2011 OUTCROP ZONE REPORT

FRUITLAND FORMATION OUTCROP ZONE
ARCHULETA COUNTY, COLORADO

APRIL 2012

REVISED SEPTEMBER 2012

Prepared for:

PETROX RESOURCES, INC.
Meeker, Colorado

and

ELM RIDGE RESOURCES, INC.
Dallas, Texas

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EXECUTIVE SUMMARY

This 2011 Outcrop Zone 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 northern San Juan Basin (NSJB). In July, 2011, 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.

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 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 Cabezon Canyon. In addition to the Kf outcrop, the Project Area includes a 1.5-mile buffer from the Kf and Kirkland Shale (Kk) boundary, known collectively as the Outcrop Zone. Figure 1 illustrates the Project Area.

The objective of the 2011 Outcrop Zone Report is to characterize the Project Area and evaluate the existing conditions for future CBM production of federal minerals within the outcrop zone.

Based on reservoir, geological, and hydrogeological characteristics of the Kf formation within the Project Area, the potential for water depletion, methane seepage, and/or coal fires impacts at the Kf outcrop appears to be low with CBM production from 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) to 15 BWPD 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 formation 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.

Petrox ran a series of advanced open hole logs on the Fosset Gulch 9U#2 well which was used to determine the natural fracture orientation, borehole anisotropy, minimum and maximum horizontal stress, Young modulus and Poission ratio rock properties and hydraulic fracture orientation. In conjunction with the above mentioned coal analysis, Petrox completed a numerical engineering simulation study to determine the drainage pattern and pressure depletion

as a function of distance and time for future coalbed methane producing wells. This study was based on history matching long term production performance from the Elm Ridge Pargin Mountain Unit. This simulation analysis is referred to the Petrox – Mansoori Study dated September 2005.

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 surface are resistive and the coal is sealed at the Kf outcrop.

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 ongoing CBM production since 1990 by Elm Ridge Resources Inc. in the 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 eight years of outcrop monitoring baseline data, the construction and monitoring of seven monitoring wells, the installation and monitoring of soil vapor tubes, and historical/on-going 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 Fruitland Formation 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 measures.

1.0 INTRODUCTION

This 2011 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 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 will require APD BLM approval.

In addition to compliance to the ROD, the monitoring program detailed in this report meets the requirements of Sections 1, 2, and 6 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 Project Area includes approximately 18 miles of the Fruitland Formation (Kf) outcrop starting on the west end at the Archuleta County-La Plata County boundary near Beaver Creek and extends southeast along the Kf outcrop to the Southern Ute Indian Tribe (SUIT) Reservation boundary at Cabezon Canyon. In addition to the Kf outcrop, the Project Area includes a 1.5-mile buffer from the Kf and Kirkland Shale (Kk) boundary, known collectively as the Outcrop Zone. Figure 1 illustrates the Project Area.

1.1 PROJECT OBJECTIVE

The objective of the 2011 Outcrop Zone Report is to characterize the Project Area and evaluate the existing conditions for future CBM production of federal minerals within the outcrop zone. This 2011 Outcrop Zone Report marks the first year of evaluating the existing conditions based on the BLM Decision Point 5 of the ROD and will 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 2011 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
- Set annual meeting dates with the San Juan Public Land Center, BLM, and Stakeholders to review outcrop monitoring data and report.

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.

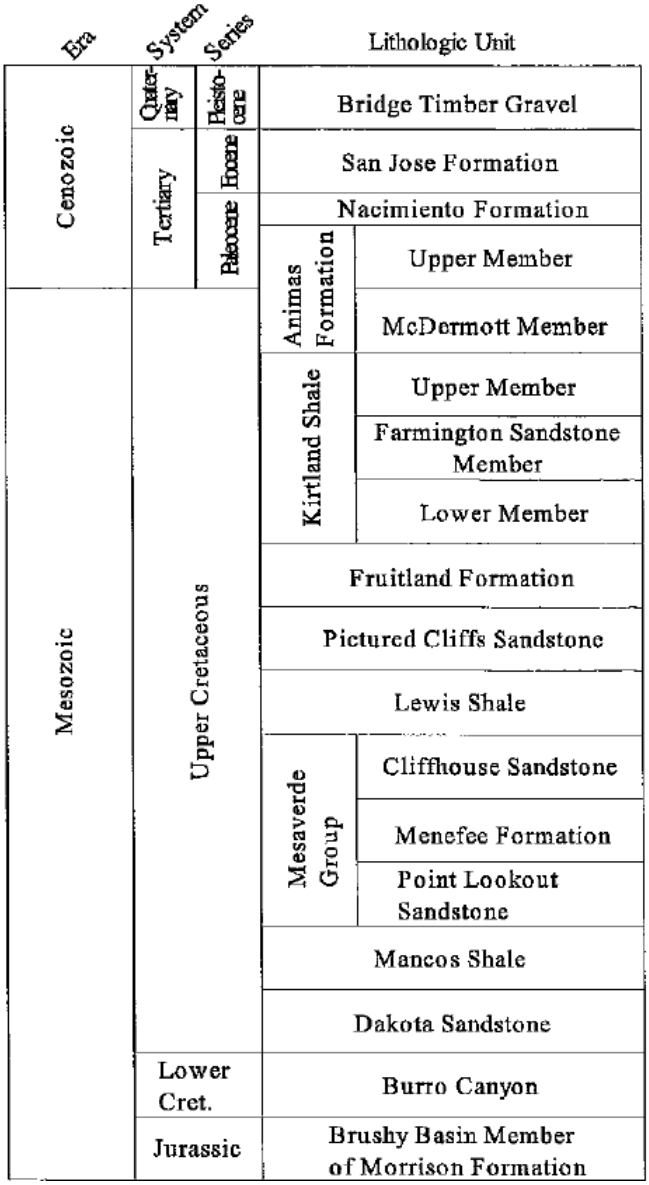
2.1 PROJECT AREA SETTING

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 Cabezon Canyon. In addition to the Kf outcrop, the Project Area includes a 1.5-mile outcrop zone. This outcrop zone has been defined by the BLM as a 1.5-mile buffer from the Kf-Kk contact. 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, which depicts the BLM and COGCC-defined 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 Kpc and Kf, 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 Petrox's project area determined from open hole log mean squares 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



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 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).

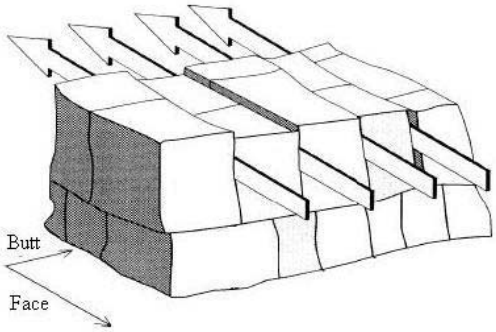
2.2.2 The Fruitland Formation

The Kf was deposited in a swampy coastal plain environment (USFS/BLM, 2006). This depositional environment produced coalbeds 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.

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 though natural fractures and face cleats. This has been documented for decades within the Kf outcrop in La Plata County where fugitive free gas has manifested into methane seeps. In the Project Area however, methane seepage has not be observed, validating the directional

permeability is north/northwest-south/southeast, and surface fractures are resistive and poorly interconnected.

Joint/Fracture/Fault Systems

Joints within the Kf tend to be planar to slightly curviplanar with lesser quantities of joints expressing strong curvature or sinuous and branching. The primary joint sets have exposed lengths up to tens of feet, an overall azimuth of approximately 330°, and dip 16.5 degrees 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.

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 % 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°C, falling within a gas produced coal with little to no residual liquid (Longman, 2012). Appendix H 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 percent (%) 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 (C_1), ethane (C_2), propane (C_3), butane (C_4), and isopentane (C_5) gases in the sample determines whether the CBM gas is considered dry or wet. The equations below illustrate whether gases are dry or wet.

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

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

Gas chemistry of the 9U #1A has a C1/ $C_{1\text{-}5}$ 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/ $C_{1\text{-}5}$ values all within the dry gas range (Souder, Miller & Associates).

In situ permeability within a coalbed is generally 3 times to 10 times greater in the face cleat direction than the butt cleat directions (Tremain et al., 1994). In situ permeability calculations and drainage analysis of the Kf coals was conducted by Mansoori and Associates (Mansoori) on behalf of Petrox in September 2005. This simulation study history matched the well performance from the Elm Ridge Pargin Mountain Unit, located adjacent and southwest of the Project Area. Through history matching utilizing a generalized equation-of-state model (GEM) reservoir simulator, the permeability of the Kf coal in the Project Area was determined to be 0.75 millidarcies (md). The Kf coalbeds 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 GEM's model, 20 years of CBM production for wells drilled more than 6,230 ft 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).

2.2.3 Surface Waters

There are nine drainage transects along the Kf outcrop in the Project Area (Figures 3 and 6) including:

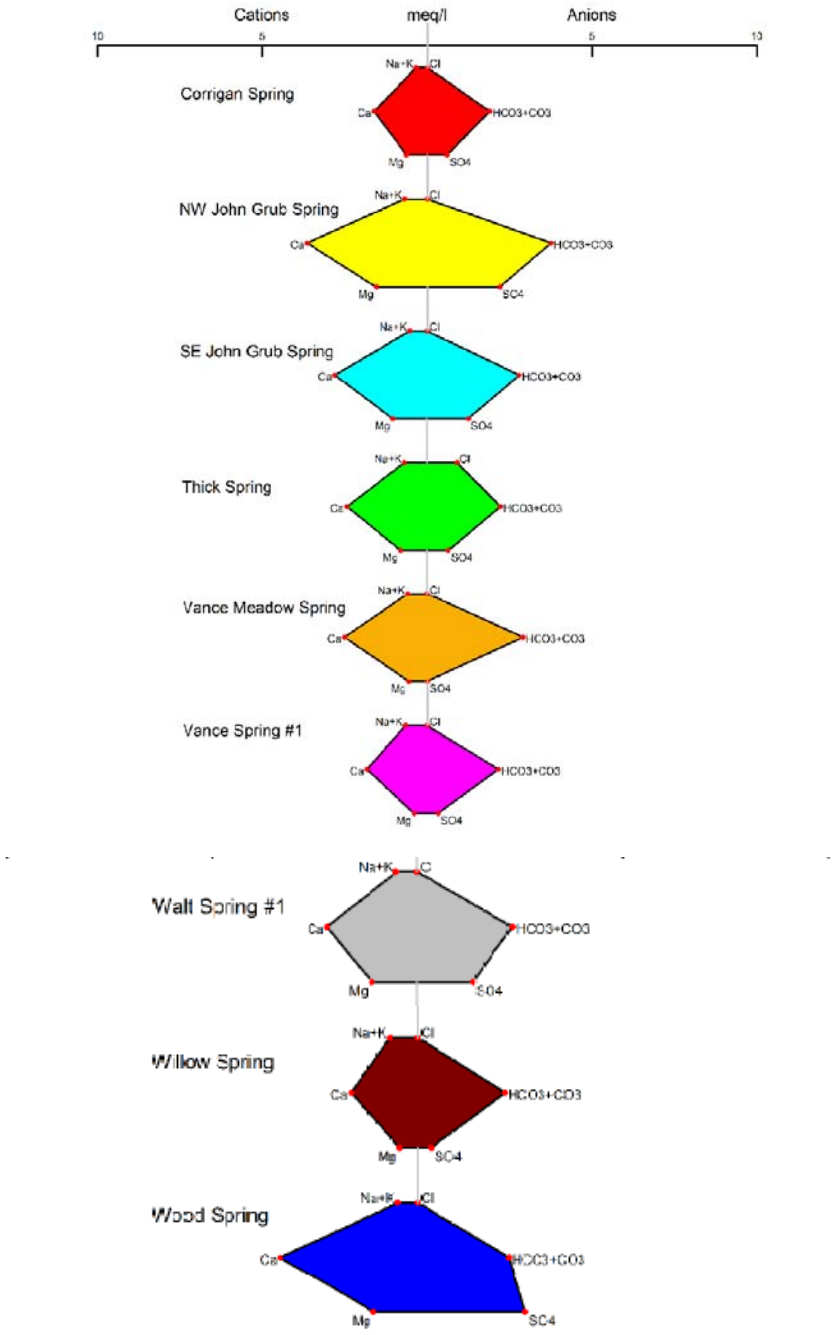
- Beaver Creek,
- Squaw Creek,
- Little Squaw Creek,
- Pole Gulch,
- Peterson Gulch,
- Candelaria Ranch,
- Piedra River,

- Stollsteimer Creek, and
- Cabezon Canyon.

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

LTE has identified 27 natural springs along the Kf outcrop within the Project Area (Figure 3, Table 1). 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. Table 2 summarizes the historical ion chemistry of the natural spring waters. The 2011 natural spring water ion chemistry is depicted on the stiff diagram below to visually represent the makeup of natural spring waters in the Project Area. Note that not all 27 natural springs were sampled in 2011 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.

2011 Natural Springs Stiff Diagram



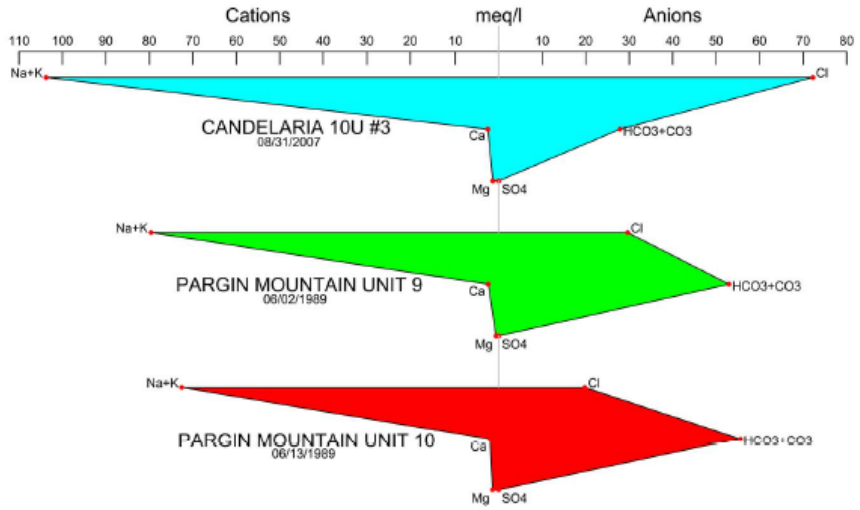
2.2.4 Groundwater and Aquifers

Groundwater can be found in high-yield alluvial aquifers, low-yield shallow bedrock aquifers, and low yield deep bedrock aquifers. Alluvial aquifers consist primarily of unconsolidated Quaternary age sands and gravels, are thin, and of limited areal extent; however, average well yield is 15 gallons per minute (gpm) and can range up to 25 gpm. The primary shallow bedrock aquifers are the Animas Formation (Ta), with an average well yield of 6 gpm to 7.5 gpm; and the

San Jose Formation, with an average well yield of 5 gpm. There are no known water production wells completed in the Nacimiento formation. Deep bedrock aquifers include the Kf, Farmington Sandstone member of the Kk, the Kpc, the Dakota Sandstone (Kd), and formations of the Mesaverde Group (Kmvu) including the Cliff House Sandstone (Kch) and the Point Lookout Sandstone. The Kf and Kpc aquifers are the primary aquifers used for groundwater consumption; the other deep bedrock aquifers are generally not used for water production due to poor water quality, poor well yields, and significant depths below ground surface (USFS/BLM, 2006).

Water chemistry of the Kf is primarily dominated by sodium chloride and bicarbonate and depleted in calcium and sulfate resulting in a high Sodium Absorption ratio (SAR). (Riese, et al., 2005). Water samples collected from the Kf during the installation of Candelaria 10U #3, Pargin Mountain Unit 9, and Pargin 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 make-up 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



2.2.5 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 permeability's 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) to150 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's 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, existing Petrox CBM production wells are completed within the nontributary boundary of the Kf.

2.3 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 seven 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.

2.4 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 subcontract 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 will be 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, added 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 gasses 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.

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.

3.1 DETAILED MAPPING

3.1.1 Property Access

Prior to conducting field activities, land information 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;
- 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 (ft^2) to 40,000 ft^2. In general, 200-foot grid spacings are 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.

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 between May 10 and June 16, 2011. Results of the 2011 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 ($mol/m^2 \cdot day$).

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

The accuracy of the total flux estimation within the project area is influenced by the ability of the grid spacing system to represent the actual flux on a detailed level relative to the subsurface

fracture system, coal quality, and stratigraphic within the Kf. The accuracy of the field meters influences the flux estimation.

The methane sensor within the flux meter unit has a range of 60 parts per million (ppm) to 50,000 ppm. The flux meter methane measurement range is 0.0 mol/m^2·day to 300 mol/m^2·day. Methane flux values below 0.2 mol/m^2·day are detectable with decreased accuracy. Due to the low accuracy and confidence level of methane flux values below 0.2 mol/m^2·day, the reporting limit set for the flux meter is 0.2 mol/m^2·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 mol/m^2·day to 600 mol/m^2·day at an accuracy of ±25 %.

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

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

Integrated West Systems Flux Manager® software on the GPS unit record 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 2011 abandoned production well survey was conducted on June 16, 2011. Results of the 2011 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. 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.

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 SUIT Reservation in Archuleta County through La Plata County to the SUIT Reservation boundary. There are two flights at two different elevations and two different resolutions: one with an approximate resolution of 1.5 meters and the other with an approximate resolution of 0.75 meters.

The flight elevations are over rugged terrain with surface elevations ranging between 6,400 feet to 8,400 feet 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.

CIR imagery was recently acquired by Agro Engineering (Agro) of Alamosa, Colorado, via a flight over the Kf outcrop on June 3, 2011. Results of the 2011 reconnaissance survey are discussed in Section 4.4.

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 spring 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.

The 2011 field verification of suspect seep areas was conducted from August 23 to August 31, 2011. Results of the 2011 event are discussed in Section 4.4.

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.

The 2011 abandoned coal mine surveys were conducted from July 27 to August 4, 2011. The results of the 2011 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 spring are collected and analyzed for the following:

- Major cations [dissolved sodium (Na), calcium (Ca), magnesium (Mg), potassium (K), and iron (Fe)] by Environmental Protection Agency (EPA) Method 200.7/4500;
- Alkalinity (carbonate/bicarbonate) by EPA Method 2320 B;
- Major Anions [chloride (Cl), sulfate (SO_4), bromide (Br), and fluoride (F)] by EPA Method 200.7/4500;
- pH by EPA Method150.1;
- SC by MCA Method WW 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
- Sodium Absorption Ratio (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 2011 natural spring sampling event was conducted in May 2011. 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 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 2011 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 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 barrels of water per day per production 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 barrels of water per day up to as much as 15 barrels of water per day. 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 bottom-hole 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 at the Kf outcrop. 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 La Plata County, efforts to extinguish active coal fires via injection near the Kf outcrop have been ineffective. An excavation of small coal fires within the SUIT Reservation has proven some early success. The potential for coal fires to occur as a result of Petrox's CBM development within the Project Area appears low.

In addition, reasonable mitigation efforts such as reduced or suspended gas production if it is 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. 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 2011 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 2011 monitoring event. Field verification of suspect methane seeps was limited throughout the Kf outcrop in Archuleta County due to property access denial or no responses. However, LTE was able to conduct field verifications at 29 of the 34 suspect seep areas identified through CIR imagery. The 2011 status of access to parcels is illustrated on Figure 13 and presented in Table 5.

4.2 DRAINAGE TRANSECTS SURVEY

During 2011, LTE conducted inspections from May 10, 2011 to June 17, 2011 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 16);
- Pole Gulch (Figure 17);
- Peterson Gulch (Figure 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 2011 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 2011 monitoring event. Out of the 1,024 flux points collected, reportable methane flux (greater than 0.2 $mol/m^2 \cdot day$) was recorded at Stollsteimer Creek (point #sc0613111_01, 0.5347 $mol/m^2 \cdot day$) and Beaver Creek (point #bc051011_42, 0.2997 $mol/m^2 \cdot day$). 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

Due to only two points out of 1,024 measurement points in Archuleta County having methane flux above the reporting limit of the flux meter in 2011, a total methane volumetric flux estimation could not be conducted. There are not enough data points with reportable fluxes to interpolate and grid along each of the six drainage transect areas to be able to then contour and process for estimating the total volumetric flux.

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

Every location sampled in Archuleta County fell below the reportable detection limit of 0.2 mol/m^2·day in 2010, compared to 3 points in 2009. Reportable methane flux was recorded in two locations during the 2011 monitoring event. 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 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 CO_2 – carbon dioxide g – gram ft^3 – cubic feet

Due to low concentrations of methane detected along the drainage transects, the carbon dioxide flux values do not appear to correlate with methane concentrations. It appears that carbon

dioxide is naturally occurring along the drainage transects and as a result, carbon dioxide data is not discussed for each transect. Carbon dioxide flux data are included in Appendix E.

4.3 ABANDONED PRODUCTION WELL SURVEY

LTE conducted the 2011 Big Horn-Schomburg #1 abandoned production well site survey on June 16, 2011. LTE collected 26 flux measurements. Reportable methane was detected at one of the 26 points (0.2122 mol/m^2·day) surveyed with the flux meter. The methane flux was just above the reporting limit of the flux meter and is considered low. A single reportable methane flux point was detected in 2007 and 2009. 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.

CIR imagery was acquired by Agro via a flight over the Kf outcrop on June 3, 2011. LTE conducted the field verification at 29 of the 34 suspect areas from August 23 to August 31, 2011. Five locations were not inspected due to property access denials (Table 5). LTE personnel were equipped with aerial photographs, topographic maps, a digital camera, traditional subsurface soil gas sampling equipment, and a GPS unit. LTE personnel visited each of the accessible suspect areas and collected subsurface soil gas measurements. A suspect area location map of the aerial images is illustrated on Figure 21. Locations of suspect areas identified on the aerial photographs and subsurface methane concentration measurements are illustrated on Figures 22 through 31.

LTE collected 98 subsurface gas concentration measurements within 29 suspect areas using the MSA GasPort® meter. Methane was not detected at the measurement points. Generally, poor vegetation health in suspect areas was a function of surface physical conditions, such as poor soil development on coal and rock outcrops and/or steep slopes. Based on field verification activities and the lack of measurable methane, it appears no new methane seeps were identified from the regional reconnaissance activities in 2011.

4.5 ABANDONED COAL MINE SURVEYS

In 2011, LTE identified seven abandoned coal mines along the Kf outcrop. Due to property access denial, the Unnamed Abandoned Mine and Cabezon Project mine were not surveyed. Below is a summary of subsurface soil gas surveys for five abandoned coal mines along the Kf outcrop. The abandoned coal mine surveys were conducted from July 27 to August 4, 2011. Figures 32 through 61 illustrate subsurface soil gas and surface temperature measurements. Subsurface soil gas and surface temperature measurements are presented in Appendix G.

Methane was detected at 48 measurement points ranging in concentration from 500 ppm to 10,000 ppm at the Chimney Rock mine. Carbon monoxide was detected at one measurement point at a concentration of 1 ppm. Surface temperatures ranged from 18.0°C to 58.3°C. Flux

measurements were recorded in the vicinity of the Chimney Rock mine as part of the Stollsteimer Creek drainage survey. Only one point detected methane flux above the flux meter reporting limit.

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.

Methane was detected at two measurement points at concentrations of 500 ppm at Chimney Rock Coal. Carbon monoxide was not detected at any of the measurement points. Surface temperatures ranged from 15.6°C to 69.2°C.

In general, areas with less shading and more sun exposure had higher temperatures. In addition, ground surface temperatures increased as readings were collected later in the day, when the ground was exposed to hotter air temperatures. Carbon monoxide is a by-product of coal combustion and with limited measurement points detecting carbon monoxide, there does appear to be active combustion/fires in the vicinity of these five 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.

Due to the fluctuation of surface temperatures measured during the 2011 surveys, LTE is reviewing other techniques to collect temperature readings within the grids of the coal mines to be more reflective of subsurface conditions. One option is to insert a thermometer probe into the temporary probe holes and collect subsurface temperature readings, which would be less affected by surficial topographical, vegetative, or timing factors.

4.6 NATURAL SPRING SURVEY

4.6.1 Sampling Status

A total of 27 potential natural springs were identified on the Kf outcrop in Archuleta County. Of the 27 natural springs, nine natural springs were sampled in 2011. 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 62. A summary of the natural springs sampled in 2011, 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 2011 field observations and measurements for the natural springs, including historical measurements, are summarized in Table 7.

Natural spring discharge rates were measured at six of the nine natural spring sampling locations in May 2011. Measurements are calculated by dividing the known volume of a container by the time required to fill the container. The flow rates measured in 2011 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 2011, dissolved methane was detected in water from the NW John Grub Spring (0.03 mg/L) and SE John Grub Spring (0.023 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. 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 the nine natural springs in May 2011. Subsurface soil methane was not detected at the natural springs. The results of the subsurface soil gas measurements are summarized in Table 10.

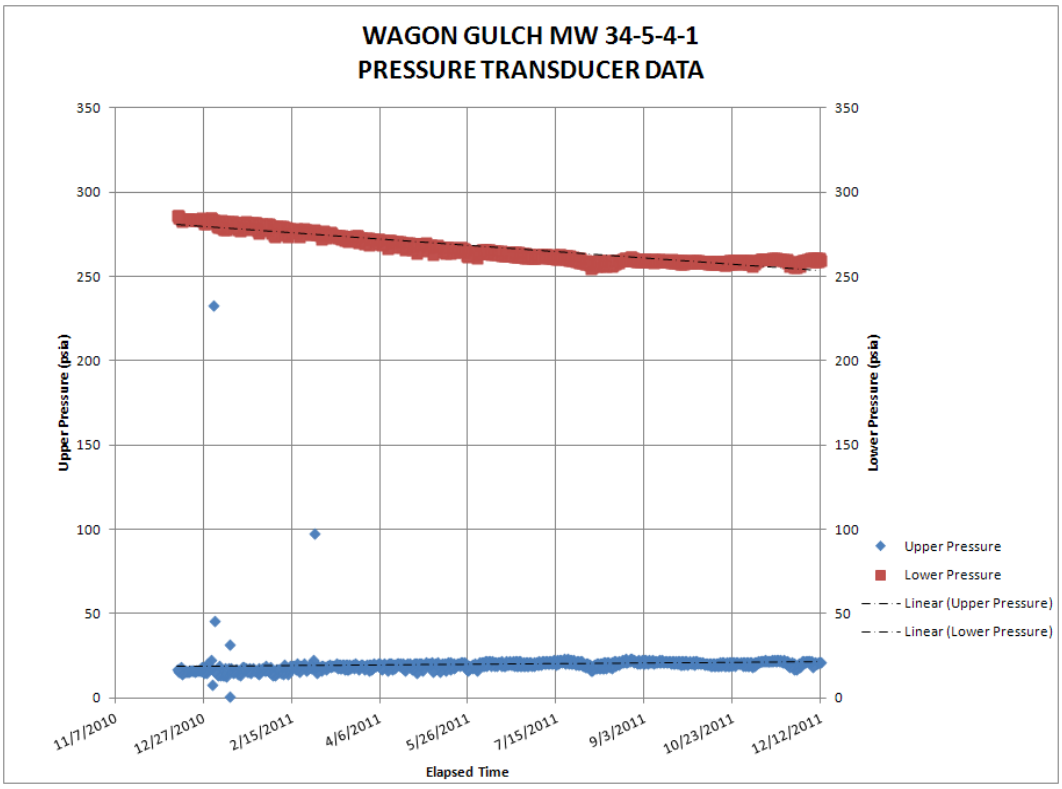
4.7 COGCC MONITORING WELL DATA ANALYSIS

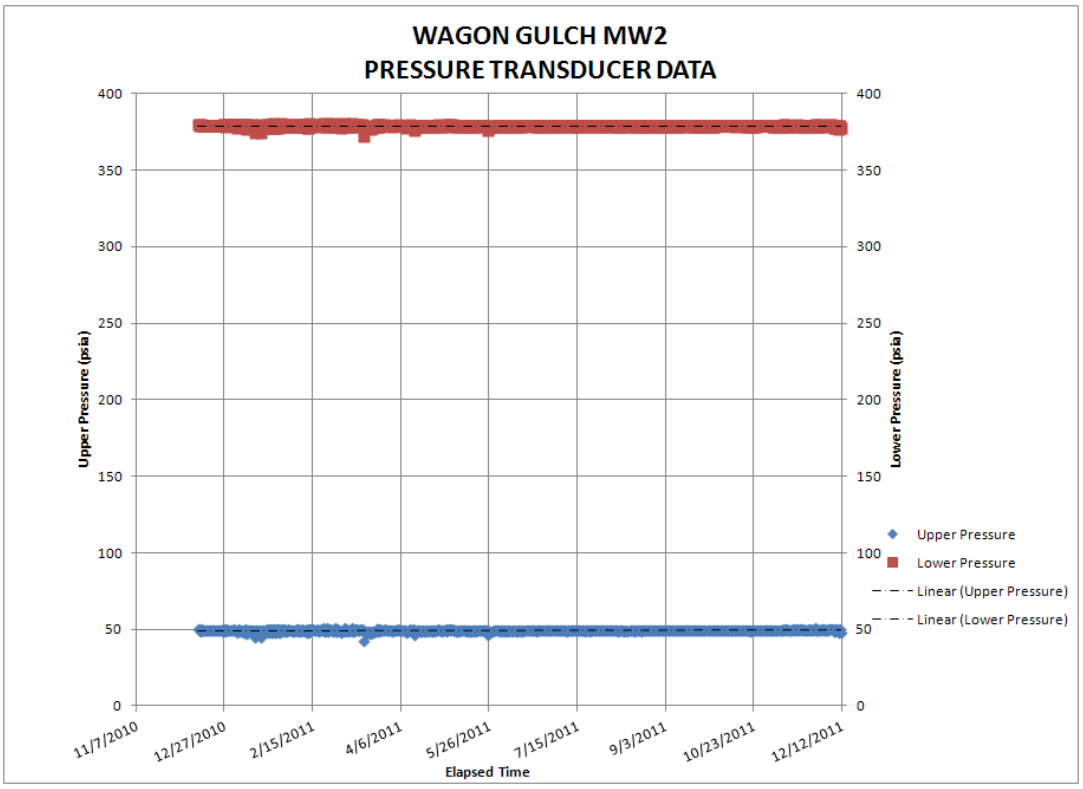
The COGCC provided LTE with well pressure raw data from 2011. Historical data are available in annual reports posted on the COGCC web site. A general analysis of results for each well is discussed in the subsequent sections of this report. In general all monitoring wells show the presence of free gas 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

Monitor wells MW 34-5-4-1 and MW 34-5-4-2 located in section 4, T34N,R5W adjacent to the North Central part of Petrox's Fosset Gulch Unit, have been monitored since December 2008. MW 35-5-4-2 did not reach an initial stable pressure for approximately 3 weeks following installation. The COGCC 2010 annual monitoring report indicated the wellhead pressure initially declined following stabilization through mid-November 2010. At that time, the trend reversed and the wellhead pressure steadily increased. The graphs below depict upper and lower transducer data for 2011, which indicates the slight increase in wellhead pressure, with an approximate increase of 5 pounds per square inch absolute (psia). The COGCC has attributed past increases in wellhead pressure to a net water level rise in the monitoring well since installation.

Monitor well MW 34-5-4-2 has shown a relatively constant wellhead pressure of 47 to 48 psia and a bottom-hole pressure of 375 psig resulting in a Pore Pressure gradient of 0.48 psi/ft. This general trend continued in 2011, with a slight increase to as much as 60 psia from the end of June through mid-September 2011. From February 2009 to Aril 23, 2009, no data are available due to pressure transducer malfunction as a result of freeze damage. The water level inside the open wellhead was at a height of 2.5 feet above ground level; however, after the well was shut in following repairs, wellhead pressure buildup returned rapidly. The pressure buildup after shut in may have reflected water and/or gas pressure build up. The COGCC proposed to vent the well to check for artesian water flow and/or venting of gas under atmospheric pressure conditions; however, no results are currently available.

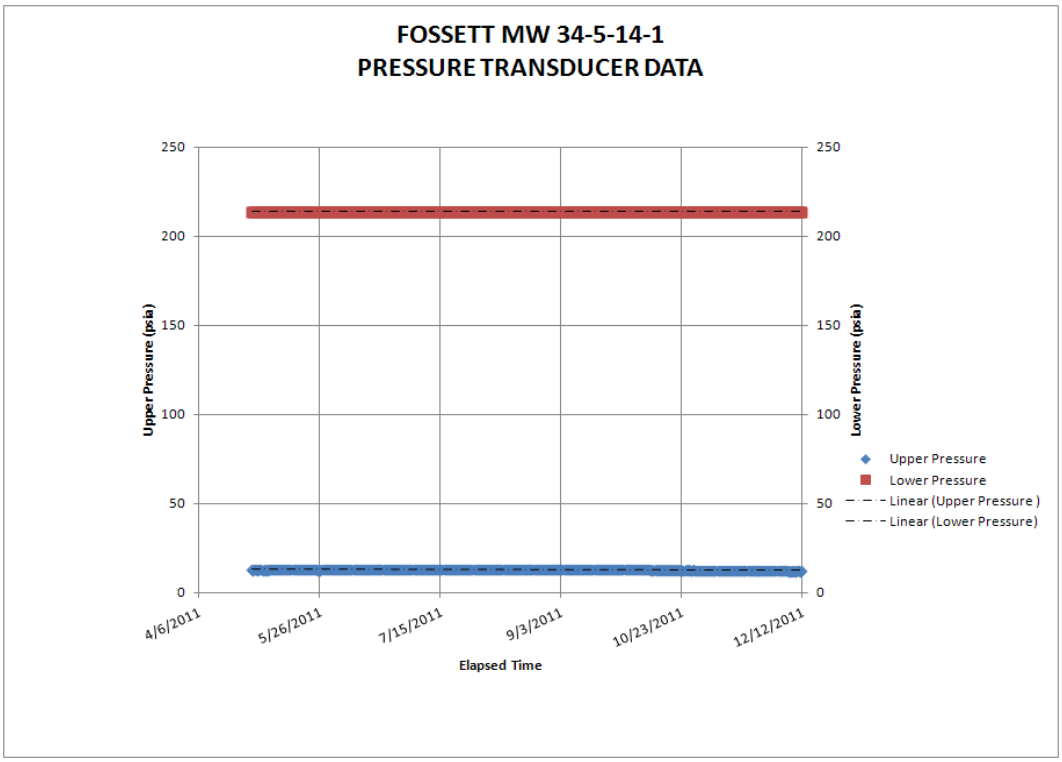


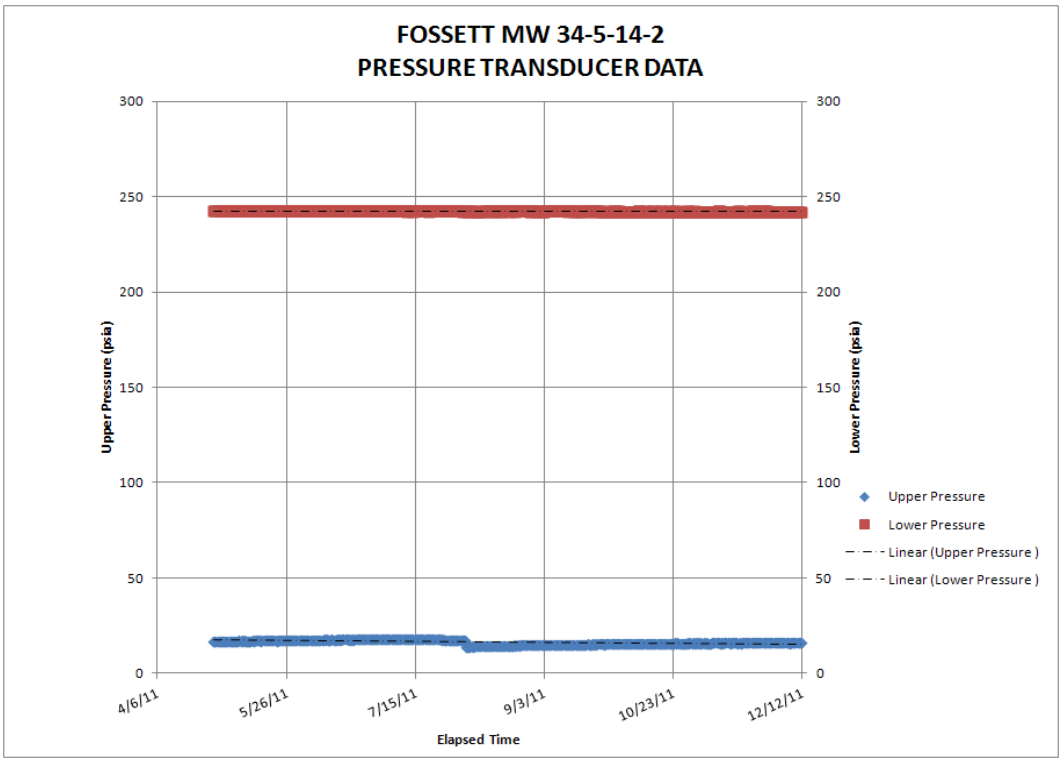


4.7.2 Fosset Gulch

Monitor wells MW 34-5-14-1 and MW 34-5-14-2 located in Section 14, T34N, R5W adjacent to the South Central part of Petrox's Fosset Gulch Unit, have been monitored by COGCC since December 4, 2008. The cables between the wellheads and the telemetry communication hub were damaged during pipeline construction on November 11, 2010, and the cables were repaired in the spring of 2011. No data are available during that time period. 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 fluctuated until July 2010. A corresponding decrease in wellhead pressure was measured after the well was vented in August 2010 and water levels rose to previous levels. The 2011 data are presented in the graphs below and exhibit a constant wellhead pressure trend. The bottom-hole pressure is 210 psig which corresponds to a pore pressure gradient of 0.41 psi/ft.

Monitor well MW 34-5-14-2 has exhibited a flat down-hole well 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, however the buildup in wellhead pressure takes two to four months to return to the pressure regime exhibited prior to each venting event. The COGCC proposed to continue monitoring without venting for six months to confirm undisturbed wellhead pressure conditions. The graph below shows 2011 data, which is similar to historical data. The decrease in wellhead pressure in August 2011 is potentially related to a venting event. The bottom-hole pressure is 245 psig which corresponds to a pore pressure of 0.44 psi/ft.



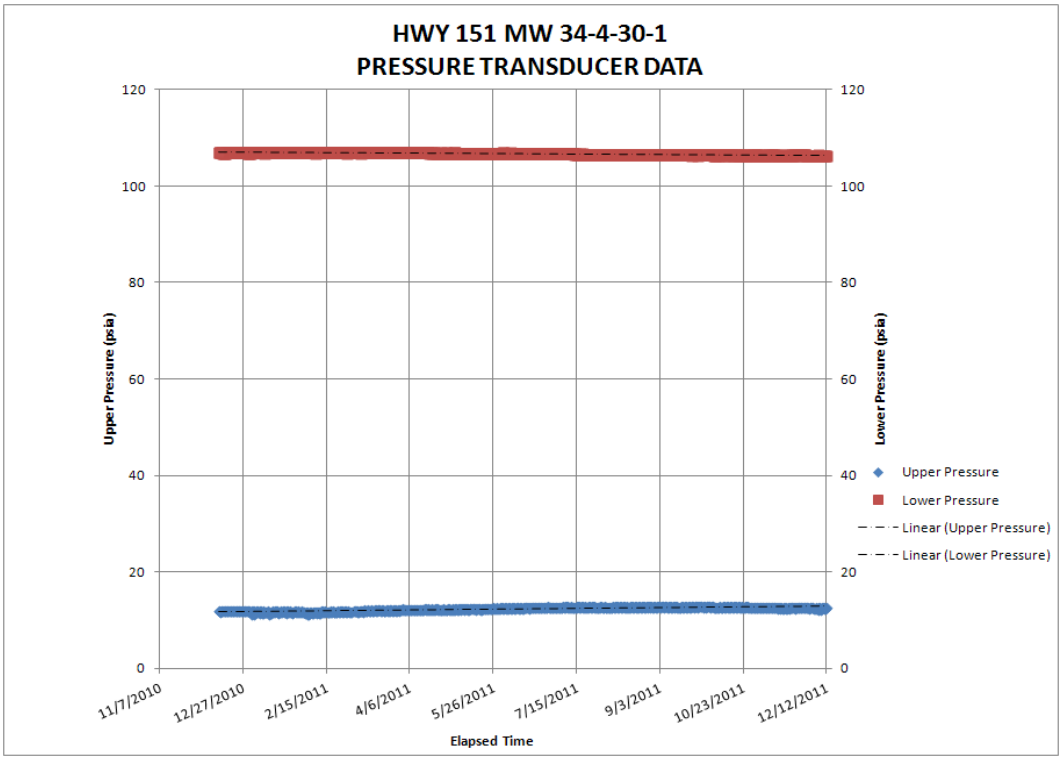


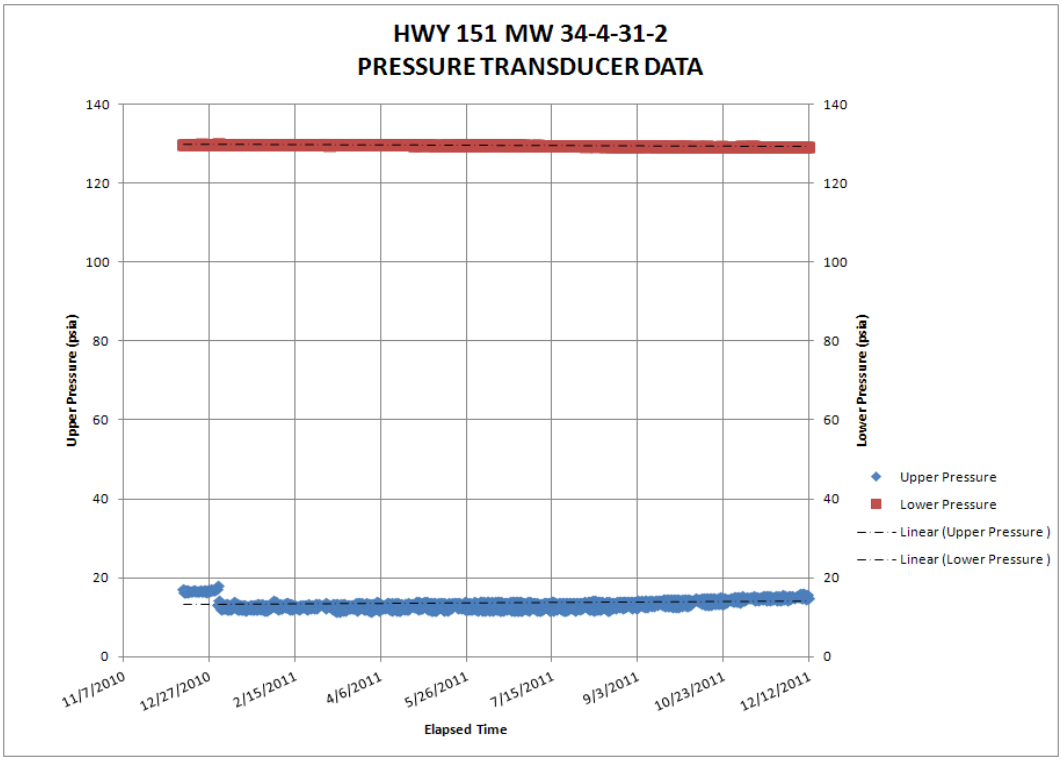
4.7.3 Highway 151

Monitor wells MW 34-4-30-1 and MW 34-4-31-2 located in section 30, T34N, R4W is adjacent to the north end of Petrox's Fosset Gulch Unit, and have been monitored since December 3,

2008. MW 34-4-30-1 shows a stable well pressure regime with a flat wellhead pressure curve at atmospheric pressure, a flat down-hole pressure curve and a flat water level curve since August 2009. Spikes in water level and wellhead pressure are related to venting events. The 2011 data are displayed in the graphs below and show a stable trend from a minimum of 11.11 psia to a maximum of 12.87 psia. The bottom-hole pressure of 105 psig corresponds to a pore pressure gradient of 0.42 psi/ft.

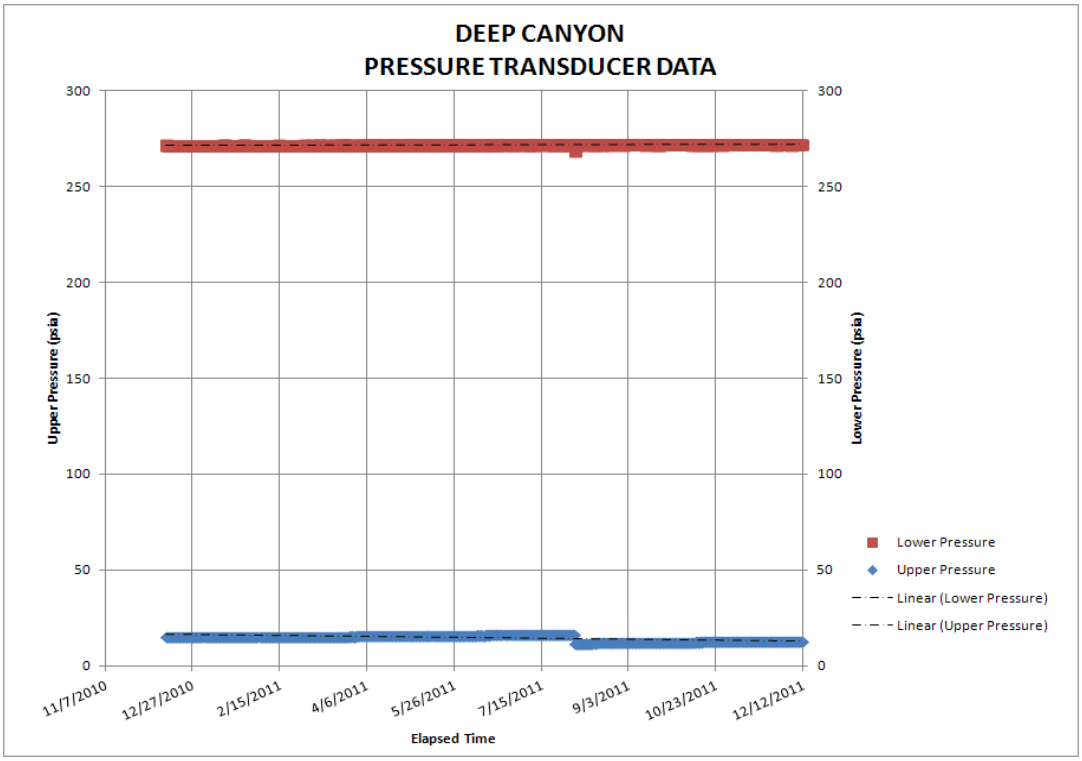
Monitor well MW 34-4-30-2 displays a stable well pressure curve, although pressures ranged from 11.42 psia to 18.04 psia, which is an increase from previous years. The COGCC has noted that historically, wellhead pressures spikes correspond to water level decreases that are associated with immediate loss of pressure when the well is vented. The graph below indicates 2011 conditions were similar to historical conditions. The sudden drop in pressure at the first part of January 2011 is potentially related to venting. Following venting events, several months are required for the wellhead pressure to buildup to previous levels. The bottom-hole pressure of 127 psig corresponds to a pore pressure gradient of 0.41 psi/ft.





4.7.4 Deep Canyon

Monitor well MW 34-4-32-1 has been monitored since 2010. The well pressure stabilized six days after the well was shut in, then displayed a relatively stable well pressure regime throughout 2010. A small increase in well pressure was measured corresponding to a water level decline in January 2011. A sharp decrease in well pressure is evident during August 2011 as depicted in the graph below.



4.7.5 Overall COGCC Monitoring Well Analysis

All COGCC monitoring wells installed within the Kf outcrop as part of the Project Area exhibit free gas. This free gas is not produced by withdrawing water out of the Kf formation 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 2011. Using the Mann-Kendall test, a z statistic was calculated for 66 of the 67 SVTs within the Project Area (Figure 12). A minimum of 10 data points are needed to calculate the z statistic. Only three measurements were available for SVT BM-109 and as a result, no z statistic could be calculated for this SVT. 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 seven of the 67 SVTs. Six of these seven SVTs are located in the Pole Gulch Drainage. However, seeping methane gas was not detected during the flux survey, which included the collection of 87 measurements across a 57 acre area. Statistical significance is a measure of the probability that a result is not an artifact of random scatter in the data. Trends with greater than 90% significance are shown on Table 4.

To eliminate the effect of seasonal variability the statistical evaluation was repeated using annual averages of the data at each SVT. Averages were only calculated for years where a minimum of five bi-monthly measurements were available. Four to nine annual data points were available for

all of the transects except Candelaria Pasture. An s statistic can be calculated for points with three to nine data points. Similar to the z statistic, a positive value indicates an upward trend and a negative value indicates a downward trend. The s statistic indicated an upward trend at one SVT at the 95% significance limit. Due to the smaller sample size, only one of these trends had a significance greater than 90%, as listed on Table 4.

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 many SVTs can detect methane but do not report incoming concentrations over time supports the data reported herein demonstrating free gas is present in the Kf at the outcrop; however, it is not migrating to the surface as a seep.

5.0 OUTCROP EVALUATION

This 2011 outcrop evaluation is based on past work within the Project Area and current conditions documented during the 2011 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 open-hole 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 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 NW-SE 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-seven natural springs have been identified along the Kf outcrop within the Project Area. These natural springs tend 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 ($\leq$ 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 ($\geq$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.

Kf aquifer is classified as a 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 presence of only two reportable methane flux values from 1,024 sample points and low total volumetric methane flux in 2011 along the Kf outcrop in Archuleta County suggests there is little or no methane seepage occurring over the mapped areas. This has been consistent over the past four years of monitoring activities. 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 spring 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 three 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 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 dead vegetation, charred ground, smoke, or steam.

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 formation 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 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 open-hole logs, drainage and performance simulation study, and pressure data history. If during the production of CBM within the outcrop zone methane seeps begin to develop and/or coal fires are observed, 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 COGCC Monitoring wells;
- The reservoir geological characteristics of the coal exhibit dominant fractures orientation north/northwest-south/southeast with 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 open-hole 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 max north/northwest-south/southeast which is the maximum directional permeability parallel to the Kf outcrop;
- The original bottom-hole 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 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 also 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 "Evaluation of Coalbed Methane Well Performance and Drainage Area" 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, suggest 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:

- Continue annual monitoring at the six drainage transects for discharges of methane gas from watercourses and soil;
- Continue annual monitoring of the Big Horn-Schomburg #1 abandoned well site as required under Section 6 of the Permit;
- Sample natural springs every year to assess any changes in the flow rates and/or the chemistry of natural springs. The next natural spring sampling event will be the spring of 2012;
- Monitor abandoned coal mines annually rather than quarterly, unless conditions change. With the abandoned coal mine surveys conducted in 2011 indicating no abandoned coal mines on fire, historical survey data dating back to 2004 indicating no presence of coal fires, regional reconnaissance surveys that are conducted every three years with field verification indicating anomalous vegetation not associated with methane seepage and suspect coal fires, quarterly surveys should be reduced to annual surveys. The surveys would be conducted along with flux mapping of the six drainage transects in the summer;
- Perform regional reconnaissance survey and field verification activities in 2014; and
- Present this outcrop zone report to all interested stake holders at the time of the GORT meeting (next scheduled for April 19, 2012) held with the BLM, USFS, and COGCC.

