMINE_080212	1229435.393881	2432057.307163	0.000000	17.400000	0.000000	4000.000000	0.000000	10.000000
GPS 073112	5.5	Postprocessed Code	8/2/2012	11:49:59am	COLUMBINEMINE_080212	1229431.492784	2432101.703002	0.000000	17.200001	0.000000			

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND TEMPERATURE MEASUREMENTS

COMMENTS	Max_PDOP	Corr_Type	GPS_Date	GPS_Time	Datafile	Northing	Easting	CH ₄	O ₂	CO	CO ₂	H ₂ S	TEMP
GPS 073112	5.1	Postprocessed Code	8/2/2012	12:19:04pm	COLUMBINEMINE_080212	1229378.636812	2432456.714769	0.000000	17.400000	0.000000	4000.000000	0.000000	11.000000
GPS 073112	2.3	Postprocessed Code	8/2/2012	12:21:30pm	COLUMBINEMINE_080212	1229369.843396	2432411.728973	0.000000	17.400000	0.000000	1000.000000	0.000000	10.000000
GPS 073112	5.9	Postprocessed Code	8/2/2012	12:23:26pm	COLUMBINEMINE_080212	1229385.279756	2432356.573422	0.000000	17.400000	0.000000	2000.000000	0.000000	10.000000
GPS 073112	5.9	Uncorrected	8/2/2012	12:25:51pm	COLUMBINEMINE_080212	1229376.557687	2432309.743930	0.000000	17.100000	0.000000	5000.000000	0.000000	10.000000
GPS 073112	4.2	Postprocessed Code	8/2/2012	12:28:45pm	COLUMBINEMINE_080212	1229383.351882	2432263.289185	0.000000	17.100000	0.000000	7000.000000	0.000000	16.000000
GPS 073112	5.2	Postprocessed Code	8/2/2012	12:31:45pm	COLUMBINEMINE_080212	1229379.808655	2432207.853936	0.000000	17.299999	0.000000	4000.000000	0.000000	14.000000
GPS 073112	6.2	Postprocessed Code	8/2/2012	12:41:22pm	COLUMBINEMINE_080212	1229344.121198	2432161.055977	0.000000	16.200001	0.000000	22000.000000	0.000000	8.000000
GPS 073112	5.3	Postprocessed Code	8/2/2012	12:43:46pm	COLUMBINEMINE_080212	1229324.731317	2432108.252770	0.000000	16.799999	0.000000	10000.000000	0.000000	10.000000
GPS 073112	4.1	Postprocessed Code	8/2/2012	12:45:53pm	COLUMBINEMINE_080212	1229320.721759	2432057.105995	0.000000	17.400000	0.000000	5000.000000	0.000000	12.000000
GPS 073112	4.6	Postprocessed Code	8/2/2012	12:47:55pm	COLUMBINEMINE_080212	1229281.003819	2432059.981441	0.000000	17.299999	0.000000	6000.000000	0.000000	20.000000
GPS 073112	6.2	Postprocessed Code	8/2/2012	12:51:03pm	COLUMBINEMINE_080212	1229225.479042	2432054.202707	0.000000	17.500000	0.000000	3000.000000	0.000000	10.000000
GPS 073112	4.7	Postprocessed Code	8/2/2012	12:53:59pm	COLUMBINEMINE_080212	1229190.138017	2432051.216195	0.000000	17.500000	0.000000	3000.000000	0.000000	10.000000
GPS 073112	6.1	Postprocessed Code	8/2/2012	12:56:28pm	COLUMBINEMINE_080212	1229125.498741	2432060.983500	0.000000	17.299999	0.000000	8000.000000	0.000000	8.000000
GPS 073112	6.2	Postprocessed Code	8/2/2012	12:59:39pm	COLUMBINEMINE_080212	1229078.227658	2432053.494566	0.000000	17.500000	0.000000	4000.000000	0.000000	9.000000
GPS 073112	5.1	Postprocessed Code	8/2/2012	01:02:05pm	COLUMBINEMINE_080212	1229042.807294	2432058.101793	0.000000	17.500000	0.000000	4000.000000	0.000000	5.000000
GPS 073112	4.8	Postprocessed Code	8/2/2012	01:05:18pm	COLUMBINEMINE_080212	1228988.480715	2432061.209104	0.000000	17.600000	0.000000	4000.000000	0.000000	5.000000
GPS 073112	4.7	Postprocessed Code	8/2/2012	01:07:32pm	COLUMBINEMINE_080212	1228979.128009	2432102.266945	0.000000	17.700001	0.000000	3000.000000	0.000000	6.000000
GPS 073112	4.7	Postprocessed Code	8/2/2012	01:10:49pm	COLUMBINEMINE_080212	1228980.063638	2432161.134742	0.000000	17.600000	0.000000	4000.000000	0.000000	9.000000
GPS 073112	4.5	Postprocessed Code	8/2/2012	01:15:06pm	COLUMBINEMINE_080212	1228988.546646	2432217.576972	0.000000	17.700001	0.000000	2000.000000	0.000000	6.000000
GPS 073112	6.5	Postprocessed Code	8/2/2012	01:18:49pm	COLUMBINEMINE_080212	1228983.909310	2432263.026116	0.000000	17.799999	0.000000	1000.000000	0.000000	10.000000
GPS 073112	5.6	Postprocessed Code	8/2/2012	01:24:04pm	COLUMBINEMINE_080212	1228985.669464	2432305.223065	0.000000	17.600000	0.000000	4000.000000	0.000000	6.000000
GPS 073112	5.9	Postprocessed Code	8/2/2012	01:28:03pm	COLUMBINEMINE_080212	1228992.983268	2432357.382102	0.000000	17.900000	0.000000	1000.000000	0.000000	5.000000
GPS 073112	5.0	Postprocessed Code	8/2/2012	01:47:44pm	COLUMBINEMINE_080212	1228992.726554	2432408.789785	0.000000	17.799999	0.000000	1000.000000	0.000000	8.000000
GPS 073112	5.4	Postprocessed Code	8/2/2012	01:52:27pm	COLUMBINEMINE_080212	1228994.599125	2432464.456424	0.000000	17.600000	0.000000	3000.000000	0.000000	8.000000
GPS 073112	5.7	Postprocessed Code	8/2/2012	01:55:43pm	COLUMBINEMINE_080212	1228995.727905	2432513.503856	0.000000	17.799999	0.000000	1000.000000	0.000000	6.000000
GPS 073112	5.8	Postprocessed Code	8/2/2012	02:02:35pm	COLUMBINEMINE_080212	1229043.104285	2432522.400037	0.000000	17.600000	0.000000	3000.000000	0.000000	6.000000
GPS 073112	6.4	Postprocessed Code	8/2/2012	02:08:39pm	COLUMBINEMINE_080212	1229081.313477	2432511.792895	0.000000	17.799999	0.000000	1000.000000	0.000000	6.000000
GPS 073112	3.0	Postprocessed Code	8/2/2012	02:12:52pm	COLUMBINEMINE_080212	1229144.071891	2432521.883589	0.000000	17.700001	0.000000	3000.000000	0.000000	5.000000
GPS 073112	6.0	Postprocessed Code	8/2/2012	02:18:56pm	COLUMBINEMINE_080212	1229169.220125	2432510.594980	0.000000	16.500000	0.000000	19000.000000	0.000000	8.000000
GPS 073112	2.7	Postprocessed Code	8/2/2012	02:21:03pm	COLUMBINEMINE_080212	1229227.787972	2432523.484307	0.000000	17.900000	0.000000	9000.000000	0.000000	11.000000