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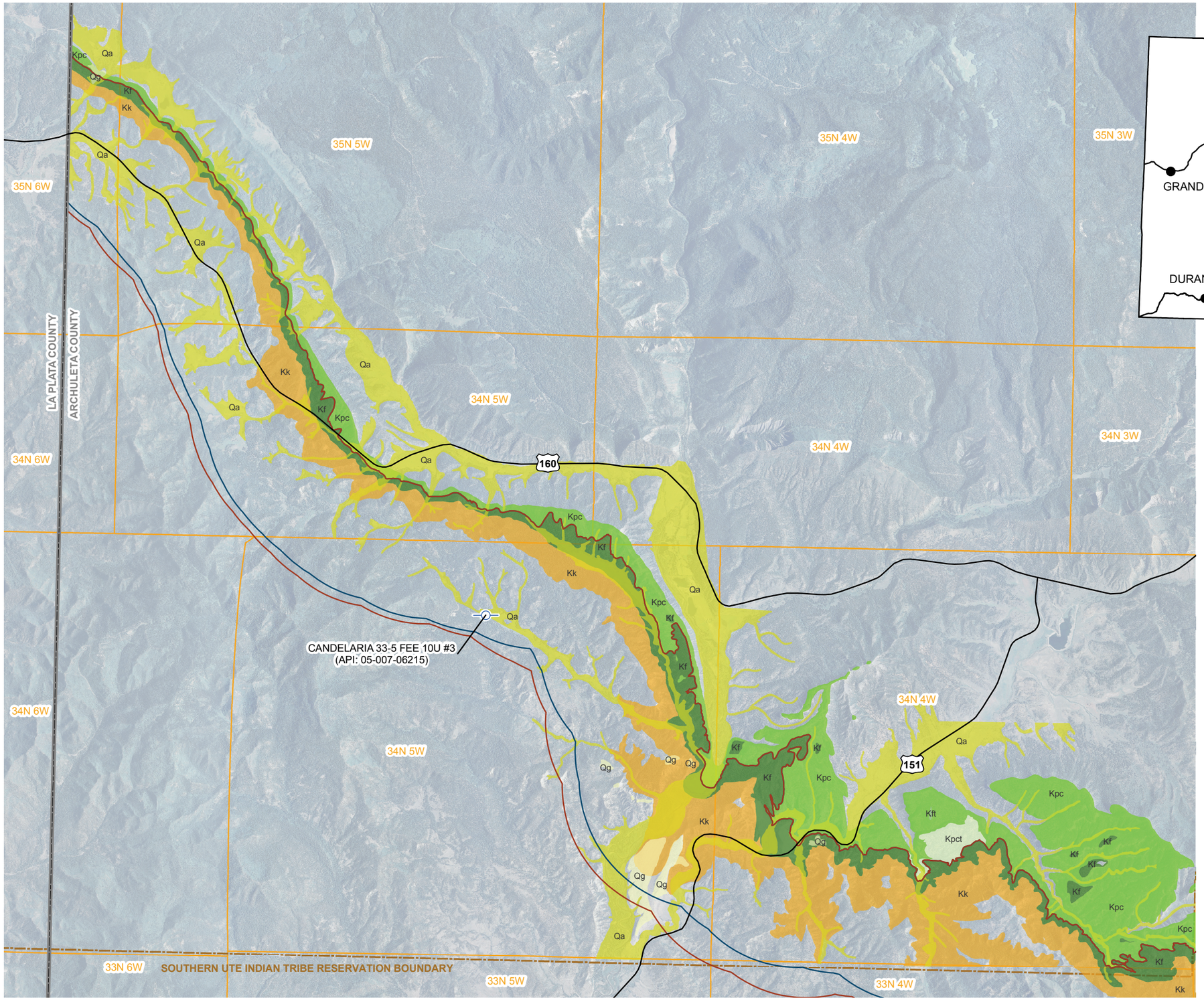
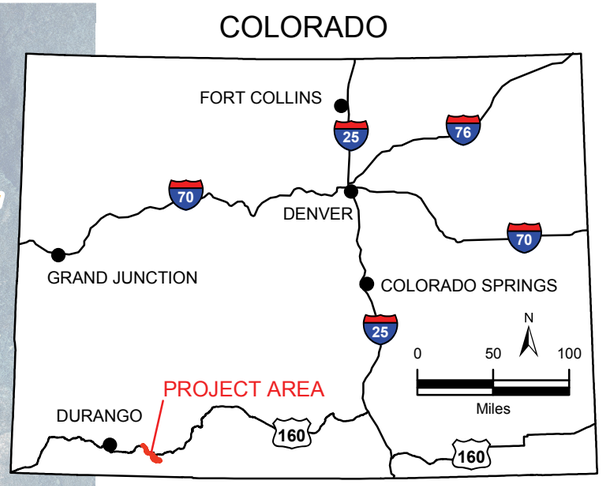
Candelaria 10U#3- *DFIT Analysis dated November 28, 2005.*

FIGURES





LEGEND

- SHUT IN WELL
- HIGHWAY
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES

GEOLOGY

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

OUTCROP ZONES

- BUREAU OF LAND MANAGEMENT
- COLORADO OIL AND GAS CONSERVATION COMMISSION

IMAGE COURTESY OF USDA/NRCS, 2009

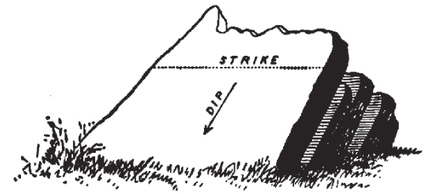
0 1.25 2.5
Miles

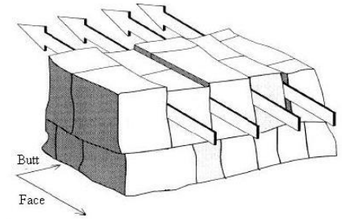
N

FIGURE 1
PROJECT AREA MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

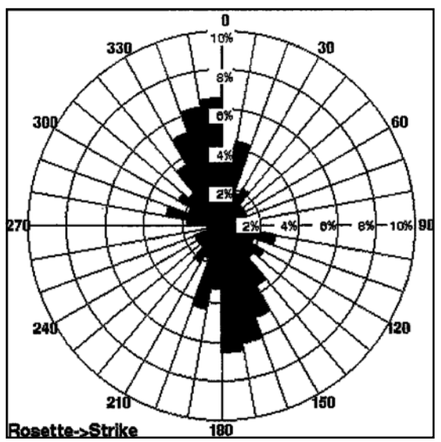
P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 01 PROJECT AREA.mxd





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

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



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

35N 6W
35N 5W
35N 4W
34N 6W
34N 5W
34N 4W
33N 6W
33N 5W
33N 4W
LA PLATA COUNTY
ARCHULETA COUNTY
160
151
SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY

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

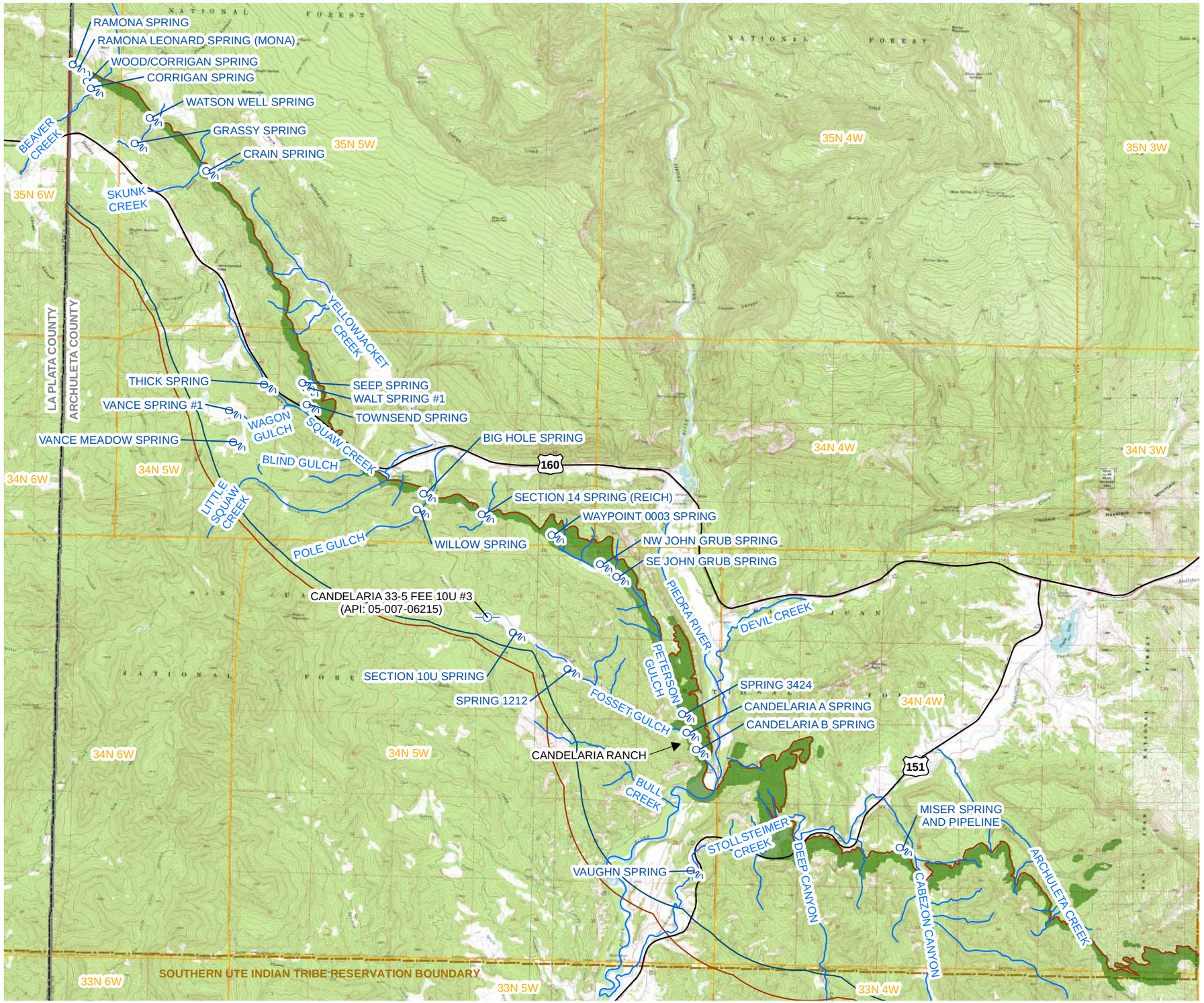
0 1.25 2.5
Miles

N

FIGURE 2
COAL FACE CLEAT ORIENTATION MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 01 PROJECT AREA.mxd



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

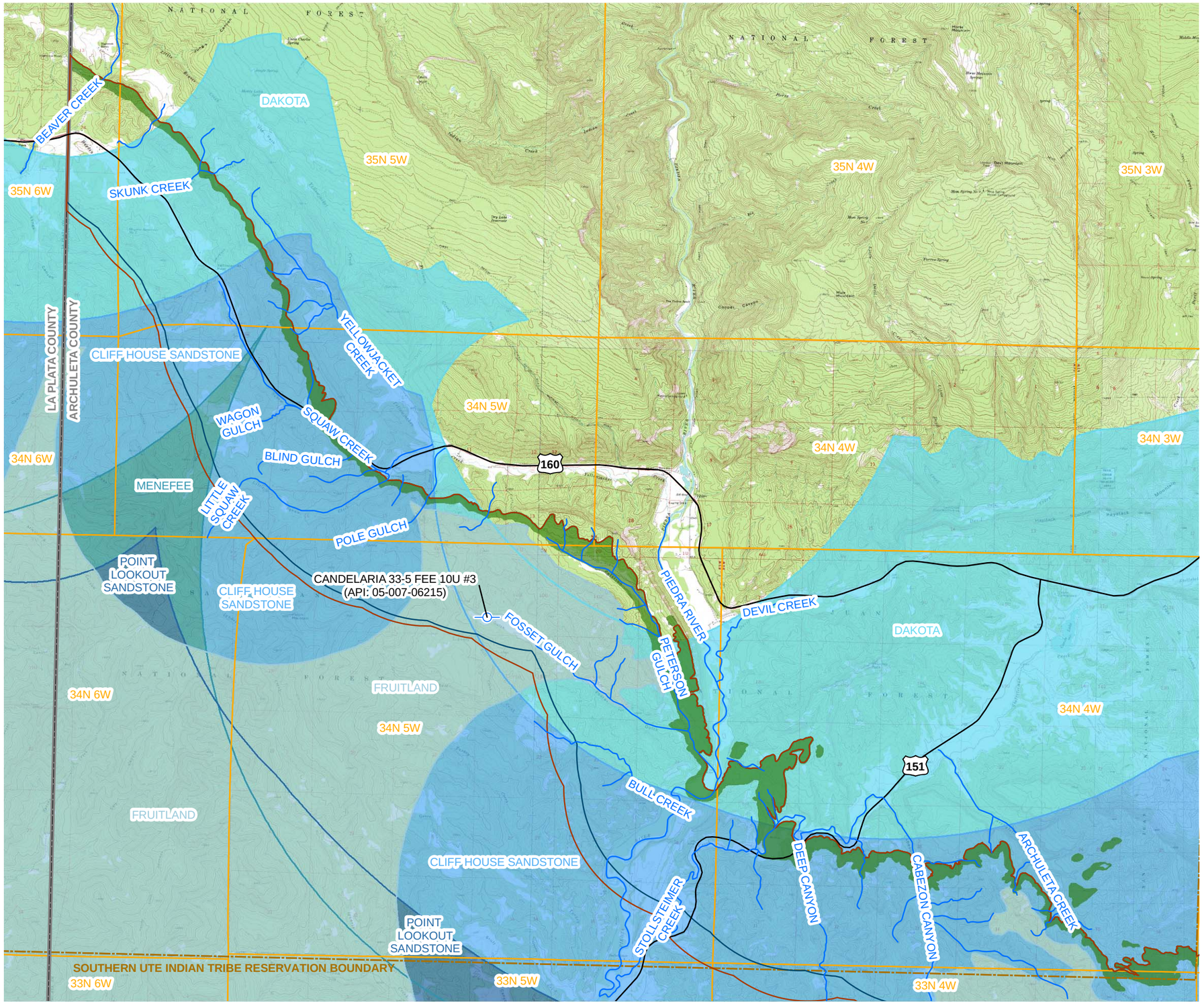
0 1.25 2.5
Miles

N

FIGURE 3
SURFACE WATER MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 03 SURFACE WATERS.mxd



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

0 1.25 2.5
Miles

N

FIGURE 4
NONTRIBUTARY GROUNDWATERS OF
NORTHERN SAN JUAN BASIN
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 04 NONTRIBUTARY.mxd

LA PLATA COUNTY

ARCHULETA COUNTY

160

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

151

SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY

LEGEND

- SHUT IN WELL
- HIGHWAY
- PRIVATE PROPERTY
- PUBLIC PROPERTY
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- FRUITLAND FORMATION (Kf)

OUTCROP ZONES

- BUREAU OF LAND MANAGEMENT
- COLORADO OIL AND GAS CONSERVATION COMMISSION

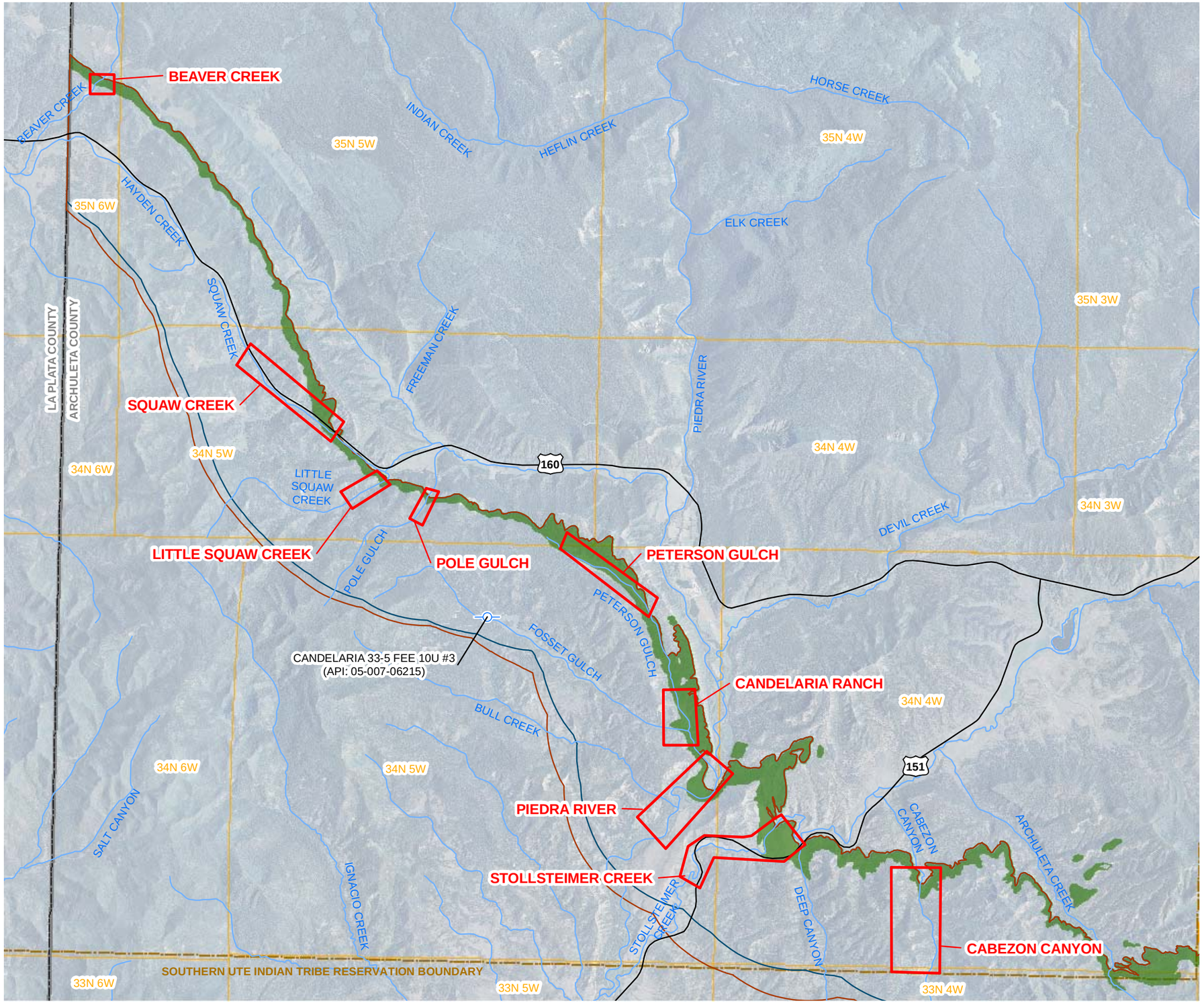
0 1.25 2.5
Miles

N

FIGURE 5
LAND USAGE MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 05 USAGE.mxd



LEGEND

- SHUT IN WELL
- DRAINAGE TRANSECT
- COUNTY BOUNDARY
- SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
- TOWNSHIP AND RANGE LINES
- HIGHWAY
- SURFACE WATER
- FRUITLAND FORMATION (Kf)

OUTCROP ZONES

- BUREAU OF LAND MANAGEMENT
- COLORADO OIL AND GAS CONSERVATION COMMISSION

IMAGE COURTESY OF USDA/NRCS, 2009

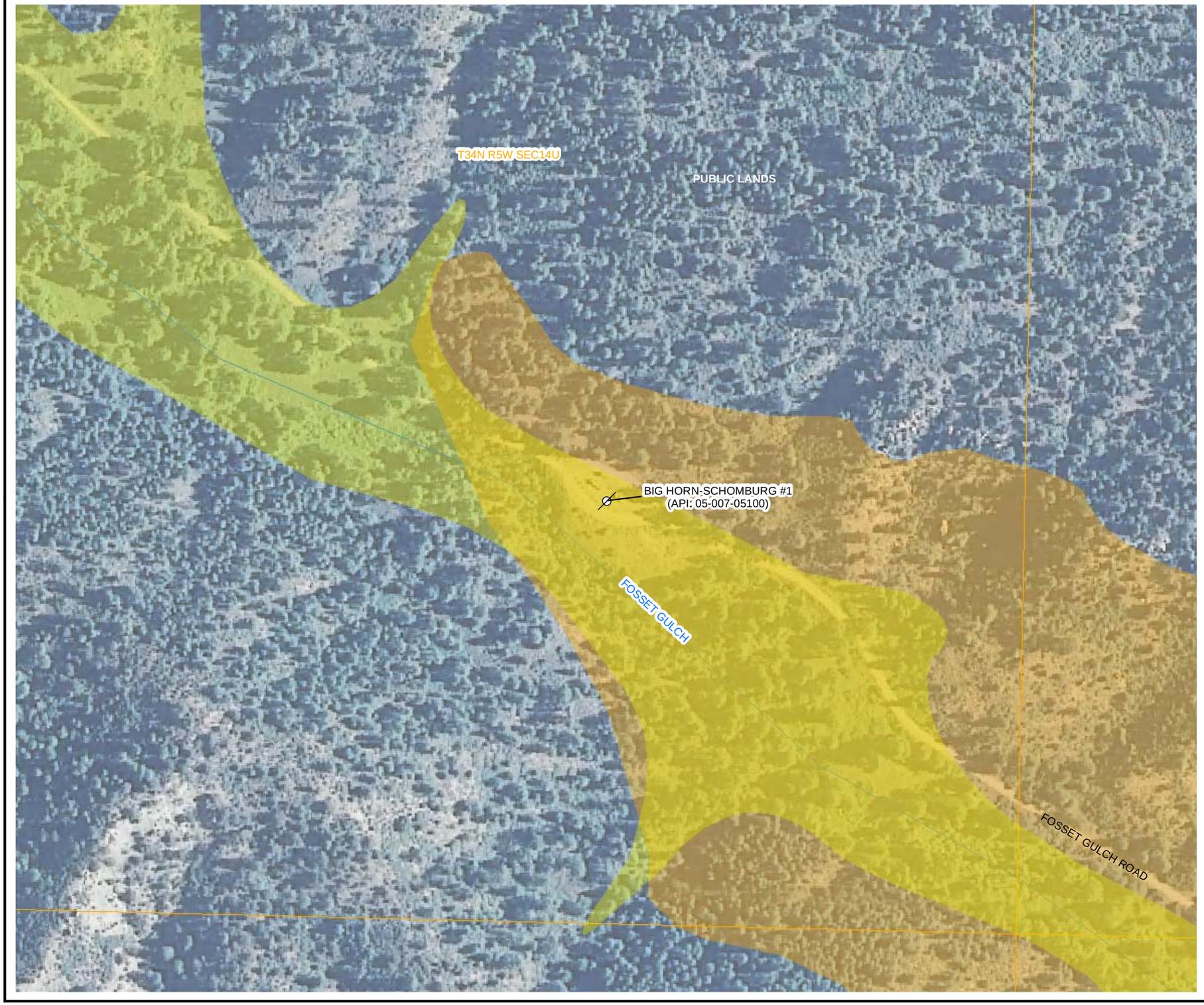
0 1.25 2.5
Miles

N

FIGURE 6
DRAINAGE TRANSECT MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 06 DRAINAGE.mxd



LEGEND

- ABANDONED PRODUCTION WELL
- PROPERTY BOUNDARY & OWNER (WHITE)
- SECTION
- SURFACE WATER

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

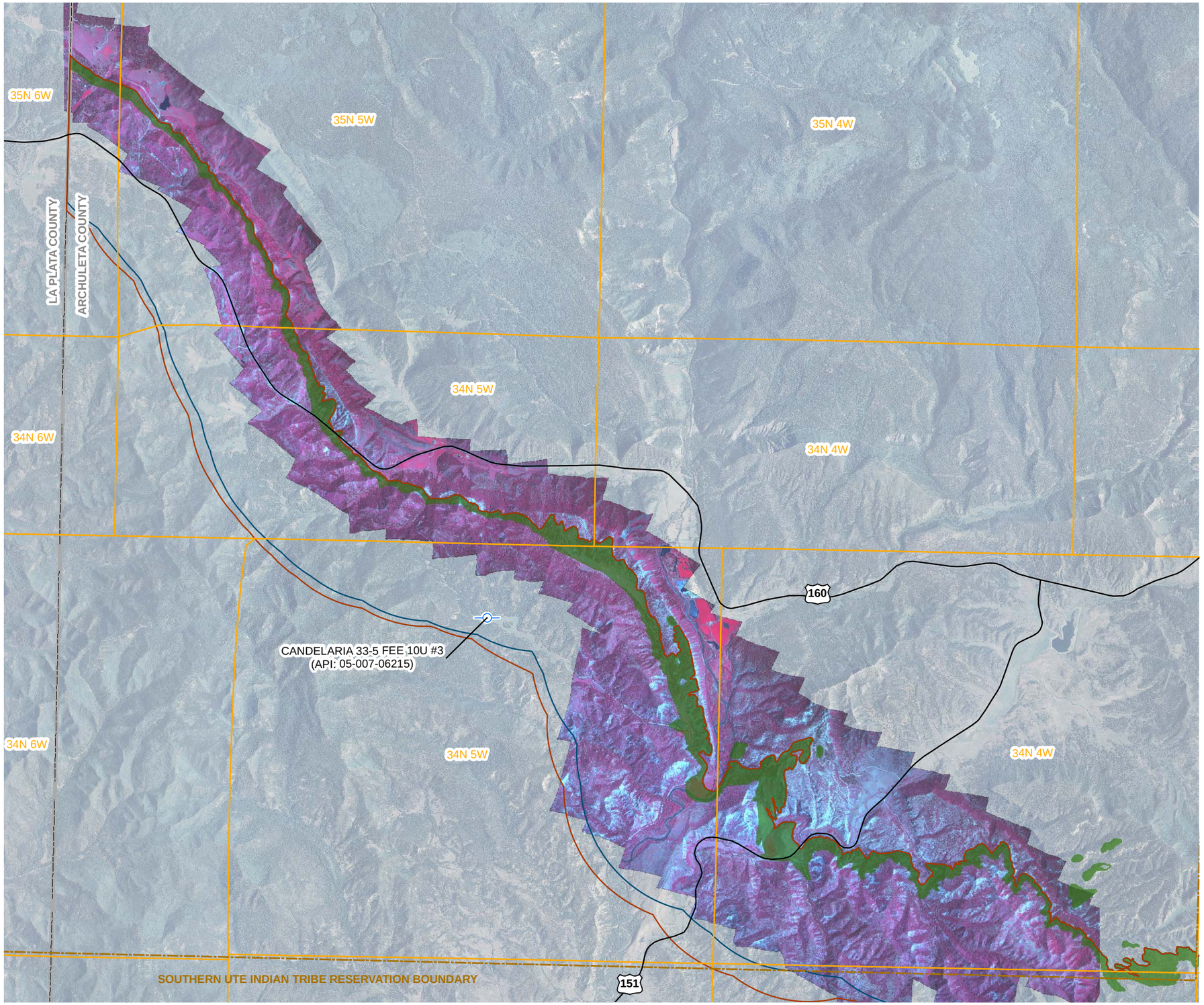
0 200 400
Feet

N

FIGURE 7
BIG HORN-SCHOMBURG #1
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 07 BIG HORN.mxd



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

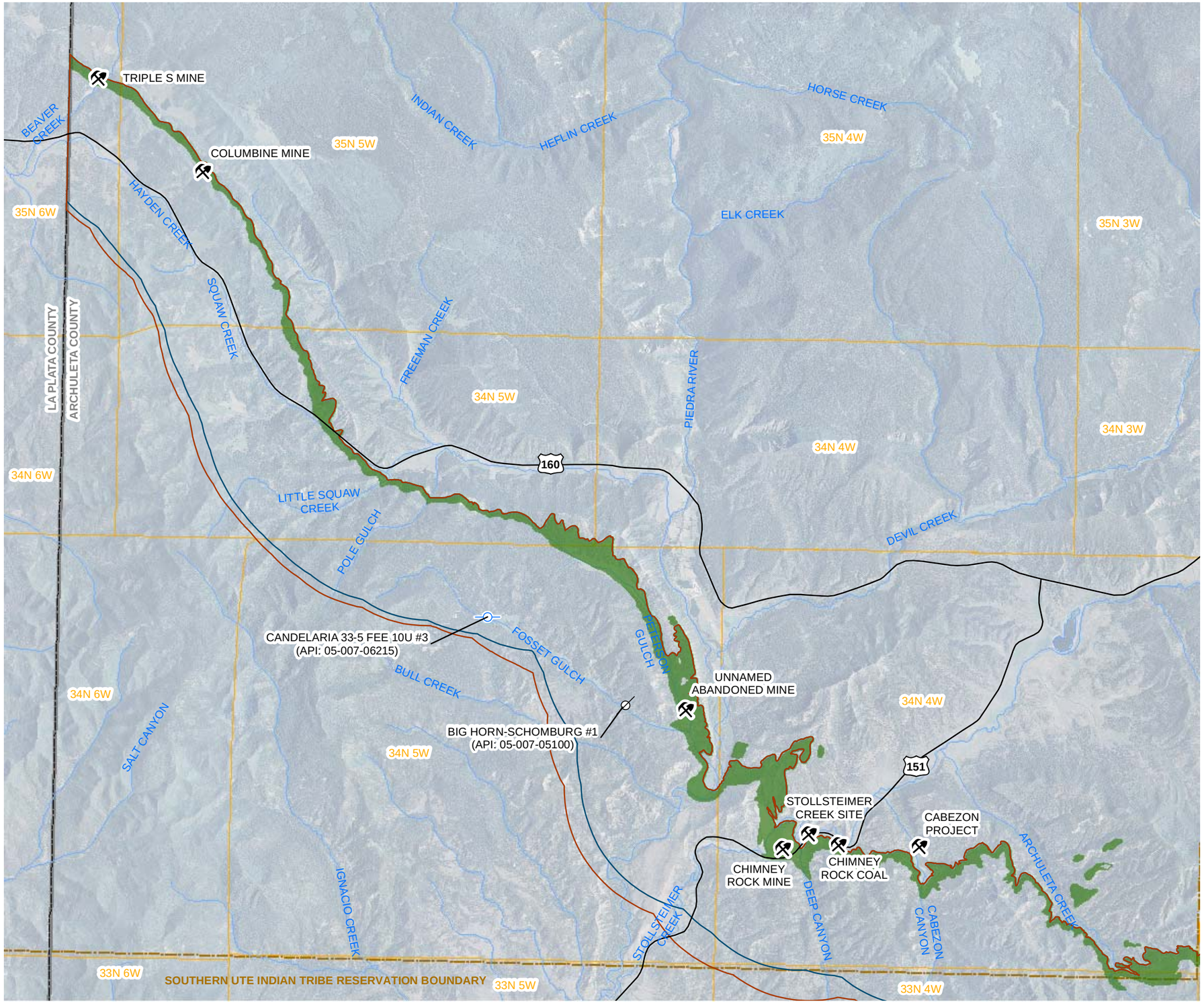
0 1.25 2.5
Miles

N

FIGURE 8
TYPICAL CIR MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 08 CIR.mxd



LEGEND

- SHUT IN WELL
- ABANDONED PRODUCTION WELL
- ABANDONED MINE
- HIGHWAY
- SURFACE WATER
- 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

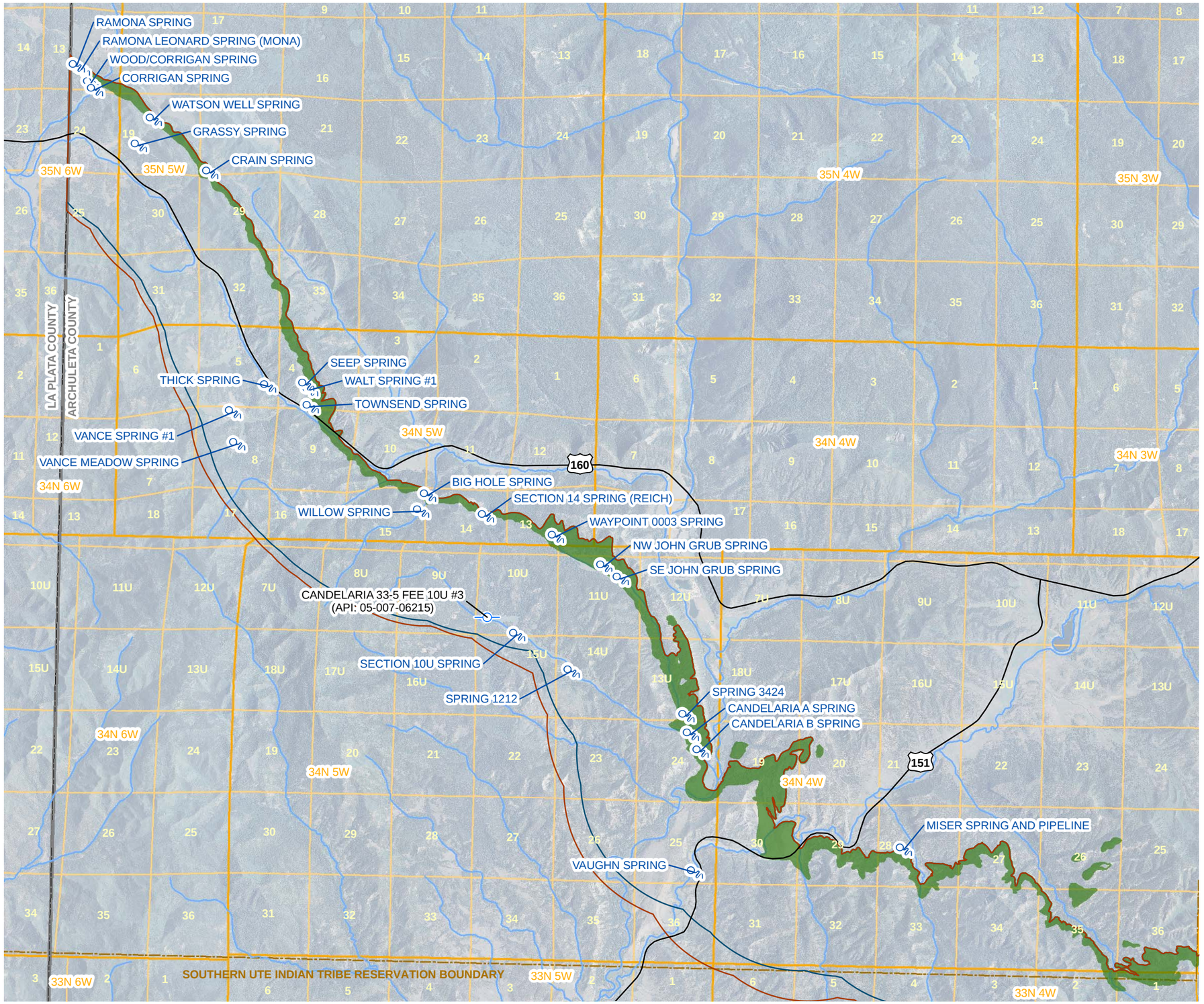
0 1.25 2.5
Miles

N

FIGURE 9
ABANDONED COAL MINE MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 09 MINES.mxd



LEGEND

- NATURAL SPRING
- SHUT IN WELL
- 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

IMAGE COURTESY OF USDA/NRCS, 2009

0 6,000 12,000

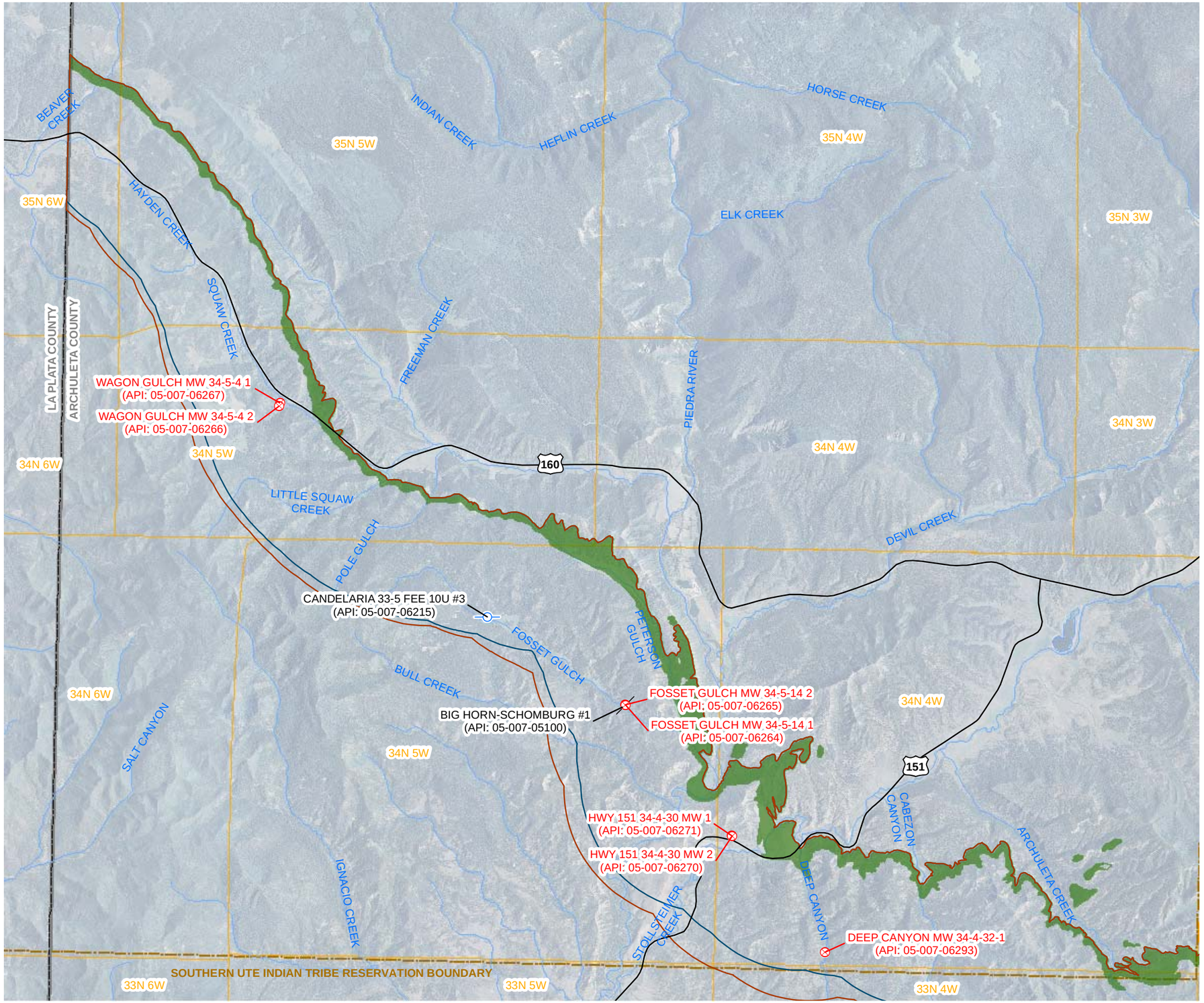
Feet

N

FIGURE 10
NATURAL SPRINGS MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 10 SPRINGS.mxd



LEGEND

- SHUT IN WELL
- ABANDONED PRODUCTION WELL
- COLORADO OIL & GAS CONSERVATION COMMISSION WELL
- HIGHWAY
- SURFACE WATER
- 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

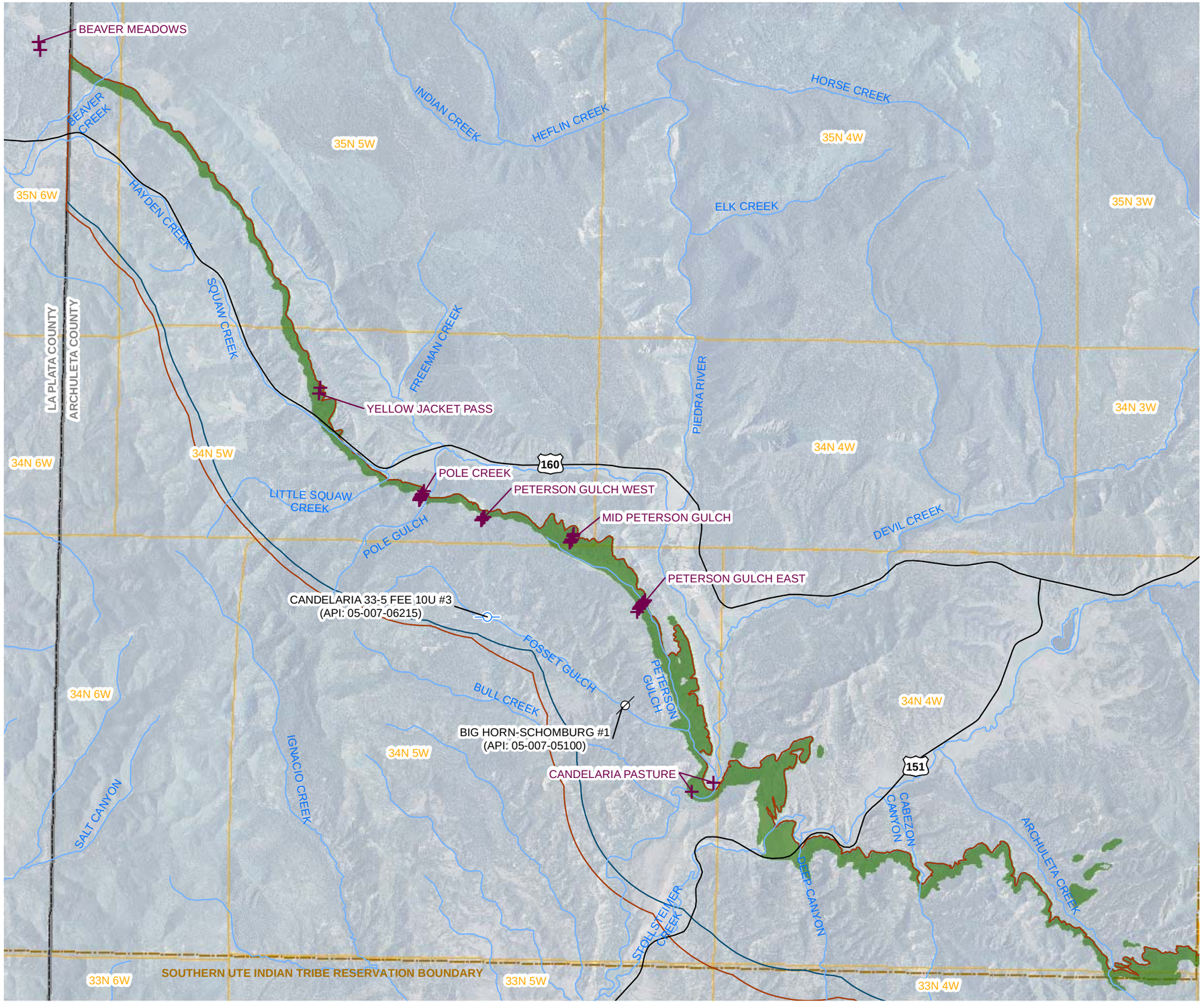
0 1.25 2.5
Miles

N

FIGURE 11
COGCC MONITORING WELLS MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 11 MW.mxd



LEGEND

- SHUT IN WELL
- ABANDONED PRODUCTION WELL
- SOIL VAPOR TUBE
- HIGHWAY
- SURFACE WATER
- 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

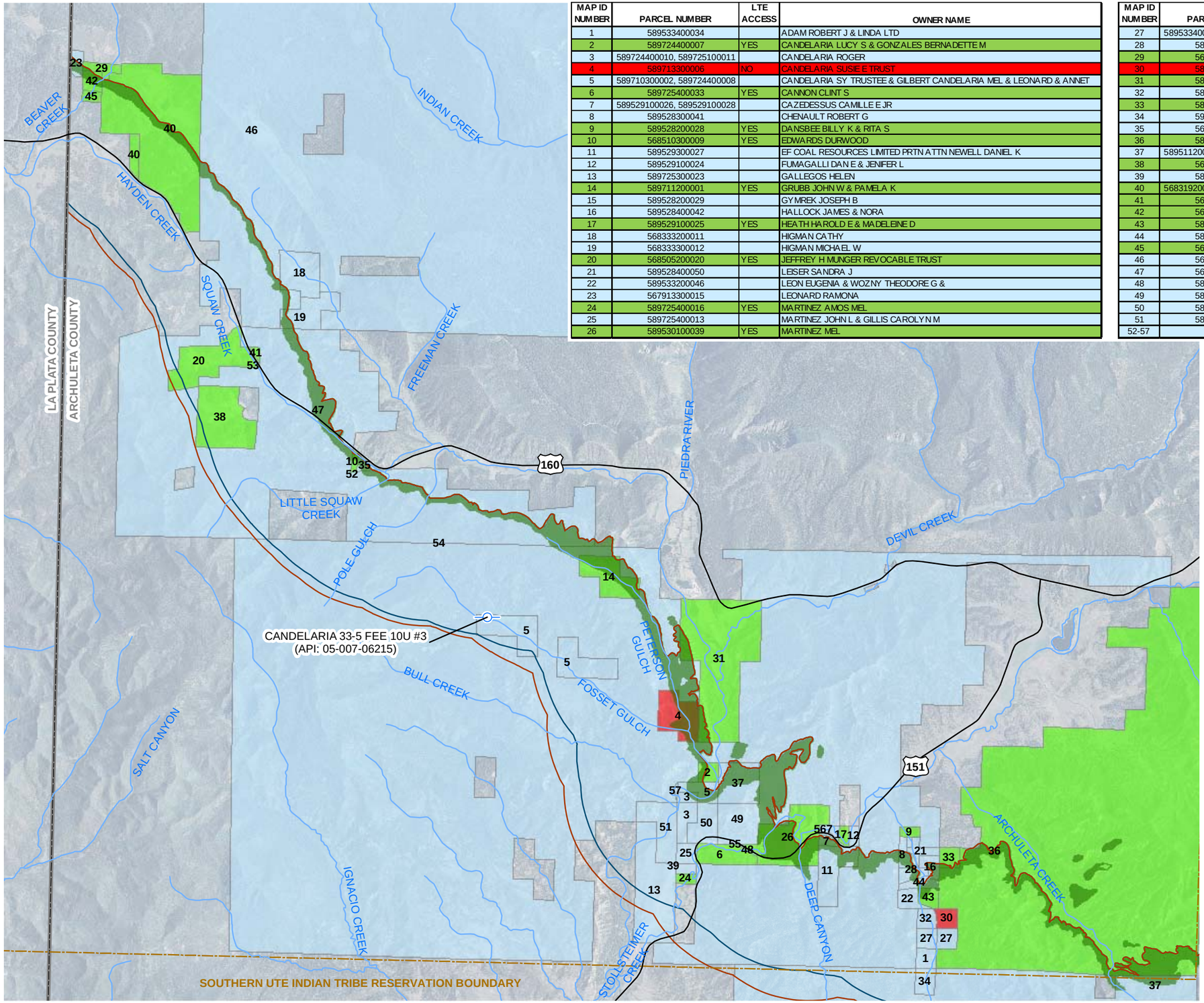
0 1.25 2.5
Miles

N

FIGURE 12
BLM SOIL VAPOR TUBE MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 12 SVT.mxd



MAP ID NUMBER	PARCEL NUMBER	LTE ACCESS	OWNER NAME
1	589533400034		ADAM ROBERT J & LINDA LTD
2	589724400007	YES	CANDELARIA LUCY S & GONZALES BERNADETTE M
3	589724400010, 589725100011		CANDELARIA ROGER
4	589713300006	NO	CANDELARIA SUSIE E TRUST
5	589710300002, 589724400008		CANDELARIA SY TRUSTEE & GILBERT CANDELARIA MEL & LEONARD & ANNET
6	589725400033	YES	CANNON CLINT S
7	589529100026, 589529100028		CAZEDESSUS CAMILLE E JR
8	589528300041		CHENAULT ROBERT G
9	589528200028	YES	DANSBEE BILLY K & RITA S
10	568510300009	YES	EDWARDS DURWOOD
11	589529300027		EF COAL RESOURCES LIMITED PRTN ATTN NEWELL DANIEL K
12	589529100024		FUMAGALLI DAN E & JENIFER L
13	589725300023		GALLEGOS HELEN
14	589711200001	YES	GRUBB JOHN W & PAMELA K
15	589528200029		GYMREK JOSEPH B
16	589528400042		HALLOCK JAMES & NORA
17	589529100025	YES	HEATH HAROLD E & MADELEINE D
18	568333200011		HIGMAN CATHY
19	568333300012		HIGMAN MICHAEL W
20	568505200020	YES	JEFFREY H MUNGER REVOCABLE TRUST
21	589528400050		LEISER SANDRA J
22	589533200046		LEON EUGENIA & WOZNY THEODORE G &
23	567913300015		LEONARD RAMONA
24	589725400016	YES	MARTINEZ AMOS MEL
25	589725400013		MARTINEZ JOHN L & GILLIS CAROLYN M
26	589530100039	YES	MARTINEZ MEL

MAP ID NUMBER	PARCEL NUMBER	LTE ACCESS	OWNER NAME
27	589533400033, 589533400048		MODISETTE JERRY L & BEVERLY A
28	589528400049		MUHLIG BRITT & MAYUMI
29	567913400016	YES	PEINADO EMILIO JR & KAREN R
30	589533100045	NO	PETSCH GLORIA A
31	589712400012	YES	RAFTER T LLC
32	589533100047		SCHAEFER JAMES & NANCY
33	589528400051	YES	SCHUCHARDT JOSEPH III & SIRI
34	596104100002		TOMFORDE PHILIP J & ANNE G
35	568510300010		TRACY BRYAN H & MARITES G
36	589701400003	YES	UNITED STATES OF AMERICA FOREST SERV; DEPT OF AGRICULTURE
37	589511200003, 596116200005		UNITED STATES OF AMERICA T/F SOUTHERN UTE TRIBE
38	568508100020	YES	VANCE WILLIAM S JR
39	589725400015		VAUGHN LARRY C
40	568319200034, 568319300003	YES	WATSON DAVID LLOYD & WATSON DALE LLOYD
41	568505100016	YES	WEISS GRETCHEN A
42	567913400017	YES	WOOD LEE THOMAS & PEGGY DARLENE
43	589528400053	YES	WOZNY THEODORE G TRUST ACCOUNT
44	589528400043		WRIGHT JEAN PAUL & SUSAN
45	567924100018	YES	ZWISLER MARTIN AND JANE TRUST
46	568301100001		PUBLIC LANDS
47	568501100001		PUBLIC LANDS
48	5895303-DEPT		PUBLIC LANDS
49	589701400004		PUBLIC LANDS
50	589725100012		PUBLIC LANDS
51	589726400024		PUBLIC LANDS
52-57			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

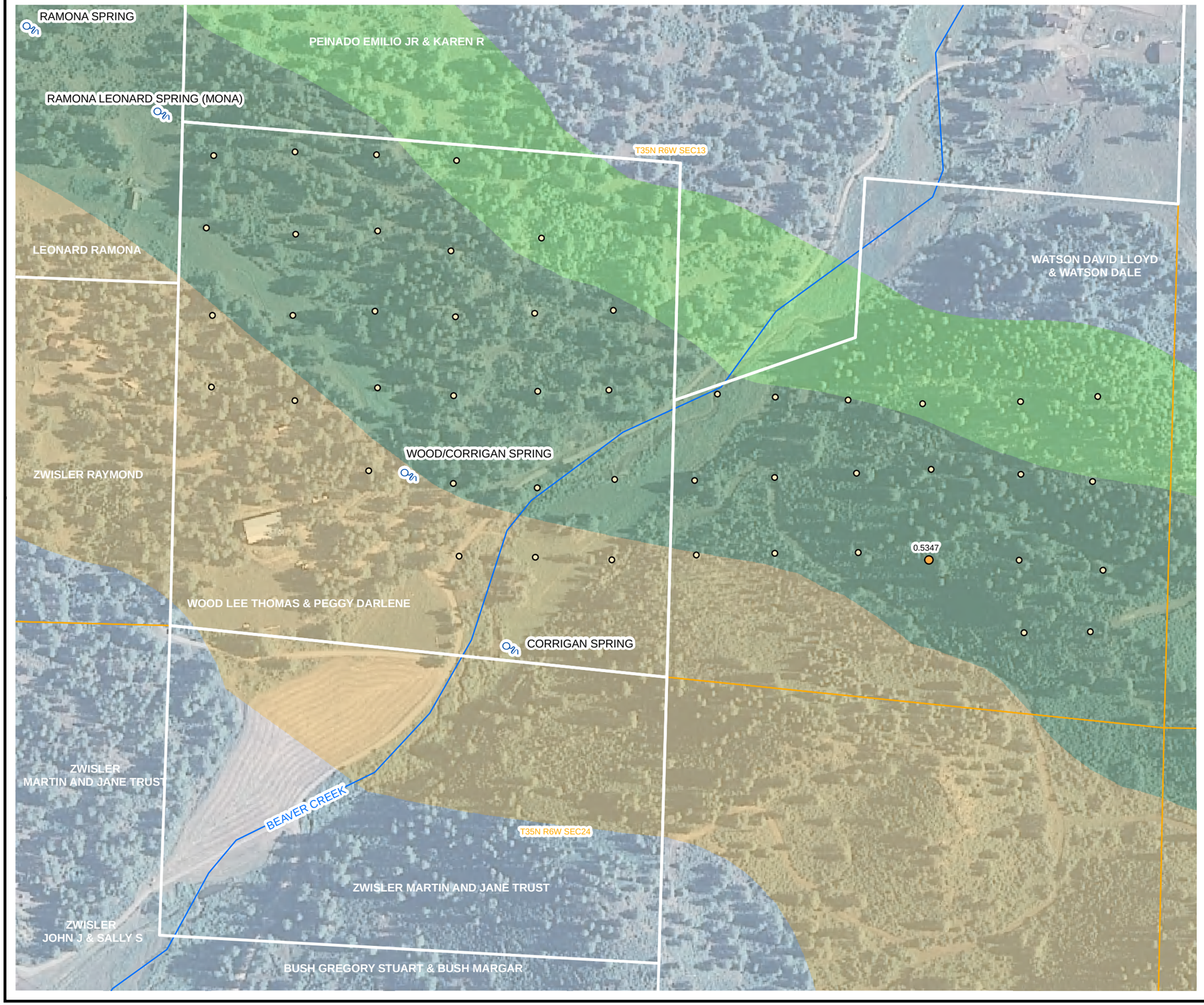
0 1.25 2.5
Miles

N

FIGURE 13
PROPERTY ACCESS MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 13 ACCESS.mxd



LEGEND

NATURAL SPRING

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

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

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

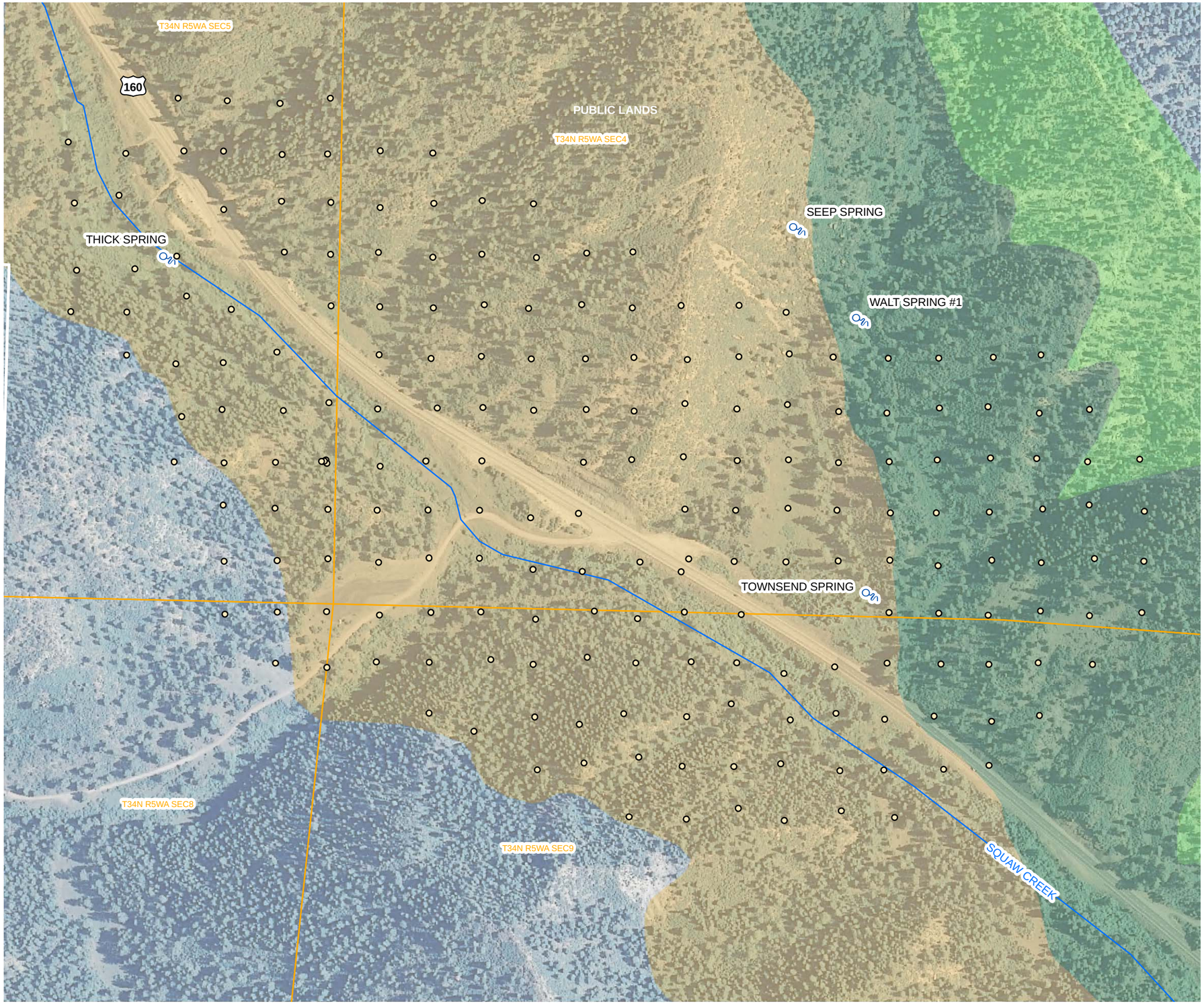
IMAGE COURTESY OF USDA/NRCS, 2009

0 250 500
Feet

N

FIGURE 14
METHANE FLUX CONTOURS
BEAVER CREEK
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

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

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

METHANE FLUX CONTOUR (mol/m^2 day)

CONTOUR INTERVAL VARIES

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

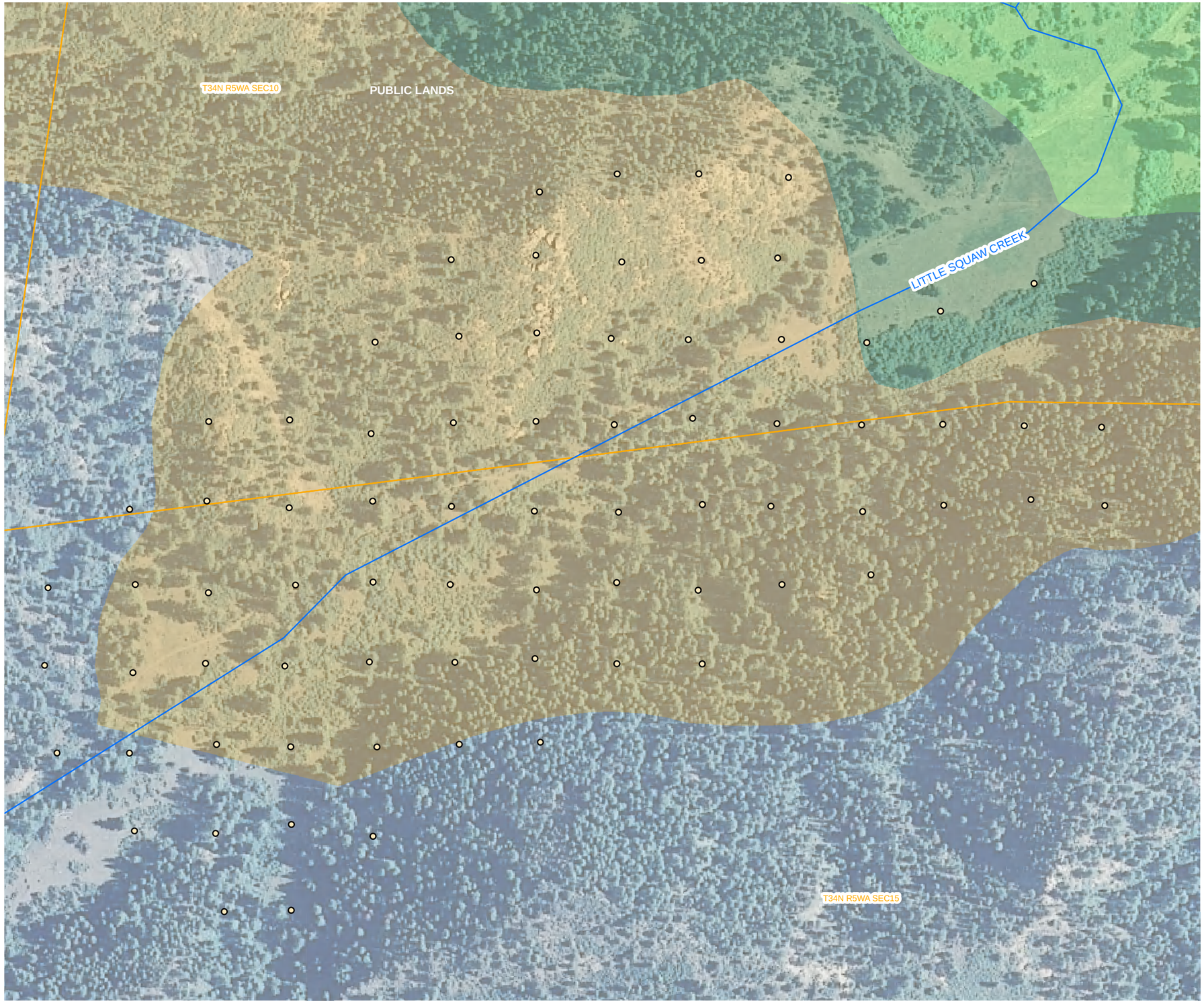
IMAGE COURTESY OF USDA/NRCS, 2009

0 400 800
Feet

N

FIGURE 15
METHANE FLUX CONTOURS
SQUAW CREEK
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

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

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

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

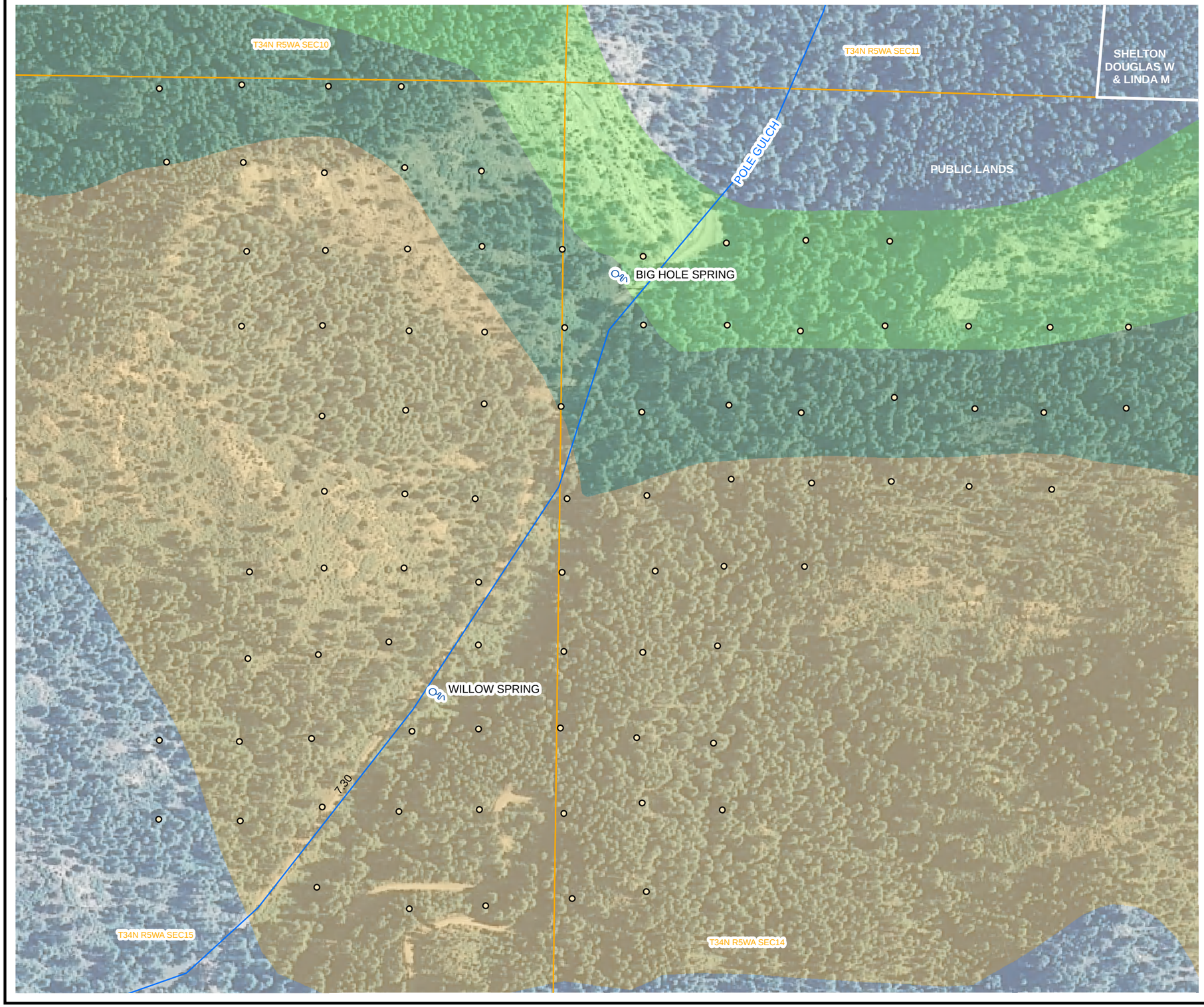
IMAGE COURTESY OF USDA/NRCS, 2009

0 250 500
Feet

N

FIGURE 16
METHANE FLUX CONTOURS
LITTLE SQUAW CREEK
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

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

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

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

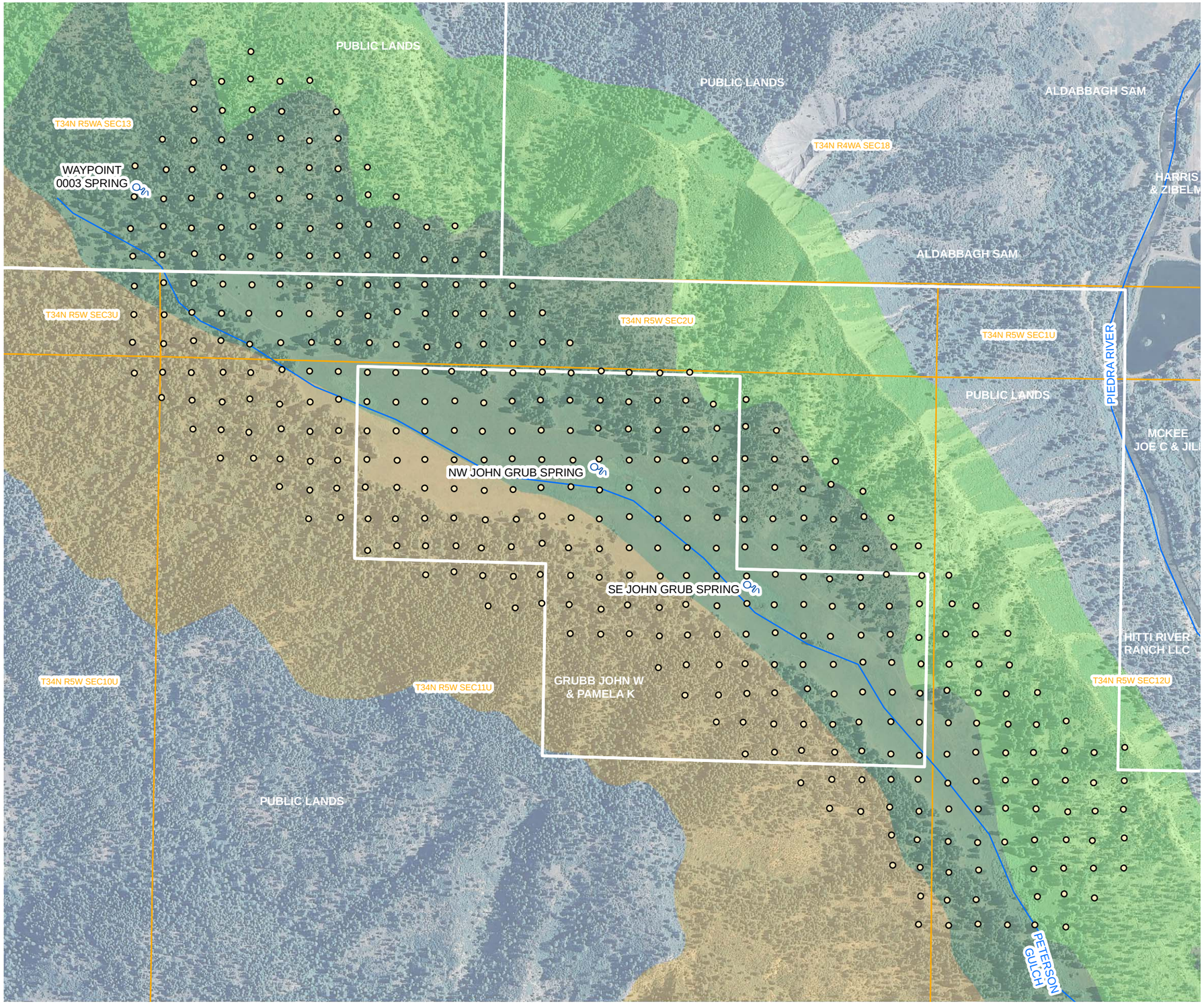
IMAGE COURTESY OF USDA/NRCS, 2009

0 250 500
Feet

N

FIGURE 17
METHANE FLUX CONTOURS
POLE GULCH
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

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

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

METHANE FLUX CONTOUR (mol/m^2 day)

CONTOUR INTERVAL VARIES

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF USDA/NRCS, 2009

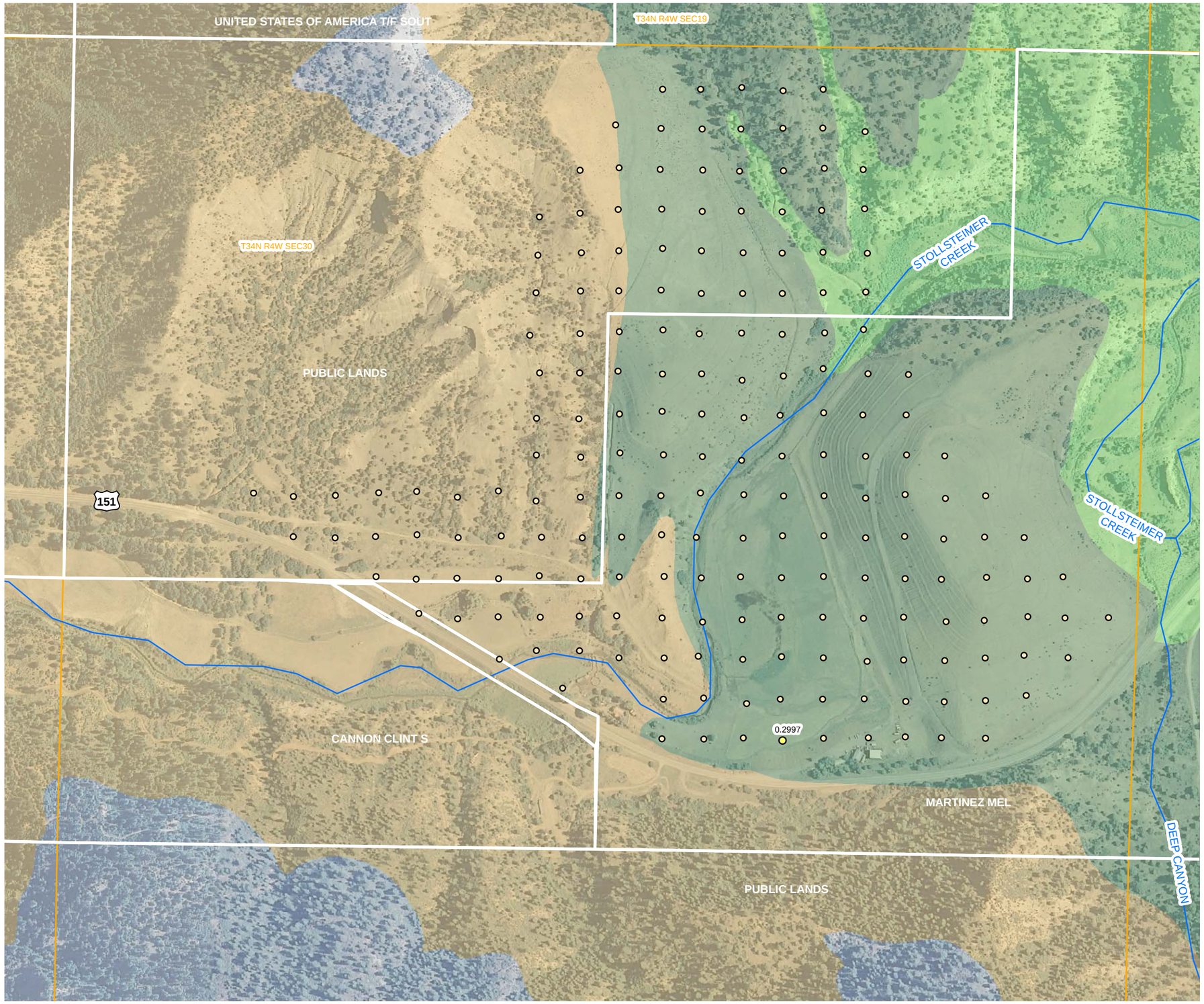
0 700 1,400

Feet

N

FIGURE 18
METHANE FLUX CONTOURS
PETERSON GULCH
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

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

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

METHANE FLUX CONTOUR (mol/m^2 day)

CONTOUR INTERVAL VARIES

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

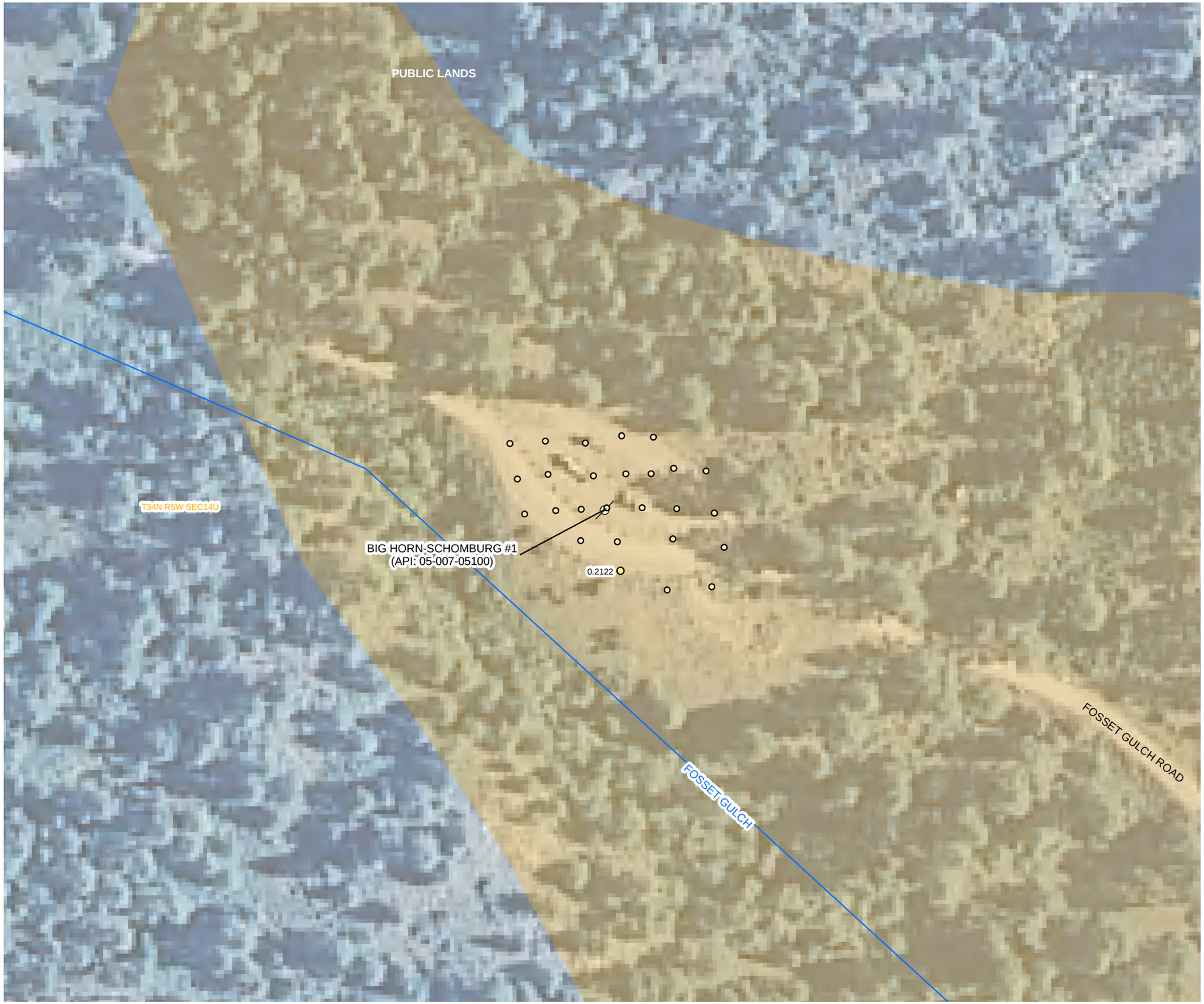
IMAGE COURTESY OF USDA/NRCS, 2009

0 500 1,000
Feet

N

FIGURE 19
METHANE FLUX CONTOURS
STOLLSTEIMER CREEK
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 14 CH4.mxd



LEGEND

NATURAL SPRING

ABANDONED PRODUCTION WELL

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

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

METHANE FLUX CONTOUR (mol/m^2 day)

CONTOUR INTERVAL VARIES

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

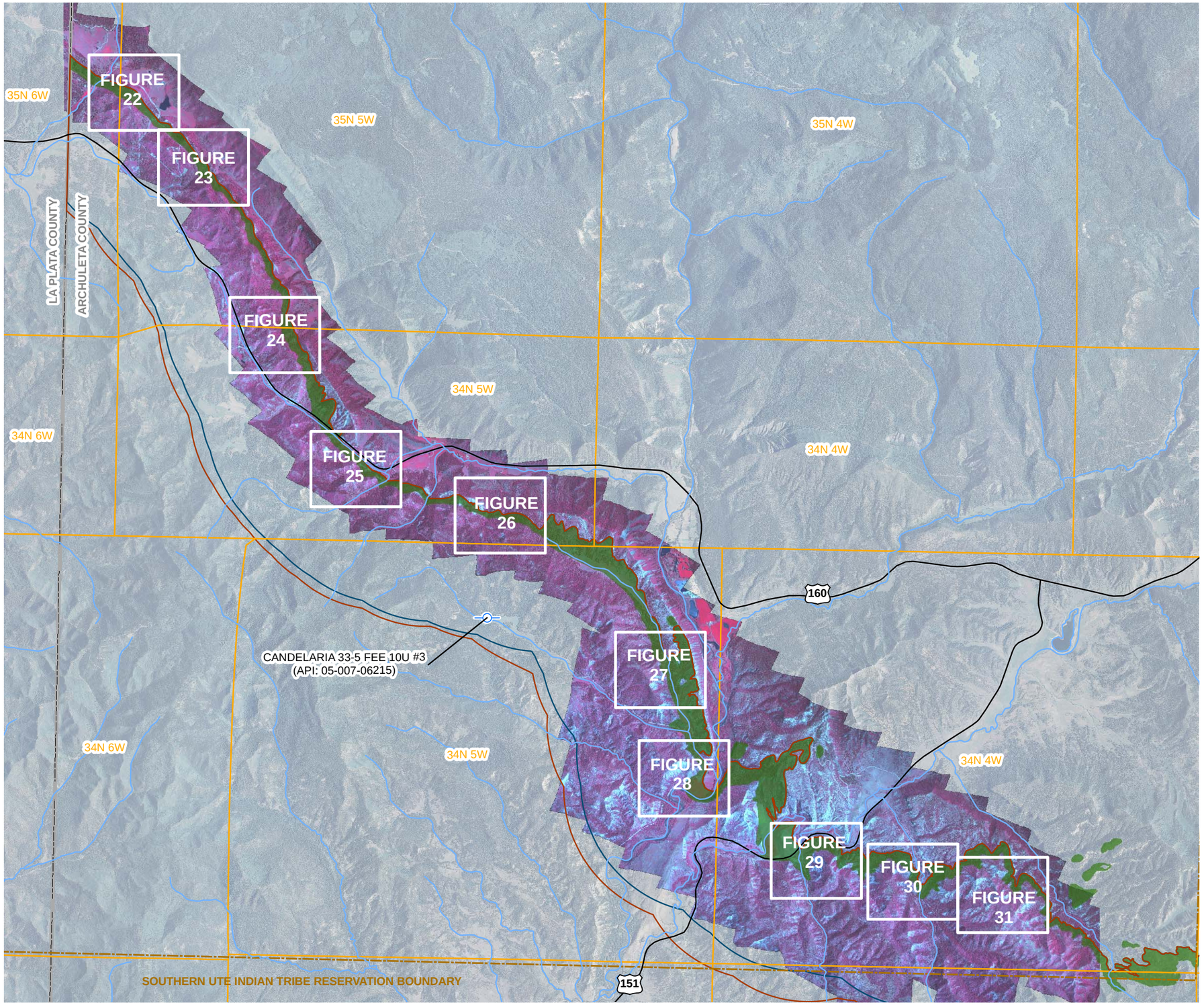
IMAGE COURTESY OF USDA/NRCS, 2009

0 80 160
Feet

N

FIGURE 20
METHANE FLUX CONTOURS
BIG HORN-SCHOMBURG #1
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 14 CH4.mxd



LEGEND

- SHUT IN WELL
- HIGHWAY
- SURFACE WATER
- 2011 SUSPECTED METHANE SEEP FIGURE LAYOUT (WHITE)
- 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 IMAGE COURTESY OF AGRO ENGINEERING, 2011

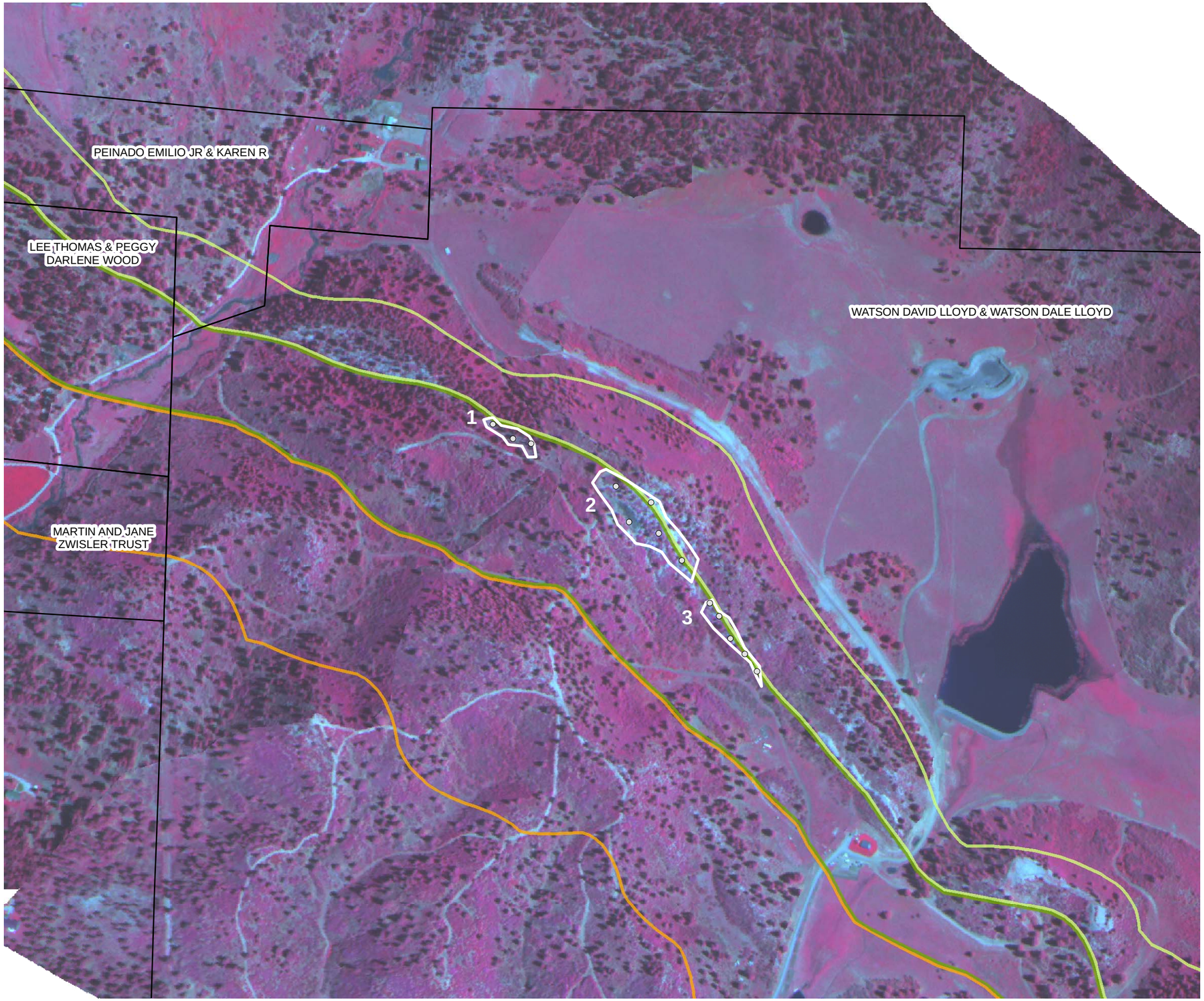
0 1.25 2.5
Miles

N

FIGURE 21
SUSPECT AREA LOCATION MAP
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 21 SUSPECT LAYOUT.mxd



LEGEND

2011 SUSPECT METHANE SEEP (WHITE)

PARCEL BOUNDARY & OWNER

COUNTY BOUNDARY

SUBSURFACE METHANE MEASUREMENT

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

ppm: PARTS PER MILLION

%: PERCENT

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

COLOR INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2011

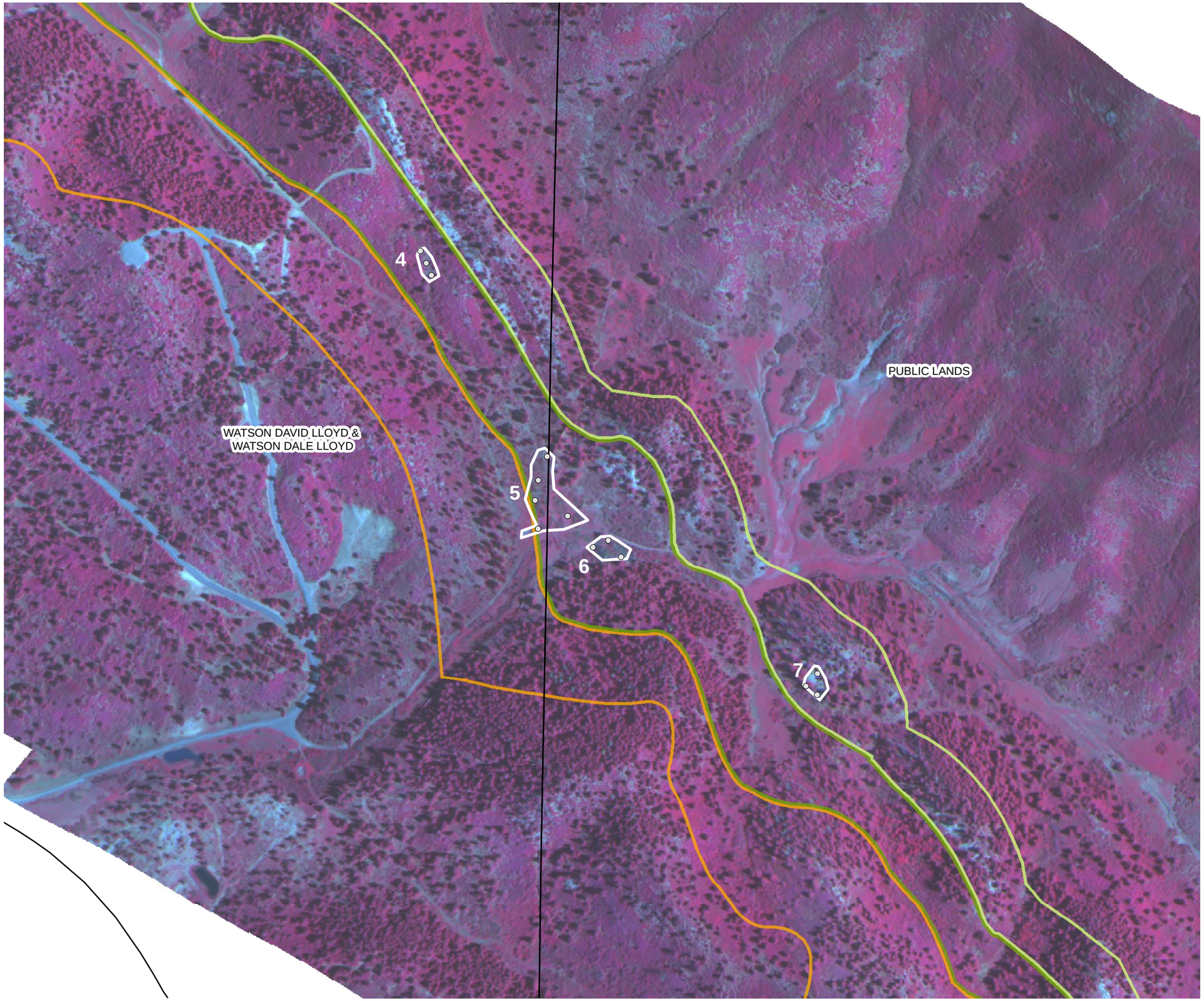
0 500 1,000

Feet

N

FIGURE 22
DETAILED SUSPECT AREA MAP
AREAS 1-3
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 22 CIR SUSPECT.mxd



LEGEND

2011 SUSPECT METHANE SEEP (WHITE)

PARCEL BOUNDARY & OWNER

COUNTY BOUNDARY

SUBSURFACE METHANE MEASUREMENT

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

ppm: PARTS PER MILLION

%: PERCENT

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

COLOR INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2011

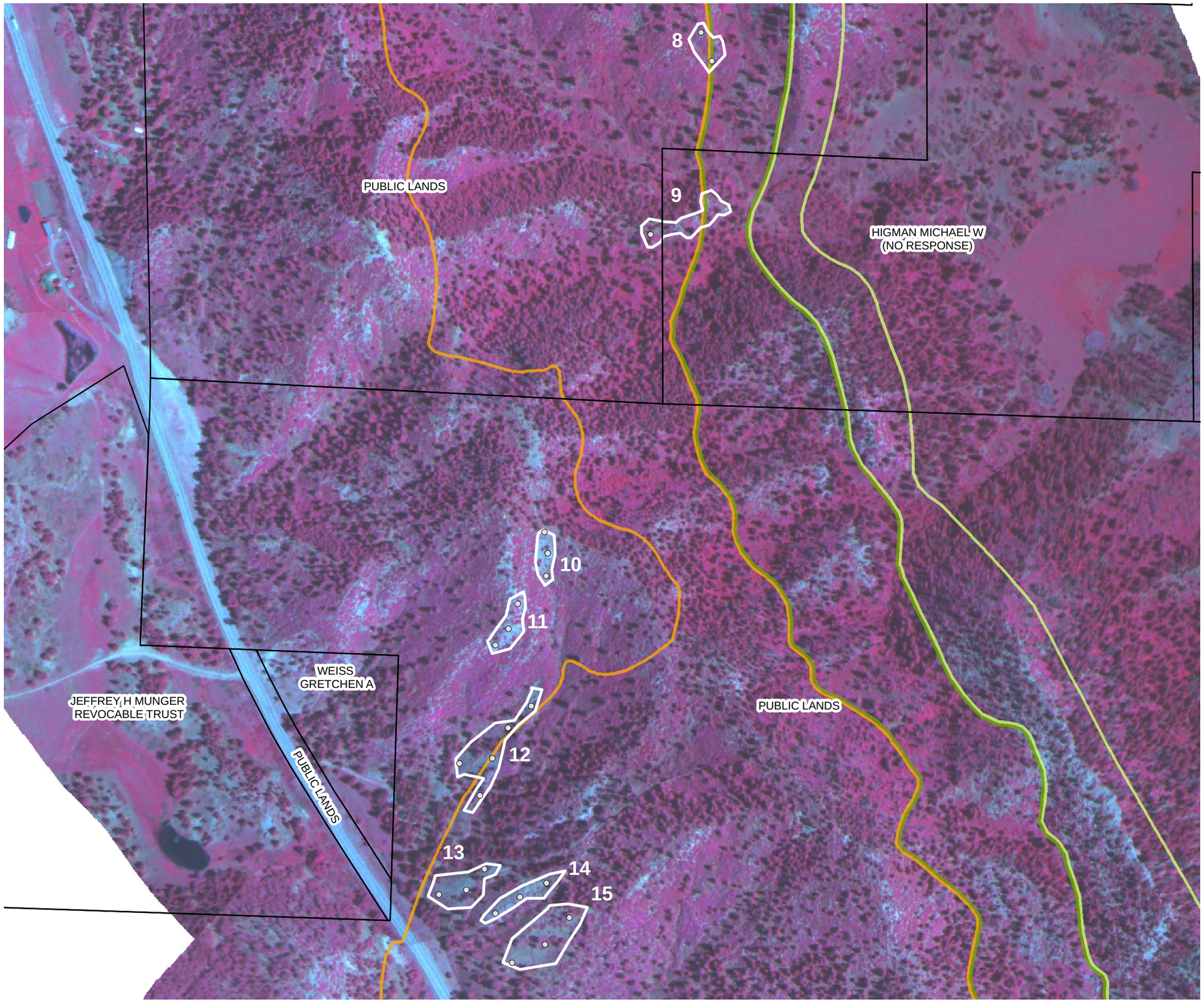
0 500 1,000

Feet

N

FIGURE 23
DETAILED SUSPECT AREA MAP
AREAS 4-7
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 22 CIR SUSPECT.mxd



LEGEND

2011 SUSPECT METHANE SEEP (WHITE)

PARCEL BOUNDARY & OWNER

COUNTY BOUNDARY

SUBSURFACE METHANE MEASUREMENT

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

ppm: PARTS PER MILLION

%: PERCENT

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

COLOR INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2011

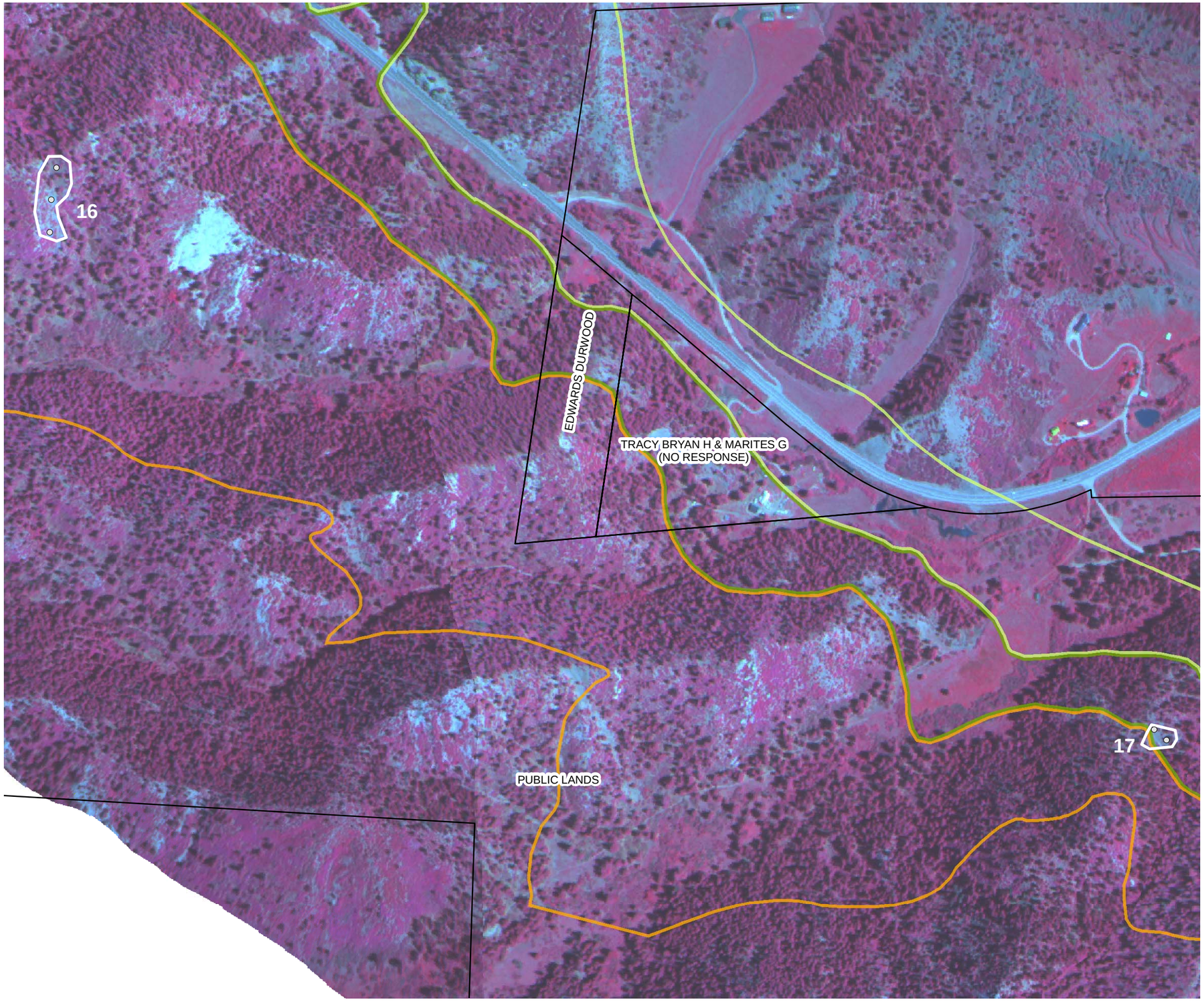
0 500 1,000

Feet

N

FIGURE 24
DETAILED SUSPECT AREA MAP
AREAS 8-15
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 22 CIR SUSPECT.mxd



LEGEND

2011 SUSPECT METHANE SEEP (WHITE)

PARCEL BOUNDARY & OWNER

COUNTY BOUNDARY

SUBSURFACE METHANE MEASUREMENT

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

ppm: PARTS PER MILLION

%: PERCENT

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

COLOR INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2011

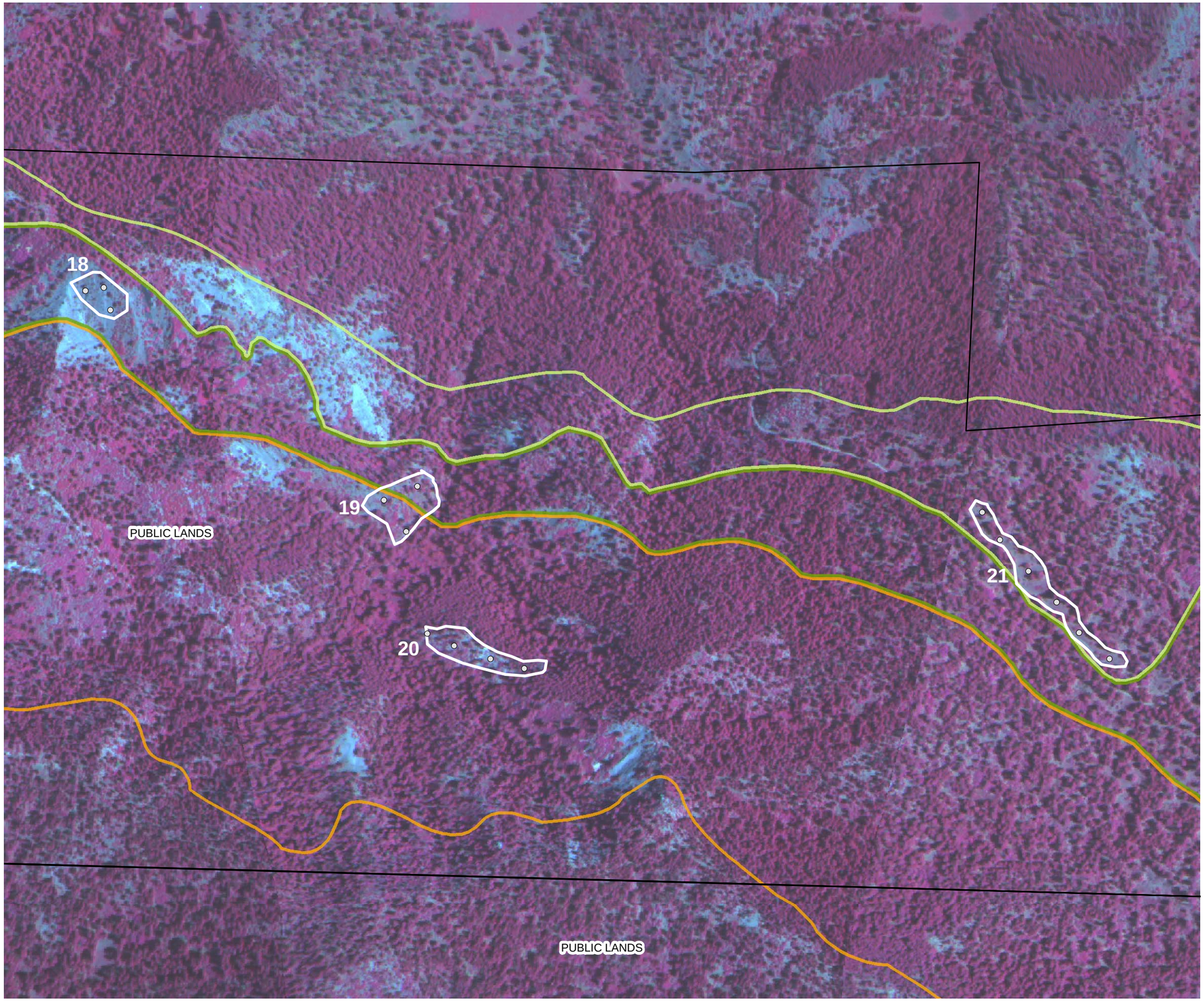
0 500 1,000

Feet

N

FIGURE 25
DETAILED SUSPECT AREA MAP
AREAS 16-17
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 22 CIR SUSPECT.mxd