GPS 073112	2.8	Postprocessed Code	8/2/2012	02:23:05pm	COLUMBINEMINE_080212	1229270.506654	2432512.543411	0.000000	17.000000	0.000000	11000.000000	0.000000	18.000000
GPS 073112	3.3	Postprocessed Code	8/2/2012	02:25:38pm	COLUMBINEMINE_080212	1229325.222264	2432511.567880	0.000000	17.400000	0.000000	4000.000000	0.000000	18.000000
GPS 073112	4.0	Postprocessed Code	8/2/2012	02:28:46pm	COLUMBINEMINE_080212	1229323.642914	2432459.807836	0.000000	17.500000	0.000000	2000.000000	0.000000	8.000000
GPS 073112	3.6	Postprocessed Code	8/2/2012	02:31:33pm	COLUMBINEMINE_080212	1229268.878882	2432459.870314	0.000000	17.500000	0.000000	2000.000000	0.000000	20.000000
GPS 073112	6.8	Postprocessed Code	8/2/2012	02:34:22pm	COLUMBINEMINE_080212	1229275.444389	2432410.380331	0.000000	17.500000	0.000000	2000.000000	0.000000	12.000000
GPS 073112	5.0	Postprocessed Code	8/2/2012	02:36:30pm	COLUMBINEMINE_080212	1229330.959761	2432411.262202	0.000000	17.200001	0.000000	4000.000000	0.000000	10.000000
GPS 073112	6.9	Postprocessed Code	8/2/2012	02:39:54pm	COLUMBINEMINE_080212	1229324.461614	2432343.079324	0.000000	17.400000	0.000000	3000.000000	0.000000	16.000000
GPS 073112	3.2	Postprocessed Code	8/2/2012	02:43:59pm	COLUMBINEMINE_080212	1229333.911345	2432315.456053	0.000000	17.500000	0.000000	3000.000000	0.000000	8.000000
GPS 073112	4.8	Postprocessed Code	8/2/2012	02:47:16pm	COLUMBINEMINE_080212	1229329.025870	2432259.748478	0.000000	17.400000	0.000000	3000.000000	0.000000	8.000000
GPS 073112	3.9	Postprocessed Code	8/2/2012	02:50:19pm	COLUMBINEMINE_080212	1229321.325356	2432204.503224	1000.000000	16.900000	0.000000	10000.000000	0.000000	13.000000
GPS 073112	4.8	Postprocessed Code	8/3/2012	07:45:07am	COLUMBINEMINE_080212	1229278.125480	2432162.596004	0.000000	19.600000	0.000000	11000.000000	0.000000	8.000000
GPS 073112	4.5	Postprocessed Code	8/3/2012	07:48:45am	COLUMBINEMINE_080212	1229274.417130	2432113.080949	0.000000	19.900000	0.000000	7000.000000	0.000000	6.000000
GPS 073112	3.8	Postprocessed Code	8/3/2012	07:51:51am	COLUMBINEMINE_080212	1229231.441491	2432158.039737	0.000000	18.600000	0.000000	19000.000000	0.000000	7.000000
GPS 073112	4.6	Postprocessed Code	8/3/2012	07:54:46am	COLUMBINEMINE_080212	1229225.931373	2432103.223397	0.000000	20.000000	0.000000	4000.000000	0.000000	6.000000
GPS 073112	4.6	Postprocessed Code	8/3/2012	07:57:14am	COLUMBINEMINE_080212	1229182.343759	2432109.855629	0.000000	20.100000	0.000000	3000.000000	0.000000	2.000000
GPS 073112	6.1	Postprocessed Code	8/3/2012	08:00:09am	COLUMBINEMINE_080212	1229178.440109	2432157.634691	0.000000	20.100000	0.000000	3000.000000	0.000000	1.000000
GPS 073112	5.8	Postprocessed Code	8/3/2012	08:03:25am	COLUMBINEMINE_080212	1229126.458089	2432170.562676	0.000000	20.000000	0.000000	4000.000000	0.000000	1.000000
GPS 073112	5.5	Postprocessed Code	8/3/2012	08:07:09am	COLUMBINEMINE_080212	1229114.625837	2432100.083556	0.000000	20.000000	0.000000	5000.000000	0.000000	1.000000
GPS 073112	5.5	Postprocessed Code	8/3/2012	08:10:39am	COLUMBINEMINE_080212	1229065.340958	2432116.530244	0.000000	20.000000	0.000000	5000.000000	0.000000	2.000000
GPS 073112	5.3	Postprocessed Code	8/3/2012	08:13:28am	COLUMBINEMINE_080212	1229077.865536	2432160.987368	0.000000	19.900000	0.000000	6000.000000	0.000000	1.000000
GPS 073112	4.7	Postprocessed Code	8/3/2012	08:16:32am	COLUMBINEMINE_080212	1229030.331138	2432117.279093	0.000000	20.000000	0.000000	6000.000000	0.000000	1.000000
GPS 073112	6.2	Postprocessed Code	8/3/2012	08:20:33am	COLUMBINEMINE_080212	1229023.014514	2432173.479297	0.000000	19.299999	0.000000	13000.000000	0.000000	2.000000
GPS 073112	7.7	Postprocessed Code	8/3/2012	08:23:05am	COLUMBINEMINE_080212	1229031.180661	2432206.771596	0.000000	19.799999	0.000000	6000.000000	0.000000	2.000000
GPS 073112	5.0	Postprocessed Code	8/3/2012	08:27:20am	COLUMBINEMINE_080212	1229026.766607	2432265.935011	0.000000	20.000000	0.000000	6000.000000	0.000000	2.000000
GPS 073112	4.2	Postprocessed Code	8/3/2012	08:31:45am	COLUMBINEMINE_080212	1229019.026773	2432308.215675	0.000000	20.100000	0.000000	2000.000000	0.000000	2.000000
GPS 073112	6.9	Postprocessed Code	8/3/2012	08:34:09am	COLUMBINEMINE_080212	1229021.162963	2432365.687838	0.000000	20.000000	0.000000	2000.000000	0.000000	5.000000
GPS 073112	4.7	Postprocessed Code	8/3/2012	08:37:33am	COLUMBINEMINE_080212	1229034.817804	2432407.043073	0.000000	20.100000	0.000000	2000.000000	0.000000	4.000000
GPS 073112	4.8	Postprocessed Code	8/3/2012	08:44:45am	COLUMBINEMINE_080212	1229084.657861	2432464.659329	0.000000	19.799999	0.000000	4000.000000	0.000000	2.000000
GPS 073112	5.9	Postprocessed Code	8/3/2012	08:48:58am	COLUMBINEMINE_080212	1229073.183869	2432408.022102	0.000000	19.700001	0.000000	4000.000000	0.000000	3.000000
GPS 073112	6.4	Postprocessed Code	8/3/2012	08:52:23am	COLUMBINEMINE_080212	1229070.651611	2432366.701439	0.000000	19.799999	0.000000	3000.000000	0.000000	2.000000
GPS 073112	4.2	Postprocessed Code	8/3/2012	08:56:21am	COLUMBINEMINE_080212	1229084.778297	2432321.518430	0.000000	19.700001	0.000000	5000.000000	0.000000	3.000000
GPS 073112	6.3	Postprocessed Code	8/3/2012	08:59:16am	COLUMBINEMINE_080212	1229073.332428	2432262.257755	0.0000					