LEGEND

2011 SUSPECT METHANE SEEP (WHITE)

PARCEL BOUNDARY & OWNER

COUNTY BOUNDARY

SUBSURFACE METHANE MEASUREMENT

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

ppm: PARTS PER MILLION

%: PERCENT

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

COLOR INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2011

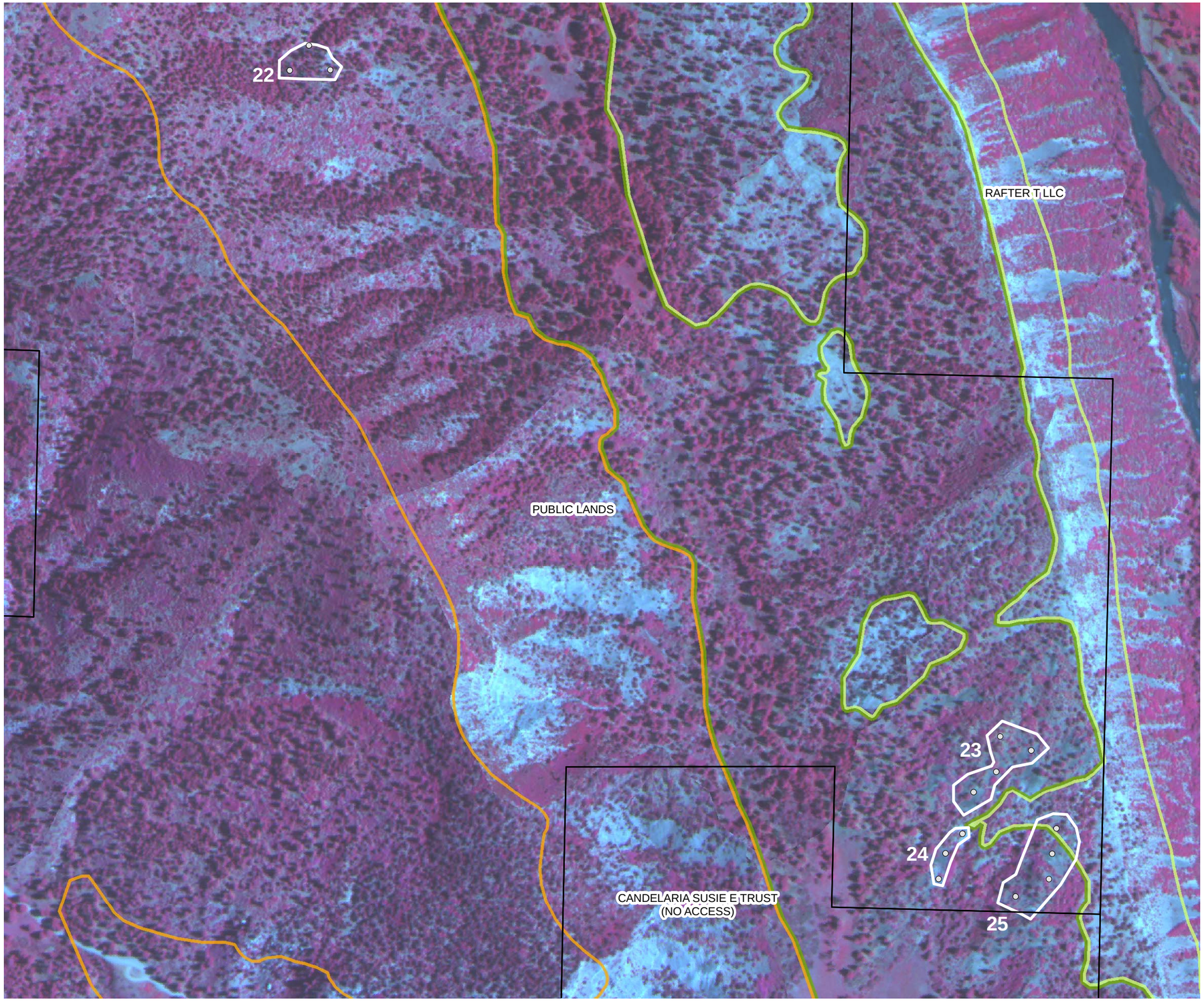
0 500 1,000

Feet

N

FIGURE 26
DETAILED SUSPECT AREA MAP
AREAS 18-21
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 22 CIR SUSPECT.mxd



LEGEND

2011 SUSPECT METHANE SEEP (WHITE)

PARCEL BOUNDARY & OWNER

COUNTY BOUNDARY

SUBSURFACE METHANE MEASUREMENT

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

ppm: PARTS PER MILLION

%: PERCENT

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

COLOR INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2011

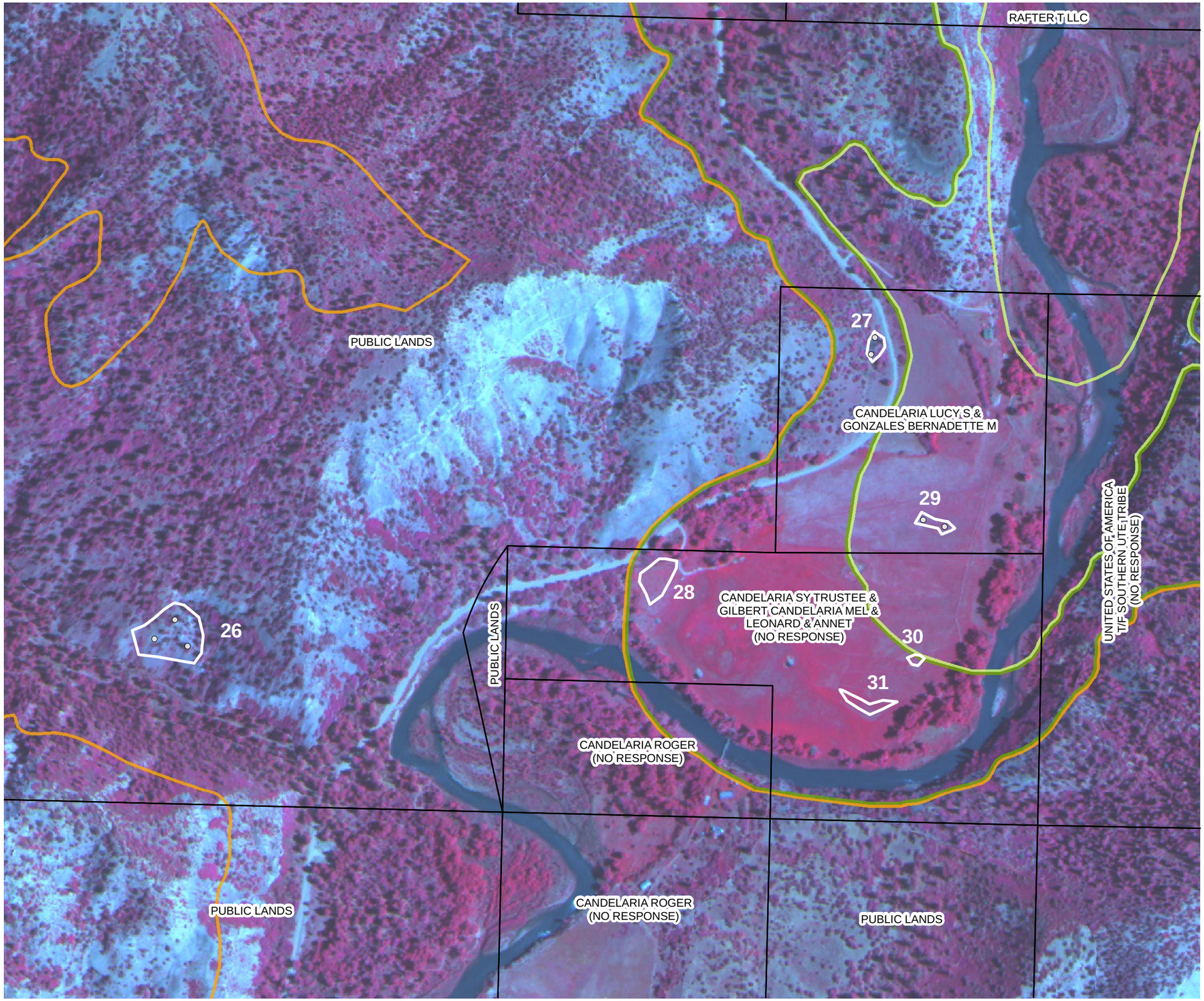
0 500 1,000

Feet

N

FIGURE 27
DETAILED SUSPECT AREA MAP
AREAS 22-25
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 22 CIR SUSPECT.mxd



LEGEND

2011 SUSPECT METHANE SEEP (WHITE)

PARCEL BOUNDARY & OWNER

COUNTY BOUNDARY

SUBSURFACE METHANE MEASUREMENT

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

ppm: PARTS PER MILLION

%: PERCENT

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

COLOR INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2011

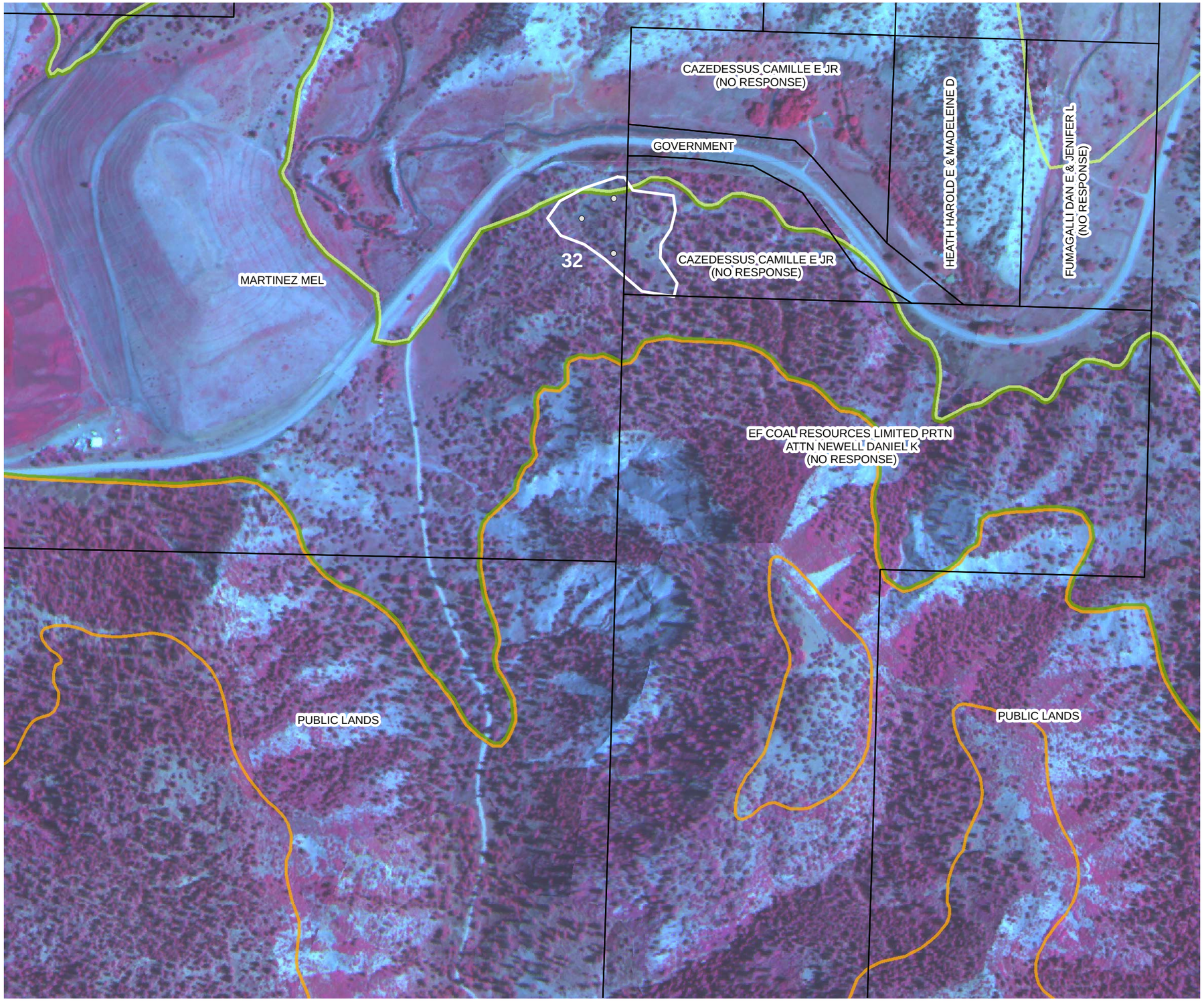
0 500 1,000

Feet

N

FIGURE 28
DETAILED SUSPECT AREA MAP
AREAS 26-31
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 22 CIR SUSPECT.mxd



LEGEND

2011 SUSPECT METHANE SEEP (WHITE)

PARCEL BOUNDARY & OWNER

COUNTY BOUNDARY

SUBSURFACE METHANE MEASUREMENT

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

ppm: PARTS PER MILLION

%: PERCENT

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

COLOR INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2011

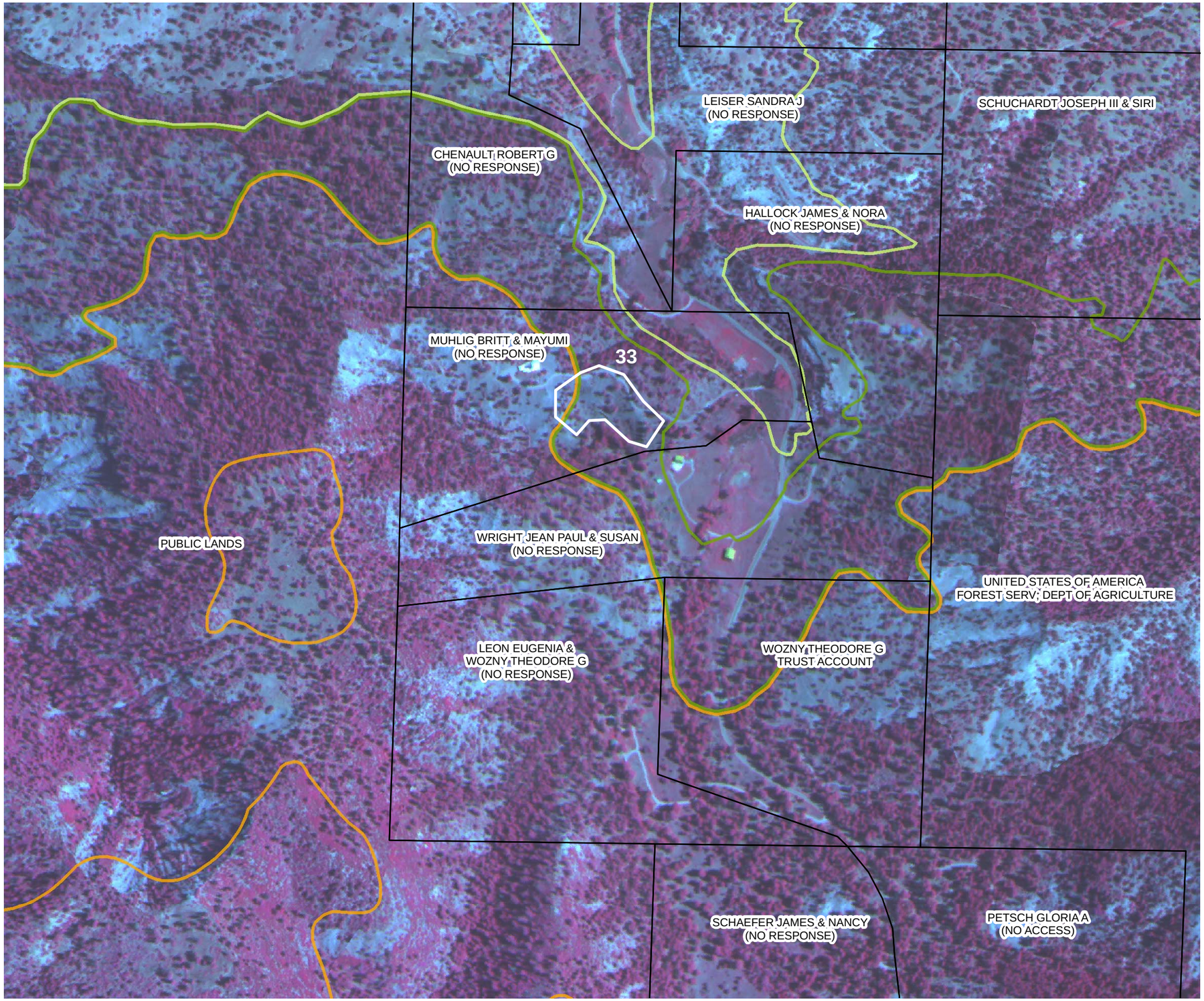
0 500 1,000

Feet

N

FIGURE 29
DETAILED SUSPECT AREA MAP
AREA 32
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 22 CIR SUSPECT.mxd



LEGEND

2011 SUSPECT METHANE SEEP (WHITE)

PARCEL BOUNDARY & OWNER

COUNTY BOUNDARY

SUBSURFACE METHANE MEASUREMENT

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

ppm: PARTS PER MILLION

%: PERCENT

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

COLOR INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2011

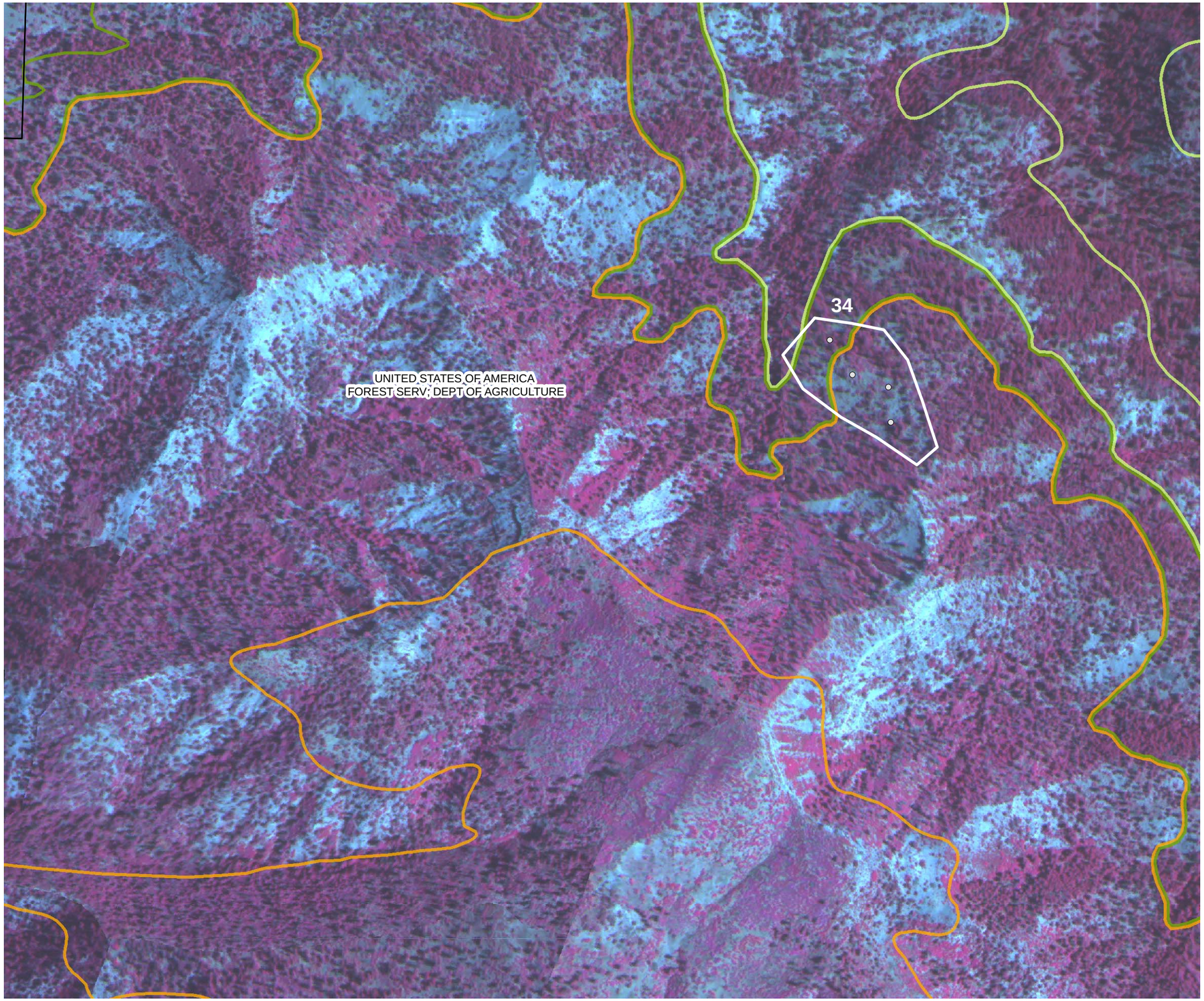
0 500 1,000

Feet

N

FIGURE 30
DETAILED SUSPECT AREA MAP
AREA 33
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 22 CIR SUSPECT.mxd



LEGEND

2011 SUSPECT METHANE SEEP (WHITE)

PARCEL BOUNDARY & OWNER

COUNTY BOUNDARY

SUBSURFACE METHANE MEASUREMENT

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

ppm: PARTS PER MILLION

%: PERCENT

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

COLOR INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2011

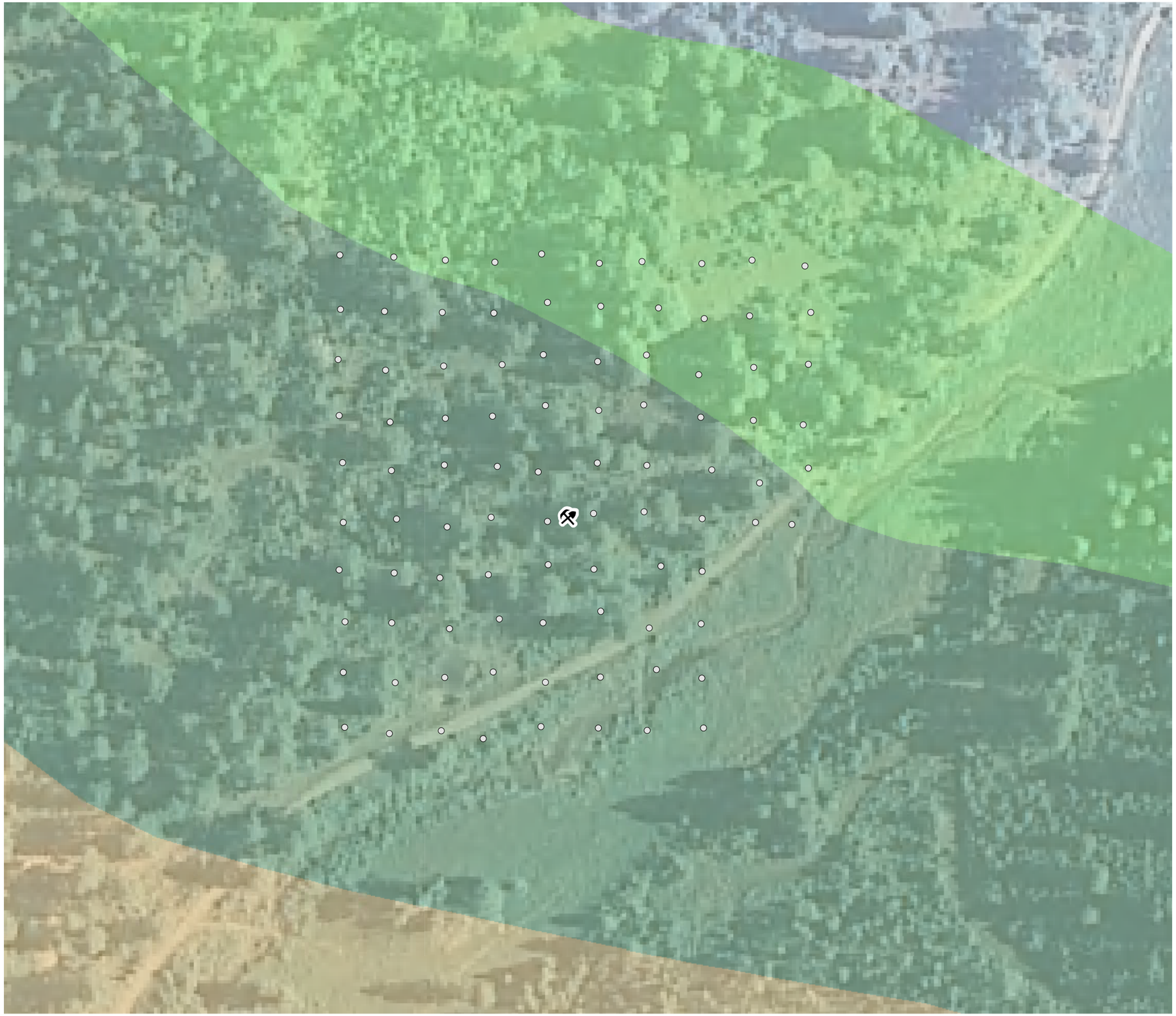
0 500 1,000

Feet

N

FIGURE 31
DETAILED SUSPECT AREA MAP
AREA 34
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 22 CIR SUSPECT.mxd



LEGEND

MINE ENTRANCE

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 0ppm ARE LABELED

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

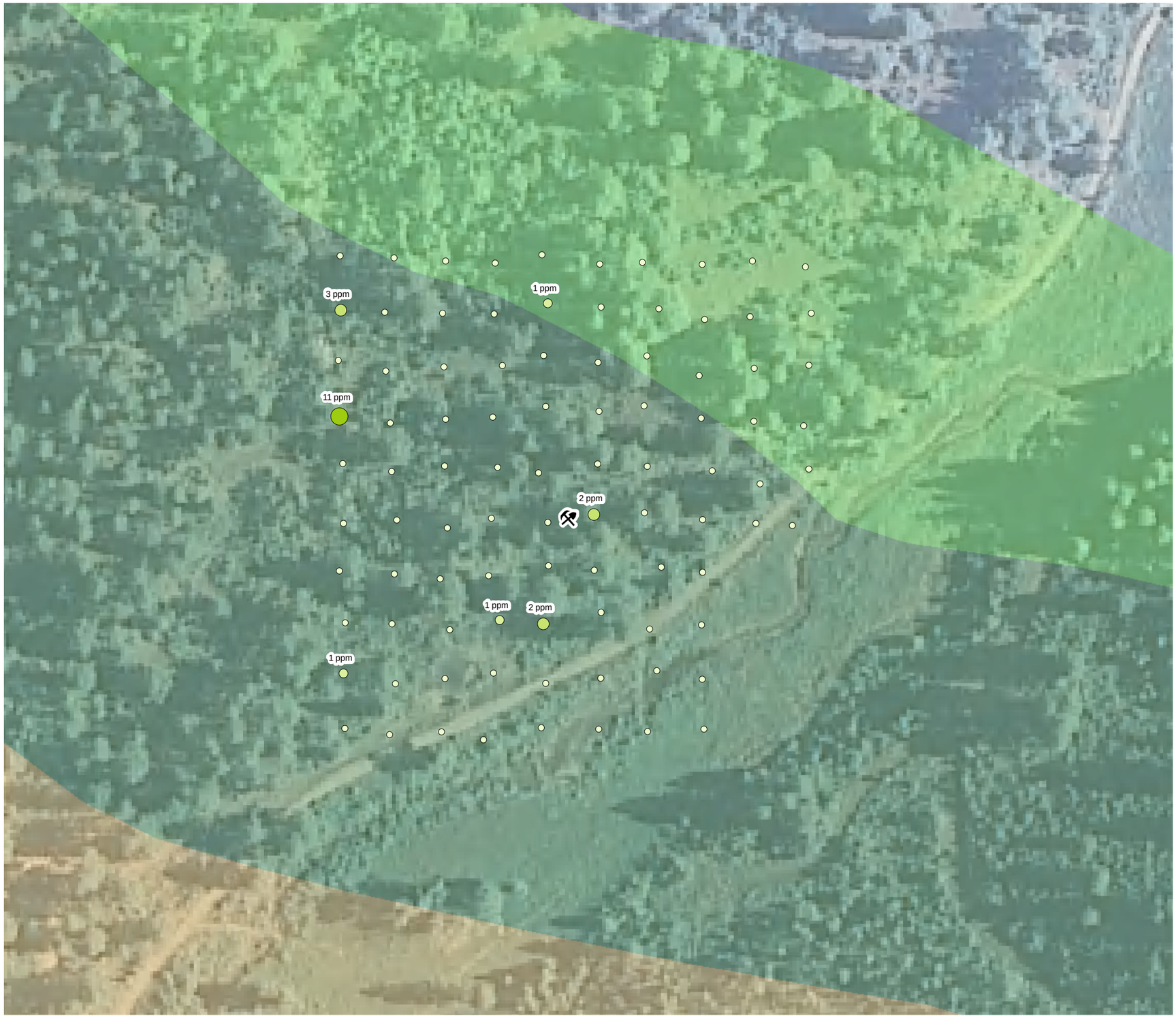
0 100 200

Feet

N

FIGURE 32
METHANE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 32 MINES CH4.mxd



LEGEND

MINE ENTRANCE

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

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 33
CARBON MONOXIDE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 33 MINES CO.mxd

LEGEND

MINE ENTRANCE

SUBURFACE CARBON DIOXIDE MEASUREMENT

- 0 - 2,500 ppm
- 2,500.1 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 41.9%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

GEOLOGY

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

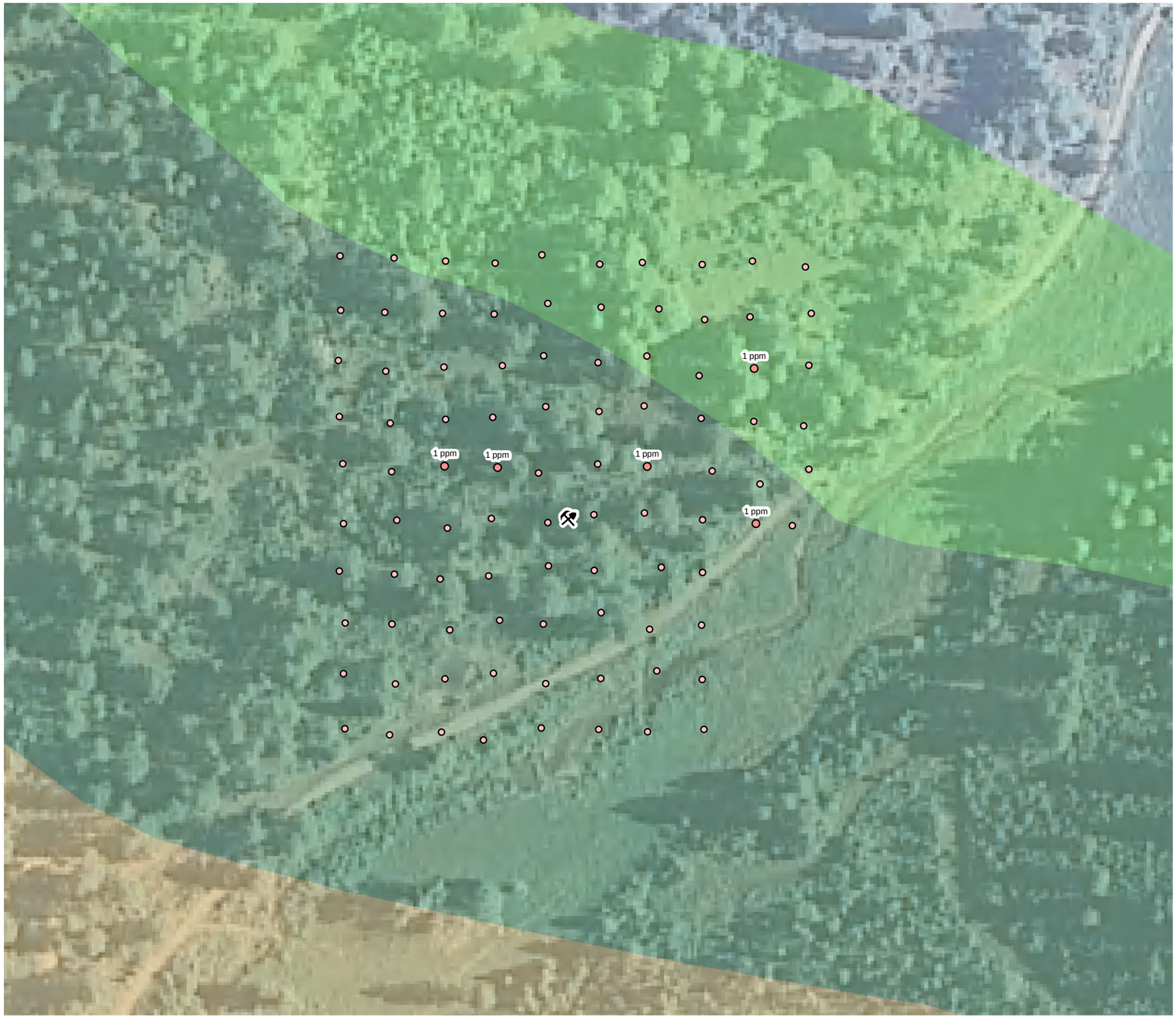
IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

FIGURE 34
CARBON DIOXIDE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 34 MINES CO2.mxd



LEGEND

MINE ENTRANCE

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

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF USDA/NRCS, 2009

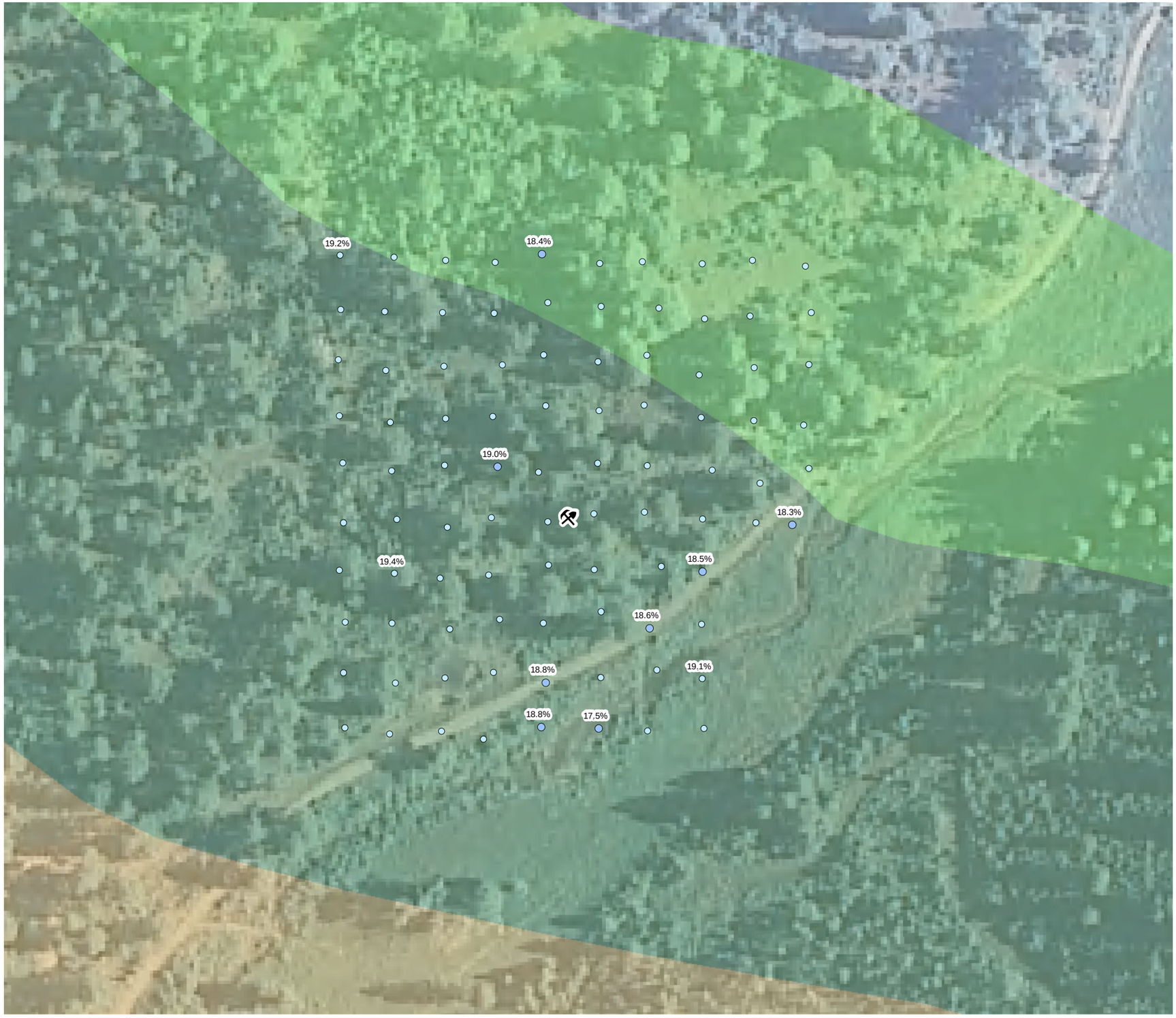
0 100 200

Feet

N

FIGURE 35
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
TRIPLE S MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 35 MINES H2S.mxd



LEGEND

MINE ENTRANCE

SUBSURFACE OXYGEN MEASUREMENT

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

%: PERCENT

ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

GEOLOGY

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

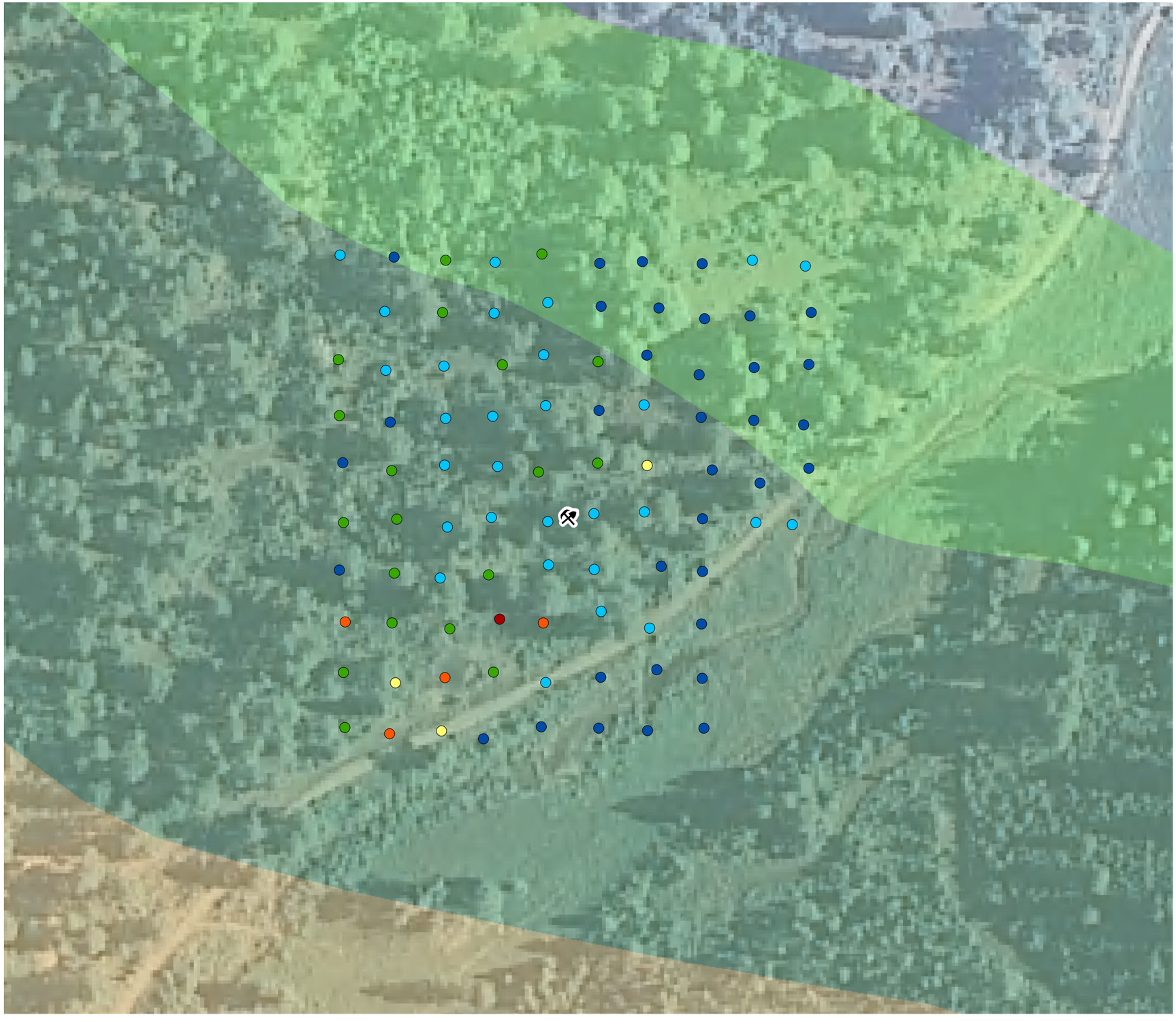
IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

FIGURE 36
OXYGEN SOIL GAS MEASUREMENTS
TRIPLE S MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 36 MINES O2.mxd



LEGEND

MINE ENTRANCE

SURFACE TEMPERATURE

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

°C: DEGREES CELCIUS

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 37
SURFACE TEMPERATURE MEASUREMENTS
TRIPLE S MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 37 MINES TEMP.mxd

LEGEND

MINE ENTRANCE

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 0ppm ARE LABELED

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 38
METHANE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 32 MINES CH4.mxd

LEGEND

MINE ENTRANCE

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

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 39
CARBON MONOXIDE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 33 MINES CO.mxd

LEGEND

MINE ENTRANCE

SUBURFACE CARBON DIOXIDE MEASUREMENT

- 0 - 2,500 ppm
- 2,500.1 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 41.9%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

FIGURE 40
CARBON DIOXIDE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 34 MINES CO2.mxd

LEGEND

MINE ENTRANCE

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

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

FIGURE 41
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
COLUMBINE MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 35 MINES H2S.mxd

LEGEND

MINE ENTRANCE

SUBSURFACE OXYGEN MEASUREMENT

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

%: PERCENT

ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

GEOLOGY

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

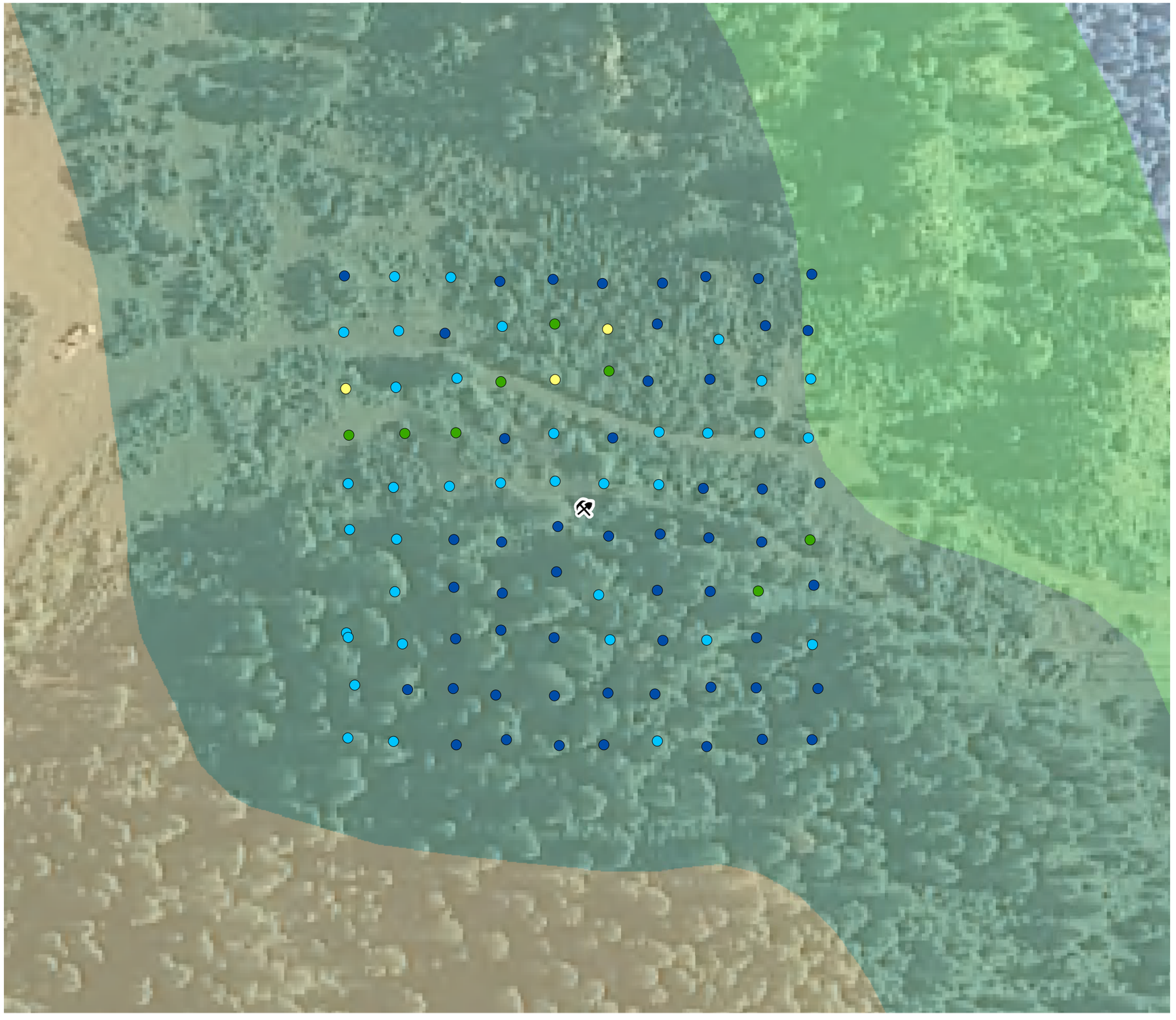
IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

FIGURE 42
OXYGEN SOIL GAS MEASUREMENTS
COLUMBINE MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 36 MINES O2.mxd



LEGEND

MINE ENTRANCE

SURFACE TEMPERATURE

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

°C: DEGREES CELCIUS

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

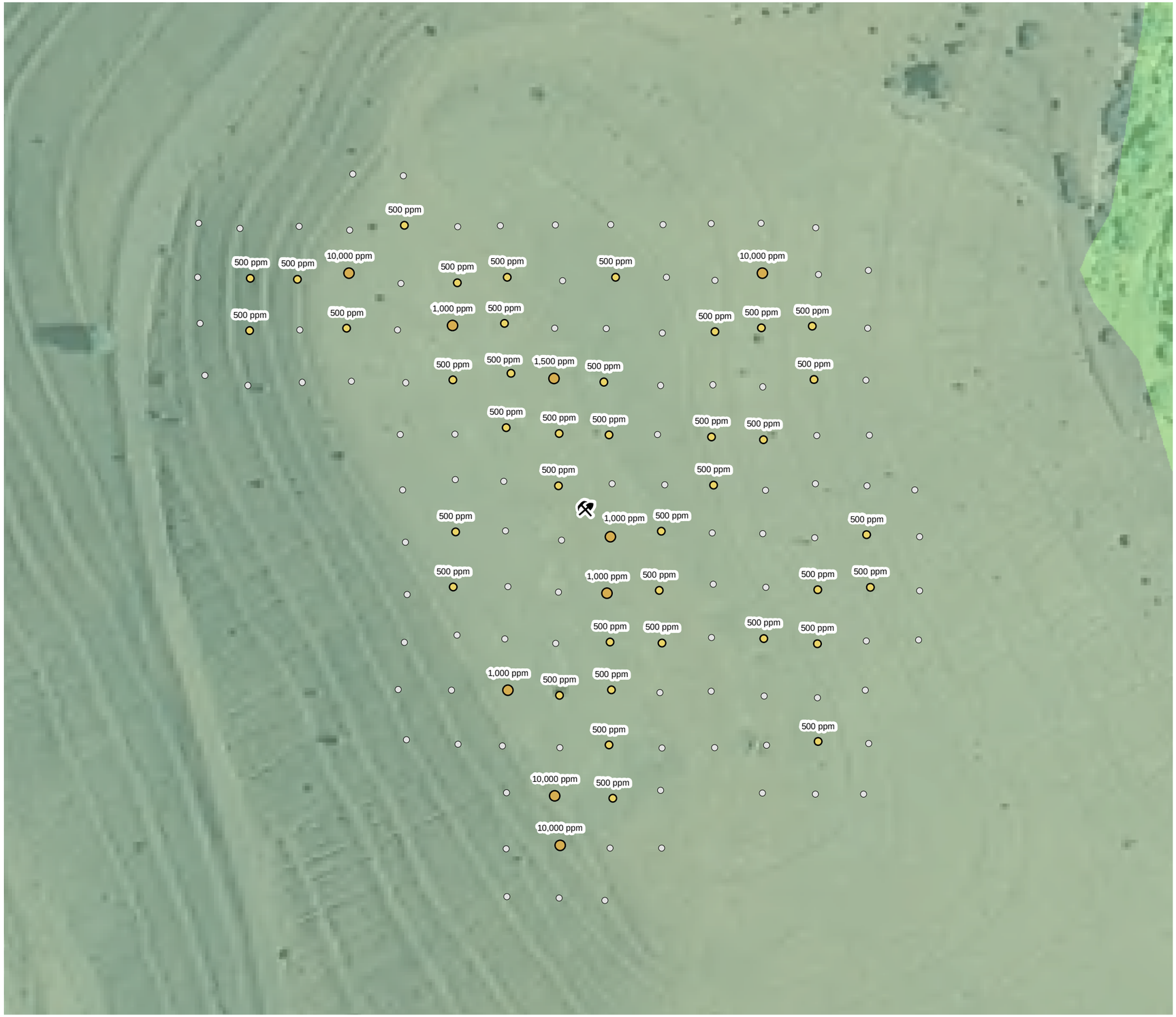
0 100 200

Feet

N

FIGURE 43
SURFACE TEMPERATURE MEASUREMENTS
COLUMBINE MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 37 MINES TEMP.mxd



LEGEND

MINE ENTRANCE

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 0ppm ARE LABELED

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

FIGURE 44
METHANE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 32 MINES CH4.mxd

LEGEND

MINE ENTRANCE

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

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 45
CARBON MONOXIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 33 MINES CO.mxd

LEGEND

MINE ENTRANCE

SUBURFACE CARBON DIOXIDE MEASUREMENT

- 0 - 2,500 ppm
- 2,500.1 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 41.9%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 46
CARBON DIOXIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 34 MINES CO2.mxd