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND TEMPERATURE MEASUREMENTS

COMMENTS	Max_PDOP	Corr_Type	GPS_Date	GPS_Time	Datafile	Northing	Easting	CH ₄	O ₂	CO	CO ₂	H ₂ S	TEMP
GPS 073112	6.4	Postprocessed Code	8/3/2012	09:42:57am	COLUMBINEMINE_080212	1229181.611064	2432363.869737	0.000000	18.600000	0.000000	3000.000000	0.000000	2.000000
GPS 073112	5.5	Postprocessed Code	8/3/2012	09:44:51am	COLUMBINEMINE_080212	1229178.742264	2432314.574836	0.000000	18.400000	0.000000	5000.000000	0.000000	2.000000
GPS 073112	5.8	Postprocessed Code	8/3/2012	09:47:24am	COLUMBINEMINE_080212	1229175.582336	2432262.453512	0.000000	18.299999	0.000000	5000.000000	0.000000	3.000000
GPS 073112	6.0	Postprocessed Code	8/3/2012	09:49:24am	COLUMBINEMINE_080212	1229163.994587	2432213.425206	0.000000	18.200001	0.000000	6000.000000	0.000000	3.000000
GPS 073112	3.2	Postprocessed Code	8/3/2012	09:51:38am	COLUMBINEMINE_080212	1229223.612439	2432208.842175	0.000000	18.100000	0.000000	5000.000000	0.000000	3.000000
GPS 073112	6.3	Postprocessed Code	8/3/2012	09:53:51am	COLUMBINEMINE_080212	1229228.965999	2432264.130781	0.000000	17.900000	0.000000	5000.000000	0.000000	6.000000
GPS 073112	3.0	Postprocessed Code	8/3/2012	09:56:58am	COLUMBINEMINE_080212	1229228.223401	2432310.748256	0.000000	19.700001	0.000000	2000.000000	0.000000	2.000000
GPS 073112	3.0	Postprocessed Code	8/3/2012	09:58:57am	COLUMBINEMINE_080212	1229224.332735	2432364.400375	0.000000	18.100000	0.000000	0.000000	0.000000	4.000000
GPS 073112	5.1	Postprocessed Code	8/3/2012	10:01:08am	COLUMBINEMINE_080212	1229223.196167	2432405.653239	0.000000	17.900000	0.000000	2000.000000	0.000000	2.000000
GPS 073112	5.1	Postprocessed Code	8/3/2012	10:03:56am	COLUMBINEMINE_080212	1229219.909417	2432473.295481	0.000000	15.900000	0.000000	28000.000000	0.000000	1.000000
GPS 073112	4.6	Postprocessed Code	8/3/2012	10:07:13am	COLUMBINEMINE_080212	1229275.464774	2432365.906088	0.000000	17.299999	0.000000	3000.000000	0.000000	4.000000
GPS 073112	4.7	Postprocessed Code	8/3/2012	10:09:24am	COLUMBINEMINE_080212	1229264.616810	2432317.440386	0.000000	16.299999	0.000000	6000.000000	0.000000	4.000000
GPS 073112	2.4	Postprocessed Code	8/3/2012	10:12:05am	COLUMBINEMINE_080212	1229276.853404	2432261.515848	0.000000	17.000000	0.000000	2000.000000	0.000000	10.000000
GPS 073112	5.4	Postprocessed Code	8/3/2012	10:14:01am	COLUMBINEMINE_080212	1229274.392983	2432213.875614	0.000000	17.000000	0.000000	2000.000000	0.000000	8.000000