LEGEND

MINE ENTRANCE

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

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF USDA/NRCS, 2009

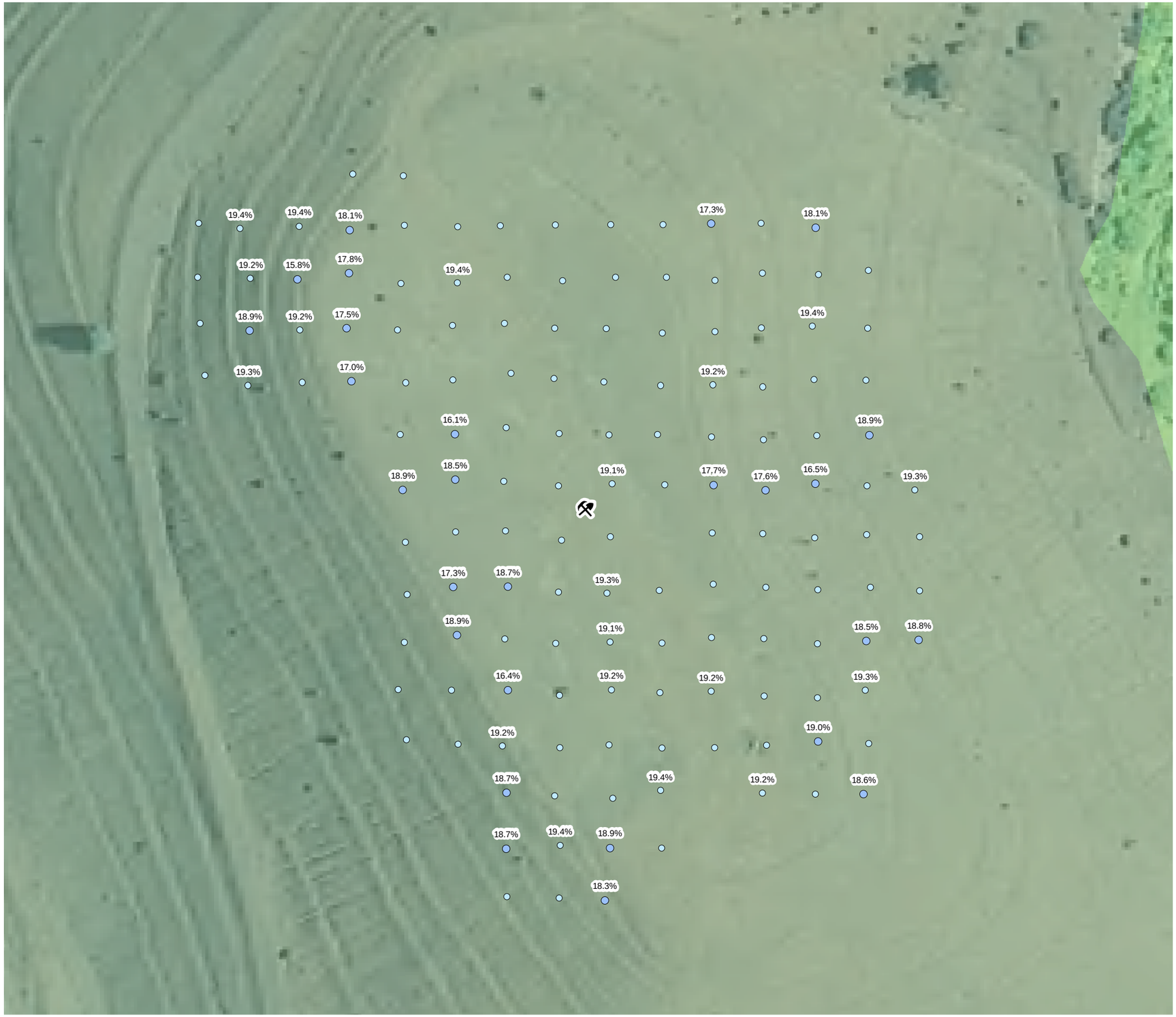
0 100 200

Feet

N

FIGURE 47
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 35 MINES H2S.mxd



LEGEND

MINE ENTRANCE

SUBSURFACE OXYGEN MEASUREMENT

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

%: PERCENT

ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

GEOLOGY

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

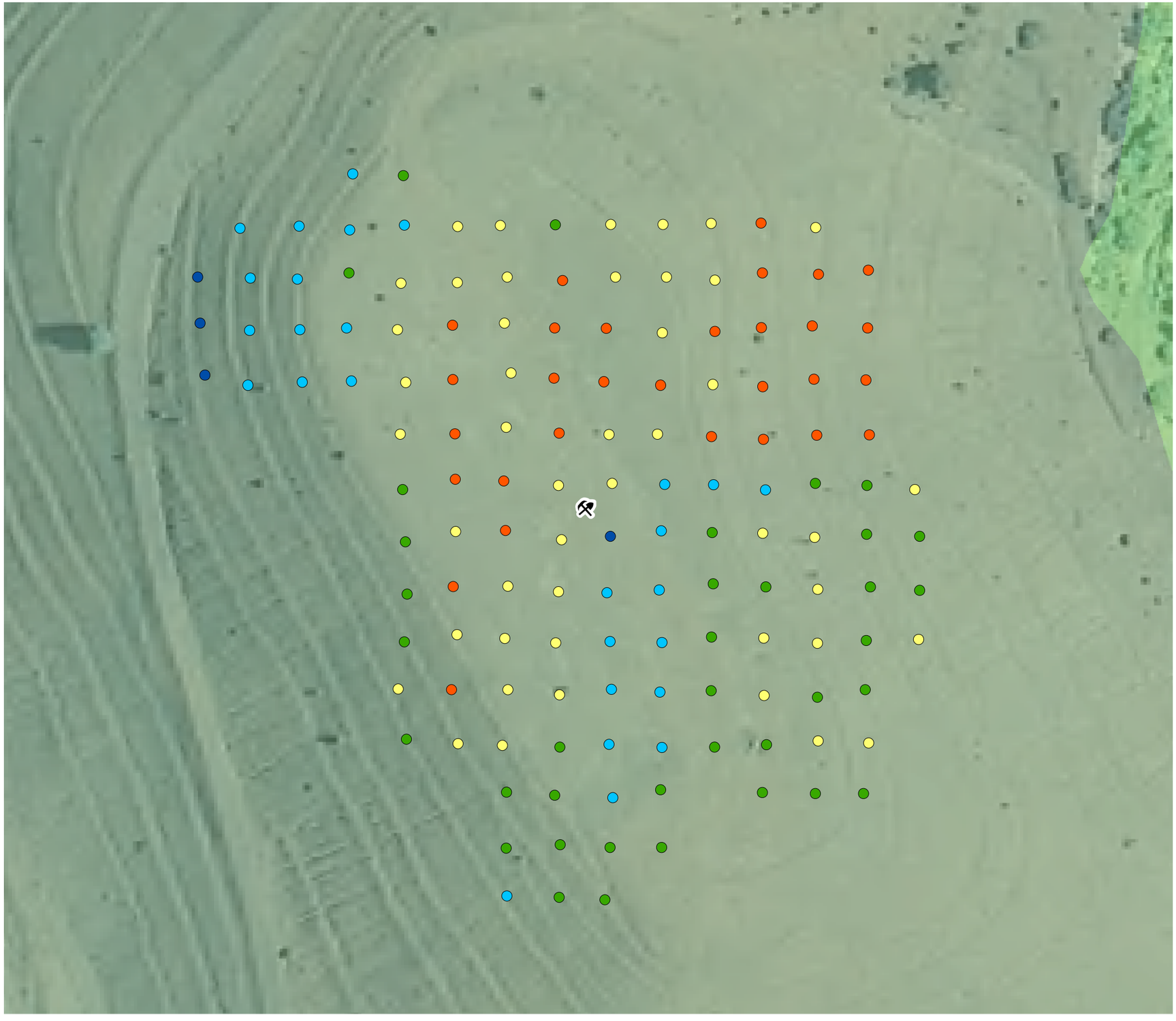
IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

FIGURE 48
OXYGEN SOIL GAS MEASUREMENTS
CHIMNEY ROCK MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 36 MINES O2.mxd



LEGEND

MINE ENTRANCE

SURFACE TEMPERATURE

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

°C: DEGREES CELCIUS

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 49
SURFACE TEMPERATURE MEASUREMENTS
CHIMNEY ROCK MINE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 37 MINES TEMP.mxd

LEGEND

MINE ENTRANCE

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 0ppm ARE LABELED

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 50
METHANE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 32 MINES CH4.mxd

LEGEND

MINE ENTRANCE

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

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 51
CARBON MONOXIDE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 33 MINES CO.mxd

LEGEND

MINE ENTRANCE

SUBURFACE CARBON DIOXIDE MEASUREMENT

- 0 - 2,500 ppm
- 2,500.1 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 41.9%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

FIGURE 52
CARBON DIOXIDE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

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LEGEND

MINE ENTRANCE

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

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

FIGURE 53
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 35 MINES H2S.mxd

LEGEND

MINE ENTRANCE

SUBSURFACE OXYGEN MEASUREMENT

0% - 5%

6% - 10%

11% - 15%

16% - 19%

20% - 22%

%: PERCENT

ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF USDA/NRCS, 2009

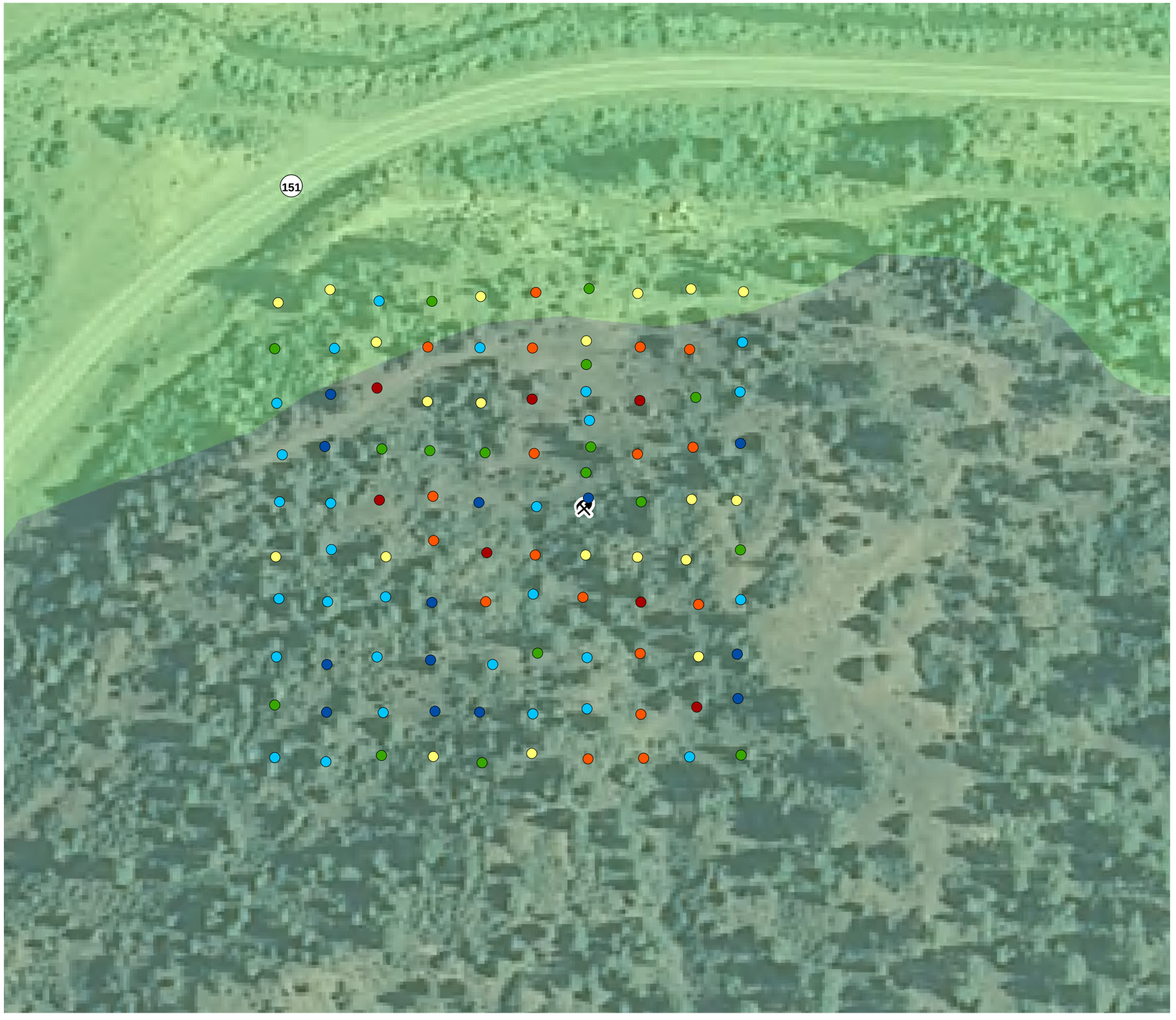
0 100 200

Feet

N

FIGURE 54
OXYGEN SOIL GAS MEASUREMENTS
STOLLSTEIMER CREEK SITE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 36 MINES O2.mxd



LEGEND

MINE ENTRANCE

SURFACE TEMPERATURE

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

°C: DEGREES CELCIUS

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 55
SURFACE TEMPERATURE MEASUREMENTS
STOLLSTEIMER CREEK SITE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 37 MINES TEMP.mxd

LEGEND

MINE ENTRANCE

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 0ppm ARE LABELED

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 56
METHANE SOIL GAS MEASUREMENTS
CHIMNEY ROCK COAL
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 32 MINES CH4.mxd

LEGEND

MINE ENTRANCE

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

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 57
CARBON MONOXIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK COAL
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 33 MINES CO.mxd

LEGEND

MINE ENTRANCE

SUBURFACE CARBON DIOXIDE MEASUREMENT

- 0 - 2,500 ppm
- 2,500.1 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 41.9%

ppm: PARTS PER MILLION

%: PERCENT

ONLY MEASUREMENTS GREATER THAN 0ppm ARE LABELED

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

FIGURE 58
CARBON DIOXIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK COAL
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 34 MINES CO2.mxd

LEGEND

MINE ENTRANCE

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

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

FIGURE 59
HYDROGEN SULFIDE SOIL GAS MEASUREMENTS
CHIMNEY ROCK COAL
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 35 MINES H2S.mxd

LEGEND

MINE ENTRANCE

SUBSURFACE OXYGEN MEASUREMENT

0% - 5%

6% - 10%

11% - 15%

16% - 19%

20% - 22%

%: PERCENT

ONLY MEASUREMENTS LESS THAN 19.5% OXYGEN ARE LABELED

GEOLOGY

KIRTLAND FORMATION (Kk)

FRUITLAND FORMATION (Kf)

PICTURED CLIFFS FORMATION (Kpc)

IMAGE COURTESY OF USDA/NRCS, 2009

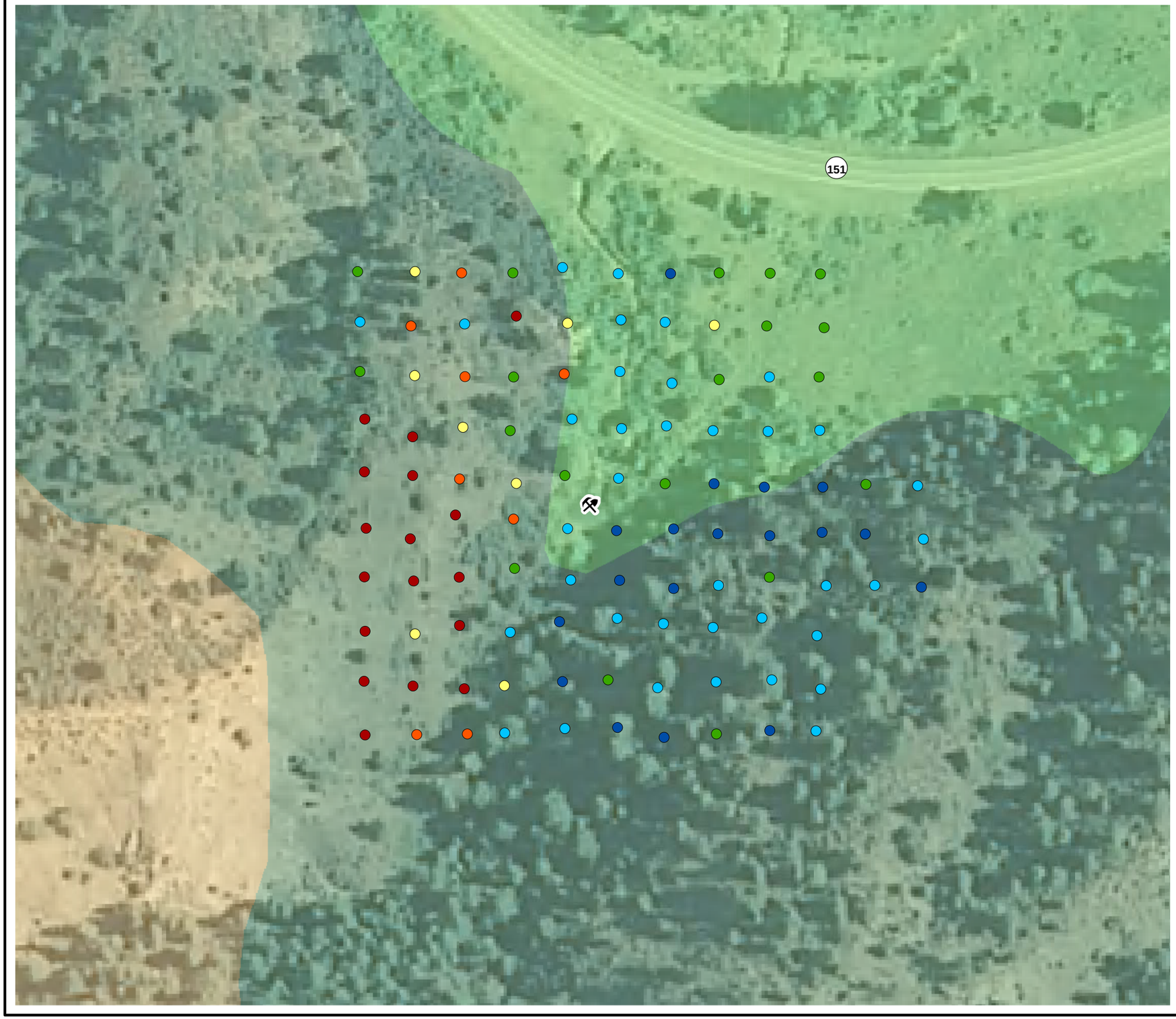
0 100 200

Feet

N

FIGURE 60
OXYGEN SOIL GAS MEASUREMENTS
CHIMNEY ROCK COAL
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 36 MINES O2.mxd



LEGEND

MINE ENTRANCE

SURFACE TEMPERATURE

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

°C: DEGREES CELCIUS

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200

Feet

N

FIGURE 61
SURFACE TEMPERATURE MEASUREMENTS
CHIMNEY ROCK COAL
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 37 MINES TEMP.mxd

RAMONA SPRING
RAMONA LEONARD SPRING (MONA)
WOOD/CORRIGAN SPRING
CORRIGAN SPRING
WATSON WELL SPRING
GRASSY SPRING
CRAIN SPRING
35N 6W
35N 5W
35N 4W
35N 3W
SEEP SPRING
THICK SPRING
WALT SPRING #1
VANCE SPRING #1
TOWNSEND SPRING
34N 6W
34N 4W
34N 3W
VANCE MEADOW SPRING
34N 5W
160
BIG HOLE SPRING
SECTION 14 SPRING (REICH)
WILLOW SPRING
WAYPOINT 0003 SPRING
NW JOHN GRUB SPRING
SE JOHN GRUB SPRING
CANDELARIA 33-5 FEE 10U #3
(API: 05-007-06215)
SECTION 10U SPRING
SPRING 1212
SPRING 3424
CANDELARIA A SPRING
CANDELARIA B SPRING
34N 6W
34N 5W
34N 4W
151
MISER SPRING AND PIPELINE
VAUGHN SPRING
SOUTHERN UTE INDIAN TRIBE RESERVATION BOUNDARY
33N 6W
33N 5W
33N 4W

LEGEND

SHUT IN WELL

2011 NATURAL SPRING STATUS

- SAMPLED
- FIELD PARAMETERS ONLY
- DRY
- NOT LOCATED
- NO ACCESS/NO SAMPLE COLLECTED

HIGHWAY
SURFACE WATER
WETLAND AREA, NO CHANNEL FLOW
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 2011. CONCENTRATIONS WERE 0 PARTS PER MILLION (ppm) METHANE FOR ALL LOCATIONS SURVEYED.

IMAGE COURTESY OF USDA/NRCS, 2009

0 1.25 2.5
Miles

N

FIGURE 62
NATURAL SPRINGS STATUS
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\BLM ROD SUPPORT\MXD\BLM_ROD_FIG 62 SPRING STATUS.mxd

TABLES

TABLE 1
NATURAL SPRINGS SAMPLING STATUS
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

NATURAL SPRING	September 2005	May/June 2006	October 2007	October 2008	May 2009	October 2009	July 2010	May 2011
Ramona Spring	NS	NS	NS	Dry	Not Located	Not Located	No Access	No Access
Ramona Leonard Spring	NS	Sampled	Sampled	Sampled	Sampled	Sampled	No Access	No Access
Wood Spring	NS	NS	NS	Dry	Sampled	Dry	NS	Sampled
Beaver Creek	NS	NS	NS	Sampled	NS	NS	NS	NS
Corrigan Spring	NS	NS	NS	Not Located	Sampled	Dry	Dry	Sampled
Watson Well Spring	NS	Sampled	NS	Sampled	Sampled	Sampled	Sampled	No Access
Grassy Spring	NS	Sampled	Sampled	No Access	No Access	No Access	No Access	No Access
Crain Spring	NS	Sampled	NS	Sampled	Sampled	Dry	Sampled	No Access
Thick Spring	NS	Sampled	Sampled	Not Located	Sampled	Dry	NS	Sampled
Seep Spring	NS	NS	NS	Dry	Not Located	Not Located	Not Located	Not Located
Walt Spring #1	NS	Sampled	NS	Dry	Dry	Dry	Dry	Sampled
Townsend Spring	NS	NS	NS	Dry	Dry	Dry	Dry	Dry
Vance Spring #1	NS	Sampled	Sampled	Sampled	Sampled	Sampled	Sampled	Sampled
Vance Meadow Spring	NS	Sampled	Sampled	Sampled	Sampled	Dry	Dry	Sampled
Willow Spring	NS	Sampled	Sampled	Sampled	Sampled	Dry	Sampled	Sampled
Big Hole Spring	NS	Sampled		Dry	Not Located	Not Located	Dry	Dry
Section 14 (Reich) Spring	Sampled	Sampled	Sampled	Sampled	Sampled	Dry	Sampled	No Access
Waypoint 0003 Spring	NS	NS	NS	Not Located	Not Located	Not Located	NS	Not Located
NW John Grubb Spring	Sampled	Sampled	Sampled	Sampled	Sampled	Dry	Sampled	Sampled
SE John Grubb Spring	Sampled	Sampled	Sampled	Sampled	Sampled	Dry	NS	Sampled
High Watson Spring	NS	NS	NS	NS	NS	NS	NS	No Access
Section 10U Spring	Sampled	Sampled	NS	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
Spring 3424	Sampled	Sampled	NS	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
Candelaria B Spring	NS	Sampled	NS	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
Miser Spring & Pipeline	NS	NS	NS	No Access	No Access	No Access	No Access	No Access

Notes:
NS - Not Sampled

TABLE 2
NATURAL SPRINGS ANALYTICAL RESULTS - MAJOR IONS
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

		Cations				Anions				
Natural Spring	**Date**	**Calcium (mg/L)**	**Magnesium (mg/L)**	**Sodium (mg/L)**	**Potassium (mg/L)**	**Carbonate (mg/L)**	**Bicarbonate (mg/L)**	**Sulfate (mg/L)**	**Chloride (mg/L)**	**SAR**
Beaver Creek	October 2008	35.0	10.7	8.6	1.9	<10	128	33	<10	0.326
	May 2009	NS	NS	NS	NS	NS	NS	NS	NS	NC
	July 2010	NS	NS	NS	NS	NS	NS	NS	NS	NC
	May/June 2011	NS	NS	NS	NS	NS	NS	NS	NS	NC
Corrigan Spring	May-11	31.9	7.6	7.2	0.5	<10	116	29	<10	0.297
Crain Spring	October 2008	65.6	18.8	15.2	1.6	<10	214	98	<10	0.426
	May 2009	74.7	21.1	19.6	1.4	<10	230	134	<10	0.516
	July 2010	68.3	18.3	14.4	1.9	<10	190	76	<10	0.399
	May 2011	NS	NS	NS	NS	NS	NS	NS	NS	NC
NW John Grub Spring	October 2008	59.1	12.8	<0.5	0.6	<10	187	54	<10	NC
	May 2009	30.9	16	11.3	0.6	<10	117	67	<10	0.411
	July 2010	66.1	14	12	0.8	<10	175	71	<10	0.350
	May 2011	72.9	18.7	14.5	1.6	<10	230	106	<10	0.392
Ramona Leonard Spring	October 2008	138	27.7	9.6	1.6	<10	200	340	<10	0.195
	May 2009	120	23.1	8.5	1.3	<10	181	250	<10	0.186
	July 2010	NS	NS	NS	NS	NS	NS	NS	NS	NC
	May 2011	NS	NS	NS	NS	NS	NS	NS	NS	NC
SE John Grub Spring	October 2008	65.3	16.9	14	0.7	<10	214	78	<10	0.399
	May 2009	72.2	16.6	14.3	0.6	10	238	57	<10	0.394
	July 2010	NS	NS	NS	NS	NS	NS	NS	NS	NC
	May 2011	56.1	12.6	11.2	1.3	<10	171	60	<10	0.352
Section 14 Spring	October 2008	48.8	6	27	0.6	<10	189	43	<10	0.970
	May 2009	62.8	6.7	24.5	1	10	188	61	<10	0.784
	July 2010	57.5	6.1	24.7	0.8	<10	169	55	<10	0.827
Thick Spring	October 2008	NS	NS	NS	NS	NS	NS	NS	NS	NC
	May 2009	44.6	8.2	14.4	0.8	<10	124	28	22	0.520
	July 2010	NS	NS	NS	NS	NS	NS	NS	NS	NC
	May 2011	48.7	9.7	15.6	<0.5	<10	136	31	32	0.534
Vance Meadow Spring	October 2008	68.3	9	14.4	2.6	<10	244	11	<10	0.434
	May 2009	66.7	8.2	14	2.7	<10	236	11	<10	0.430
	July 2010	NS	NS	NS	NS	NS	NS	NS	NS	NC
	May 2011	50.1	6.7	12	2.2	<10	178	<10	<10	0.422
Vance Spring #1	October 2008	52.5	6.6	13.1	5.9	<10	182	19	<10	0.453
	May 2009	57.8	7.7	14.3	4.2	<10	208	<10	<10	0.469
	July 2010	63.4	8.4	14.9	5.8	<10	226	<10	<10	0.466
	May/June 2011	36.6	4.8	10.6	7.5	<10	133	16	<10	0.437
Walt Spring #1	May 2011	43.8	13.6	11.7	0.6	<10	141	65	<10	0.396
Watson Well Spring	October 2008	109	38.7	25.5	2.4	<10	394	134	<10	0.534
	May 2009	86.8	30.7	20.5	1.9	<10	288	94	<10	0.481
	July 2010	78.1	26.9	18.1	2.5	12	218	84	<10	0.450
	May 2011	NS	NS	NS	NS	NS	NS	NS	NS	NC
Willow Spring	October 2008	39.3	5.8	16.5	1.4	<10	157	19	<10	0.649
	May 2009	34.5	5.1	16.1	1.4	<10	122	18	<10	0.676
	July 2010	39.2	5.7	16.3	1.8	<10	131	16	<10	0.643
	May 2011	32.7	5.2	14.9	1	<10	129	16	<10	0.638
Wood Spring	October 2008	NS	NS	NS	NS	NS	NS	NS	NS	NC
	May 2009	65.7	11.6	10.7	1.6	<10	142	122	<10	0.320
	July 2010	NS	NS	NS	NS	NS	NS	NS	NS	NC
	May 2011	66.9	12.8	10.4	0.8	<10	135	126	<10	0.305

Notes:
mg/L - milligrams per liter
NA - Not Analyzed
< - less than the laboratory reporting limit
SAR - sodium adsoption ratio (calculated using laboratory analytical aion and cation results)
NC - not calculated due to no data available

TABLE 3
BLM SOIL VAPOR TUBE DATA
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Transect Name	Line	No. of Probes	First Data	Last Data	Total No. of Sampling Events	95% Significance	
						Up	Down
BM: Beaver Meadows - North of HWY 160	101-109	9	11/28/01	12/7/11	445		
CP: Candelaria Pasture - East of NW corner of Fosset Gulch RD, near Piedra River	201-213	13	10/28/04	8/17/06	163		
PG: Peterson Gulch Line 1 South of Hwy 160	101-112	12	5/3/00	10/27/11	468		2
PG: Peterson Gulch Line 2 - South of Hwy 160	201-206	6	8/19/04	10/3/11	246		
PG: Peterson Gulch Line 3 - South of Hwy 160	301-308	8	8/19/04	10/3/11	328		
PC: Pole Creek South of Hwy 160 on right side of Fosset Gulch Rd	101-110	10	8/26/04	10/17/11	370	6	
SC: Stollsteimer Creek South of Hwy 160 on State 151 one mile south of Chimney Rock Road	101-106	6	8/19/04	12/1/11	271		
YJP: Yellow Jacket Pass North of Hwy 160	101-103	3	11/28/01	10/17/11	147		
					Totals	6	2

Notes:
BLM - Bureau of Land Management
% - percent
Trends are counted at the 90% level of significance.

TABLE 4
BLM SOIL VAPOR TUBE ANALYSIS RESULTS
2011 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	12/7/11	54	600	-0.49	down	
BM-102	11/28/01	12/7/11	53	600	-0.19	down	
BM-103	11/28/01	12/7/11	53	900	0.09	up	
BM-104	11/28/01	12/7/11	53	550	0.24	up	
BM-105	1/31/02	12/7/11	50	2,520	0.73	up	
BM-106	1/31/02	12/7/11	52	900	0.20	up	
BM-107	11/28/01	12/7/11	50	800	0.35	up	
BM-108	11/28/01	12/7/11	50	750	0.80	up	
BM-109	1/31/02	5/29/02	3	450	2	up	
Candelaria Pasture							
CP-201	10/28/04	8/2/06	11	900	0.16	up	
CP-202	10/28/04	8/2/06	11	850	0.16	up	
CP-203	10/28/04	8/2/06	10	900	1.11	up	
CP-204	10/28/04	8/2/06	10	600	0.81	up	
CP-205	10/28/04	8/2/06	12	650	1.46	up	
CP-206	10/28/04	8/2/06	12	1,050	0.21	up	
CP-207	10/28/04	8/17/06	13	1,050	0.48	up	
CP-208	10/28/04	8/17/06	13	670,000	0.90	up	
CP-209	10/28/04	8/17/06	13	5,350	0		
CP-210	10/28/04	8/17/06	13	160,000	0.97	up	
CP-211	10/28/04	8/17/06	13	850	0.14	up	
CP-212	10/28/04	8/17/06	13	800	0		
CP-213	10/28/04	8/17/06	11	900	0.82	up	
Peterson Gulch							
PG-101	8/19/04	10/3/11	39	550	1.10	up	
PG-102	8/19/04	10/3/11	39	650	-1.40	down	
PG-103	8/19/04	10/27/11	39	700	-1.44	down	
PG-104	8/19/04	10/3/11	38	850	-0.62	down	
PG-105	8/19/04	10/3/11	39	1,150	-0.68	down	
PG-106	8/19/04	10/27/11	39	800	-0.80	down	
PG-107	8/19/04	10/3/11	39	650	-1.27	down	
PG-108	8/19/04	10/3/11	39	650	-0.59	down	
PG-109	8/19/04	10/3/11	39	850	-1.56	down	
PG-110	8/19/04	10/3/11	39	800	-1.73	down	v
PG-111	5/3/00	10/3/11	39	700	-0.99	down	
PG-112	8/19/04	10/3/11	39	550	-1.92	down	v
PG-201	8/19/04	10/3/11	40	1,050	0.18	up	
PG-202	8/19/04	10/3/11	40	950	1.03	up	
PG-203	8/19/04	10/3/11	41	1,100	0.44	up	
PG-204	8/19/04	10/3/11	40	1,300	0.71	up	
PG-205	8/19/04	10/3/11	41	750	0.93	up	
PG-206	8/19/04	10/3/11	41	1,050	0.51	up	
PG-301	8/19/04	10/3/11	41	1,850	1.02	up	
PG-302	8/19/04	10/3/11	40	1,350	-0.18	down	
PG-303	8/19/04	10/3/11	37	850	0.34	up	
PG-304	8/19/04	10/3/11	37	950	1.03	up	
PG-305	8/19/04	10/3/11	41	700	0.14	up	

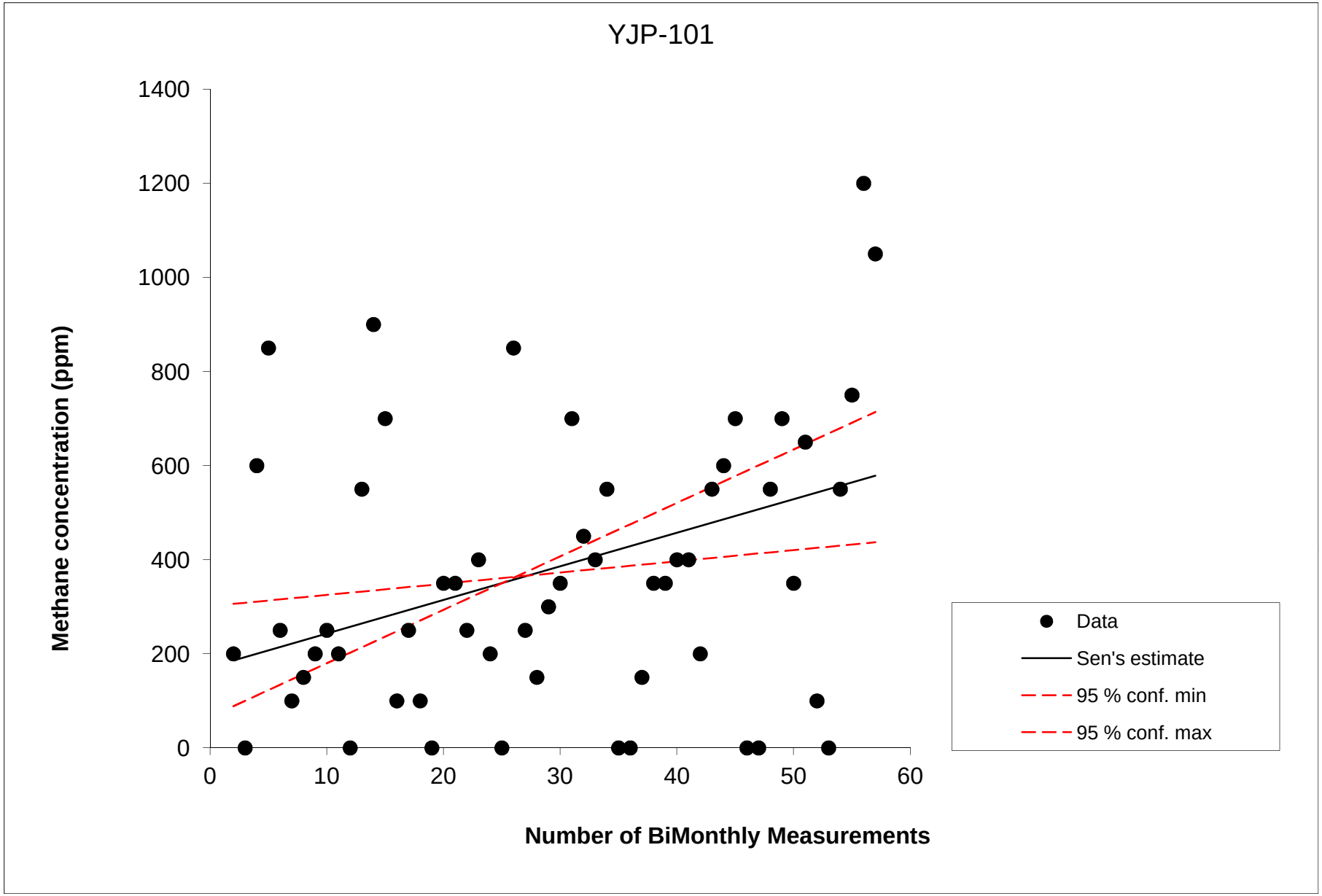
TABLE 4
BLM SOIL VAPOR TUBE ANALYSIS RESULTS
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Transect	First Data	Last Data	Number of Readings	Maximum Concentration (ppm)	Z	Direction	Significance
PG-306	8/19/04	10/3/11	41	1,000	-0.05	down	
PG-307	8/19/04	10/3/11	41	500	0.47	up	
PG-308	8/19/04	10/3/11	41	650	0.45	up	
Pole Creek							
PC-101	8/26/04	10/17/11	37	650	2.68	up	^^^
PC-102	8/26/04	10/17/11	37	700	3.03	up	^^^
PC-103	8/26/04	10/17/11	36	950	2.26	up	^^
PC-104	8/26/04	10/17/11	37	650	2.45	up	^^
PC-105	8/26/04	10/17/11	37	800	2.77	up	^^^
PC-106	8/26/04	10/17/11	36	900	1.81	up	^
PC-107	8/26/04	10/17/11	36	750	1.95	up	^
PC-108	8/26/04	10/17/11	37	750	2.05	up	^^
PC-109	8/26/04	10/17/11	37	650	0.78	up	
PC-110	8/26/04	10/17/11	36	700	0.63	up	
Stollsteimer Creek							
SC-101	8/19/04	12/1/11	39	950	1.47	up	
SC-102	8/19/04	12/1/11	45	700	0.74	up	
SC-103	8/19/04	12/1/11	46	750	1.25	up	
SC-104	8/19/04	12/1/11	44	870,000	1.12	up	
SC-105	8/19/04	12/1/11	43	240,000	1.16	up	
SC-106	8/19/04	12/1/11	45	550	0.60	up	
Yellow Jacket Pass							
YJP-101	11/28/01	10/17/11	48	1,200	2.79	up	^^^
YJP-102	11/28/01	10/17/11	48	1,150	1.28	up	
YJP-103	11/28/01	10/17/11	49	950	0.56	up	

Notes:
BLM - Bureau of Land Management
ppm - part per million
Z: Mann-Kendall test statistic. (If n<10 then S statistic is displayed).
Direction: direction of trend (up or down)
Significance: Level of significance of trend (one tailed test)

^ or v	90%
^^ or vv	95%
^^^ or vvv	99%
^^^^ or vvvv	99.9%


YJP-101
Methane concentration (ppm)
1400
1200
1000
800
600
400
200
0
0
10
20
30
40
50
60
Number of BiMonthly Measurements
Data
Sen's estimate
95 % conf. min
95 % conf. max

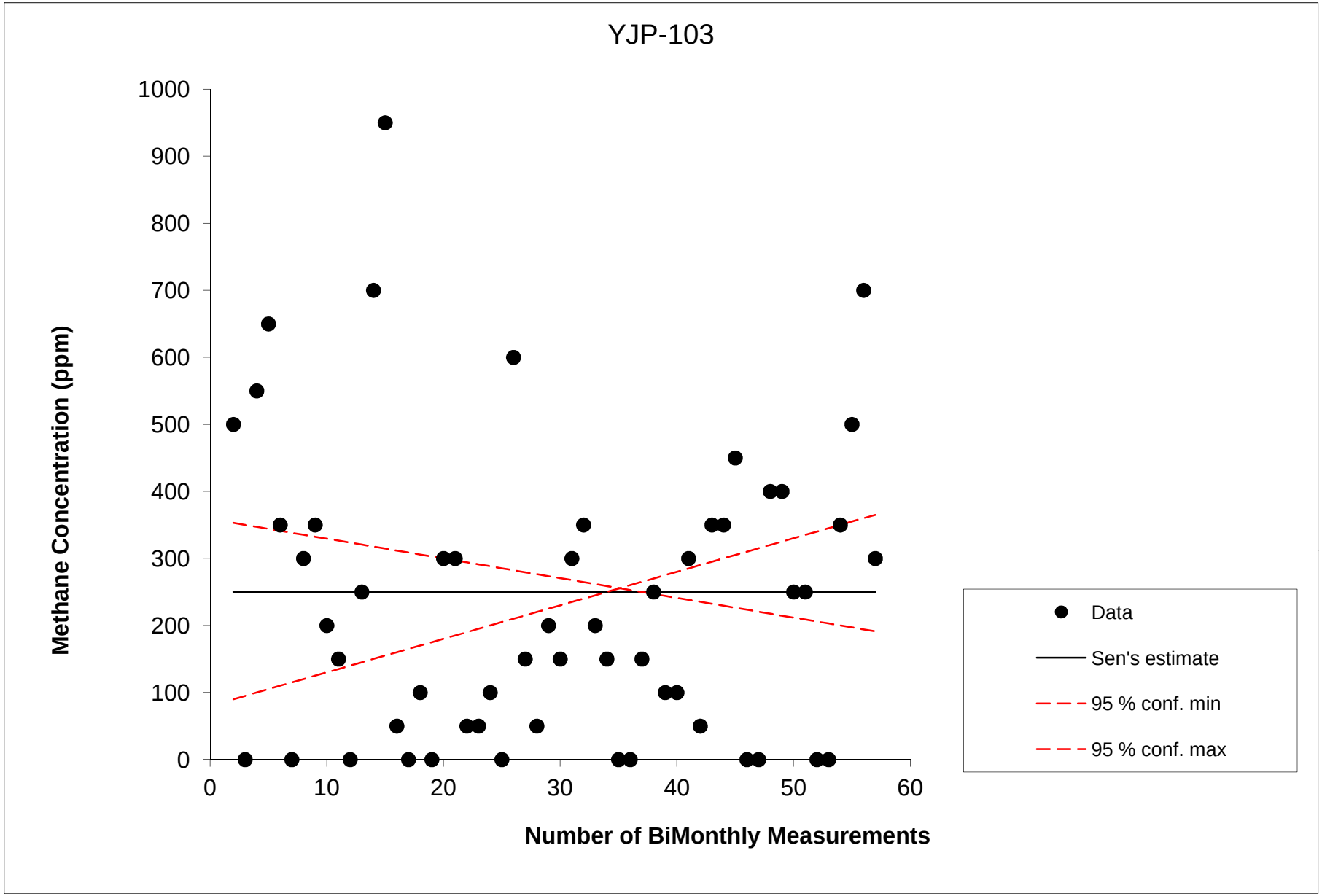

YJP-103
Methane Concentration (ppm)
1000
900
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
Number of BiMonthly Measurements
Data
Sen's estimate
95 % conf. min
95 % conf. max

TABLE 5
PROPERTY OWNER AND ACCESS INFORMATION
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Map ID Number	Parcel Number	LTE Access	Owner Name	Mailing Address	Mailing City, State, Zipcode
1	589533400034		ROBERT J & LINDA ADAM	12611 JONES RD STE #200	HOUSTON, TX 77070
2	589724400007	YES	LUCY S CANDELARIA & BERNADETTE M GONZALES	PO BOX 1812	ARBOLES, CO 81121
3	589724400010, 589725100011	NO RESPONSE	ROGER CANDELARIA	9105 SIXTH ST	LANHAM, MD 20706
4	589713300006	NO	SUSIE E CANDELARIA TRUST	8815 N ACACIA GROVE	TUCSON, AZ 85743
5	589710300002, 589724400008	NO RESPONSE	SY, GILBERT, MEL, LEONARD & ANNET CANDELARIA &	PO BOX 1771	ARBOLES, CO 81121
6	589725400033	YES	CLINT S CANNON	34315 BRUMLOW	WALLER, TX 77484
7	589529100026, 589529100028	NO RESPONSE	CAMILLE E CAZEDESSUS JR	PO BOX 2340	PAGOSA SPRINGS, CO 81147-2340
8	589528300041	NO RESPONSE	ROBERT G CHENAULT	PO BOX 328	BLOOMFIELD, NM 87413
9	589528200028	YES	BILLY K & RITA S DANSBEE	482 COUNTY RD 917	PAGOSA SPRINGS, CO 81147
10	568510300009	YES	DURWOOD EDWARDS	309 OLDS CREEK DR	FORT DAVIS, TX 79734
11	589529300027	NO RESPONSE	EF COAL RESOURCES LIMITED PRTN	PO BOX 773457	STEAMBOAT SPRINGS, CO 80477
12	589529100024	NO RESPONSE	DAN E & JENIFER L FUMAGALLI	P O BOX 729	POST, TX 79356-0729
13	589725300023	NO RESPONSE	HELEN GALLEGOS	9371 HIGHWAY 151	PAGOSA SPRINGS, CO 81147
14	589711200001	YES	JOHN W & PAMELA K GRUBB	8325 OLD AZTEC HWY	FLORA VISTA, NM 87415
15	589528200029	NO RESPONSE	JOSEPH B GYMREK	PO BOX 880220	PUKALANI, HI 96788
16	589528400042	NO RESPONSE	JAMES & NORA HALLOCK	PO BOX 311	CORTEZ, CO 81321
17	589529100025	YES	HAROLD E & MADELEINE D HEATH	4421 HIGHWAY 151	PAGOSA SPRINGS, CO 81147
18	568333200011	NO RESPONSE	CATHY HIGMAN	23541 COUNTY RD S	DOLORES, CO 81323
19	568333300012	NO RESPONSE	MICHAEL W HIGMAN	23541 COUNTY RD S	DOLORES, CO 81323
20	568505200020	YES	JEFFREY H MUNGER REVOCABLE TRUST	1200 CR 505	BAYFIELD, CO 81122
21	589528400050	NO RESPONSE	SANDRA J LEISER	RR 1 BOX 100	MADISON, KS 66860
22	589533200046	NO RESPONSE	EUGENIA LEON & THEODORE G WOZNY &	1601 A CR 917	PAGOSA SPRINGS, CO 81147
23	567913300015	NO RESPONSE	RAMONA LEONARD	PO BOX 207	MAYER, AZ 86333
24	589725400016	YES	AMOS MEL MARTINEZ	PO BOX 1171	IGNACIO, CO 81137
25	589725400013	NO RESPONSE	JOHN L MARTINEZ & CAROLYN M GILLIS	5768 HANSEN CIR	MURRAY, UT 84107
26	589530100039	YES	MEL MARTINEZ	5671 HIGHWAY 151	PAGOSA SPRINGS, CO 81147
27	589533400033, 589533400048	NO RESPONSE	JERRY L & BEVERLY A MODISETTE	1818 COUNTY RD 917	PAGOSA SPRINGS, CO 81147-9778
28	589528400049	NO RESPONSE	BRITT & MAYUMI MUHLIG	1019 COUNTY RD 917	PAGOSA SPRINGS, CO 81147
29	567913400016	YES	EMILIO JR & KAREN R PEINADO	PO BOX 706	BAYFIELD, CO 81122
30	589533100045	NO	GLORIA A PETSCH	PO BOX 70	PAGOSA SPRINGS, CO 81147
31	589712400012	YES	RAFTER T LLC	340 SEABREEZE DR	MARCO ISLAND, FL 34145
32	589533100047	NO RESPONSE	JAMES & NANCY SCHAEFER	2754 S LAS PALMAS	MESA, AZ 85202
33	589528400051	YES	JOSEPH III & SIRI SCHUCHARDT	795 MAJESTIC DR	PAGOSA SPRINGS, CO 81147
34	596104100002	NO RESPONSE	PHILIP J & ANNE G TOMFORDE	2580 COUNTY RD 917	PAGOSA SPRINGS, CO 81147

TABLE 5
PROPERTY OWNER AND ACCESS INFORMATION
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Map ID Number	Parcel Number	LTE Access	Owner Name	Mailing Address	Mailing City, State, Zipcode
35	568510300010	NO RESPONSE	BRYAN H & MARITES G TRACY	PO BOX 799	BAYFIELD, CO 81122
36	589701400003	YES	NITED STATES OF AMERICA FOREST SERV; DEPT OF AGRICULTU	11127 W 8TH AVE	LAKEWOOD, CO 80225
37	589511200003, 596116200005	NO RESPONSE	UNITED STATES OF AMERICA T/F SOUTHERN UTE TRIBE	PO BOX 737	IGNACIO, CO 81137
38	568508100020	YES	WILLIAM S JR VANCE	27360 W US HWY 160	BAYFIELD, CO 81122
39	589725400015	NO RESPONSE	LARRY C VAUGHN	6505A HWY 151	PAGOSA SPRINGS, CO 81147
40	568319200034, 568319300003	YES	DAVID LLOYD WATSON & DALE LLOYD WATSON	30301 US HWY 160	BAYFIELD, CO 81122
41	568505100016	YES	GRETCHEN A WEISS	874 LOGGERHEAD LANE	SUMMERLAND KEY, FL 33042
42	567913400017	YES	LEE THOMAS & PEGGY DARLENE WOOD	31861 L W HWY 160	BAYFIELD, CO 81122
43	589528400053	YES	THEODORE G WOZNY TRUST ACCOUNT	1601 COUNTY RD 917	PAGOSA SPRINGS, CO 81147
44	589528400043	NO RESPONSE	JEAN PAUL & SUSAN WRIGHT	1023 COUNTY RD 917	PAGOSA SPRINGS, CO 81147
45	567924100018	YES	MARTIN AND JANE ZWISLER TRUST	31861 K HIGHWAY 160	BAYFIELD, CO 81122
46	568301100001	YES	PUBLIC LANDS		
47	568501100001	YES	PUBLIC LANDS		
48	5895303-DEPT	YES	PUBLIC LANDS		
49	589701400004	YES	PUBLIC LANDS		
50	589725100012	YES	PUBLIC LANDS		
51	589726400024	YES	PUBLIC LANDS		
52-57		YES	PUBLIC LANDS		

Notes:

Indicates access granted by property owner
Indicates no response from propery owner and assumed no access
Indicates access denied by property owner

TABLE 6
METHANE FLUX DATA
2011 OUTCROP ZONE REPORT
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 (0.2 mol/m^2·day)					Maximum Measurable Methane Flux^2 (mol/m^2·day)					Volumetric Methane Flux (MCFD)			
	2007	**2008**	**2009**	**2010**	**2011**	**2007**	**2008**	**2009**	**2010**	**2011**	**2007**	**2008**	**2009**	**2010**	**2011**	**2008**	**2009**	**2010**	**2011**
Beaver Creek	14	53	46	48	48	1	0	0	0	1	**0.2000**	0.1579	0.0607	0.0740	**0.5347**	0	0	0	NA
Little Squaw Creek	21	77	78	77	76	2	2	0	0	0	**0.2300**	**0.2911**	0.0268	0.0852	0.0830	NA	0	0	0
Yellow Jacket Pass/ Squaw Creek	10	208	170	204	205	0	0	0	0	0	0.0700	0.0373	0.0970	0.0140	0.1366	0	0	0	0
Pole Gulch	10	86	87	85	88	1	0	1	0	0	**0.3000**	0.1775	**0.2156**	**0.1089**	0.0117	0	NA	0	0
Peterson Gulch	18	357	331	382	412	1	0	0	0	0	**0.2300**	0.1925	0.1733	0.0069	0.1991	0	0	0	0
Stollsteimer Creek	11	201	203	176	195	0	3	2	0	1	0.1500	**0.3440**	0.3382	0.1493	**0.2997**	NA	0.50	0	NA
TOTAL	**84**	**982**	**915**	**972**	**1024**	**5**	**5**	**3**	**0**	**2**	--	--	--	--	--	**NA**	**NA**	**0**	**NA**
Abandoned Production Well																			
Big Horn-Schomburg #1	5	9	5	9	26	1	0	1	0	1	**0.2364**	0.0661	0.0055	0.0852	**0.2122**	--	--	--	--

Notes:

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

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
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Natural Spring	2010 Field Observations / Notes	2011 Field Observations/ Notes	Inspection Date	Water Quality Field Measurements				
				Conductivity (µS/cm)	pH (Units)	ORP (mV)	Temperature (^{0}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	Dry	Sampled	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	Dry	Sampled	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
			5/3/2011	253	6.83	97.4	22.5	126
Beaver Creek	Not Sampled	Not Sampled	10/13/2007	286.6	8.00	21	10.0	146.6
			10/16/2008	303.0	7.40	166.0	5.80	197
			5/14/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
Watson Well Spring	Sampled July 2010	Not Sampled due to access	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
			7/12/2010	570	6.75	NM	17.8	NM
High Watson Spring	Dry	Not Sampled due to access	10/16/2008	743	7.25	159.5	10.98	483
			5/28/2009	NM	NM	NM	NM	NM
			10/8/2009	NM	NM	NM	NM	NM
Grassy Spring	No Access	Not Sampled due to access	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
			10/8/2009	NM	NM	NM	NM	NM
Crain Spring	Sampled July 2010	Not Sampled due to access	6/1/2006	570.3	7.5	-115	29.1	375.3
			10/14/2007	NM	NM	NM	NM	NM
			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
			7/12/2010	482	6.8	NM	11.8	NM
Seep Spring	Not Located	Dry or not located	5/24/2006	NM	NM	NM	NM	NM
			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
Walt Spring #1	Dry	Sampled	5/24/2006	524	7.9	86	12.1	345.4
			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
			5/3/2011	207	7.41	93.2	11.4	155
Townsend Spring	Dry	Dry or not located	5/24/2006	NM	NM	NM	NM	NM
			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

TABLE 7
NATURAL SPRINGS FIELD OBSERVATIONS AND MEASUREMENTS
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Natural Spring	2010 Field Observations / Notes	2011 Field Observations/ Notes	Inspection Date	Water Quality Field Measurements				
				Conductivity (µS/cm)	pH (Units)	ORP (mV)	Temperature (^{0}C)	TDS (ppm)
Thick Spring	Bog not 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 July 2010	Sampled	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	Dry	Sampled	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
			5/4/2011	365	7.24	22.9	16.9	182
Big Hole Spring	Dry	Dry	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
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	NM	NM	NM	NM	NM
Willow Spring	Sampled July 2010	Sampled	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
			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
			5/26/2011	277	6.3	116.5	10.4	139
Section 14 Spring (Reich)	Sampled July 2010	Not Sampled due to access	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
			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
Waypoint 0003 Spring	Not Located	Not Located	5/26/2006	NM	NM	NM	NM	NM
			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
NW John Grub Spring	Sampled July 2010	Sampled	9/19/2005	415.8	6.97	NM	15.8	282.3
			5/26/2006	421.7	7.83	108	27	275.9
			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	Bog not sampled	Sampled	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
			10/8/2009	NM	NM	NM	NM	NM
			7/12/2010	NM	NM	NM	NM	NM
			5/5/2011	428	7.08	16	23.6	213
Section 10U Spring	No 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

TABLE 7
NATURAL SPRINGS FIELD OBSERVATIONS AND MEASUREMENTS
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

Natural Spring	2010 Field Observations / Notes	2011 Field Observations/ Notes	Inspection Date	Water Quality Field Measurements				
				Conductivity (µS/cm)	pH (Units)	ORP (mV)	Temperature (^{0}C)	TDS (ppm)
Spring 1212	No 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	No 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	No 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	No 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	No 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	No 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
^{0}C - degrees celsius
TDS - total dissolved solids
ppm - parts per million
NM - Not Measured

TABLE 8
NATURAL SPRINGS WATER FLOW RATE MEASURMENTS
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES, INC. AND ELM RIDGE 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
Ramona Leonard Spring	NM	0.6	0.4	0.75	1.3	0.24	NM	NM
Beaver Creek	NM	NM	7	NM	NM	NM	NM	NM
Corrigan Spring	NM	1	NM	NM	0.75	NM	NM	NM
Wood/Corrigan Spring	NM	NM	NM	NM	NM	NM	NM	0.3
Grassy Spring	NM	NM	<0.25	NM	NM	NM	NM	NM
Crain Spring	NM	NM	NM	0.2	2.66	NM	2	NM
Walt Spring #1	NM	NM	<1	NM	NM	NM	NM	0.4
Thick Spring	NM	2	<1	NM	NM	NM	NM	0.2
Vance Spring #1	NM	1	<0.5	0	1.9	0.2	NM	0.4
Vance Meadow Spring	NM	<0.5	<0.5	0	NM	NM	0.27	0.2
Big Hole Spring	NM	<1	NM	NM	NM	NM	NM	NM
Willow Spring	NM	1	<0.25	0.03	0.6	NM	0.5	0.3
Section 14 Spring	NM	<1	<0.5	0	1.5	NM	1.3	NM
NW John Grub Spring	0.1	<1	<0.5	0.9	NM	NM	NM	NM
SE John Grub Spring	0.25	<1	<0.25	0	NM	NM	NM	NM
Section 10U Spring	0.9	1	NM	NM	NM	NM	NM	NM
Spring 1212	NM	5.28	NM	NM	NM	NM	NM	NM
Spring 3424	1	1	NM	NM	NM	NM	NM	NM
Townsend Spring	NM	NM	NM	NM	NM	NM	NM	NM
Seep Spring	NM	NM	NM	NM	NM	NM	NM	NM
Watson Well Spring	NM	NM	NM	NM	NM	NM	NM	NM
Vaughn Spring	NM	<1	NM	NM	NM	NM	NM	NM

Notes:
NM - Not Measured
< - less than designated flow rate

TABLE 9
NATURAL SPRINGS ANALYTICAL RESULTS - DISSOLVED METHANE
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES, INC. AND ELM RIDGE 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
Ramona Leonard Spring	<0.0005	<0.001	<0.02	<0.02	<0.02	<0.02	NS	NS
Beaver Creek	NS	NS	<0.02	<0.02	NS	NS	NS	NS
Corrigan Spring	NS	<0.001	NS	NS	<0.02	NS	NS	<0.02
Watson Well Spring	NS	0.016	NS	<0.02	<0.02	<0.02	NS	NS
Grassy Spring	NS	NS	<0.02	NS	NS	NS	NS	NS
Crain Spring	NS	0.0067	NS	<0.02	<0.02	NS	<0.02	NS
Walt Spring #1	NS	<0.001	NS	NS	NS	NS	NS	<0.02
Thick Spring	NS	<0.001	<0.02	NS	<0.02	NS	NS	<0.02
Vance Spring #1	NS	0.022	<0.02	0.05	<0.02	<0.02	<0.02	<0.02
Vance Meadow Spring	NS	0.011	0.06	<0.02	<0.02	NS	NS	<0.02
Big Hole Spring	NS	0.001	NS	NS	NS	NS	NS	NS
Willow Spring	NS	<0.001	<0.02	<0.02	<0.02	NS	<0.02	NS
Section 14 Spring	0.0006	<0.001	0.02	0.02	<0.02	NS	NS	NS
NW John Grub Spring	0.015	0.0016	0.30	0.03	0.07	NS	0.07	0.03
SE John Grub Spring	<0.0005	0.0025	0.65	<0.02	0.02	NS	NS	0.023
Section 10U Spring	<0.0005	0.0062	NS	NS	NS	NS	NS	NS
Section 12U Spring	<0.0005	NS	NS	NS	NS	NS	NS	NS
Spring 1212	0.0005	<0.001	NS	NS	NS	NS	NS	NS
Spring 3424	0.0017	0.023	NS	NS	NS	NS	NS	NS
Townsend Spring	NS	NS	NS	NS	NS	NS	NS	NS
Vaughn Spring	NS	0.0037	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
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES, INC. AND ELM RIDGE 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
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
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
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
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
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
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
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
Section 14 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
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
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

TABLE 10
SUBSURFACE SOIL GAS MEASUREMENTS AT NATURAL SPRINGS
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

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

NATURAL SPRING	Date	SUBSURFACE SOIL GAS CONCENTRATIONS			
		Methane (ppm)	Oxygen (%)	Hydrogen Sulfide (ppm)	Carbon Monoxide (ppm)
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
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
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
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
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
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
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

Notes:
ppm - parts per million
% - percent
NS - not sampled

APPENDIX A
NATURAL GAS COMPOSITION LABORATORY ANALYTICAL REPORT

GAS ANALYSIS SERVICE

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

ANALYSIS NO. PR220001
CUST. NO. 59500 - 10000

WELL/LEASE INFORMATION

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

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

ANALYSIS

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

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

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

ANALYSIS RUN AT 14.730 PSIA & 60 DEGREES F

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

APPENDIX B
NATURAL SPRINGS LABORATORY ANALYTICAL REPORT

Four Corners Geoscience,Inc.
P.O. Box 4224
Durango, CO 81302
lynn@fcgeo.com

Methane Analysis Report

Client

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

Project Name:	**Archuleta Spring Sampling**
Project Number:	19111002
Report Date:	5/30/2011
Sampled By:	Sam LaRue
Date of sampling	5/26/2011

Analysis:	Lynn Fechter			**Results:**	
FCGeo #	**Sample Date**	**Sample Time (Hrs)**	**Site ID-Location**	***CH4 (mg/L)***	***Limit (mg/L)***
052611-LB2	5/26/2011	1020	Willow Spring	<0.02	0.02
052611-LB-BLK1	5/26/2011		LAB BLANK	0.02	0.02

Date Samples delivered to FCGeo 5/26/2011
Analyses were conducted on SRI gas chromatograph w/ FID within 24 hours of delivery.
Conducted Methane analysis per protocol and method established by BLM San Juan Resource Area 1993 and USGS method.
Laboratory calibration quality control conducted the same day as sample runs.
Blanks and duplicated runs conducted for each sample set.
No field blanks received at FCGeo Lab
ND- None Detected

Lynn M. Fechter, B.S. Geology

Four Corners Geoscience,Inc.
P.O. Box 4224
Durango, CO 81302
lynn@fcgeo.com
Methane Analysis Report

Client

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

Project Name:	Archuleta Spring Sampling
Project Number:	Unknown
Report Date:	5/11/2011
Sampled By:	Sam LaRue

May 5,2011

Analysis: Lynn Fechter **FCGeo #**	**Sample Date**	**Sample Time (Hrs)**	**Site ID-Location**	**Results: *CH4 (mg/L)***	***Limit (mg/L)***
050511-LB3	5/5/2011	1004	Darwin Rather Spring#1	<0.02	0.02
050511-LB4	5/5/2011	1039	Darwin Rather Spring#2	<0.02	0.02
050511-LB5	5/5/2011	1300	NW John Grubb Spring	0.023	0.02
050511-LB6	5/5/2011	1331	SE John Grubb Spring	0.03	0.02
050511-LB-BLK3	5/5/2011	BLANK	LAB BLANK	0.02	0.02
050511-LB-BLK4	5/5/2011	BLANK	LAB BLANK	0.02	0.02
050511-LB-BLK5	5/5/2011	BLANK	LAB BLANK	0.02	0.02
050511-LB-BLK6	5/5/2011	BLANK	LAB BLANK	0.02	0.02

Date Samples delivered to FCGeo 5/5/2011

Analyses were conducted on SRI gas chromatograph w/ FID within 24 hours of delivery.

Conducted Methane analysis per protocol and method established by BLM San Juan Resource Area 1993 and USGS method.

Laboratory calibration quality control conducted the same day as sample runs.

Blanks and duplicated runs conducted for each sample set.

No field blanks received at FCGeo Lab

ND- None Detected

Lynn M. Fechter, B.S. Geology

Four Corners Geoscience,Inc.
P.O. Box 4224
Durango, CO 81302
lynn@fcgeo.com

Methane Analysis Report

Client

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

Project Name:	**Archuleta Spring Sampling**
Project Number:	Unknown
Report Date:	5/11/2011
Sampled By:	Sam LaRue

May 4,2011

Analysis:	Lynn Fechter			**Results:**	
FCGeo #	**Sample Date**	**Sample Time (Hrs)**	**Site ID-Location**	***CH4 (mg/L)***	***Limit (mg/L)***
050411-LB3	5/4/2011	1251	Vance Spring #1	<0.02	0.02
050411-LB4	5/4/2011	1331	Vance Meadow Spring	<0.02	0.02
050411-LB-BLK1	5/4/2011	BLANK	LAB BLANK	0.02	0.02
050411-LB-BLK2	5/4/2011	BLANK	LAB BLANK	0.02	0.02

Date Samples delivered to FCGeo 5/4/2011

Analyses were conducted on SRI gas chromatograph w/ FID within 24 hours of delivery.

Conducted Methane analysis per protocol and method established by BLM San Juan Resource Area 1993 and USGS method.

Laboratory calibration quality control conducted the same day as sample runs.

Blanks and duplicated runs conducted for each sample set.

No field blanks received at FCGeo Lab

ND- None Detected

Lynn M. Fechter, B.S. Geology

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

Methane Analysis Report

Client

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

Project Name:	**Archuleta Spring Sampling**
Project Number:	Unknown
Report Date:	5/11/2011
Sampled By:	Sam LaRue

May 3,2011

Analysis: Lynn Fechter

FCGeo #	Sample Date	Sample Time (Hrs)	Site ID-Location	Results: CH4 (mg/L)	Limit (mg/L)
050311-LB1	5/3/2011	1421	Corrigan Spring	<0.02	0.02
050311-LB2	5/3/2011	1349	Wood/Corrigan spring	<0.02	0.02
050311-LB3	5/3/2011	1049	Thick Spring	<0.02	0.02
050311-LB4	5/3/2011	1217	Walt Spring#1	<0.02	0.02
050311-LB-BLK1	5/3/2011	BLANK	LAB BLANK	0.02	0.02
050311-LB-BLK2	5/3/2011	BLANK	LAB BLANK	0.02	0.02
050311-LB-BLK3	5/3/2011	BLANK	LAB BLANK	0.02	0.02
050311-LB-BLK4	5/3/2011	BLANK	LAB BLANK	0.02	0.02

Samples delivered to FCGeo May 3,2011
Analyses were conducted on SRI gas chromatograph w/ FID within 24 hours of delivery.
Conducted Methane analysis per protocol and method established by BLM San Juan Resource Area 1993 and USGS method.
Laboratory calibration quality control conducted the same day as sample runs.
Blanks and duplicated runs conducted for each sample set.
No field blanks received at FCGeo Lab
ND- None Detected

Lynn M. Fechter, B.S. Geology

Green Analytical Laboratories

GAL ID No.: **1105-041**

May 20, 2011

LT Environmental
2243 Main Ave. #3
Durango, CO 81301
Attention: Sam LaRue

Project Name: La Plata Natural Springs
Project Number:
Date Received: 05/05/11

This is to transmit the attached analytical report. The analytical data and information contained therein was generated using specified or selected methods contained in references, such as Standard Methods for the Examination of Water and Wastewater, 18th & 19th editions, and Methods for Determination of Organic Compounds in Drinking Water, EPA-600/4-79-020.

Samples were received by Green Analytical Laboratories, Inc. in good condition on 05/05/11.

If you should have any questions or comments regarding this report, please do not hesitate to call.

Sincerely,

Debbie Zufelt
Laboratory Manager

75 Suttle Street, Durango, Colorado 81303
Telephone (970) 247-4220 Fax (970) 247-4227

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

GAL I.D.: 1105-041-03
Date Received: 05/05/11
Date Reported: 05/20/11
QC Batches:

LT Environmental
2243 Main Ave. #3
Durango, CO 81301
Attention: Sam LaRue

PROJECT NAME: La Plata Natural Springs
PROJECT NUMBER:
SAMPLE I.D.: Darwin Rather Spring 1

Sample Date: 05/05/11
Sample Matrix: Water

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS	Maximum Contamination Level
Alkalinity, Total	2320B	10	178	1	mg/L	
Alkalinity, Bicarbonate	2320B	10	178	1	mg/L	
Alkalinity, Carbonate	2320B	10	<10	1	mg/L	
Alkalinity, Hydroxide	2320B	10	<10	1	mg/L	
Calcium	200.7	0.5	52.4	1	mg/L	
Chloride	4500CL	10	13	1	mg/L	
Magnesium	200.7	0.5	17.3	1	mg/L	
Potassium	200.7	0.5	2.1	1	mg/L	
Sodium	200.7	0.5	7.4	1	mg/L	
Sulfate	4500SO4	10	38	1	mg/L	
TDS	2540C	10	255	1	mg/L	

Debbie Zufelt, Laboratory Manager

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

GAL I.D.: 1105-041-04
Date Received: 05/05/11
Date Reported: 05/20/11
QC Batches:

LT Environmental
2243 Main Ave. #3
Durango, CO 81301
Attention: Sam LaRue

PROJECT NAME: La Plata Natural Springs
PROJECT NUMBER:
SAMPLE I.D.: Darwin Rather Spring 2

Sample Date: 05/05/11
Sample Matrix: Water

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT LIMIT	RESULT	DIL	UNITS	Maximum Contamination Level
Alkalinity, Total	2320B	10	120	1	mg/L	
Alkalinity, Bicarbonate	2320B	10	120	1	mg/L	
Alkalinity, Carbonate	2320B	10	<10	1	mg/L	
Alkalinity, Hydroxide	2320B	10	<10	1	mg/L	
Calcium	200.7	0.5	35.4	1	mg/L	
Chloride	4500CL	10	<10	1	mg/L	
Magnesium	200.7	0.5	6.1	1	mg/L	
Potassium	200.7	0.5	0.7	1	mg/L	
Sodium	200.7	0.5	13.0	1	mg/L	
Sulfate	4500SO4	10	28	1	mg/L	
TDS	2540C	10	185	1	mg/L	

Debbie Zufelt, Laboratory Manager

Page ____ of ____

CHAIN OF CUSTODY RECORD

Green Analytical Laboratories

NOTES:
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) Spring Water

FOR GAL USE ONLY
GAL JOB # 1105-041

Client: Environmental
Contact: Sam LaRue slarue@ltenv.com
Address: 2243 Main Ave Suite #3
Durango, CO 81301
Phone Number: 970-769-0936
FAX Number:

PO#
Project Name: La Plata/Archuleta Springs
Samplers Signature:

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

Sample ID	Collection: Date	Collection: Time	Misc: Collected by: (Init.)	Misc: Matrix Type From Table 1	Misc: No. of Containers	Misc: Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	Preservative(s): HNO3	Preservative(s): HCL	Preservative(s): H2SO4	Preservative(s): NAOH	Preservative(s): Other (Specify)	Analyses Required: Gen Chem Alk, Cl, SO4, TDS	Analyses Required: Metals Ca, Mg, K, Na	Comments
1.															15.8°C
2.															
3. Darwin Rather Spring 1	5/5/11	10:04	S.L	7	2	N							X	X	No preservative
4. Darwin Rather Spring 2	5/5/11	10:39	S.L	7	2	N							X	X	No preservative
5.															
6. Please Invoice & report separately per Sam LaRue 5-20-11															
7. under name "La Plata Natural Springs"															
8.															
9.															
10.															

Relinquished by: Date: 5/5/11 Time: 16:07 Received by: Date: 5/5/11 Time: 1605
Relinquished by: Date: Time: Received by: Date: Time:

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

APPENDIX C
CBM PRODUCTION WELL WATER LABORATORY ANALYTICAL REPORT

TO: TOM
FROM: Mike
as discussed
Thanks

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

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

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

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

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

Laboratory Report

RESULTS

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

John Green, Laboratory Director

Pargin Mnt 9, 10, 11
Water Analysis

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

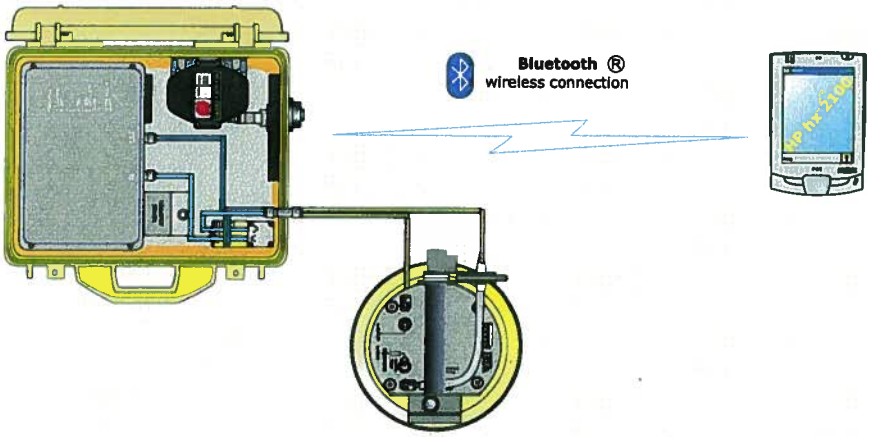
FE (mg/L)	HCO3 (mg/L)	K (mg/L)	MG (mg/L)	NA (mg/L)	pH (PH UNITS)	RESISTIVITY (ohm-m)	SO4 (mg/L)	TDS (mg/L)	TDS, Calc (mg/L)	lat	long	utm_x	utm_y
	3230	1	8	1830	7.19	1.64	0		6170	37.14528	-107.374	289181	4113423
	3392								5820	37.15243	-107.376	288986	4114221
	3392	13	17	1660	7.17	1.66	0		5820	37.15243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

APPENDIX D
EQUIPMENT SPECIFICATIONS

WEST Systems portable soil flux meter

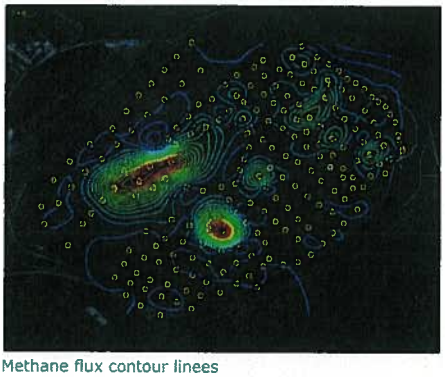
for Carbon dioxide, Methane and Hydrogen sulfide fluxes

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 linees

a group of researchers during a flux mapping fieldwork, using the WS-LI820 flux meter

Courtesy of United States Geological Survey

WEST Systems

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

Portable soil flux meter

Common physical characteristics:
Total Weight = 8.3 Kg/16 lbs. to be carried on the back using the backpack-like support vest. The field operator will also have to carry one of the accumulation chambers and the palmtop:

Warm Up
Only at instrument cold start-up a warm-up time of 20 minutes is required. The typical measurement time ranges from 2 to 4 minutes and the autonomy of the instrument is about 4 hours with a single NiMH 14.4 Volts, 2.6 A/h battery. The instrument comes with two interchangeable batteries.

Accumulation Chamber specifications:
- Accumulation chamber A diameter : 200 mm / Height: 100 mm / weight: 1.5 Kg/3.3 lbs
- Accumulation chamber B diameter : 200 mm / Height: 200mm / weight : 2.2 Kg /4.84 lbs

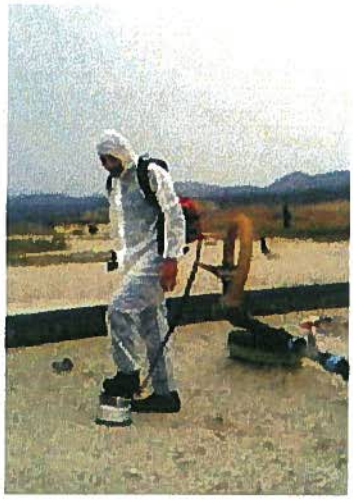
Palm top computer: PocketPC Color Display based on Windows Mobile operating system.
- PalmTop with cables, 0.3 Kg/0.7 lbs.
- Size 125mm (4.8") x 82mm (3.2") * 25 mm (1").

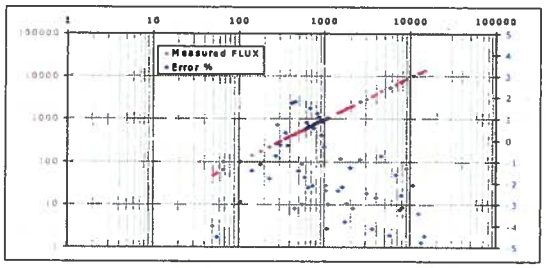
Software The instrument is supplied with a custom software, FluxManager, which allows recording and visualization of the increase in concentration of the target gas in the accumulation chamber, and then the flux calculations. The obtained measurements can be saved on the palmtop computer and then transferred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

The instrument is supplied complete with:
- backpack-like support vest
- Carrying case for transport and storage
- 2 batteries NiMH 14.4 Volts 2.6 A/h and 1 NiMH battery charger Accumulation chamber A and B
- Palmtop Pocket PC
- User Manual, in English
- FLUX Manager Software for Windows Mobile, in English

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

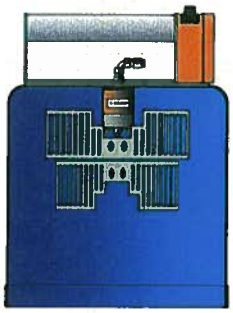
Finally we improved the connection between the instrument and the palmtop that now is based on BlueTooth wireless embedded device.





The measured carbon dioxide flux vs imposed flux (grams m^{-2} day^{-1});
The error % vs imposed flux (in blue).

The instrument is extremely versatile and allows measurement of flux in 2/4 minutes. In the picture: Soil bio-gas flux monitoring in a landfil.



Accumulation Chamber Type B

The accumulation chambers

In the normal use of instrument only the chamber B is used. To extend the instrument sensitivity to very low fluxes the accumulation chamber A is supplied.

	Type A	Type B
net area m^2	0.0314	
net volume m^3	0.003	0.006

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CO_2 - LI820

LI820 based Carbon dioxide fluxmeter

The CO_2 Fluxmeter is equipped with the LICOR LI-820 the most accurate and reliable portable carbon dioxide detector. The LI-820 is a double beam infrared sensor compensated for temperature variation in the range from -10 to 45°C and for atmospheric pressure variation in the range 660-1060 HPa. Accuracy 2% repeatability ±5ppm. The full scale range can be set to 1000 , 2000, 5000 or 20000 ppmV of carbon dioxide. The characteristics of precision refer to the sensor set to a full scale range of 20000 ppmV. If a very high sensitivity is required, the detector can be set to 1000 or 2000 ppm full scale value to measure with very high precision fluxes in the range from 0 to 10 moles m^{-2} day^{-1}

CO_2 FLUX Measurement range:
from 0 up 600 moles m^{-2} day^{-1}

The accuracy depends on the measured flux:

0 to 0.5 moles m^{-2} day^{-1}	25% (Acc.ch.A)
0.5 to 1 moles m^{-2} day^{-1}	15% (Acc.ch.A or B)
1 to 150 moles m^{-2} day^{-1}	10% (Acc.ch.B)
150 to 300 moles m^{-2} day^{-1}	10% (Acc.ch.B)
300 to 600 moles m^{-2} day^{-1}	20% (Acc.ch.B)

WS-DRAGER CO_2

WS-DRAGER: CO_2 Flux measurement:

A double beam infrared sensor compensated for temperature variation in the range from -20 to 65°C. Accuracy 3%. The full scale value can be set from 2,000 to 300,000 ppm of carbon dioxide. Carbon Dioxide flux measurement range from 0.5 to 1500 moles/m^2 per day.

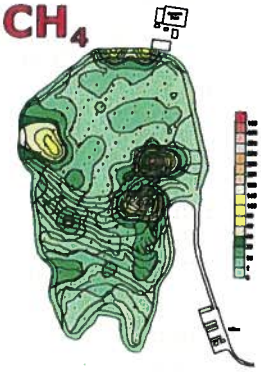
The precision depends on the measured flux:

range:0.5 – 5 moles/m^2 per day 25% (Acc. chamber A)

5-350 moles/m^2/day 10% (Acc. chamber B)

350-600 moles/ m^2/day 25% (Acc. chamber B)

600-1500 moles/ m^2/day 25% (Acc.Ch.B / F.S.=10%)



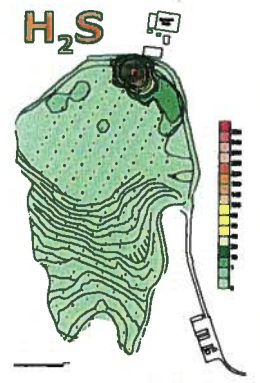
WS-HC CH^4

Methane fluxmeter

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

Methane Flux measurement range
from 0.2 up 300 moles m^{-2} day^{-1}
The fluxmeter is provided with 2 accumulation chambers and the accuracy depends on the measured flux:

0.2 to 10 moles m^{-2} day^{-1}	25% (Acc.Ch.A)
10 to 150 moles m^{-2} day^{-1}	15% (Acc.Ch.A)
150 to 300 moles m^{-2} day^{-1}	20% (Acc.Ch.B)



H_2S - WEST

Hydrogen sulfide

The hydrogen sulphide detector is a electrochemical cell with the following specifications:
The full-scale range is 20ppm, with a precision of 3% of reading, and the repeatability is 1.5% of span with a zero offset of 0.3%.

H_2S Flux measurement range: from 0.0025 to 0.5 moles/m^2 per day.
The precision depends on the measured flux:
0.0025 – 0.05 moles/m^2 per day ±25% (Acc. Chamber A)
0.05 – 0.5 moles/m^2 per day ±10% (Acc. Chamber B)

NOTE: The hydrogen sulphide flux evaluation can be affected by the presence of large quantities of water in both liquid and vapour phases.

We thanks to N.Lima et al. for the maps.

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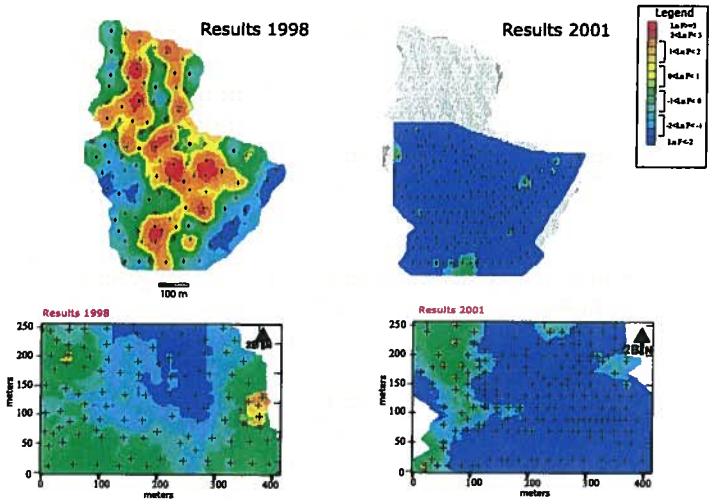
Application on a landfill: mapping the biogas non controlled emissions.

The figure shows the compare between the results of the measurement regime of a land/fill undertaken in 1998 and 2001: the mapping performed in 1998 gave clear indications of the areas which required intervention to improve the cover and the capture system.
The interventions were performed only where necessary with a significant economic savings.
The measurement regime of 2001 indicates without any doubt that the intervensions were efficient and state-of-the-art.



The obtained results:

- Minor atmospheric emissions;
- Higher quantity and better quality of biogas for cogeneration;
- Optimisation of management costs.

Continuous soil flux monitoring

WEST Systems produces a soil gas station for the continuous monitoring of carbon dioxide and hydrogen sulfide flux, soil temperature , soil water content, soil pressure gradient, soil heat flux and meteorological parameters.
For more information contact your local representative, visit our web site or e-mail to: g.virgili@westsystems.com

Local sales representative

H.Q.

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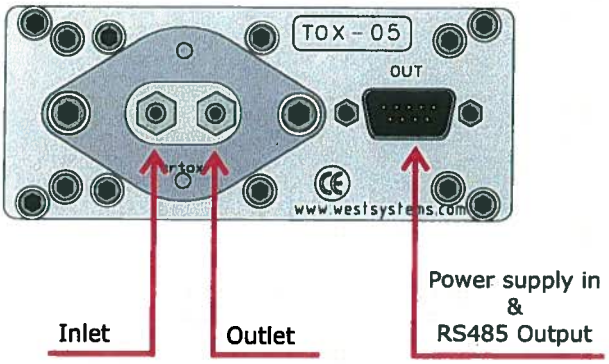
Hydrogen Sulfide Detector



Pin	Signal
1	Gnd
2	+VDC
3	Gnd
4	RS485-B
5	RS485-A
6	Gnd
7	+12V
8	Gnd
9	RS485-B

Legenda
Gnd: Ground reference for power supply and RS485
+VDC: 10-28 Volts Power supply input
RS485-A: Digital signal output A
RS485-B: Digital signal output B

Sensor specifications
Ambient conditions:
Air temperature -40°C to 65 °C
Air pressure 700 hPa to 1300 hPa
Air RH 5% - 95% non condensating.
Expected sensor life > 24 months.
Chemical cell order code: WEST H2S-BH
Detector order code: WEST TOX-05-H2S-BH
Factory calibration : 20 ppm
RMS Noise <= 0.02 ppm
Zero Offset <= 0.2 ppm
Max Overrange >= 200 ppm

The chemical cell reaction is:

$$H_2S + 2O_2 = H_2SO_4$$

the gas sample specific consuption is very low:

2.5×10^{-10} moles/Sec per ppm

Due to this consuption the H2S flux is methodically understimated by a -10% with the AccumulationChamber A and by a -5% when using the accumulation chamber B. Then we advise to use the accumulation chamber B except when the flux is very very low.

Appendix M

WS-HC detector

WS-HC Hydrocarbon Flux measurement:
The HydroCarbon detector is based on a double beam infrared spectrometer able to detect methane, hexane , propane and other molecules with HC linkages. The instrument comes calibrated for the methane. *The instrument requires a frequent **zero base-line** calibration that will be done using atmospheric air. The calibration requires 20 second.*

Detector specifications:

Accuracy 5%

Repeatibility 2%

Resolution 22 ppm (Methane equivalent)

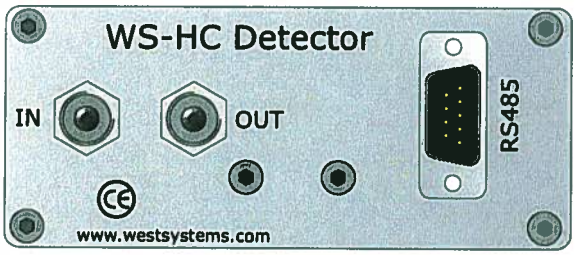
Full scale range is 50000 ppm of methane.

Detection limit 60 ppm.

Methane flux measurement range from 0.1 to 150 moles/m^2 per day.
The precision depends on the measured flux:

```
range 0.1  5      moles/ m^2 per day ±25%
      5 - 150     moles/ m^2 per day ±10%
```

The measurement of very low fluxes (< 0.1 moles/m^2/day) is possible but the error will increase due to the low detector sensitivity.



RS485 Connector DB9 Male panel

Pin 1	**Gnd**
Pin 2	**+Power supply**
Pin 3	**Gnd**
Pin 4	**RS485 B**
Pin 5	**RS485 A**
Pin 6	**Gnd**
Pin 7	**+Power supply**
Pin 8	**Gnd**
Pin 9	**RS485 B**

The gas fittings can be used with rilsan 6x4 mm tubes or silicon 5x3.2 tubes. Please respect inlet and outlet ports.

LI-820 Specifications

CO_2 Specifications

Measurement Range: 0-1000 ppm, 0-2000 ppm with 14 cm bench; 0-5000 ppm, 0-20000 ppm with 5 cm bench

Accuracy: < 2.5% of reading with 14 cm bench; 4% of reading with 5 cm bench

Calibration Drift

[1]Zero Drift: < 0.15 ppm / °C

[2]Span Drift at 370 ppm: < 0.03% / °C

[3]Total Drift at 370 ppm: <0.4 ppm / °C

RMS Noise at 370 ppm with 1 sec Signal Filtering: < 1 ppm

[1] Zero drift is the change with temperature at 0 concentration
[2] Span drift is the change after re-zeroing following a temperature change
[3] Total drift is the change with temperature without re-zeroing or re-spanning

Measurement Principle: Non-Dispersive Infrared

Traceability: Traceable gases to WMO standards from 0-3000 ppm. Traceable gases to EPA protocol gases from 3000 to 20000 ppm

Pressure Compensation Range: 15 kPa-115 kPa

Maximum Gas Flow Rate: 1 liter/minute

Output Signals: Two Analog Voltage (0-2.5 V or 0-5 V) and Two Current (4-20 mA)
Digital: TTL (0-5 V) or Open Collector

DAC Resolution: 14-bits across user-specified range

Source Life: 18000 hours

Power Requirements: Input Voltage 12-30 VDC
1.2A @ 12V (14 W) maximum during warm-up with heaters on
0.3 A @ 12 V (3.6 W) average after warm-up with heaters on

Supply Operating Range: 12-30 VDC

Operating Temperature Range: -20 to 45 °C

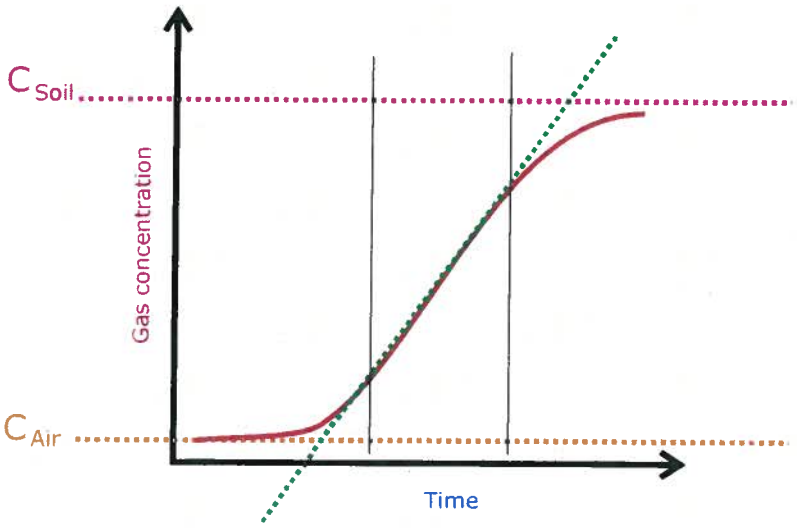
Relative Humidity Range: 0 to 95% RH, Non-Condensing

Dimensions: 8.75" x 6" x 3" (22.23 x 15.25 x 7.62 cm)

Weight: 2.2 lbs (1 kg)

Quantifying the flux

How explained in the chapter 3 the flux is proportional to the concentration increase ratio ppm/sec. The proportionality factor depends on the chamber volume/surface ratio as well as the barometric pressure and the air temperature inside the accumulation chamber.



There are two methods to carry out the field work, in both cases for each measurement you have to record the type of accumulation chamber used, the barometric pressure, and the air temperature.
The variation of few mBar of the pressure and or few degrees of temperature do not affect the evaluation of flux very much, then you can use a mean value for both parameters. Of course that depends on the accuracy you want to reach for the evaluation of flux.
The instrument measures the barometric pressure, using the embedded pressure sensor of the LICOR, with a good accuracy. A platinum Pt100 or a thermo-couple thermometer can be used to measure the air temperature as well as the soil temperature.

Choosing the flux measurement unit

The first measurements made, 10 years ago, with the accumulation chamber was expressed in cm/sec which is a speed, the speed of carbon dioxide flowing out from the soil. During the last ten years several units have been used by volcanologist and by geochemistry researchers. The most common unit is grams/squaremeter per day, but using the same instrument for two gas species to express the flux using this unit means to have two different conversion factors. Actually we use the unit **moles/squaremeter per day** that has two advantages: A single conversion factor for every gas specie and an easy conversion of the flux in grams/sm per day simply multiplying the result expressed in moles/sm per day for the molecular weight of the target gas.

From the [tools][settings] menu you can set the accumulation chamber factor in the "A.c.K." field.

If this factor is set to 1 the instrument will give you results expressed in ppm/sec, that's simply the slope of the curve in the selected interval.

If you set the A.c.K to a value different from 1 the instrument will give you the results expressed in moles per square meter per day.

Please see next page.

Quantifying the flux

Method 1: Measuring the slope

Set the Accumulation Chamber factor to 1 in order to have the flux measurement expressed in the slope unit "ppm/sec" and translate it in the desired unit with a post processing.
Using this method you can focus only on the accumulation chamber interfacing with the soil, the flux curve shape and the other aspects of the measurement, putting off choosing the correct accumulation chamber factor.

Method 2: Measuring the flux directly in moles/sm/day.

To get the results directly in moles/sm/day you have to set the Accumulation Chamber factor to the correct value, taking it from the tables.
For each measurement, if there are variations in the air temperature, or of the barometric pressure, or if you changed the accumulation chamber you have to select the [tools][settings] menu and put the correct accumulation chamber factor in the "A.c.K." field. This operation can be "critical". In any case on the saved files you'll find the results of flux evaluation expressed in both units , the raw ppm/sec and the moles/sm/day computed with the A.c.K. you set.

The accumulation chamber factors

Here following the formula used to compute the A.c.K.:

$$K = \frac{86400 \cdot P}{10^6 \cdot R \cdot T_k} \cdot \frac{V}{A}$$

Where

- **P** is the barometric pressure expressed in mBar (HPa)
- **R** is the gas constant 0.08314510 bar $L\,K^{-1}\,mol^{-1}$
- $\mathbf{T_k}$ is the air temperature expressed in Kelvin degree
- **V** is the chamber net volume in cubic meters
- **A** is the chamber inlet net area in square meters.

The dimensions of the A.c.K. are

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

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

An example:

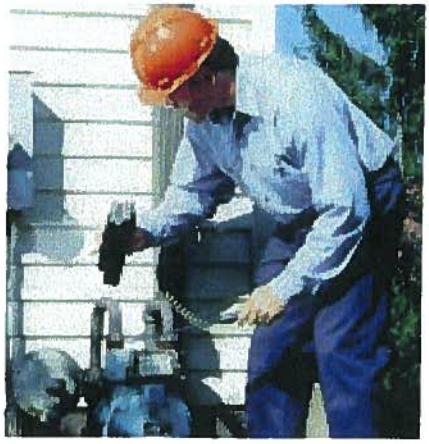
You're using the accumulation chamber B, the slope of the flux curve is 2.5 ppm/sec, the barometric pressure is 1008 mBar (HPa) and the air temperature is 22 °C.
From the table B get the value that correspond to the barometric pressure and temperature. In this case I get the value computed for 25°C and 1013 mBar : 0.696.

Then the flux is: 2.5 x 0.696= 1.74 moles per square meter per day.

Gasport® Gas Tester

MSA

The Gasport Gas Tester is designed for gas utility workers to detect methane and certain toxic gases. It is a reliable, simple, versatile tool to help your service technicians get the job done quickly! With multiple ranges and sensing capabilities built into one rugged housing, the Gasport Tester simplifies your work by reducing the number of meters you have to carry on the job.



Applications

The Gasport Tester's poison-tolerant methane sensor provides three measurement ranges for your daily service needs:

- Open air, safety sampling
- Small, in-home leak detection
- Street/outdoor service line leak detection

Features and Benefits

- **Proven in field use–rugged and reliable**
  Less costly to maintain, less time in repair
- **Multiple functions in one instrument**
  No need to buy, carry & maintain multiple instruments
- **New, poison-tolerant combustible gas sensor**
  Reduces meter ownership costs
- **User-selectable, "silent" operation mode**
  Reduces customer disturbances and worries
- **Fast warm up time**
  Fastest warm up time in industry saves time
- **Can monitor up to four gases at a time**
  Fewer instruments to carry
- **Show all gas concentrations simultaneously**
  Eliminates guesswork on what reading is displayed
- **Autoranging methane sensor**
  Automatically switches between 0-5% and 5-100% methane ranges
- **Gas readings recorded for later retrieval**
  Can double check readings after job is done
- **Simple manual or automated calibration options**
  Reduces training time and helps ensure accuracy
- **Intrinsically safe**
  Meets safety standards for work in hazardous areas
- **Lifetime warranty on case and electronics**
  Reduced maintenance and lifetime costs

Specifications

Gas	Range	Resolution
Methane	0–5000 ppm	50 ppm
Methane	0–100% LEL or 0–5% CH_4	1 % LEL or 0.1% CH_4
Methane	5–100% CH_4	1% CH_4
Oxygen	0–25%	0.1%
Carbon Monoxide	0–1000 ppm	1 ppm
Hydrogen Sulfide	0–100 ppm	1 ppm

Battery types: NiCd and Alkaline
Case material: Impact resistant, stainless-steel-fiber-filled polycarbonate
Operating temperature: normal -10 to 40°C; extended -20 to 50°C
Operating humidity: Continuous: 15-95% RH, non-condensing
Intermittent duty: 5-95% RH, non condensing
Warm up time: Less than 20 seconds to initial readings
Datalog capacity: 12 hours
Input: 3 clearly marked, metal domed keys
Warranty: Case and Electronics: Lifetime
Sensors and consumable parts: 1 year

The answer for gas utilities' gas detection needs

Gasport® Gas Tester

Ordering Information

Battery Chargers

Part No.	Description
494716	Omega 120 VAC 50/60Hz
495965	Omega 220 VAC 50/60Hz
801759	Omega 110/220 VAC, Five Unit, 50/60Hz
800525	Omega 8 - 24VDC for vehicle use

Battery Packs

Part No.	Description
496990	Standard NiCd Rechargeable
800526	Alkaline, Type C
711041	Alkaline, with Thumbscrews
800527	Heavy Duty NiCd Rechargeable

Sensors

Part No.	Description
813693	Combustible Gas
480566	O_2
812389	CO
812390	H_2S

Protective Boots

Part No.	Description
804955	Black, for NiCd Battery Packs
802806	Orange, for NiCd Battery Packs
806751	Black, for Alkaline Battery Packs
806750	Orange, for Alkaline Battery Packs
806749	Black, for HD NiCd Battery Packs
806748	Orange, for HD NiCd Battery Packs
812833	Yellow Soft Carrying Case with Harness
711022	Black padded Vinyl Carrying Case with Harness

Sampling Equipment

Part No.	Description
800332	Probe - 1 ft., plastic
800333	Probe - 3 ft., plastic
803561	Probe - 3 ft., plastic (holes 2" from end) (bar hole probe)
803962	Probe - 3 ft., plastic (holes 2" from handle) (solid probe)
803848	Probe - Hot Gas Sampler
710465	Sampling Line - 5 ft., coiled
497333	Sampling Line - 10 ft.
497334	Sampling Line - 15 ft.
497335	Sampling Line - 25 ft.

Sampling Accessories

Part No.	Description
801582	Replacement Filter, Probe, pkg. of 10
801291	External Filter Holder
014318	Charcoal Filter
711039	Line Scrubber Filter Holder
711059	Line Scrubber Replacement Cartridges, Box of 12
808935	Dust Filter, Pump Module
802897	Water Trap (Teflon) Filter, Pump Module

Calibration Check Equipment

Part No.	Description
477149	Calibration Kit Model RP with 0.25 lpm Regulator
491041	Calibration Gas - methane, 2.5%
473180	Calibration Gas - 300 ppm CO
813718	Calibration Gas - methane, 2.5% oxygen, 15%60 ppm CO
813720	Calibration Gas - methane, 2.5% oxygen, 15%300 ppm CO 10 ppm H_2S
710288	Gasmiser™ Demand Regulator 0 - 3.0 lpm

Accessories

Part No.	Description
804679	Data Docking Module Kit. Includes the Data Docking Module, MSA Link Software and Instruction Manual

Approvals

The Gasport Gas Tester has been designed to meet intrinsic safety testing requirements in certain hazardous atmospheres.

The Gasport Gas Tester is approved by MET (an OSHA Nationally Recognized Testing Laboratory [NRTL]) for use in Class I, Division I, Groups A, B, C, D; Class II, Division I, Groups E, F, G; and Class III Hazardous locations. Gaspor tGas Testers sold in Canada are approved by CSA for use in Class I, Division I, Groups A, B, C, and D locations.

Contact MSA at 1-800-MSA-2222 for more information or with questions regarding the status of approvals.

Gasport Gas Tester Kits

	LEL Display	O_2	CO	H_2S	Alarms Always	Alarms Optional	Leak Detect Page	Peak	Alkaline Battery	NiCd Battery	5ft Coiled Line	1ft Probe	Part No.
4-Gas, Selectable, NiCd	•	•	•	•		•	•	•		•	•	•	711489
4-Gas, Selectable, Alkaline	•	•	•	•		•	•	•	•		•	•	711490
3-Gas, Selectable, NiCd	•	•	•			•	•	•		•	•	•	711493
3-Gas, Selectable, Alkaline	•	•	•			•	•	•	•		•	•	711494
2-Gas, Selectable, NiCd	•		•			•	•	•		•	•	•	711495
2-Gas, Selectable, Alkaline	•		•			•	•	•	•		•	•	711496
4-Gas, Alarms On, NiCd	•	•	•	•	•		•	•		•	•	•	711491
4-Gas, Alarms On, Alkaline	•	•	•	•	•		•	•	•		•	•	711492

Assemble-to-Order (ATO) System: You Make the Choices

The ATO System makes it easy to "custom order" the Gasport Gas Tester, configured exactly the way you want it. You can choose from an extensive line of base instrument components and accessories. To obtain a copy of the "ATO System and Price Information for the Gasport Gas Tester," call toll-free 1-800-MSA-2222, and request Bulletin 0804-28. **To obtain a copy of the ATO via FAX, call MSA QuickLit Information Service at 1-800-672-9010. At the prompt, request QuickLit Document #2345 (ATO for Gasport Gas Tester).**

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Offices and representatives worldwide
For further information:

MSA

GeoXT

The total GPS platform for all your GIS field requirements

The GeoXT™ handheld, from the GeoExplorer® series, is an essential tool for maintaining your GIS. It's all you need to collect location data, keep existing GIS information up to date, and even mobilize your GIS.

The unique GeoExplorer series combines a Trimble® GPS receiver with a rugged field-ready handheld computer running the Microsoft® Windows Mobile™ 2003 software for Pocket PCs. Plus there's an internal battery that easily lasts for a whole day of GPS operation. The result is tightly integrated, tough, and incredibly powerful.

High-accuracy Integrated GPS

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

Need submeter accuracy in real-time? Use corrections from a satellite-based augmentation system (SBAS) like WAAS[1] or EGNOS[2]. Want to get that extra edge in precision? Collect data with Trimble's TerraSync™ or GPScorrect™ software, and then postprocess back in the office.

Because the GPS receiver and antenna are built into the handheld computer, it's never been easier to use GPS in your application. The system is more than just cable-free: it's a totally integrated solution.

Optimized productivity

Take advantage of the power and flexibility of Windows Mobile software for Pocket PCs by choosing from the most comprehensive range of field software available—whether off-the-shelf or purpose-built. Whatever your needs, Windows Mobile lets you choose a software solution to match your workflow.

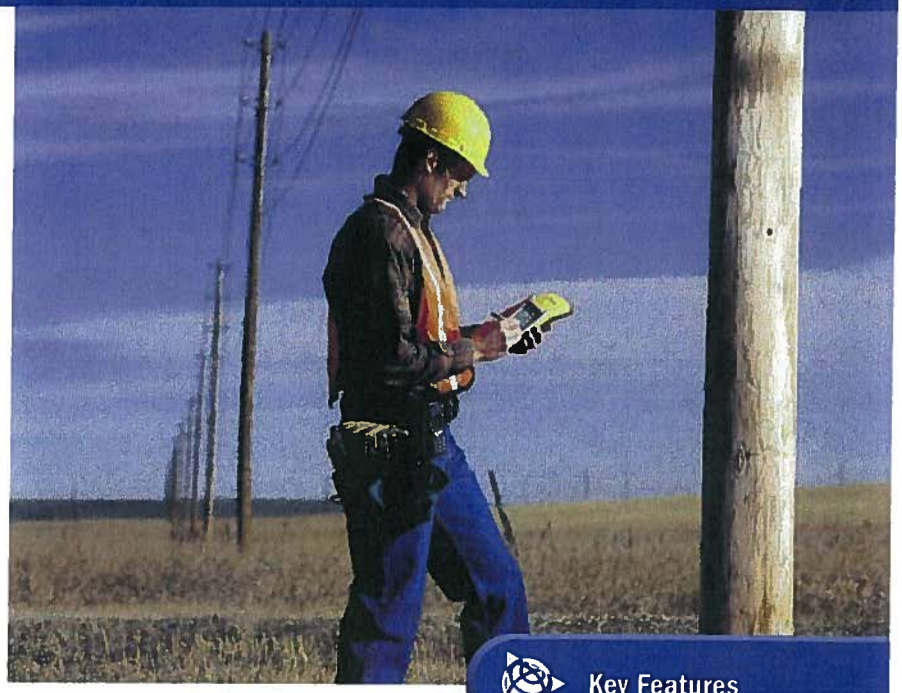
Windows Mobile includes familiar Microsoft productivity tools, including Pocket Word, Pocket Excel, and Pocket Outlook®. Pocket Outlook lets you synchronize e-mails, contacts, appointments, and data with your office computer, so whether you're in the office or in the field, you're always up to date.

Go wireless with integrated Bluetooth®* for connection to other Bluetooth-enabled devices, including cell phones and PCs. You also have the option to use the USB support module to connect to a desktop computer, or use the optional serial clip for cabled connections in the field.

Receive a free copy of Microsoft Streets & Trips** 2004 software with your GeoXT handheld, and take advantage of comprehensive map and travel information for easy navigation and route planning.

All the memory you need

There's plenty of storage space in the GeoXT for all your GIS data. The fast processor and large memory mean even big graphics files load quickly—and they're crisp and crystal-clear on the advanced TFT outdoor color screen.