APPENDIX H
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 feet	Bottom Depth feet	Sorption Time hours	Diffusivity 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
<i>Average</i>	-	-	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

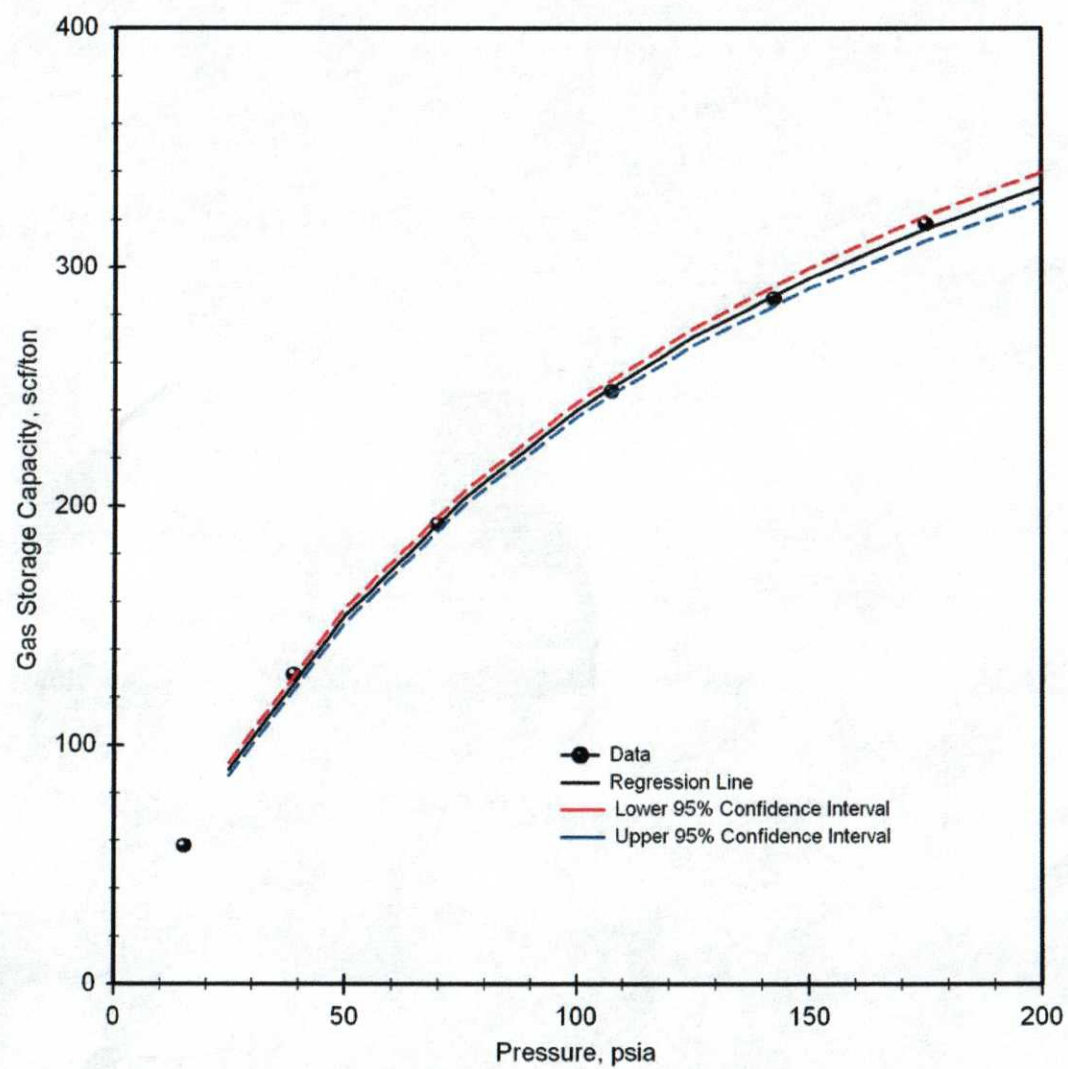
In-Situ Proximate Analysis Summary

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

Sample 41680-2 Adsorption Isotherm Data



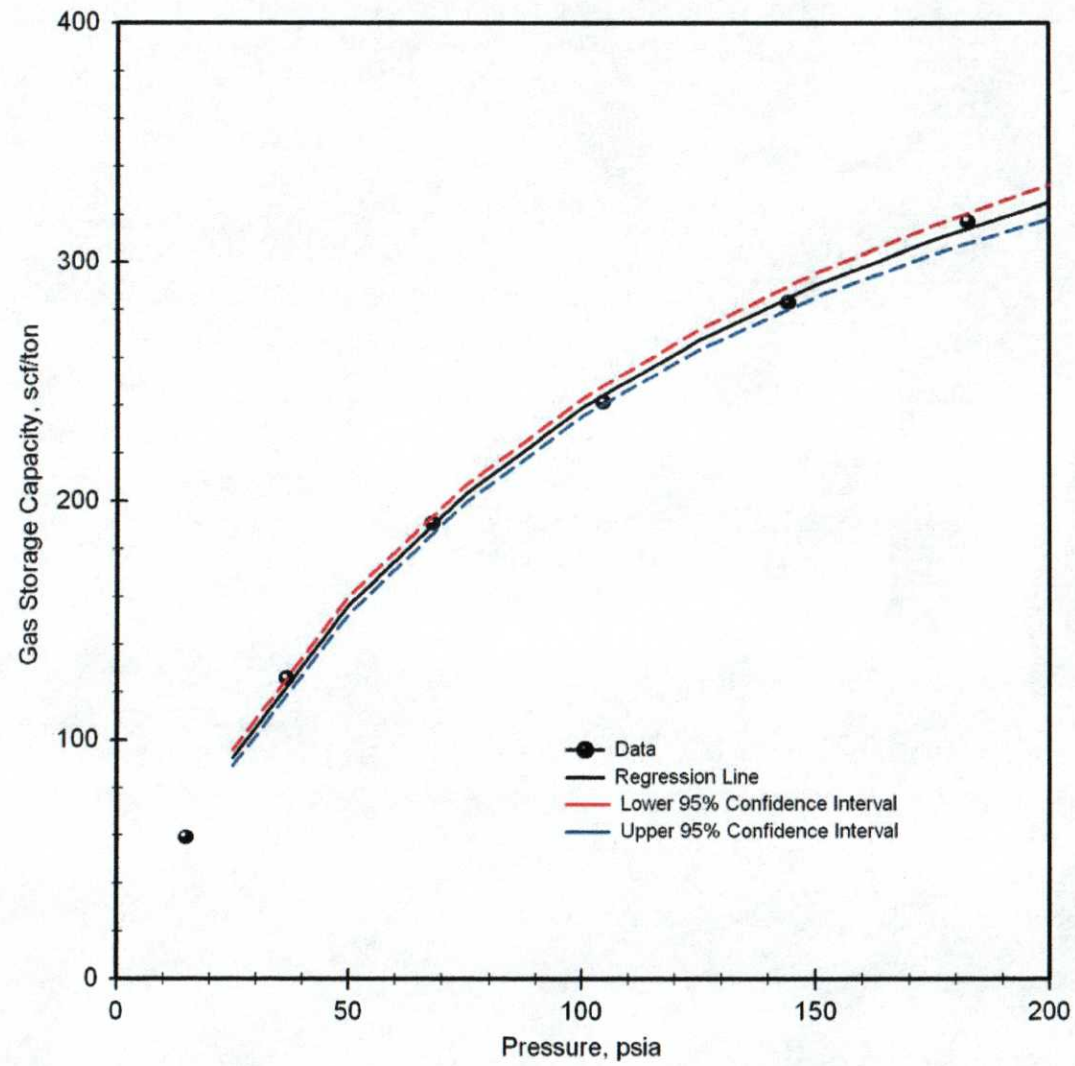
Sample 41680-4 Adsorption Isotherm Parameters

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

Sample 41680-4 Adsorption Isotherm Data



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
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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
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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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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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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
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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

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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*