Key Features

- High-performance submeter GPS with integrated WAAS/EGNOS
- Windows Mobile 2003 software for Pocket PCs, allowing maximum flexibility in software choice
- Rugged handheld with all-day battery
- Advanced color TFT display with backlight
- Integrated Bluetooth for wireless connectivity

From data collection to data maintenance, to mobile GIS and beyond ... the GeoXT is the handheld of choice.

* *Bluetooth type approvals are country specific. GeoExplorer series handhelds are approved for use with Bluetooth in the USA. For a complete list of other countries with Bluetooth approval please refer to: www.trimble.com/geo_bluetooth.html.*

** *Microsoft Streets & Trips 2004 software available in US/Canada; Microsoft AutoRoute® 2004 in Europe.*

Trimble.

GeoXT

The total GPS platform for all your GIS field requirements

Standard features

System
- Microsoft Windows Mobile 2003 software for Pocket PCs
- 206 MHz Intel StrongARM processor
- 512 MB non-volatile Flash data storage
- Outdoor color display
- Ergonomic cable-free handheld
- Rugged and water-resistant design
- All-day internally rechargeable battery
- Bluetooth wireless

GPS
- Submeter accuracy
- Integrated WAAS[1]/EGNOS[2]
- RTCM real-time correction support
- NMEA and TSIP protocol support
- EVEREST multipath rejection technology

Software
- GPS Controller for control of integrated GPS and in-field mission planning
- GPS Connector for connecting integrated GPS to external ports
- File Explorer, Internet Explorer, Pocket Outlook (Inbox, Calendar, Contacts, Tasks, Notes), Sprite Pocket Backup, Transcriber, Pocket Word, Pocket Excel, Pictures, Windows® Media Player, Bluetooth File Transfer, Calculator, ActiveSync®
- Microsoft Streets & Trips/AutoRoute 2004 software

Accessories
- Support module with power supply and USB data cable
- Getting Started Guide
- Companion CD includes Outlook 2002 and ActiveSync 3.7.1
- Hand strap
- Pouch
- Stylus

Optional Features

Software
- TerraSync
- GPScorrect for ESRI® ArcPad®
- GPS Pathfinder® Tools Software Development Kit (SDK)
- GPS Pathfinder Office
- Trimble GPS Analyst extension for ArcGIS®

Accessories
- Serial clip for field data and power input
- Vehicle power adaptor[3]
- Portable power kit[3]
- Hurricane antenna
- External patch antenna
- Pole-mountable ground plane
- Baseball cap with antenna sleeve
- Beacon-on-a-Belt (BoB™) differential correction receiver[3]
- Hard carry case
- Null modem cable[3]
- Backpack kit

Specifications subject to change without notice.

Technical specifications

Physical

Size	21.5 cm × 9.9 cm × 7.7 cm (8.5 in × 3.9 in × 3.0 in)
Weight	0.72 kg (1.59 lb) with battery
Processor	206 MHz Intel StrongARM SA-1110
Memory	64 MB RAM and 512 MB internal Flash disk
Power	
Low (no GPS)	0.6 Watts
Normal (with GPS)	1.4 Watts
High (with GPS, backlight, and Bluetooth)	2.5 Watts
Battery	Internal lithium-ion, rapidly rechargeable in unit, 21 Watt-hours

Environmental

Temperature	
Operating	-10 °C to +50 °C (14 °F to 122 °F)
Storage	-20 °C to +70 °C (-4 °F to 158 °F)
Humidity	99% non-condensing
Casing	Wind-driven rain and dust-resistant per IP 54 standard Slip-resistant grip, shock- and vibration-resistant

Input/output

Communications	Bluetooth for wireless connectivity USB via support module, serial via optional DE9 serial clip adaptor
Bluetooth	
Certification	Bluetooth type approvals are country specific. GeoExplorer series handhelds are approved for use with Bluetooth in the USA. For a complete list of other countries with Bluetooth approval please refer to www.trimble.com/geoxt_ts.asp.
Profiles	
Both client and host support	Serial Port, File Transfer (using OBEX)
Client support only	Dial-Up Networking, Lan Access
Host support only	Basic Imaging, Object Push
Display	Advanced outdoor TFT, 240 × 320 pixel, 65,536 colors, with backlight
Audio	Microphone and half duplex speaker, record and playback utilities
Interface	Anti-glare coated touch screen, Soft Input Panel (SIP) virtual keyboard 2 hardware control keys plus 4 programmable permanent touch buttons Handwriting recognition software, Audio system events, warnings, and notifications

GPS

Channels	12
Integrated real-time	WAAS[1] or EGNOS[2]
Update rate	1 Hz
Time to first fix	30 sec (typical)
Protocols	NMEA (GGA, VTG, GLL, GSA, ZDA, GSV, RMC), TSIP (Trimble Standard Interface Protocol)

Accuracy (RMS)[4] after differential correction

Postprocessed[5]	Submeter
Carrier postprocessed[6]	
With 10 minutes tracking satellites	30 cm
Real-time	Submeter

1 *WAAS (Wide Area Augmentation System). Available in North America only. For more information, see http://gps.faa.gov/programs/index.htm.*
2 *EGNOS (European Geostationary Navigation Overlay System). Available in Europe only. For more information, see http://www.esa.int/export/esaSA/navigation.html.*
3 *Serial clip also required.*
4 *Horizontal accuracy. Requires data to be collected with minimum of 4 satellites, maximum PDOP of 6, minimum SNR of 4, minimum elevation of 15 degrees, and reasonable multipath conditions. Ionospheric conditions, multipath signals or obstruction of the sky by buildings or heavy tree canopy may degrade precision by interfering with signal reception. Accuracy varies with proximity to base station by +1 ppm for postprocessing and real-time, and by +5 ppm for carrier postprocessing.*
5 *Postprocessing with GPS Pathfinder Office software or GPS Analyst extension for ArcGIS.*
6 *Requires collection of carrier data. (Only available with the GPS Pathfinder Office software).*

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ULTRAMETER II™

OVER 50 YEARS

MYRON L COMPANY

Water Quality Instrumentation

Accuracy • Reliability • Simplicity

ULTRAMETER II™

Advanced Design • Superior Performance

MADE IN USA

OVER 50 YEARS

pH/ORP Sensor protective cap

Four-digit display for full 9999 readings, with autoranging capability up to 200 mS/200 ppt

Powerful microprocessor based surface-mount circuitry

Display prompts for simple pH calibration

Memory for 100 readings with Date & Time Stamp

Real Time Clock

Factory calibrations stored in microprocessor

Conductivity

Resistivity

TDS

Temperature

pH

ORP

CE

ULTRA-FAST
ULTRA-EASY
ULTRA-POWERFUL

Since 1957, the Myron L Company has designed and manufactured highly reliable analytical instruments for a wide variety of applications. Thousands of professionals around the world rely every day on the performance of our instruments. Demanding uses range from boiler water testing to ultrapure water control to medical instruments for artificial kidney machines.

We are proud of the trust our handheld instruments and monitor/controllers have earned in the past. Our product line has evolved to a new level of outstanding performance and value in analytical instruments: the Ultrameter II series. While priced like affordable single-parameter instruments, the Ultrameter II does the job of three, four or even six instruments.

Accuracy You Can Trust

Both Ultrameter II models deliver performance of ±1% of reading (not merely full scale). This high level of accuracy has been achieved through advanced four-electrode conductivity cell technology, a unique pH/ORP sensor and powerful microprocessor-based circuitry. With displayed values of up to 9999, the full four-digit LCD ensures resolution levels never before possible in such affordable instruments. Factory calibrated with NIST traceable solutions, each Ultrameter II may be supplied with both certification of traceability and NIST traceable solutions for definitive calibration.

Fast and accurate in the laboratory, both Ultrameter II models are rugged enough for daily in-line controller checks in hostile process applications.

Innovative Engineering

The Ultrameter II is a prime example of how high-tech engineering can greatly simplify and streamline a task. Whether in the lab, industrial plant, or in a remote field location, merely:

1. Fill the cell cup
2. Push a parameter key
3. Take the reading

Temperature compensation and range selection are both rapid and automatic. The Ultrameter II is a true one-hand operation instrument.

Easy to Calibrate

All calibrations are quickly accomplished by pressing the ☒ or ☒ keys to agree with our NIST traceable Standard Solution. When calibration is necessary, display prompts simplify pH calibration and make sure the correct buffer is being used. Plus, all parameters (excluding factory-set temperature) have an internal electronic setting that can be used for field calibration and as a check on pH/ORP sensor life.

Advanced Features

- Fully automatic temperature compensation
- User adjustable temperature compensation (up to 9.99%/°C) which also allows TC to be disabled for applications requiring non-compensated readings.
- User adjustable conductivity/TDS conversion ratio for greater accuracy when measuring solutions not contained in the microprocessor.
- Auto-shutoff maximizes the life of the single 9V battery to more than 100 hours/5000 tests.
- Non-volatile microprocessor provides data back-up, even when the battery is changed. This assures all calibrations and memory data will be retained.
- Extended life pH/ORP sensor is user replaceable in the field.

High Performance at a Low Cost

Beyond their affordable purchase price, Ultra-Fast, Ultra-Easy, Ultra-Powerful Ultrameter II's save both time and money. Measure for measure, Ultrameter II's give you a better return on your investment than any other handheld instrument. To see for yourself, contact your distributor or the Myron L Company today.

Multiple Applications

Irrigation Water

Hydroponics

Laboratories

Homeland Security

Reverse Osmosis

Deionization

Wastewater

Cooling Towers

Environmental

Desalination

Fountain Solutions

BENEFITS DESIGNED TO SAVE YOU TIME & MONEY

Built-in IR Port allows you to conveniently download your data to a computer. **(Requires Myron L uDock™ Accessory Package)**

Ample memory provides increased flexibility to record and store 100 separate readings.

Real Time Clock with Date & Time Stamp allows you to maintain the integrity of each individual reading.

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

The pH/ORP sensor chamber provides protection to a unique porous liquid-junction.

The large capacity KCl reservoir guarantees extended life.

A custom LCD helps simplify calibration and operation by using annunciators and prompts to indicate various conditions.

IP67/NEMA 6 rated Ultrameter II's are waterproof and buoyant and can be fully immersed to 3 feet/1 meter.

Features

Ultrameter II™ Models	4PII Conductivity TDS, Resistivity Temperature	6PII Conductivity, TDS Resistivity, pH ORP, Temperature
Autoranging	•	•
Adjustable Temp. Compensation	•	•
Adjustable Cond/TDS ratio	•	•
Memory (100 readings)	•	•
Date & Time Stamp	•	•
pH Calibration Prompts		•
Low battery indicator	•	•
Auto-off	•	•

Specifications

Display	4 Digit Liquid Crystal Display
Dimensions LxWxH	196 x 68 x 64 mm/ 7.7 x 2.7 x 2.5 inches
Weight	352 g/12.4 oz.
Case/conductivity cell material	VALOX*
Cell capacities	pH/ORP: 1,2 ml/0.04 oz. Cond/TDS/Res: 5 ml/0.2 oz.
Power	9V alkaline battery
Battery life	>100 hours (5000 readings)
Operating/storage temperature	0 – 55°C/32 – 132°F
Protection ratings	IP67/NEMA 6 Waterproof to 1 meter/3 feet

*™GENERAL ELECTRIC

Parameters

	Conductivity	TDS	Resistivity	pH	ORP	Temperature
Ranges	0–9999 µS/cm 10–200 mS/cm in 5 autoranges	0–9999 ppm 10–200 ppt in 5 autoranges	10 KΩ–30 MΩ	0–14 pH	±999 mV	0–71°C 32–160°F
Resolution	0.01(<100 µS) 0.1(<1000 µS) 1.0(<10 mS) 0.01(<100 mS) 0.1(<200 mS)	0.01(<100 ppm) 0.1(<1000 ppm) 1.0(<10 ppt) 0.01(<100 ppt) 0.1(<200 ppt)	0.01(<100 KΩ) 0.1(<1000 KΩ) 0.1(>1 MΩ)	±0.01 pH	±1 mV	0.1°C/F
Accuracy	±1% of reading	±1% of reading	±1% of reading	±0.01 pH	±1 mV	±0.1°C
Auto Temperature Compensation	0–71°C 32–160°F	0–71°C 32–160°F	0–71°C 32–160°F	0–71°C 32–160°F	—	—
Adjustable Temperature Compensation to 25°C	0–9.99%/°C	0–9.99%/°C	0–9.99%/°C	—	—	—
Conductivity/TDS Ratios Preprogrammed	KCl, 442*, NaCl	KCl, 442*, NaCl	—	—	—	—
Adjustable Conductivity/TDS Ratio Factor	0.20–7.99	0.20–7.99	—	—	—	—

*442 Natural Water Standard ™ Myron L Company

Accessories

uDock™ Accessory Package includes uDock™, USB cable and Macintosh/PC application software for downloading data. MODEL: U2CIP

Certificates confirming the NIST traceability of an Ultrameter II are available (must be specified when placing instrument order). MODEL: MC

Conductivity Standard Solutions are necessary to maintain accuracy and for periodic calibration of conductivity/TDS parameters. All Standard Solutions are NIST traceable for your complete confidence. RECOMMENDED VALUES: KCl-7000 (7 mS), 442-3000 (TDS), or NaCl-14.0 (mS) available in 2 oz/59 ml, 1 qt/1 L, and 1 gal/3,8 L.

pH Buffers are necessary to maintain accuracy and for periodic calibration of pH and ORP parameters. Calibration with pH 7 Buffer is especially important. All pH 4, 7, and 10 Buffers are NIST traceable and are available in 2 oz/59 ml, 1 qt/1 L, and 1 gal/3,8 L.

pH Sensor Storage Solution Available in 2 oz/59 ml, 1 qt/1 L, and 1 gal/3,8 L.
MODEL: SS2OZ, SSQ and SSG

Certificate of NIST traceability for pH Buffer or Conductivity Standard Solutions are available (must be specified when placing solution order).
MODEL: SC

Hard protective case (small)
MODEL: UPP

Hard protective case (kit) with three buffers (pH 4, 7, and 10), one pH/ORP storage solution, and two standard solutions, (KCl-7000 and 442-3000). All bottles are 2 oz/59 ml.
MODEL: PKU

Soft protective case is constructed of padded Nylon and features a belt clip for hands-free mobility.
MODEL: UCC (Blue)
UCCDT (Desert Tan)

Replacement pH/ORP sensor user-replaceable, features a unique/porous liquid-junction.
MODEL: RPR

Built on Trust

Founded in 1957, Myron L Company is one of the world's leading manufacturers of water quality instruments. Because of our policy of continuous product improvement, changes in design and the specifications in this brochure are possible. You have our assurance any changes will be guided by our product philosophy: Accuracy, Reliability, Simplicity.

Limited Warranty

All Myron L Ultrameter II's have a Two (2) Year Limited Warranty. The pH/ORP sensors have a Six (6) Month Limited Warranty. Warranty is limited to the repair or replacement of the Ultrameter II only, at our discretion. Myron L Company assumes no other responsibility or liability.

MYRON L COMPANY
Water Quality Instrumentation
Accuracy • Reliability • Simplicity

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SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

UMIIB 03-08

APPENDIX E
FLUX METER DATA

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AreaAbbrev	SitePt	Easting	Northing	CH4flux	CO2flux	H2Sflux	Date
BC	bc051011_1	2424984.656	1234751.208	0	0.010672442	0.000496393	5/10/2011
BC	bc051011_10	2424355.292	1235566.649	0	0.185855865	0.001920991	5/10/2011
BC	bc051011_11	2424370.762	1235349.288	0	0.164445341	0.004561258	5/10/2011
BC	bc051011_12	2424368.222	1235171.218	0	0.099934109	0.004074053	5/10/2011
BC	bc051011_13	2424576.045	1235137.36	0	0.315091014	0.00239249	5/10/2011
BC	bc051011_14	2424570.892	1235349.514	0	0.171459183	0.002152207	5/10/2011
BC	bc051011_15	2424577.904	1235550.849	0	2.260753632	0.0043021	5/10/2011
BC	bc051011_16	2424782.32	1235559.168	0	0.087803356	0.004533325	5/10/2011
BC	bc051011_17	2424775.44	1235359.883	0	0.192418516	0.001907495	5/10/2011
BC	bc051011_18	2424781.869	1235169.194	0	0.185788482	0.003815938	5/10/2011
BC	bc051011_19	2424759.578	1234962.953	0.046524376	0.074439004	0.001908692	5/10/2011
BC	bc051011_2	2424970.033	1234931.826	0	0	0.001728399	5/10/2011
BC	bc051011_20	2425178.989	1234921.2	0	0.278867394	0.00262632	5/10/2011
BC	bc051011_21	2425357.467	1235163.714	0.00428884	0.124614634	0.001667882	5/10/2011
BC	bc051011_22	2425179.979	1235160.753		0.100906044	0.001427916	5/10/2011
BC	bc051011_23	2425172.81	1235354.249	0	0.143943861	0.001427542	5/10/2011
BC	bc051011_24	2425189.648	1235541.039	0.010933043	0.136900708	0.002852098	5/10/2011
BC	bc051011_25	2425368.725	1235361.58	0	0.139568403	0.002377656	5/10/2011
BC	bc051011_26	2425174.216	1234748.509	0	0.228455365	0.000950907	5/10/2011
BC	bc051011_27	2425364.746	1234742.225	0	0.225794375	0.002374284	5/10/2011
BC	bc051011_28	2425371.79	1234941.853	0	0.10413482	0.000948837	5/10/2011
BC	bc051011_29	2425627.681	1235153.731	0	0.118914187	0.001895047	5/10/2011
BC	bc051011_3	2424971.059	1235149.948	0	1.016341448	0.002211574	5/10/2011
BC	bc051011_30	2425771.424	1235145.869	0	0.157689884	0.001894173	5/10/2011
BC	bc051011_31	2425952.67	1235139.002	0.121610381	0.279349685	0.002597503	5/10/2011
BC	bc051011_32	2426138.176	1235129.845	0	0.165951654	0.002353924	5/10/2011
BC	bc051011_33	2426381.542	1235134.98	0	0.043510094	0.002339252	5/10/2011
BC	bc051011_34	2426574.103	1235147.606	0	0.081084684	0.001398012	5/10/2011
BC	bc051011_35	2426561.136	1234936.522	0	0.030796967	0.001166552	5/10/2011
BC	bc051011_36	2426587.011	1234716.223	0	0.287724167	0.001396719	5/10/2011
BC	bc051011_37	2426555.924	1234563.289	0.005358672	0.343653977	0.003261801	5/10/2011
BC	bc051011_38	2426390.355	1234560.788	0	0.31971857	0.002100341	5/10/2011
BC	bc051011_39	2426378.428	1234741.218	0.016766239	0.117130816	0.003958696	5/10/2011
BC	bc051011_4	2424975.634	1235345.759	0	0.191973642	0.003419378	5/10/2011
BC	bc051011_40	2426382.581	1234954.312	0	0.134954512	0.001864657	5/10/2011
BC	bc051011_41	2426159.334	1234966.969	0	0.155740052	0.002098294	5/10/2011
BC	bc051011_42	2426153.661	1234741.801	0.534656763	0.092760861	0.00559362	5/10/2011
BC	bc051011_43	2425977.739	1234760.134				5/12/2011
BC	bc051011_44	2425973.713	1234957.448	0	0.100572422	0	5/12/2011
BC	bc051011_45	2425769.79	1234946.471	0	0.011753706	0	5/12/2011
BC	bc051011_46	2425770.25	1234758.046	0	0.04170955	0	5/12/2011
BC	bc051011_47	2425575.108	1234754.034	0	0.053197712	0	5/12/2011
BC	bc051011_48	2425571.23	1234939.079	0	0	0	5/12/2011
BC	bc051011_5	2424964.48	1235509.289	0	0.107341275	0.003164255	5/10/2011
BC	bc051011_6	2424978.562	1235733.558	0	0.111641221	0.002426983	5/10/2011
BC	bc051011_7	2424779.45	1235748.217	0.061215494	0.203970999	0.000967834	5/10/2011
BC	bc051011_8	2424576.313	1235755.398	0.02193285	0.126776695	0	5/10/2011
BC	bc051011_9	2424373.621	1235746.181	0	0.082743295	0.001202664	5/10/2011
LSC	lsc053111_01	2443366.154	1209121.908	0	0.054528527	0.006444281	5/31/2011
LSC	lsc053111_02	2443392.692	1209319.354	0	0.020944187	0.006160055	5/31/2011
LSC	lsc053111_03	2443172.494	1209328.212	0	0.432420224	0.005133309	5/31/2011
LSC	lsc053111_04	2442971.621	1209327.523	0.00338919	0.086182259	0.00532587	5/31/2011
LSC	lsc053111_05	2442780.974	1209283.801	0	0.168008432	0.003856722	5/31/2011
LSC	lsc053111_06	2442771.956	1209128.475	0.000239485	0.119981758	0.00263433	5/31/2011

APPENDIX E
FLUX METER DATA

AreaAbbrev	SitePt	Easting	Northing	CH4flux	CO2flux	H2Sflux	Date
LSC	lsc053111_07	2442563.942	1209117.542	0.000239247	0.151443094	0.004545685	5/31/2011
LSC	lsc053111_08	2442376.645	1208915.562	0	0.028430849	0.008600929	5/31/2011
LSC	lsc053111_09	2442582.814	1208930.251	0	0.002632482	0.005025648	5/31/2011
LSC	lsc053111_10	2442774.404	1208937.941	0.000238716	0	0.006684054	5/31/2011
LSC	lsc053111_11	2442956.696	1208924.794	0.003816668	0.146703169	0.003101042	5/31/2011
LSC	lsc053111_12	2442982.946	1209112.193	0.000477247	0.086381614	0.006920074	5/31/2011
LSC	lsc053111_13	2443178.636	1209116.104	0.000712493	0	0.004987454	5/31/2011
LSC	lsc053111_14	2443146.333	1208921.835	0.00071266	0.096921764	0.006889047	5/31/2011
LSC	lsc053111_15	2443375.33	1208922.336	0.000952547	0.328152329	0.00571528	5/31/2011
LSC	lsc053111_16	2443364.53	1208715.632	0.000714303	0.095002316	0.001428606	5/31/2011
LSC	lsc053111_17	2443157.483	1208728.318	0	0.142905235	0.006657815	5/31/2011
LSC	lsc053111_18	2442964.284	1208712.883	0	0.123479433	0.00498667	5/31/2011
LSC	lsc053111_19	2442772.091	1208720.914	0	0.150301501	0	5/31/2011
LSC	lsc053111_20	2442569.168	1208717.853	0	0	0.000946956	5/31/2011
LSC	lsc053111_21	2442367.198	1208691.192	0.001180157	0.158377036	0.009677285	5/31/2011
LSC	lsc053111_22	2442166.603	1208724.635	0	0.064138986	0.002593856	5/31/2011
LSC	lsc053111_23	2441968.1	1208720.495	0	0.159899786	0.001175734	5/31/2011
LSC	lsc053111_24	2441773.934	1208505.632	0	0.171264663	0.000234609	5/31/2011
LSC	lsc053111_25	2441573.153	1208312.866	0	0.003997234	0.001881051	5/31/2011
LSC	lsc053111_26	2441565.159	1208122.412	0	0.124524675	0	5/31/2011
LSC	lsc053111_27	2441595.481	1207908.101	0	0.376699626	0.001174983	5/31/2011
LSC	lsc053111_28	2441785.321	1207716.526	0.004470607	0.150118291	0.002823542	5/31/2011
LSC	lsc053111_29	2442006.353	1207518.841	0	0	0.00047092	5/31/2011
LSC	lsc053111_30	2442170.35	1207522.004	0	0.122017689	0.001175508	5/31/2011
LSC	lsc053111_31	2442371.8	1207703.682	0	0.261045069	0.001411054	5/31/2011
LSC	lsc053111_32	2442171.088	1207732.503	0.049305417	0.393034607	0.002817452	5/31/2011
LSC	lsc053111_33	2441985.013	1207711.064	0	0	0.001412221	5/31/2011
LSC	lsc053111_34	2441787.725	1208320.828	0.082983561	0	0	6/1/2011
LSC	lsc053111_35	2441781.886	1208104.618	0.020068528	0	0	6/1/2011
LSC	lsc053111_36	2441773.469	1207907.418	0.018159429	0.158526897	0.000490795	6/1/2011
LSC	lsc053111_37	2441986.948	1207928.754	0	0.170021355	0.000244284	6/1/2011
LSC	lsc053111_38	2442169.377	1207922.982	0	0.074157104	0	6/1/2011
LSC	lsc053111_39	2442381.495	1207922.486	0	0	0	6/1/2011
LSC	lsc053111_40	2442583.637	1207929.163	0	0.532999277	0.000241942	6/1/2011
LSC	lsc053111_41	2442783.139	1207934.086	0	0	0.000241031	6/1/2011
LSC	lsc053111_42	2443180.736	1208126.511	0	0.095216058	0	6/1/2011
LSC	lsc053111_43	2442970.445	1208126.624	0	0.093969457	0	6/1/2011
LSC	lsc053111_44	2442769.838	1208139.333	0	0	0.000241004	6/1/2011
LSC	lsc053111_45	2442573.089	1208130.158	0	0.165243074	0	6/1/2011
LSC	lsc053111_46	2442362.98	1208130.804	0	0.118926771	0.000482462	6/1/2011
LSC	lsc053111_47	2442155.161	1208120.992	0	0	0.000241043	6/1/2011
LSC	lsc053111_48	2441960.205	1208127.629	0	0.030330103	0	6/1/2011
LSC	lsc053111_49	2441967.029	1208301.111	0.002157319	0.25456363	0.005513148	6/1/2011
LSC	lsc053111_50	2441963.554	1208526.167	0	0.155584157	0.006930783	6/1/2011
LSC	lsc053111_51	2442165.419	1208509.254	0	0.148121253	0.006667838	6/1/2011
LSC	lsc053111_52	2442181.427	1208319.869	0	0.07144358	0.003095888	6/1/2011
LSC	lsc053111_53	2442371.861	1208327.204	0	0.264792949	0.004762463	6/1/2011
LSC	lsc053111_54	2442371.136	1208525.524	0	0.151079297	0.006423844	6/1/2011
LSC	lsc053111_55	2442564.632	1208512.704	0	0.176605195	0.005222197	6/1/2011
LSC	lsc053111_56	2442561.458	1208321.072	0	0.294281751	0.007357044	6/1/2011
LSC	lsc053111_57	2442773.384	1208308.13	0	0.108142801	0.00450595	6/1/2011
LSC	lsc053111_58	2442768.2	1208500.782	0	0.306423962	0.007109604	6/1/2011
LSC	lsc053111_59	2442974.708	1208498.335	0.000947515	0.2629354	0.00568509	6/1/2011
LSC	lsc053111_60	2442970.265	1208326.145	0.009702111	0.153577313	0.007099105	6/1/2011

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AreaAbbrev	SitePt	Easting	Northing	CH4flux	CO2flux	H2Sflux	Date
LSC	lsc053111_61	2443170.785	1208307.386	0.002834945	0.298614204	0.004252417	6/1/2011
LSC	lsc053111_62	2443180.896	1208517.137	0.002595717	0.15267536	0.004719485	6/1/2011
LSC	lsc053111_63	2443349.279	1208513.125	0	0.122728884	0.004248308	6/1/2011
LSC	lsc053111_64	2443376.354	1208320.936	0	1.928677559	0.007311851	6/1/2011
LSC	lsc053111_65	2443595.164	1208345.084	0	0.248738274	0.005407354	6/1/2011
LSC	lsc053111_66	2443574.943	1208500.149	0	0.208978698	0.004231289	6/1/2011
LSC	lsc053111_67	2443774.097	1208515.436	0	0.21864441	0.000705305	6/1/2011
LSC	lsc053111_68	2443988.38	1208529.412	0	0.231426746	0.00140685	6/1/2011
LSC	lsc053111_69	2444170.104	1208514.645	0	0	0.000937303	6/1/2011
LSC	lsc053111_70	2444162.151	1208706.767	0	0.037231509	0.000706927	6/1/2011
LSC	lsc053111_71	2443971.376	1208710.257	0	0.208845988	0.001414307	6/1/2011
LSC	lsc053111_72	2443771.674	1208713.894	0	0.451024085	0.000472277	6/1/2011
LSC	lsc053111_73	2443572.325	1208712.162	0	0	0.000472277	6/1/2011
LSC	lsc053111_74	2443585.046	1208914.364	0	0	0	6/1/2011
LSC	lsc053111_75	2443766.276	1208991.329	0	0.090780579	0	6/1/2011
LSC	lsc053111_76	2443995.829	1209059.447	0	0.409090847	0.000945328	6/1/2011
PG	pg060211_01	2446975.82	1208335.817	0	0.174581096	0.001972668	6/2/2011
PG	pg060211_02	2447173.261	1208342.655	0.000737773	0.246908158	0.001229622	6/2/2011
PG	pg060211_03	2447381.684	1208340.365	0	0.108994544	0.00073645	6/2/2011
PG	pg060211_04	2447370.013	1208130.668	0	0.122115314	0.001957761	6/2/2011
PG	pg060211_05	2447577.438	1208129.818	0	0.105129756	0.00220039	6/2/2011
PG	pg060211_06	2447780.059	1208127.217	0	0.262719333	0.002441629	6/2/2011
PG	pg060211_07	2447974.583	1208127.501	0	0.122395083	0.001946641	6/2/2011
PG	pg060211_08	2447969.332	1207926.335	0	0.023300746	0.001699013	6/2/2011
PG	pg060211_09	2447764.485	1207915.651	0.001937074	0.254725218	0.000968537	6/2/2011
PG	pg060211_10	2447784.166	1207725.221	0	0.193273231	0.001935151	6/2/2011
PG	pg060211_11	2447578.865	1207732.798	0	0.205930978	0.001933624	6/2/2011
PG	pg060211_12	2447592.755	1207925.242	0	0.267073214	0.002177227	6/2/2011
PG	pg060211_13	2447392.777	1207952.899	0.001939718	0.16633077	0.002182182	6/2/2011
PG	pg060211_14	2447385.434	1207744.494	0	0.272108167	0.002907656	6/2/2011
PG	pg060211_15	2447169.843	1207533.641	0	0.135935456	0.000965794	6/2/2011
PG	pg060211_16	2447187.365	1207741.021	0	0.027478881	0.002169385	6/2/2011
PG	pg060211_17	2447161.654	1207914.983	0	0.237800449	0.001935304	6/2/2011
PG	pg060211_18	2447159.625	1208118.27	0.001449969	0.234170049	0.001449969	6/2/2011
PG	pg060211_19	2446977.86	1208132.068	0	0.191682279	0.002175461	6/2/2011
PG	pg060211_20	2446768.518	1208302.831	0	0.138980567	0.000241286	6/2/2011
PG	pg060211_21	2446567.561	1208320.127	0	0.251940042	0.000721202	6/2/2011
PG	pg060211_22	2446368.703	1208327.498	0.011718939	0	0.000478324	6/2/2011
PG	pg060211_23	2446367.426	1208514.548	0	0	0	6/2/2011
PG	pg060211_24	2446168.293	1208723.893	0	0.204029813	0.000237244	6/2/2011
PG	pg060211_25	2445987.397	1208724.655	0	0	0.000472563	6/2/2011
PG	pg060211_26	2445771.359	1208728.046	0	0.209156886	0.000471074	6/2/2011
PG	pg060211_27	2445567.008	1208718.694	0	0	0.000235234	6/2/2011
PG	pg060211_28	2445584.541	1208536.347	0	0.141769096	0	6/2/2011
PG	pg060211_29	2445775.457	1208535.468	0	0	0	6/2/2011
PG	pg060211_30	2445976.986	1208509.619	0	0	0.000468838	6/2/2011
PG	pg060211_31	2446176.586	1208522.837	0	0	0.000468687	6/2/2011
PG	pg060211_32	2446183.486	1208321.015	0	0.007028049	0	6/2/2011
PG	pg060211_33	2445979.408	1208317.751	0	0.358678371	0.000938335	6/2/2011
PG	pg060211_34	2445783.98	1208315.039	0	0.014025452	0.000701273	6/2/2011
PG	pg060211_35	2445770.966	1208129.839	0	0.133475542	0.00093503	6/2/2011
PG	pg060211_36	2445972.444	1208131.57	0	0.081504628	0.000468417	6/2/2011
PG	pg060211_37	2446187.193	1208118.487	0	0.038459722	0.000469021	6/2/2011
PG	pg060211_38	2446375.065	1208115.363	0	0.091782294	0.000938949	6/2/2011

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AreaAbbrev	SitePt	Easting	Northing	CH4flux	CO2flux	H2Sflux	Date
PG	pg060211_39	2446573.914	1208126.465	0	0.027690507	0.000946684	6/2/2011
PG	pg060211_40	2446769.633	1208132.698	0	0.212973505	0.000947602	6/2/2011
PG	pg060211_41	2446765.304	1207916.892	0	0.074933194	0.000474261	6/2/2011
PG	pg060211_42	2446778.087	1207710.273	0	0.174040005	0.00047487	6/2/2011
PG	pg060211_43	2446987.634	1207750.507	0	0	0.000474633	6/2/2011
PG	pg060211_44	2446982.143	1207933.701	0	0.076890506	0.000949266	6/2/2011
PG	pg060211_45	2446564.818	1207930.73	0	0.080708794	0.001471893	6/3/2011
PG	pg060211_46	2446374.024	1207937.111	0	0.188684657	0.000244094	6/3/2011
PG	pg060211_47	2446179.047	1207921.579	0	0.170157954	0.001941888	6/3/2011
PG	pg060211_48	2445970.995	1207906.649	0	0.21215184	0.00120678	6/3/2011
PG	pg060211_49	2445976.775	1207720.65	0	0.024478683	0	6/3/2011
PG	pg060211_50	2445976.022	1207530.307	0	0.166168362	0.000718307	6/3/2011
PG	pg060211_51	2445961.931	1207315.42	0	0.079859793	0.002151911	6/3/2011
PG	pg060211_52	2445944.911	1207107.486	0	0.320535064	0.000239563	6/3/2011
PG	pg060211_53	2445971.364	1206937.944	0	0	0.000956688	6/3/2011
PG	pg060211_54	2445958.198	1206738.633	0	0.0821459	0.002626758	6/3/2011
PG	pg060211_55	2445767.86	1206903.543	0	0.125132337	0.001191737	6/3/2011
PG	pg060211_56	2445565.158	1206907.498	0	0.250177741	0.000238038	6/3/2011
PG	pg060211_57	2445566.754	1207103.317	0	0.086301617	0.001422554	6/3/2011
PG	pg060211_58	2445765.504	1207100.127	0	0.179288805	0.00189223	6/3/2011
PG	pg060211_59	2445786.675	1207305.913	0	0.198512405	0.001658218	6/3/2011
PG	pg060211_60	2445790.642	1207520.983	0	0	0.004490772	6/3/2011
PG	pg060211_61	2446174.953	1207530.522	0	0.203843713	0.003996936	6/3/2011
PG	pg060211_62	2446176.682	1207713.898	0	0.142298728	0.006125442	6/3/2011
PG	pg060211_63	2446351.453	1207702.092	0.003289238	0.104785711	0.003759129	6/3/2011
PG	pg060211_64	2446360.232	1207495.472	0.007770999	0.213349238	0.002590333	6/3/2011
PG	pg060211_65	2446567.466	1207519.668	0	0.136588961	0.003061477	6/3/2011
PG	pg060211_66	2446798.623	1207522.964	0	0.182815611	0.004476155	6/3/2011
PG	pg060211_67	2446969.937	1207534.63	0.000235272	0.131046355	0.003293805	6/3/2011
PG	pg060211_68	2446580.042	1207702.165	0	0.326384962	0.007059516	6/3/2011
PG	pg060211_69	2446188.268	1206685.467	0	0.208518028	0	6/6/2011
PG	pg060211_70	2446377.53	1206692.906	0	0	0	6/6/2011
PG	pg060211_71	2446592.47	1206710.638	0	0.515204251	0	6/6/2011
PG	pg060211_72	2446776.333	1206727.949	0.002445448	0.360948175	0.001467269	6/6/2011
PG	pg060211_73	2446965.785	1206930.91	0	0.213182449	0.000974548	6/6/2011
PG	pg060211_74	2446766.166	1206947.783	0	0.057349764	0.001464249	6/6/2011
PG	pg060211_75	2446571.868	1206922.201	0.000729973	0.34527728	0.000729973	6/6/2011
PG	pg060211_76	2446362.105	1206931.825	0.004136828	0.116804548	0.000486686	6/6/2011
PG	pg060211_77	2446162.322	1206926.537	0	0.361804217	0.001216558	6/6/2011
PG	pg060211_78	2446194.632	1207125.368	0	0.116804287	0.001946738	6/6/2011
PG	pg060211_79	2446359.876	1207131.208	0	0.11872071	0.00048656	6/6/2011
PG	pg060211_80	2446563.175	1207133.938	0	0.216283694	0.000728228	6/6/2011
PG	pg060211_81	2446752.981	1207109.587	0	0.213560596	0.000726397	6/6/2011
PG	pg060211_82	2446943.786	1207096.359	0	0.034483034	0.00048228	6/6/2011
PG	pg060211_83	2446953.436	1207337.335	0	0.184289902	0.003613528	6/6/2011
PG	pg060211_84	2446767.647	1207321.263	0	0.146871015	0.001449385	6/6/2011
PG	pg060211_85	2446571.825	1207323.278	0	0.373700678	0.002648652	6/6/2011
PG	pg060211_86	2446359.208	1207339.539	0	0.518713892	0.002893801	6/6/2011
PG	pg060211_87	2446137.162	1207347.103	0	0.257680953	0.00506202	6/6/2011
YJP	053011_01	2438567.627	1214122.182	0	0	0.00049315	5/30/2011
YJP	053011_02	2438771.017	1214120.071	0	0.447299361	0	5/30/2011
YJP	053011_03	2438976.767	1214124.645	0	0.222303793	0	5/30/2011
YJP	053011_04	2438971.695	1214322.822	0	0.201670855	0.000244746	5/30/2011
YJP	053011_05	2438977.945	1214509.405	0	0.027374486	0.000733245	5/30/2011

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AreaAbbrev	SitePt	Easting	Northing	CH4flux	CO2flux	H2Sflux	Date
YJP	053011_06	2438978.483	1214709.383	0	0.015604458	0.000487639	5/30/2011
YJP	053011_07	2438956.384	1214922.828	0	0.008029151	0.000243308	5/30/2011
YJP	053011_08	2438784.548	1214935.618	0	0.128465846	0	5/30/2011
YJP	053011_09	2438771.904	1215098.299	0	0.053650986	0	5/30/2011
YJP	053011_10	2438777.5	1214736.125	0	0.204858571	0.000242436	5/30/2011
YJP	053011_11	2438781.364	1214520.23	0	0.150206462	0	5/30/2011
YJP	053011_12	2438779.012	1214330.56	0	0.167656362	0	5/30/2011
YJP	053011_13	2438573.891	1214322.701	0	0.133905306	0.000243908	5/30/2011
YJP	053011_14	2438580.112	1214517.915	0	0.182845309	0	5/30/2011
YJP	053011_15	2438578.75	1214719.876	0	0.124067508	0	5/30/2011
YJP	053011_16	2438586.66	1214924.801	0	0.168419331	0	5/30/2011
YJP	053011_17	2438587.458	1215125.962	0	0.174878225	0	5/30/2011
YJP	053011_18	2438383.676	1214913.074	0	0.204070702	0	5/30/2011
YJP	053011_19	2438374.443	1214740.291	0	0.041465577	0	5/30/2011
YJP	053011_20	2438368.426	1214532.631	0	0.068203144	0.000720456	5/30/2011
YJP	053011_21	2438374.746	1214327.034	0	0.178928584	0	5/30/2011
YJP	053011_22	2438389.178	1214131.777	0	0	0.000241566	5/30/2011
YJP	053011_23	2438165.355	1214520.806	0	0.054744571	0.000964662	5/30/2011
YJP	053011_24	2438174.27	1214711.129	0	0.07184305	0	5/30/2011
YJP	053011_25	2438174.035	1214921.98	0	0.013415174	0.000479113	5/30/2011
YJP	053011_26	2438167.747	1215115.865	0	0.095813431	0	5/30/2011
YJP	053011_27	2438359.756	1215125.184	0	0.075221196	0.000716392	5/30/2011
YJP	053011_28	2438169.602	1215334.923	0	0.129294544	0.000715652	5/30/2011
YJP	053011_29	2437988.475	1215330.752	0	0.096406735	0	5/30/2011
YJP	053011_30	2437968.359	1215128.634	0	0.197057962	0	5/30/2011
YJP	053011_31	2437983.765	1214916.745	0	0.030132649	0	5/30/2011
YJP	053011_32	2437986.598	1214717.952	0	0.025954375	0.000240318	5/30/2011
YJP	053011_33	2437975.576	1214511.219	0	0	0	5/30/2011
YJP	053011_34	2437779.551	1214714.639	0	0.169938907	0	5/30/2011
YJP	053011_35	2437770.558	1214915.773	0	0.099859908	0	5/30/2011
YJP	053011_36	2437759.574	1215114.022		0.016798588	0.000719939	5/30/2011
YJP	053011_37	2437790.813	1215313.421	0	0.165030435	0.00143713	5/30/2011
YJP	053011_38	2437779.297	1215523.821	0	0	0.00023896	5/30/2011
YJP	053011_39	2437577.615	1215536.676	0	0.057149746	0.001434722	5/30/2011
YJP	053011_40	2437576.287	1215326.401	0	0.060846832	0.001437327	5/30/2011
YJP	053011_41	2437585.654	1215128.145	0	0.068569005	0.000239752	5/30/2011
YJP	053011_42	2437574.438	1214925.709	0	0.05281318	0.00144036	5/30/2011
YJP	053011_43	2437580.52	1214725.074	0	0.008901189	0.000240573	5/30/2011
YJP	053011_44	2437400.773	1214723.134	0	0.044250611	0	5/30/2011
YJP	053011_45	2437377.233	1214917.857	0	0	0	5/30/2011
YJP	053011_46	2437386.037	1215115.973	0	0.078664318	0.000240564	5/30/2011
YJP	053011_47	2437383.543	1215314.815	0	0.057892215	0.000960867	5/30/2011
YJP	053011_48	2437387.703	1215525.876	0	0.150830597	0	5/30/2011
YJP	053011_49	2437383.601	1215722.382	0	0.023891924	0	5/30/2011
YJP	053011_50	2437177.981	1215731.936	0	0.105634496	0.000238453	5/30/2011
YJP	053011_51	2436970.174	1215719.068	0	0.043162454	0.000238467	5/30/2011
YJP	053011_52	2436981.402	1215938.257	0	0.221779555	0.000238729	5/30/2011
YJP	053011_53	2436783.004	1215917.904	0	0.216989338	0	5/30/2011
YJP	053011_54	2436576.572	1215927.908	0	0.075594522	0.000478446	5/30/2011
YJP	053011_55	2436382.957	1215938.255	0	0.164031282	0.000478225	5/30/2011
YJP	053011_56	2436561.565	1215730.589	0	0.138250962	0	5/30/2011
YJP	053011_57	2436791.874	1215716.942	0	0.081440218	0.00071859	5/30/2011
YJP	053011_58	2436789.17	1215533.684	0	0.147204801	0.001431489	5/30/2011
YJP	053011_59	2436983.813	1215529.727	0	0.116802953	0.002388608	5/30/2011

APPENDIX E
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AreaAbbrev	SitePt	Easting	Northing	CH4flux	CO2flux	H2Sflux	Date
YJP	053011_60	2437177.122	1215509.293	0	0.071658254	0.00286633	5/30/2011
YJP	053011_61	2437170.476	1215333.102	0	0.23991935	0.002623372	5/30/2011
YJP	053011_62	2436982.023	1215325.991	0	0.12481498	0.003108419	5/30/2011
YJP	053011_63	2436800.229	1215334.709	0	0.051062465	0.00023973	5/30/2011
YJP	053011_64	2436984.236	1215123.522	0	0.22838679	0.002875804	5/30/2011
YJP	053011_65	2437175.733	1215120.411	0	0	0.000719777	5/30/2011
YJP	053011_66	2437173.228	1214932.146	0	0.191157281	0.000239846	5/30/2011
YJP	053011_67	2436405.421	1215731.498	0	0.192708567	0.002178865	5/30/2011
YJP	053011_68	2436562.139	1215501.704	0	0	0.000483309	5/30/2011
YJP	yjp052311_01	2437567.93	1214322.175	0	0.174017087	0.00239693	5/23/2011
YJP	yjp052311_02	2437364.866	1214323.784	0	0.10757567	0.000715581	5/23/2011
YJP	yjp052311_03	2437164.77	1214323.375	0	0.020958846	0.000238169	5/23/2011
YJP	yjp052311_04	2436971.499	1214326.445	0	0.111426324	0.001904724	5/23/2011
YJP	yjp052311_05	2436763.389	1214330.432	0	1.085894465	0.000948172	5/23/2011
YJP	yjp052311_06	2436560.056	1214343.036	0	0.27400288	0.00142216	5/23/2011
YJP	yjp052311_07	2436563.962	1214123.331	0	0.049154297	0	5/23/2011
YJP	yjp052311_08	2436771.995	1214125.783	0	0.093254685	0.001652615	5/23/2011
YJP	yjp052311_09	2436971.497	1214132.117	0	0.170908809	0.001420295	5/23/2011
YJP	yjp052311_10	2437171.277	1214118.249	0	0.346424311	0.000237115	5/23/2011
YJP	yjp052311_100	2439586.225	1214922.399	0	0.119895309	0	5/27/2011
YJP	yjp052311_101	2439564.95	1214728.413	0	0.117471851	0.000237317	5/27/2011
YJP	yjp052311_102	2439574.702	1214527.681	0	0.207900032	0.000949315	5/27/2011
YJP	yjp052311_103	2439756.008	1214525.799	0	0.106544755	0.000237293	5/27/2011
YJP	yjp052311_104	2439779.932	1214327.97	0	0.172447458	0.000713576	5/27/2011
YJP	yjp052311_105	2439963.037	1214343.712	0	0.178218246	0.000237624	5/27/2011
YJP	yjp052311_106	2439983.469	1214132.891	0	0.137501583	0	5/27/2011
YJP	yjp052311_107	2439774.992	1214116.89	0	0.17496796	0	5/27/2011
YJP	yjp052311_108	2439771.579	1213927.882	0	0.035528522	0.001184284	5/27/2011
YJP	yjp052311_109	2439565.442	1213910.886	0	0.10667488	0.001422332	5/27/2011
YJP	yjp052311_11	2437369.104	1214135.558	0	0.174854293	0.006405788	5/23/2011
YJP	yjp052311_110	2439580.111	1214127.345	0	0.162791967	0.001425915	5/27/2011
YJP	yjp052311_111	2439570.115	1214315.551	0	0.071952209	0	5/27/2011
YJP	yjp052311_112	2439362.03	1214312.682	0	0.144094646	0.00261127	5/27/2011
YJP	yjp052311_113	2439365.576	1214519.911	0	0.070891693	0.000474192	5/27/2011
YJP	yjp052311_114	2439373.746	1214723.315	0	0.079935007	0	5/27/2011
YJP	yjp052311_115	2439371.476	1214919.017	0	0.299231827	0.001887898	5/27/2011
YJP	yjp052311_116	2439173.199	1214918.17	0	0.264874905	0.000235864	5/27/2011
YJP	yjp052311_117	2439167.96	1214703.82	0	0.120093115	0.000235939	5/27/2011
YJP	yjp052311_118	2439176.526	1214513.204	0.000235785	0.214093134	0.000707356	5/27/2011
YJP	yjp052311_119	2439181.266	1214312.53	0	0.236241043	0.000707309	5/27/2011
YJP	yjp052311_12	2437376.45	1213922.381	0	0.06520851	0	5/23/2011
YJP	yjp052311_120	2439179.478	1214126.914	0	0	0	5/27/2011
YJP	yjp052311_121	2439368.723	1214105.615	0	0.257825077	0.000708311	5/27/2011
YJP	yjp052311_122	2439371.422	1213919.326	0.000235919	0.127632335	0	5/27/2011
YJP	yjp052311_123	2439175.887	1213921.609	0	0.164466143	0.000471926	5/27/2011
YJP	yjp052311_124	2439168.307	1213722.802	0	0.093945235	0.001419827	5/27/2011
YJP	yjp052311_125	2438962.42	1213708.561	0	0.201917902	0.00047343	5/27/2011
YJP	yjp052311_126	2438967.929	1213526.412	0	0.011129998	0.001184042	5/27/2011
YJP	yjp052311_127	2439159.2	1213503.35	0	0.312828928	0.000236992	5/27/2011
YJP	yjp052311_128	2439353.288	1213515.896	0	0.066577479	0	5/27/2011
YJP	yjp052311_129	2439579.638	1213494.679	0	0.042903576	0.000237036	5/27/2011
YJP	yjp052311_13	2437369.782	1213726.362	0	0.390467793	0.000712532	5/23/2011
YJP	yjp052311_130	2439767.605	1213518.358	0	0	0.000236256	5/27/2011
YJP	yjp052311_131	2439568.689	1213321.95	0	0.261373073	0	5/27/2011