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

GEO MARK 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



SOURCE ROCK ANALYSES
 GEOMARK RESEARCH, LTD.

Mark W. Longman

USGS Library Number (S098, R950, R951)

Sample ID	Project / Sample ID	Rock ID	Well Name	County	State	Formation Name	Upper Depth (ft)	Lower Depth (ft)	Median Depth (ft)	Sample Type	Source Rock Analysis										S1/TOC Norm. Oil Content	Production Index (E101+S2)	Experimental Notations	
											Percent Carbonate (wt%)	Loss 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 (Olivine Ref.)	Calculated %Ro (at Tmax)	Hydrogen Index (Stoichiometric)	Oxygen Index (Stoichiometric)				S2/S3 Conc. (mg HC/mg CO2)
RLON-120101-001		S098					228.00		228.00		66.30	4.50	188.46	1.53	490			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	465			1.21	149	5	28	46	0.24	Low Temp S2 Shoulder
RLON-120101-003		R950					488.00		488.00		0.85	0.44	1.21	0.09	457			1.07	127	9	13	85	0.27	Low Temp S2 Shoulder
RLON-120101-004		R950					509.00		509.00		59.30	8.90	199.82	1.64	455			1.03	327	3	118	10	0.04	Low Temp S2 Shoulder
RLON-120101-005		R951					761.00		761.00		79.50	4.99	213.12	1.73	452			1.06	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

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 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



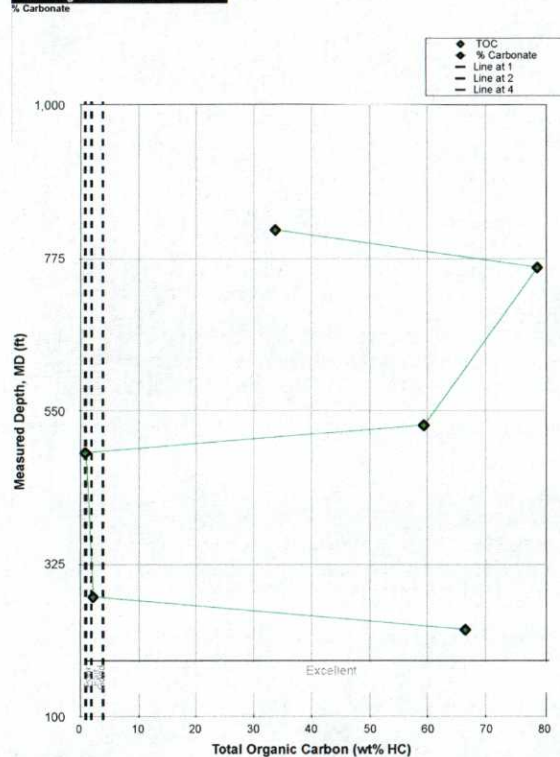
SOURCE ROCK ANALYSES

GEO MARK RESEARCH, LTD.

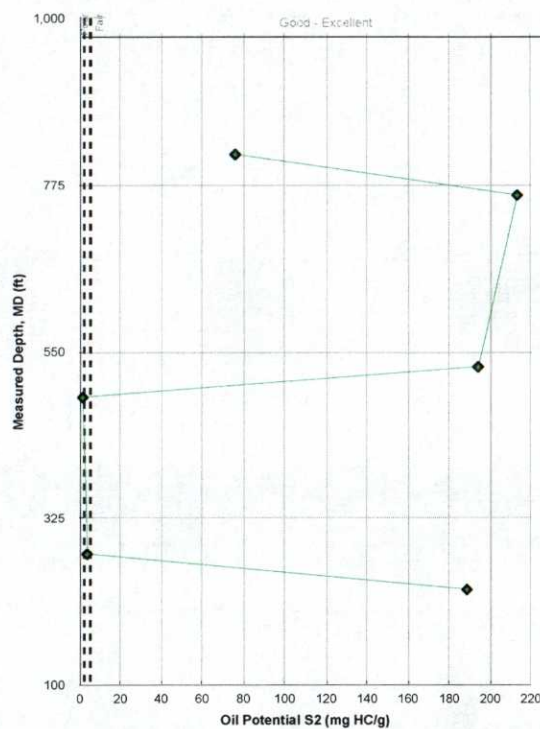
Mark W. Longman

USGS Library Number (S098, R950, R951)

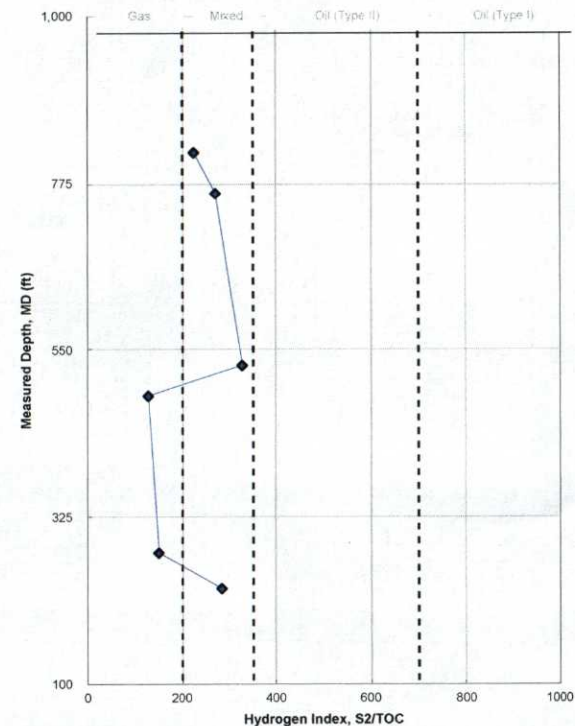
Total Organic Carbon



Oil Potential, S2



Hydrogen Index, S2/TOC



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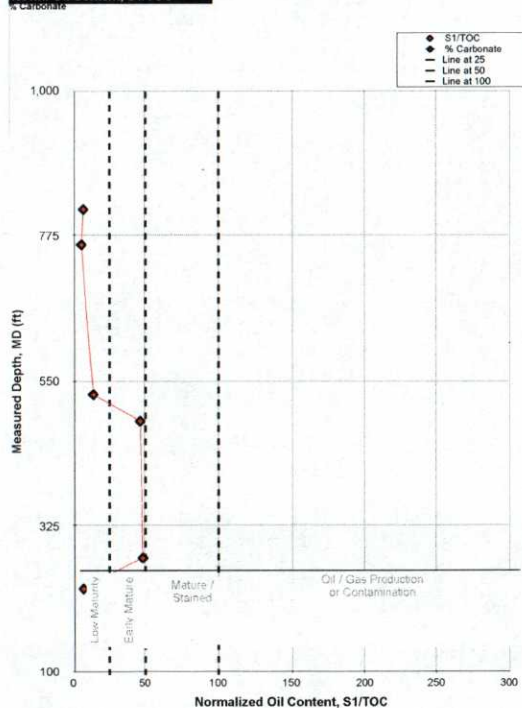
SOURCE ROCK ANALYSES

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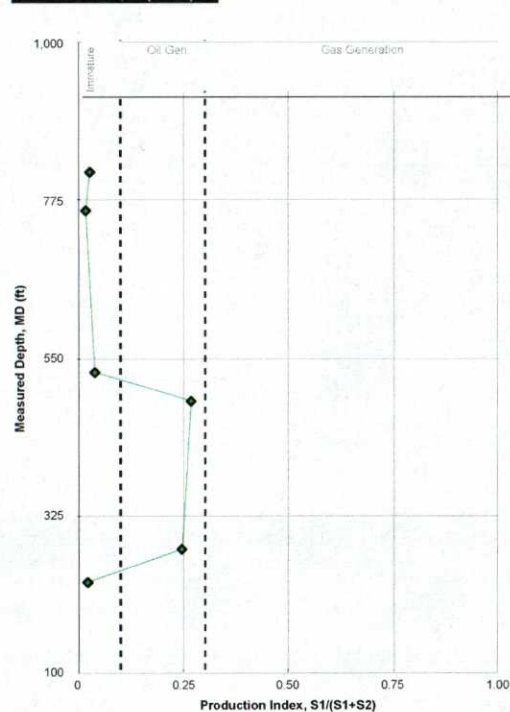
Mark W. Longman

USGS Library Number (S098, R950, R951),

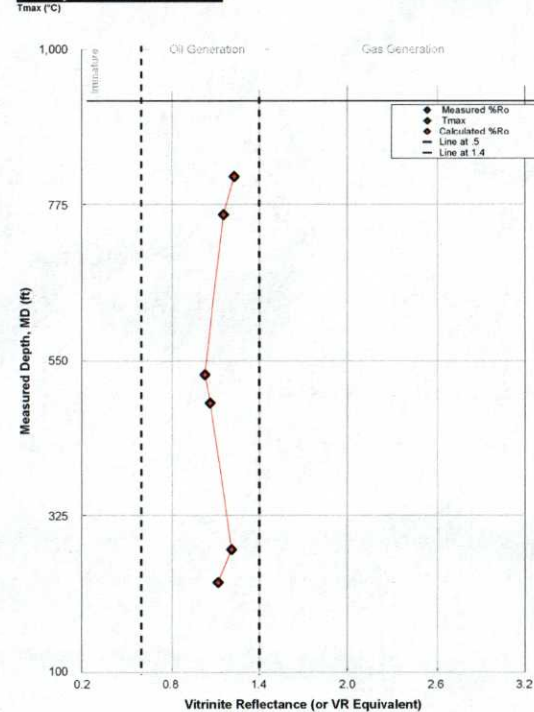
Norm. Oil Content, S1/TOC



Production Index, S1/(S1+S2)



Maturity Indicators



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Source Rock Analyses



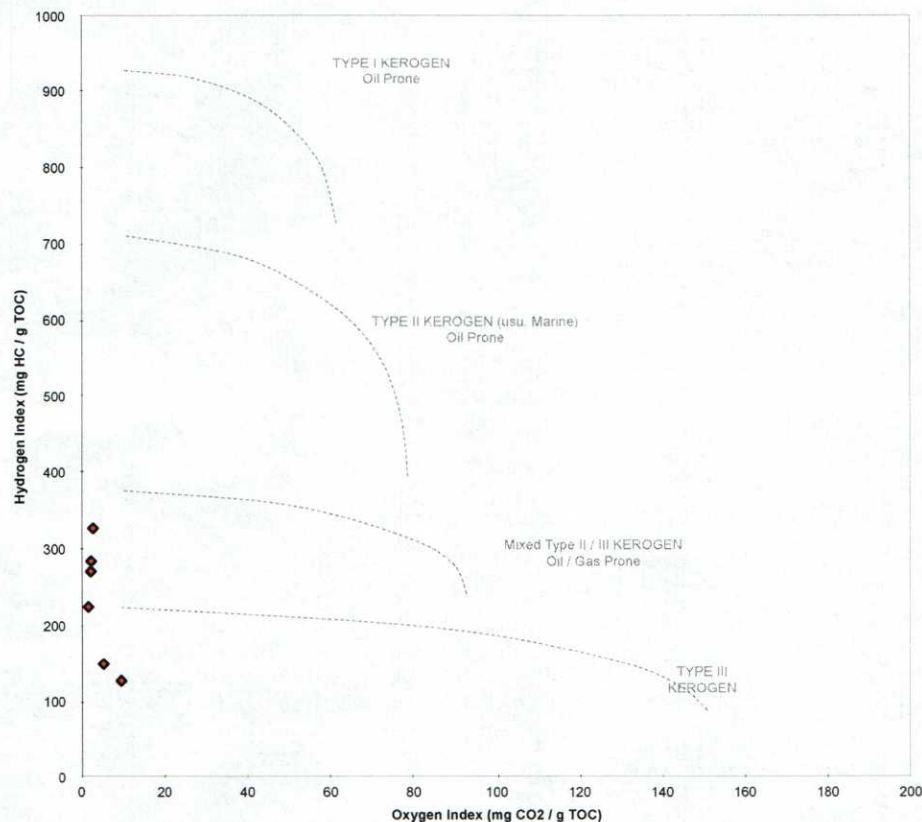
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Pseudo Van Krevelen Plot



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Source Rock Analyses

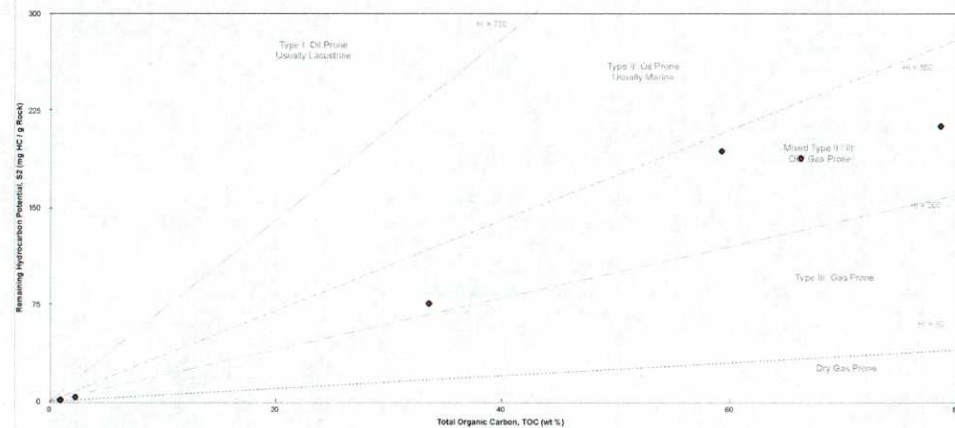
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Kerogen Quality Plot



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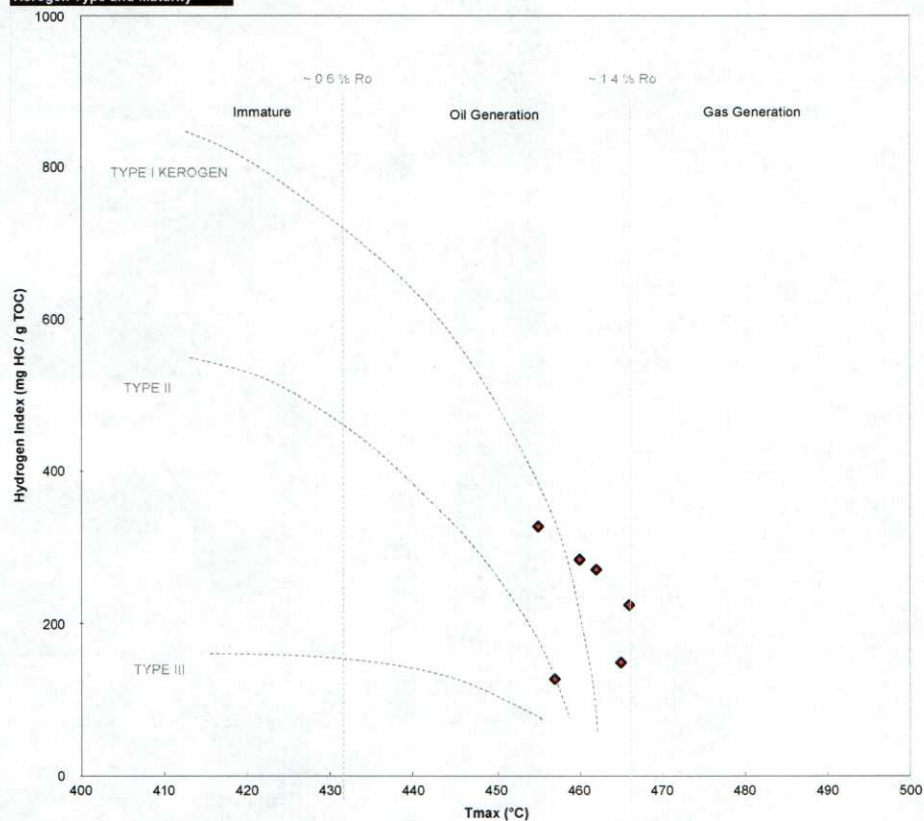
Client: Mark W. Longman
Field/Well: USGS Library Number (R950, R951, S098)
Geomark ID: RLON-120101
Source Rock Analyses



Mark W. Longman

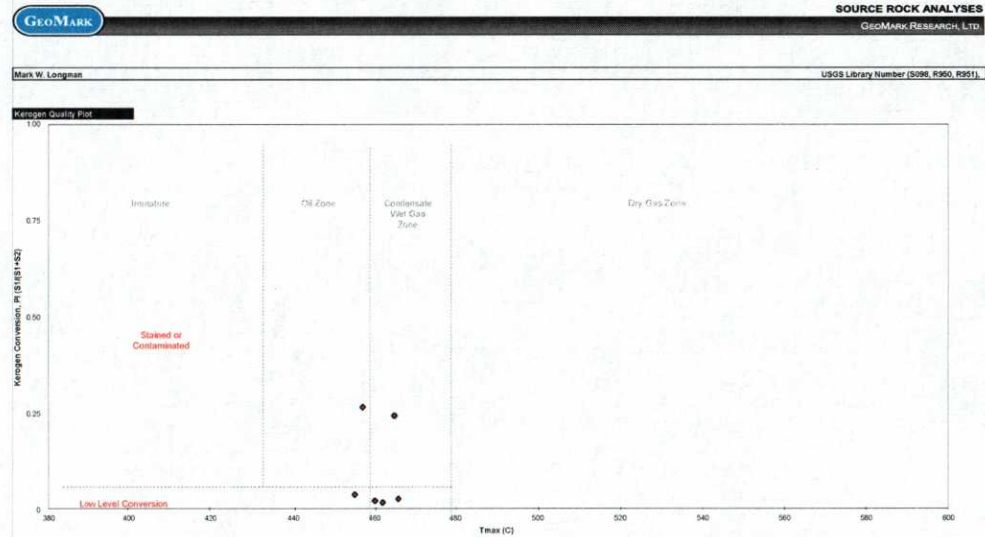
USGS Library Number (S098, R950, R951)

Kerogen Type and Maturity



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Source Rock Analyses

Layer	0	0
00 = 00	00	40
00 = 000	00	100
00 = 000	00	200
00 = 000	00	300

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