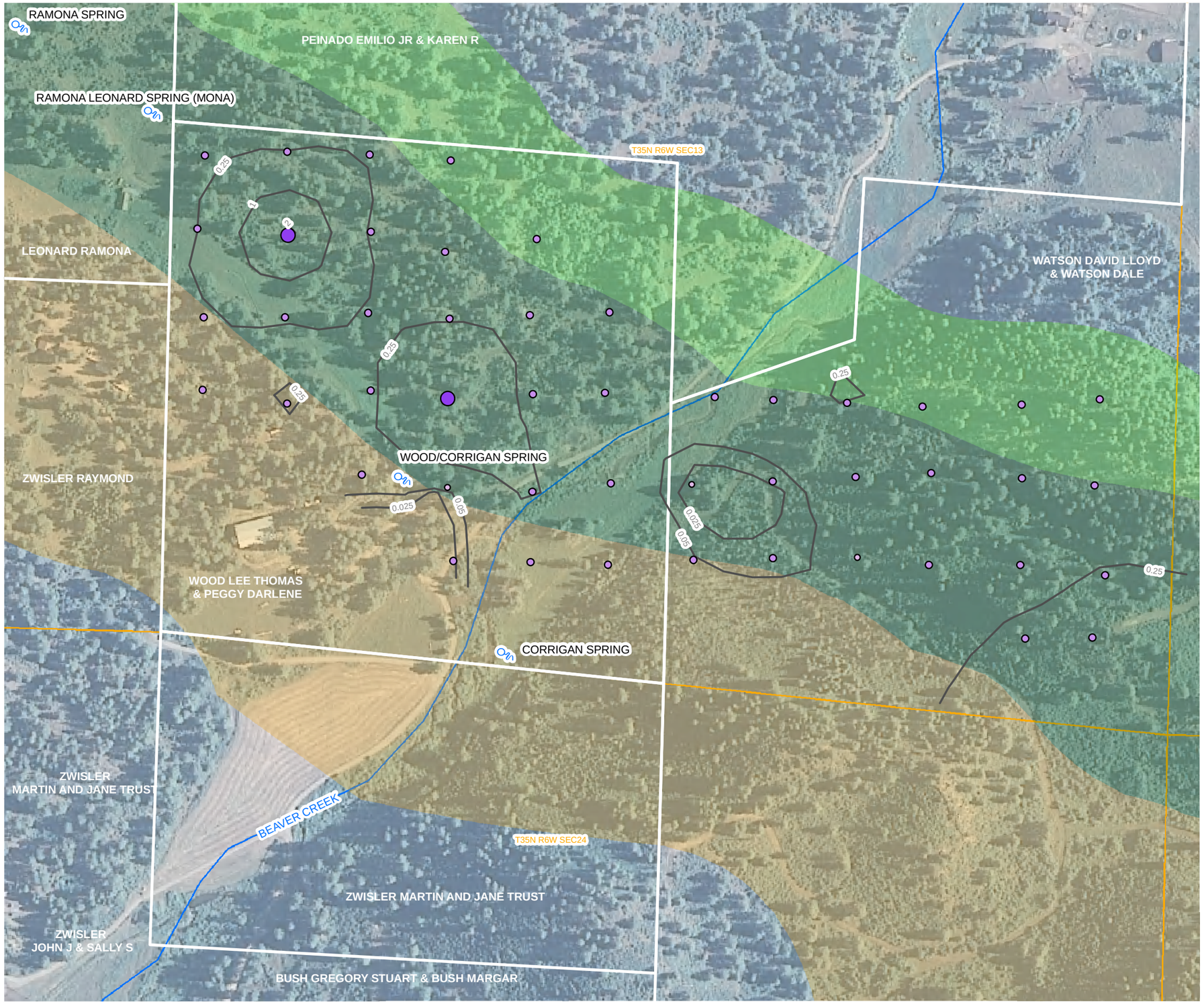
APPENDIX E
FLUX METER DATA

AreaAbbrev	SitePt	Easting	Northing	CH4flux	CO2flux	H2Sflux	Date
YJP	yjp052311_132	2438595.593	1213913.414	0	0.815061152	0.001184338	5/27/2011
YJP	yjp052311_133	2438359.615	1214081.676	0	0.025959264	0.000235993	5/27/2011
YJP	yjp052311_134	2438197.186	1214119.736	0	0.374094635	0	5/27/2011
YJP	yjp052311_135	2437971.262	1214082.717	0	0.270912737	0.000940669	5/27/2011
YJP	yjp052311_136	2437777.083	1214091.162	0	0.234098271	0.000234803	5/27/2011
YJP	yjp052311_137	2437768.043	1214293.044	0	0	0.00023462	5/27/2011
YJP	yjp052311_138	2437955.594	1214310.358	0	0.011012886	0.000234317	5/27/2011
YJP	yjp052311_139	2437576.257	1214516.668	0	0.03926358	0	5/27/2011
YJP	yjp052311_14	2437369.147	1213527.54	0	0.244176418	0.001657842	5/23/2011
YJP	yjp052311_15	2437161.6	1213727.492	0	0.283073038	0.00118144	5/23/2011
YJP	yjp052311_16	2436967.639	1213706.182	0	0.226677775	0.002376077	5/23/2011
YJP	yjp052311_17	2436765.541	1213723.037	0	0.234276488	0	5/23/2011
YJP	yjp052311_18	2436566.732	1213915.292	0.00023707	0.205539316	0.003556044	5/23/2011
YJP	yjp052311_19	2436772.403	1213923.745	0	0.122751571	0.001892125	5/23/2011
YJP	yjp052311_20	2436966.544	1213924.836	0	0.104944102	0.000945442	5/23/2011
YJP	yjp052311_21	2437174.164	1213911.518	0	0.410381168	0.000236804	5/23/2011
YJP	yjp052311_22	2437572.152	1213924.624	0	0.214472383	0.001893796	5/23/2011
YJP	yjp052311_23	2437611.916	1213737.276	0	0.192754447	0.002838102	5/23/2011
YJP	yjp052311_24	2437545.003	1213456.119	0	0.07766518	0.002124579	5/23/2011
YJP	yjp052311_25	2437784.217	1213512.537	0	0.196385875	0.003292697	5/23/2011
YJP	yjp052311_26	2437959.137	1213483.403	0	0	0.001648599	5/23/2011
YJP	yjp052311_27	2437794.494	1213304.641	0	0.215668738	0.002349333	5/23/2011
YJP	yjp052311_28	2437977.963	1213331.38	0	0.111471787	0.010538299	5/23/2011
YJP	yjp052311_29	2437787.761	1213895.362	0	0.049675934	0	5/24/2011
YJP	yjp052311_30	2438018.536	1213927.337	0	0.122746341	0.000490005	5/24/2011
YJP	yjp052311_31	2438187.574	1213897.866	0	0.142687112	0.000488655	5/24/2011
YJP	yjp052311_32	2438372.66	1213923.463	0	0.200357556	0.000488082	5/24/2011
YJP	yjp052311_33	2438578.128	1213724.168	0	0.058558922	0.000975982	5/24/2011
YJP	yjp052311_34	2438763.532	1213682.464	0	0.276525855	0.00048727	5/24/2011
YJP	yjp052311_35	2438788.855	1213501.123	0	0.189779565	0.000486614	5/24/2011
YJP	yjp052311_36	2438983.388	1213301.872	0.002188971	0.056183584	0.000972876	5/24/2011
YJP	yjp052311_37	2439155.915	1213304.264	0	0.144793734	0.000485885	5/24/2011
YJP	yjp052311_38	2439390.663	1213307.207	0.030374127	0.204114124	0.001457958	5/24/2011
YJP	yjp052311_39	2439197.856	1213118.02	0.00193758	0.125458315	0.00096879	5/24/2011
YJP	yjp052311_40	2438988.281	1213144.214	0	0.07631392	0	5/24/2011
YJP	yjp052311_41	2438764.701	1213107.063	0.040229801	0.193965122	0	5/24/2011
YJP	yjp052311_42	2438584.008	1213154.386	0	0.234824181	0	5/24/2011
YJP	yjp052311_43	2438379.92	1213112.038	0	0	0.00166128	5/24/2011
YJP	yjp052311_44	2438154.234	1213120.931	0	0	0	5/24/2011
YJP	yjp052311_45	2438192.655	1213355.069	0	0.253104657	0	5/24/2011
YJP	yjp052311_46	2438363.731	1213318.746	0	0.075294286	0.000472064	5/24/2011
YJP	yjp052311_47	2438566.722	1213317.798	0	0.23376739	0.001179452	5/24/2011
YJP	yjp052311_48	2438750.481	1213329.226	0	0.086784653	0.00023647	5/24/2011
YJP	yjp052311_49	2438556.653	1213563.606	0	0.110614449	0	5/24/2011
YJP	yjp052311_50	2438381.422	1213513.62	0	0	0.000235393	5/24/2011
YJP	yjp052311_51	2438133.791	1213525.205	0	0.112584881	0	5/24/2011
YJP	yjp052311_52	2437778.028	1213718.329	0	0.065546043	0	5/24/2011
YJP	yjp052311_53	2437990.791	1213746.56	0	0	0	5/24/2011
YJP	yjp052311_54	2438180.884	1213723.494	0	0.398905128	0	5/24/2011
YJP	yjp052311_55	2438399.452	1213728.548	0	0	0.000236256	5/24/2011
YJP	yjp052311_56	2437567.191	1214134.205	0	0.353623033	0.002739333	5/25/2011
YJP	yjp052311_57	2437356.275	1214515.449	0	0.204165787	0.002224567	5/25/2011
YJP	yjp052311_58	2437176.882	1214495.234	0	0.107058011	0.002701005	5/25/2011
YJP	yjp052311_59	2436963.48	1214519.623	0.136561841	0.173075721	0.004625089	5/25/2011

APPENDIX E
FLUX METER DATA

AreaAbbrev	SitePt	Easting	Northing	CH4flux	CO2flux	H2Sflux	Date
YJP	yjp052311_60	2436950.534	1214514.511	0	0.258296132	0.003880505	5/25/2011
YJP	yjp052311_61	2436967.412	1214506.322	0	0.157866985	0.0026634	5/25/2011
YJP	yjp052311_62	2436957.411	1214515.606	0	0.313298315	0.002659168	5/25/2011
YJP	yjp052311_63	2436947.05	1214514.668	0	0.13402319	0.002414832	5/25/2011
YJP	yjp052311_64	2436765.724	1214510.686	0.005520333	0.024481475	0.003120188	5/25/2011
YJP	yjp052311_65	2436563.642	1214508.305	0	0.154023141	0.001676768	5/25/2011
YJP	yjp052311_66	2436367.93	1214512.616	0.004767303	0.045289379	0.003575477	5/25/2011
YJP	yjp052311_67	2436396.915	1214689.698	0	0.184553608	0.00569317	5/25/2011
YJP	yjp052311_68	2436374.239	1214896.624	0	0.213166088	0.00379806	5/25/2011
YJP	yjp052311_69	2436180.846	1214931.117	0	0.105122246	0.002847555	5/25/2011
YJP	yjp052311_70	2436181.678	1215099.312	0	0.030571144	0.001421914	5/25/2011
YJP	yjp052311_71	2435961.55	1215100.886	0	0.090024307	0.001895249	5/25/2011
YJP	yjp052311_72	2435984.496	1215263.121	0	0.230196297	0.002129256	5/25/2011
YJP	yjp052311_73	2435975.696	1215527.255	0	0.194787681	0.004745132	5/25/2011
YJP	yjp052311_74	2435951.754	1215765.713	0	0.267188817	0.003562517	5/25/2011
YJP	yjp052311_75	2436177.897	1215720.922	0.009509372	0.250809669	0	5/25/2011
YJP	yjp052311_76	2436151.228	1215558.209	0	0	0	5/25/2011
YJP	yjp052311_77	2436213.069	1215269.345				5/25/2011
YJP	yjp052311_78	2436377.806	1215318.775	0	0.205178723	0.001423205	5/25/2011
YJP	yjp052311_79	2436591.961	1215110.787	0	0.147820637	0	5/25/2011
YJP	yjp052311_80	2436416.117	1215161.523	0	0	0	5/25/2011
YJP	yjp052311_81	2436559.984	1214901.449	0	0.04780085	0.001183189	5/25/2011
YJP	yjp052311_82	2436555.55	1214717.48	0	0.215131283	0	5/25/2011
YJP	yjp052311_83	2436796.392	1214712.805	0	0.084277034	0.00023607	5/25/2011
YJP	yjp052311_84	2436771.213	1214942.465	0	0.023181025	0.000473082	5/25/2011
YJP	yjp052311_85	2436975.39	1214744.121	0.056325745	0.142471001	0	5/25/2011
YJP	yjp052311_86	2437167.165	1214719.636	0	0.052795738	0.000710257	5/25/2011
YJP	yjp052311_87	2439380.235	1213719.63	0	0.209918708	0	5/27/2011
YJP	yjp052311_88	2439568.059	1213718.411	0	0.162198648	0.000983022	5/27/2011
YJP	yjp052311_89	2439762.232	1213724.3	0	0.074714676	0.000488331	5/27/2011
YJP	yjp052311_90	2439976.231	1213718.384	0	0.027769309	0	5/27/2011
YJP	yjp052311_91	2439964.364	1213909.409	0	0.031275652	0.001212235	5/27/2011
YJP	yjp052311_92	2440169.518	1213921.679	0	0.019310234	0.000482756	5/27/2011
YJP	yjp052311_93	2440177.304	1214122.772	0	0.167095691	0.000721276	5/27/2011
YJP	yjp052311_94	2440179.143	1214318.486	0	0.077844545	0.000479043	5/27/2011
YJP	yjp052311_95	2440161.478	1214522.653	0	0.005983961	0.000478717	5/27/2011
YJP	yjp052311_96	2439956.849	1214513.219	0	0.042624198	0.000478924	5/27/2011
YJP	yjp052311_97	2439964.222	1214717.488	0	0.31175229	0.000719428	5/27/2011
YJP	yjp052311_98	2439766.875	1214703.193	0	0.394785494	0.000238541	5/27/2011
YJP	yjp052311_99	2439773.31	1214931.516	0	0.101523601	0	5/27/2011

APPENDIX F
CARBON DIOXIDE FLUX CONTOURS



LEGEND

NATURAL SPRING

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

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 250 500
Feet

N

FIGURE F1
CARBON DIOXIDE FLUX CONTOURS
BEAVER CREEK
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

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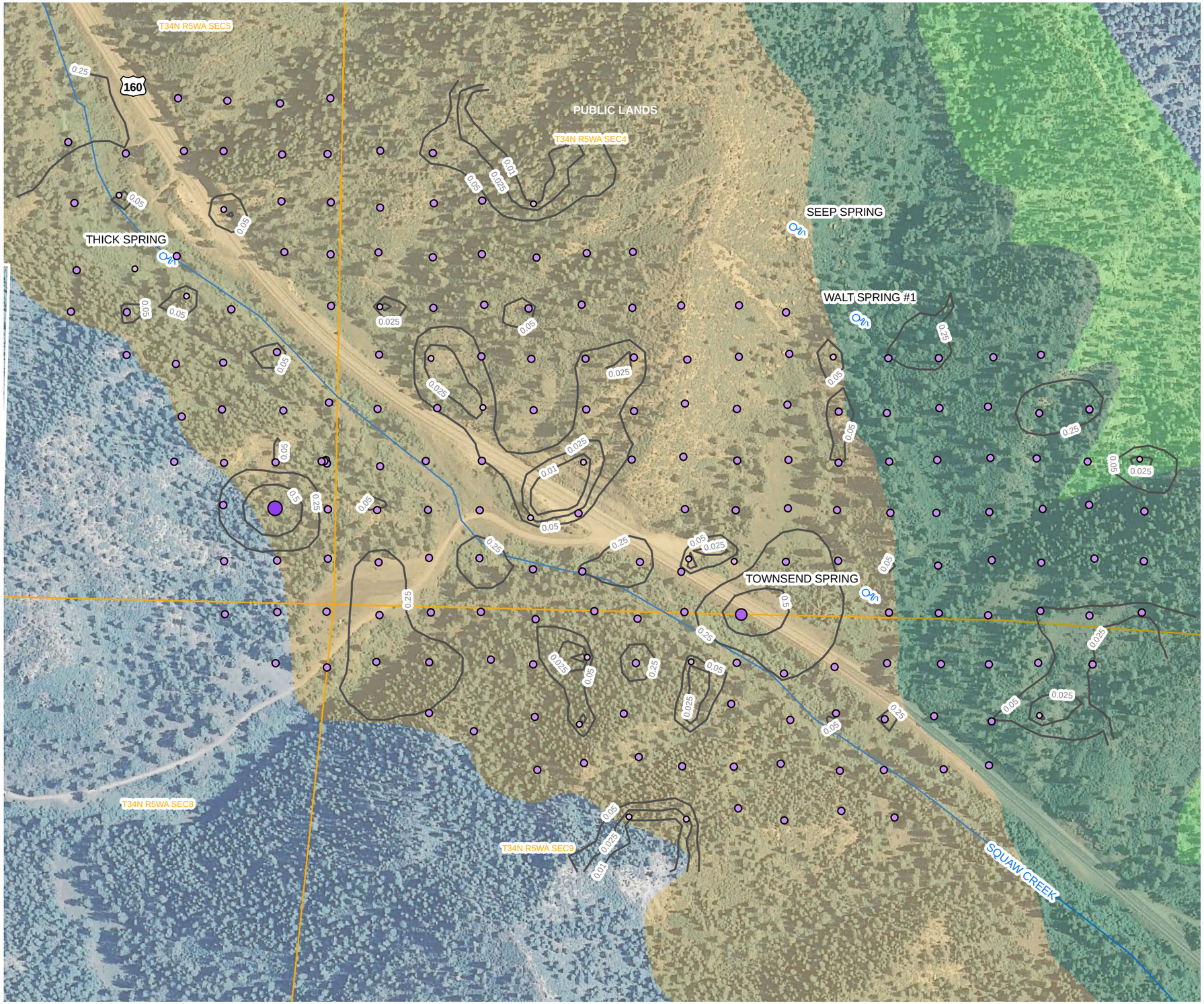


LEGEND

NATURAL SPRING

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

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

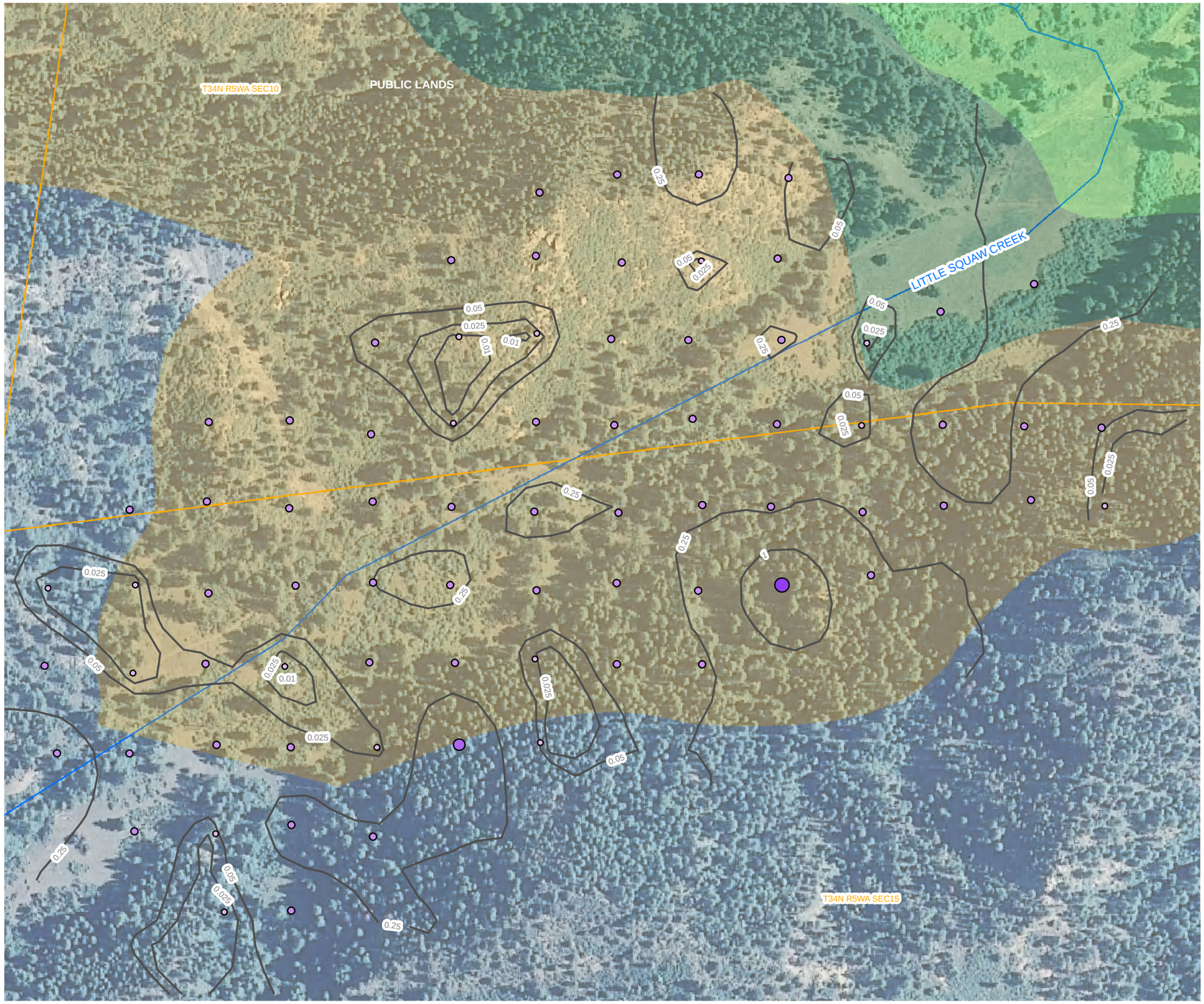
IMAGE COURTESY OF USDA/NRCS, 2009

0 400 800
Feet

N

FIGURE F2
CARBON DIOXIDE FLUX CONTOURS
SQUAW CREEK
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2011\2011_APP_D_CO2.mxd



LEGEND

NATURAL SPRING

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

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

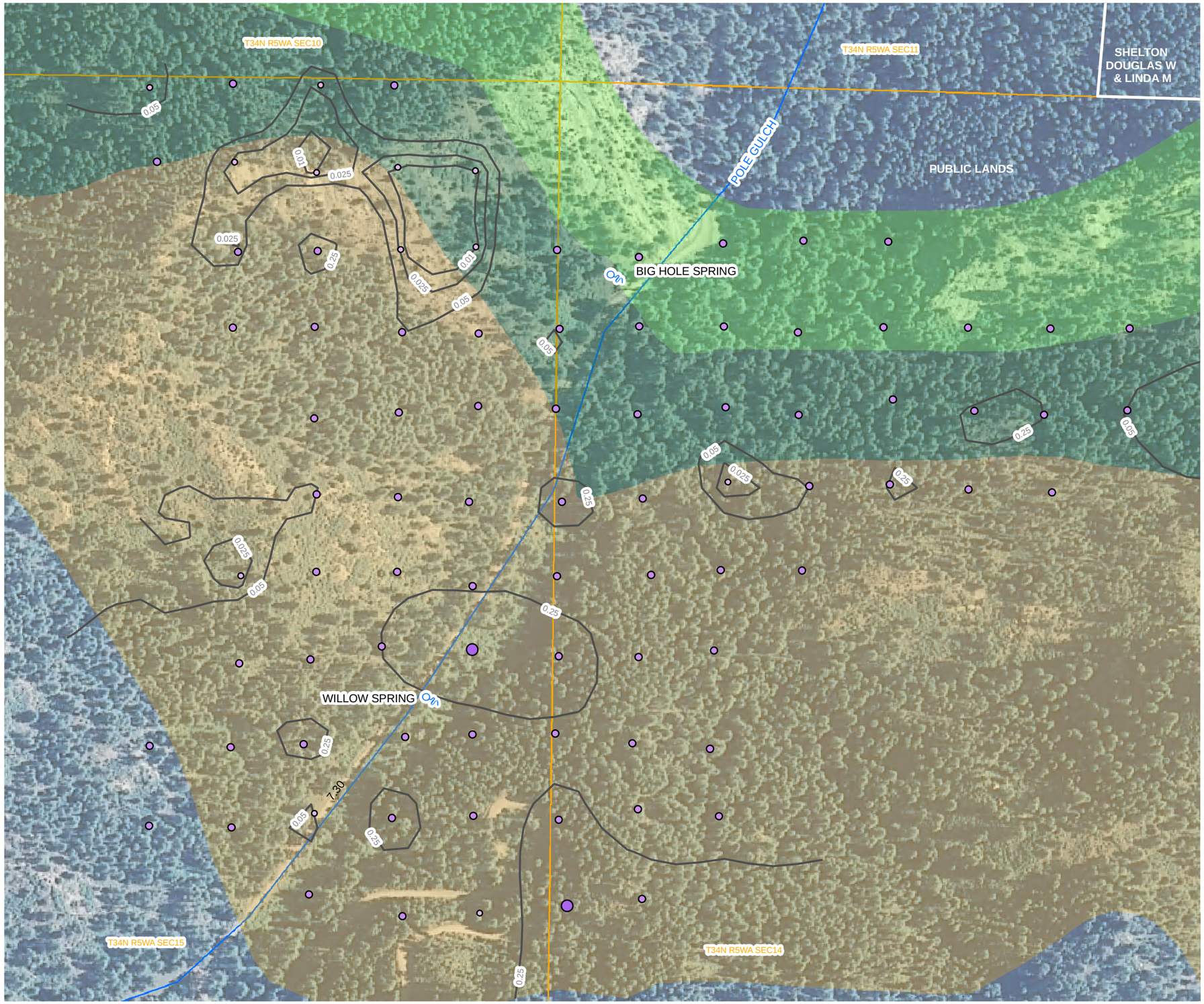
IMAGE COURTESY OF USDA/NRCS, 2009

0 250 500
Feet

N

FIGURE F3
CARBON DIOXIDE FLUX CONTOURS
LITTLE SQUAW CREEK
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2011\2011_APP_D_CO2.mxd



LEGEND

NATURAL SPRING

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

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 250 500
Feet

N

FIGURE F4
CARBON DIOXIDE FLUX CONTOURS
POLE GULCH
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO

PETROX RESOURCES AND ELM RIDGE RESOURCES

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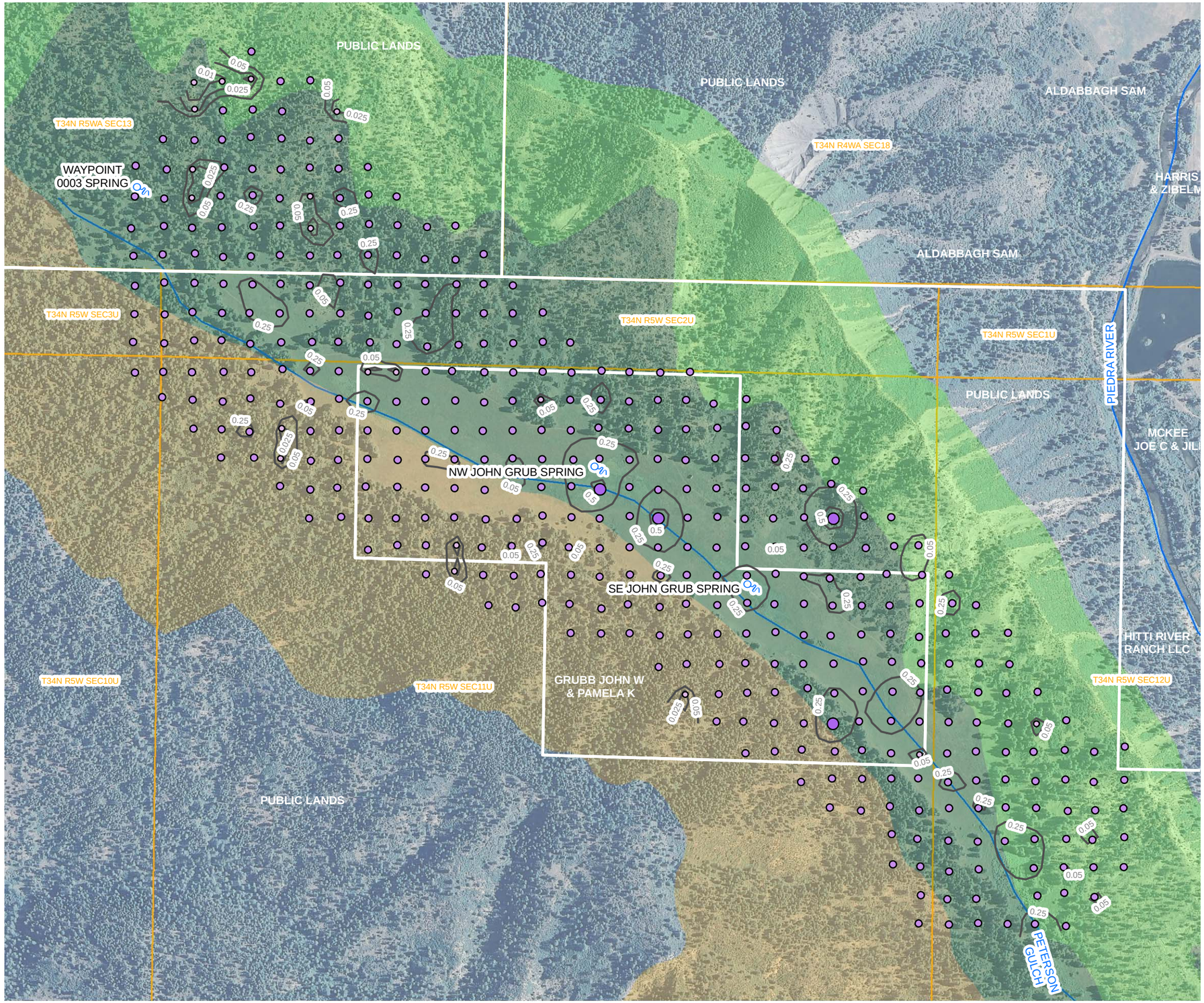

LEGEND

NATURAL SPRING

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

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 700 1,400
Feet

N

FIGURE F5
CARBON DIOXIDE FLUX CONTOURS
PETERSON GULCH
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

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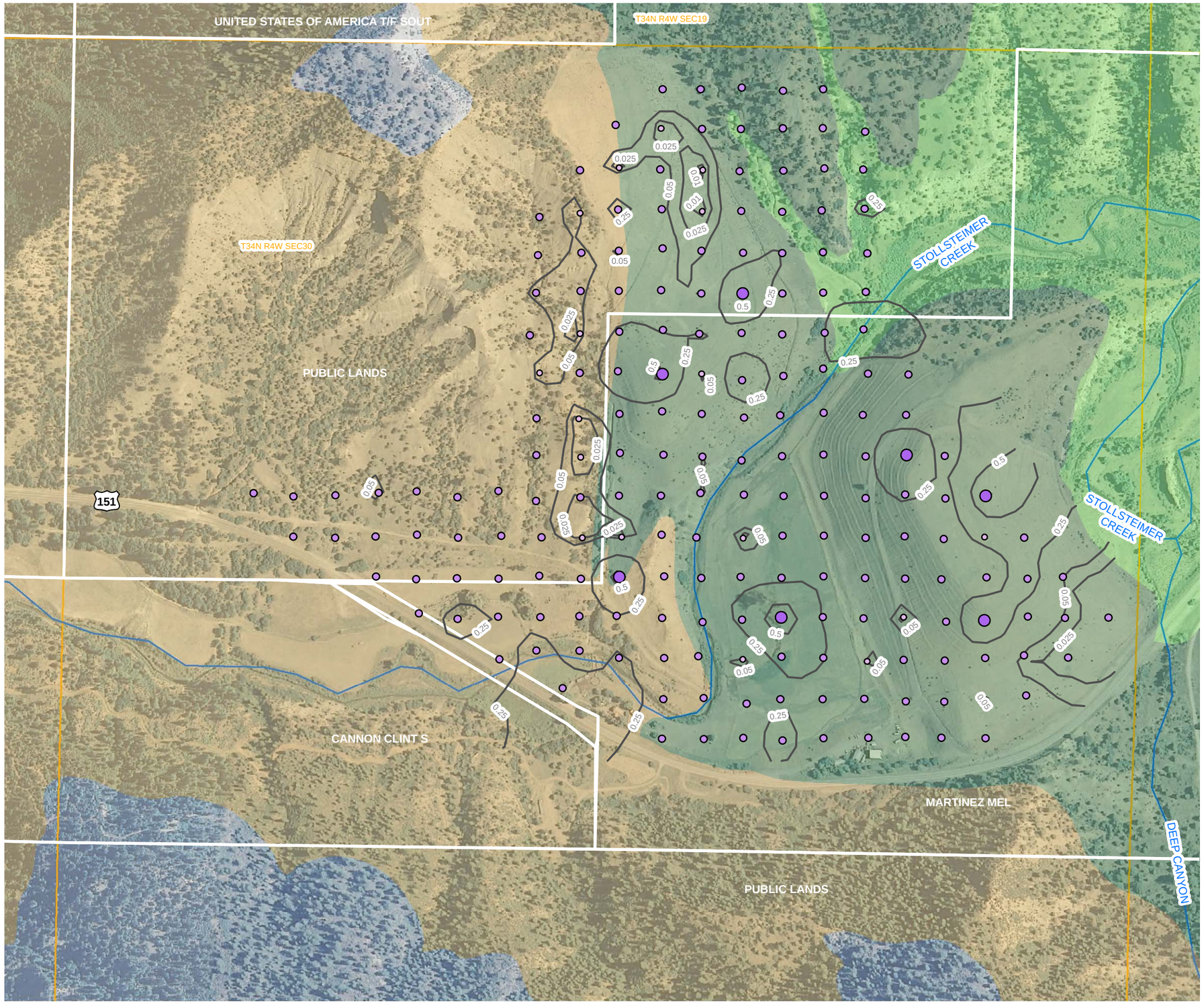

LEGEND

NATURAL SPRING

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

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 500 1,000
Feet

N

FIGURE F6
CARBON DIOXIDE FLUX CONTOURS
STOLLSTEIMER CREEK
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

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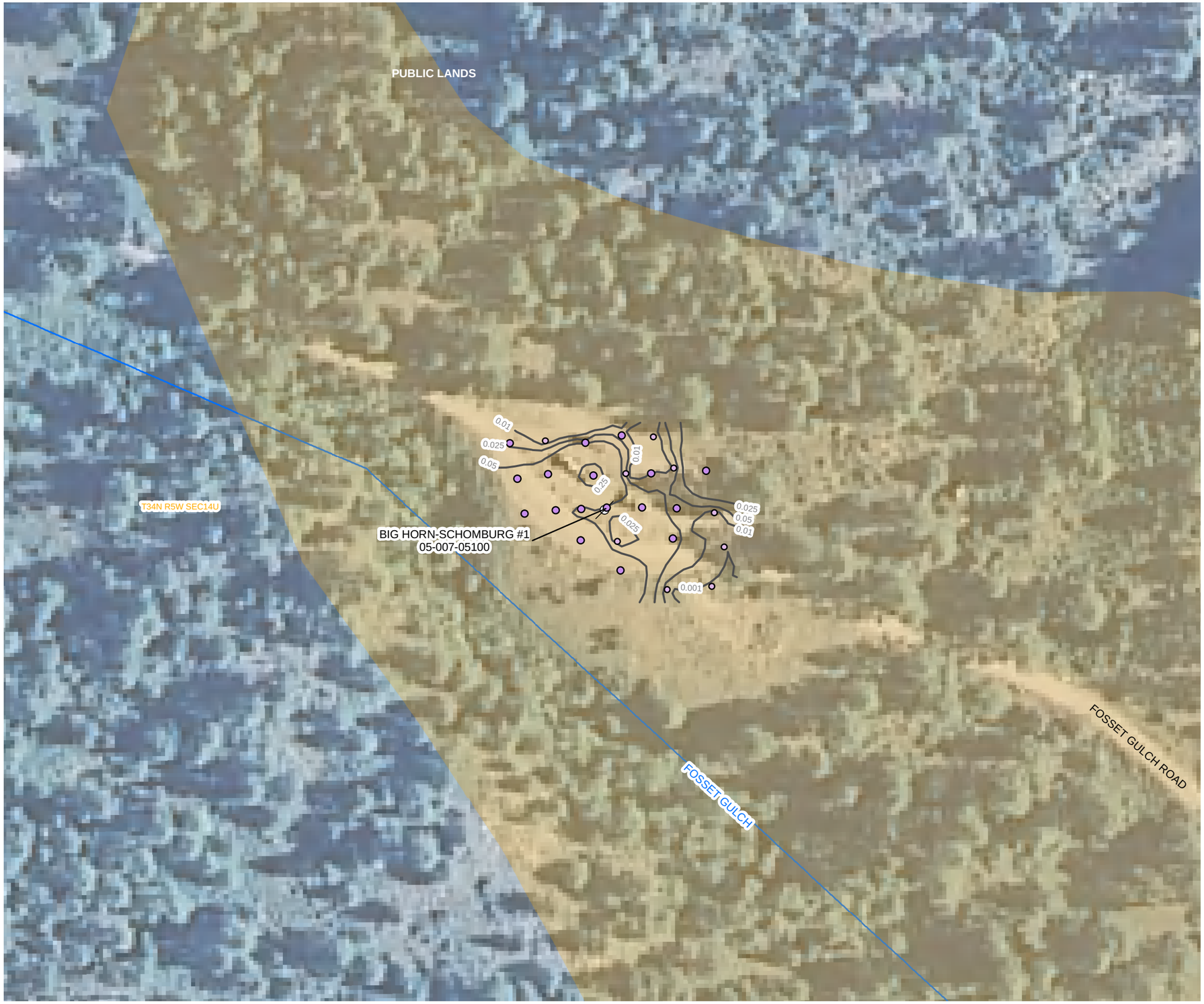


LEGEND

NATURAL SPRING

ABANDONED PRODUCTION WELL

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

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

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

PROPERTY BOUNDARY & OWNER (WHITE)

SECTION

SURFACE WATER

GEOLOGY

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

IMAGE COURTESY OF USDA/NRCS, 2009

0 80 160

Feet

N

FIGURE F7
CARBON DIOXIDE FLUX CONTOURS
BIG HORN-SCHOMBURG #1
2011 OUTCROP ZONE REPORT
ARCHULETA COUNTY, COLORADO
PETROX RESOURCES AND ELM RIDGE RESOURCES

P:\San Juan Basin GIS\Archuleta\Fruitland_OMR\MXDs\Subgas_Flux\2011\2011_APP_D_CO2.mxd

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

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
COLUMBINE MINE	20.6	0.00	0.00	0.00	1000.00	21.5	0.0	0.0	8/2/2011	10:50:40am	7698.954	1229230.659	2432309.249
COLUMBINE MINE	20.6	0.00	0.00	0.00	3000.00	21.1	0.0	0.0	8/2/2011	10:52:56am	7701.209	1229229.468	2432362.509
COLUMBINE MINE	20.3	0.00	0.00	0.00	6000.00	19.0	0.0	0.0	8/2/2011	10:55:57am	7704.254	1229225.986	2432406.059
COLUMBINE MINE	19.7	0.00	0.00	0.00	10000.00	19.7	0.0	0.0	8/2/2011	10:59:53am	7705.407	1229225.192	2432463.362
COLUMBINE MINE	18.5	0.00	0.00	0.00	23000.00	21.1	0.0	0.0	8/2/2011	11:02:23am	7709.522	1229280.109	2432460.802
COLUMBINE MINE	20.4	0.00	0.00	0.00	4000.00	19.4	0.0	0.0	8/2/2011	11:05:35am	7709.996	1229231.361	2432519.256
COLUMBINE MINE	20.3	0.00	0.00	0.00	3000.00	20.3	0.0	0.0	8/2/2011	11:07:20am	7712.650	1229275.025	2432507.975
COLUMBINE MINE	20.1	0.00	0.00	0.00	7000.00	20.3	0.0	0.0	8/2/2011	11:09:37am	7721.846	1229331.901	2432510.307
COLUMBINE MINE	20.7	0.00	0.00	0.00	2000.00	19.6	0.0	0.0	8/2/2011	11:11:52am	7738.996	1229378.858	2432507.815
COLUMBINE MINE	20.3	0.00	0.00	0.00	5000.00	19.3	0.0	0.0	8/2/2011	11:13:57am	7760.421	1229433.596	2432511.412
COLUMBINE MINE	19.8	0.00	0.00	0.00	11000.00	19.0	0.0	0.0	8/2/2011	11:17:30am	7748.075	1229429.442	2432459.768
COLUMBINE MINE	19.7	0.00	0.00	0.00	11000.00	19.2	0.0	0.0	8/2/2011	11:20:39am	7740.404	1229431.185	2432408.409
COLUMBINE MINE	20.3	0.00	0.00	0.00	7000.00	19.3	0.0	0.0	8/2/2011	11:23:55am	7735.177	1229424.921	2432366.458
COLUMBINE MINE	19.5	0.00	0.00	0.00	12000.00	19.6	0.0	0.0	8/2/2011	11:26:52am	7720.847	1229424.787	2432307.841
COLUMBINE MINE	20.6	0.00	0.00	0.00	9000.00	19.8	0.0	0.0	8/2/2011	11:30:21am	7712.130	1229428.629	2432260.146
COLUMBINE MINE	19.7	0.00	0.00	0.00	11000.00	17.4	0.0	0.0	8/2/2011	11:34:09am	7702.575	1229426.669	2432208.429
COLUMBINE MINE	20.4	0.00	0.00	0.00	4000.00	22.2	0.0	0.0	8/2/2011	11:36:40am	7693.254	1229430.503	2432160.685
COLUMBINE MINE	20.5	0.00	0.00	0.00	2000.00	21.1	0.0	0.0	8/2/2011	11:39:40am	7687.408	1229431.448	2432106.015
COLUMBINE MINE	19.3	0.00	0.00	0.00	14000.00	17.6	0.0	0.0	8/2/2011	11:42:03am	7686.988	1229431.971	2432057.145
COLUMBINE MINE	20.5	0.00	0.00	0.00	2000.00	23.2	0.0	0.0	8/2/2011	11:45:39am	7677.320	1229377.188	2432056.536
COLUMBINE MINE	19.3	0.00	0.00	0.00	12000.00	23.3	0.0	0.0	8/2/2011	11:47:57am	7679.486	1229378.573	2432110.056
COLUMBINE MINE	19.3	0.00	0.00	0.00	13000.00	19.2	0.0	0.0	8/2/2011	11:50:50am	7686.941	1229376.256	2432154.837
COLUMBINE MINE	19.5	0.00	0.00	0.00	11000.00	23.3	0.0	0.0	8/2/2011	12:18:34pm	7679.189	1229323.936	2432107.333
COLUMBINE MINE	20.1	0.00	0.00	0.00	7000.00	37.6	0.0	0.0	8/2/2011	12:21:13pm	7684.063	1229279.237	2432115.873
COLUMBINE MINE	19.6	0.00	0.00	0.00	9000.00	29.1	0.0	0.0	8/2/2011	12:23:36pm	7698.324	1229228.013	2432159.310
COLUMBINE MINE	20.5	0.00	0.00	0.00	1000.00	26.6	0.0	0.0	8/2/2011	12:26:12pm	7691.288	1229226.799	2432104.996
COLUMBINE MINE	20.7	0.00	0.00	0.00	2000.00	26.1	0.0	0.0	8/2/2011	12:29:17pm	7699.507	1229176.458	2432107.968
COLUMBINE MINE	19.8	0.00	0.00	0.00	9000.00	22.6	0.0	0.0	8/2/2011	12:34:15pm	7738.304	1229125.492	2432106.218
COLUMBINE MINE	20.1	0.00	0.00	0.00	4000.00	21.3	0.0	0.0	8/2/2011	12:37:33pm	7720.831	1229075.432	2432113.652
COLUMBINE MINE	20.1	0.00	0.00	0.00	6000.00	17.0	0.0	0.0	8/2/2011	12:40:32pm	7746.596	1229030.966	2432118.508
COLUMBINE MINE	20.3	0.00	0.00	0.00	4000.00	20.6	0.0	0.0	8/2/2011	12:43:47pm	7747.403	1228980.576	2432105.058
COLUMBINE MINE	20.1	0.00	0.00	0.00	5000.00	22.0	0.0	0.0	8/2/2011	12:46:12pm	7729.876	1228983.794	2432060.669
COLUMBINE MINE	20.3	0.00	0.00	0.00	5000.00	27.6	0.0	0.0	8/2/2011	12:48:44pm	7726.867	1229035.217	2432067.449
COLUMBINE MINE	20.3	0.00	0.00	0.00	4000.00	25.9	0.0	0.0	8/2/2011	12:51:11pm	7701.055	1229086.062	2432059.239
COLUMBINE MINE	20.3	0.00	0.00	0.00	4000.00	24.8	0.0	0.0	8/2/2011	12:53:43pm	7700.375	1229081.670	2432060.894
COLUMBINE MINE	19.9	0.00	0.00	1.00	7000.00	22.3	0.0	0.0	8/2/2011	12:55:49pm	7690.537	1229185.882	2432062.404
COLUMBINE MINE	19.9	0.00	0.00	0.00	8000.00	29.4	0.0	0.0	8/2/2011	12:57:42pm	7684.818	1229230.652	2432060.867
COLUMBINE MINE	19.4	0.00	0.00	0.00	9000.00	33.3	0.0	0.0	8/2/2011	01:00:27pm	7677.551	1229277.707	2432061.715
COLUMBINE MINE	20.0	0.00	0.00	0.00	6000.00	44.5	0.0	0.0	8/2/2011	01:04:49pm	7676.276	1229322.614	2432058.652
COLUMBINE MINE	19.9	0.00	0.00	0.00	5000.00	29.3	0.0	0.0	8/2/2011	01:08:43pm	7683.007	1229332.635	2432166.503
COLUMBINE MINE	19.5	0.00	0.00	0.00	6000.00	26.2	0.0	0.0	8/2/2011	01:21:18pm	7693.956	1229383.044	2432210.788
COLUMBINE MINE	18.8	0.00	0.00	0.00	11000.00	33.9	0.0	0.0	8/2/2011	01:24:21pm	7683.581	1229329.149	2432209.453
COLUMBINE MINE	19.9	0.00	0.00	0.00	3000.00	45.7	0.0	0.0	8/2/2011	01:27:34pm	7690.266	1229331.424	2432261.938
COLUMBINE MINE	19.1	0.00	0.00	0.00	10000.00	35.8	0.0	0.0	8/2/2011	01:29:51pm	7705.069	1229385.460	2432261.514
COLUMBINE MINE	19.8	0.00	0.00	0.00	4000.00	44.8	0.0	0.0	8/2/2011	01:32:58pm	7713.625	1229380.194	2432312.858
COLUMBINE MINE	20.0	0.00	0.00	0.00	3000.00	38.6	0.0	0.0	8/2/2011	01:35:49pm	7706.546	1229339.558	2432314.293

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
COLUMBINE MINE	19.4	0.00	0.00	0.00	7000.00	34.1	0.0	0.0	8/2/2011	01:39:58pm	7689.001	1229279.811	2432165.804
COLUMBINE MINE	20.1	0.00	0.00	0.00	5000.00	24.2	0.0	0.0	8/2/2011	01:44:43pm	7700.841	1229231.334	2432209.150
COLUMBINE MINE	19.5	0.00	1.00	0.00	7000.00	23.6	0.0	0.0	8/2/2011	01:47:56pm	7698.589	1229232.913	2432262.005
COLUMBINE MINE	20.5	0.00	0.00	0.00	3000.00	15.1	0.0	0.0	8/2/2011	01:51:14pm	7714.998	1229188.858	2432264.593
COLUMBINE MINE	20.3	0.00	0.00	0.00	3000.00	19.3	0.0	0.0	8/2/2011	01:54:32pm	7738.000	1229145.073	2432263.162
COLUMBINE MINE	20.4	0.00	0.00	0.00	5000.00	17.9	0.0	0.0	8/2/2011	01:57:49pm	7740.875	1229124.365	2432210.755
COLUMBINE MINE	20.4	0.00	0.00	0.00	5000.00	18.1	0.0	0.0	8/2/2011	02:00:16pm	7718.984	1229174.040	2432209.996
COLUMBINE MINE	20.1	0.00	0.00	0.00	8000.00	18.9	0.0	0.0	8/3/2011	09:06:50am	7714.007	1229330.097	2432352.195
COLUMBINE MINE	19.8	0.00	0.00	0.00	8000.00	17.2	0.0	0.0	8/3/2011	09:11:18am	7723.685	1229385.342	2432361.337
COLUMBINE MINE	20.2	0.00	0.00	0.00	6000.00	24.9	0.0	0.0	8/3/2011	09:16:08am	7727.112	1229370.284	2432421.136
COLUMBINE MINE	19.3	0.00	0.00	0.00	13000.00	16.8	0.0	0.0	8/3/2011	09:19:02am	7734.447	1229383.524	2432466.272
COLUMBINE MINE	19.4	0.00	0.00	0.00	6000.00	25.0	0.0	0.0	8/3/2011	09:35:51am	7720.020	1229330.374	2432462.561
COLUMBINE MINE	19.3	0.00	0.00	0.00	9000.00	19.5	0.0	0.0	8/3/2011	09:40:45am	7719.293	1229331.597	2432412.307
COLUMBINE MINE	19.2	0.00	0.00	0.00	7000.00	24.8	0.0	0.0	8/3/2011	09:44:49am	7704.091	1229279.579	2432410.509
COLUMBINE MINE	19.5	0.00	0.00	0.00	6000.00	20.9	0.0	0.0	8/3/2011	09:47:41am	7700.491	1229280.786	2432363.147
COLUMBINE MINE	19.2	0.00	0.00	0.00	8000.00	15.3	0.0	0.0	8/3/2011	09:52:26am	7696.719	1229275.014	2432317.881
COLUMBINE MINE	19.8	0.00	0.00	0.00	3000.00	28.2	0.0	0.0	8/3/2011	09:56:38am	7694.929	1229279.149	2432260.601
COLUMBINE MINE	19.8	0.00	0.00	0.00	4000.00	14.7	0.0	0.0	8/3/2011	09:58:32am	7688.455	1229274.421	2432212.831
COLUMBINE MINE	19.3	0.00	0.00	0.00	10000.00	17.5	0.0	0.0	8/3/2011	10:03:23am	7709.299	1229176.413	2432163.568
COLUMBINE MINE	19.7	0.00	0.00	0.00	8000.00	15.1	0.0	0.0	8/3/2011	10:05:53am	7714.607	1229129.909	2432163.491
COLUMBINE MINE	20.0	0.00	0.00	0.00	6000.00	14.2	0.0	0.0	8/3/2011	10:08:17am	7735.271	1229080.198	2432165.472
COLUMBINE MINE	19.9	0.00	0.00	0.00	8000.00	15.4	0.0	0.0	8/3/2011	10:12:25am	7754.986	1229031.833	2432162.874
COLUMBINE MINE	19.8	0.00	1.00	0.00	9000.00	14.7	0.0	0.0	8/3/2011	10:15:19am	7772.201	1228977.402	2432166.137
COLUMBINE MINE	20.0	0.00	0.00	0.00	8000.00	18.3	0.0	0.0	8/3/2011	10:18:40am	7781.620	1228982.264	2432214.692
COLUMBINE MINE	20.2	0.00	0.00	0.00	6000.00	14.4	0.0	0.0	8/3/2011	10:21:49am	7805.360	1228976.745	2432266.026
COLUMBINE MINE	20.8	0.00	0.00	0.00	1000.00	18.4	0.0	0.0	8/3/2011	10:24:45am	7809.485	1228977.203	2432309.260
COLUMBINE MINE	20.3	0.00	0.00	0.00	5000.00	23.1	0.0	0.0	8/3/2011	10:28:17am	7814.812	1228981.053	2432361.419
COLUMBINE MINE	20.6	0.00	0.00	0.00	3000.00	15.1	0.0	0.0	8/3/2011	10:34:17am	7807.778	1228975.436	2432409.344
COLUMBINE MINE	20.3	0.00	0.00	0.00	4000.00	17.0	0.0	0.0	8/3/2011	10:39:00am	7791.710	1228982.555	2432463.389
COLUMBINE MINE	21.0	0.00	0.00	0.00	1000.00	17.1	0.0	0.0	8/3/2011	10:42:28am	7789.121	1228982.270	2432511.574
COLUMBINE MINE	20.1	0.00	0.00	0.00	4000.00	13.9	0.0	0.0	8/3/2011	10:47:35am	7773.468	1229032.015	2432517.382
COLUMBINE MINE	20.4	0.00	0.00	0.00	4000.00	23.8	0.0	0.0	8/3/2011	10:51:45am	7759.124	1229074.690	2432512.010
COLUMBINE MINE	20.8	0.00	0.00	0.00	2000.00	17.9	0.0	0.0	8/3/2011	10:57:25am	7760.010	1229081.325	2432457.756
COLUMBINE MINE	20.5	0.00	0.00	0.00	4000.00	18.4	0.0	0.0	8/3/2011	11:01:07am	7777.742	1229032.682	2432457.448
COLUMBINE MINE	20.8	0.00	0.00	0.00	2000.00	15.1	0.0	0.0	8/3/2011	11:04:17am	7786.347	1229033.218	2432413.445
COLUMBINE MINE	20.5	0.00	0.00	0.00	4000.00	15.8	0.0	0.0	8/3/2011	11:06:55am	7798.951	1229026.452	2432359.061
COLUMBINE MINE	20.4	0.00	0.00	0.00	4000.00	16.8	0.0	0.0	8/3/2011	11:11:37am	7794.427	1229027.543	2432313.241
COLUMBINE MINE	20.1	0.00	0.00	0.00	6000.00	17.4	0.0	0.0	8/3/2011	11:15:16am	7786.008	1229024.873	2432261.395
COLUMBINE MINE	20.3	0.00	0.00	0.00	6000.00	18.2	0.0	0.0	8/3/2011	11:17:53am	7777.429	1229025.649	2432204.290
COLUMBINE MINE	20.3	0.00	0.00	0.00	6000.00	15.1	0.0	0.0	8/3/2011	11:20:28am	7761.713	1229088.547	2432209.468
COLUMBINE MINE	20.1	0.00	0.00	0.00	9000.00	19.5	0.0	0.0	8/3/2011	11:23:43am	7774.304	1229081.115	2432260.893
COLUMBINE MINE	20.4	0.00	0.00	0.00	5000.00	22.4	0.0	0.0	8/3/2011	11:26:36am	7777.818	1229079.251	2432315.416
COLUMBINE MINE	20.6	0.00	0.00	0.00	2000.00	16.4	0.0	0.0	8/3/2011	11:30:27am	7778.188	1229078.526	2432366.519
COLUMBINE MINE	20.6	0.00	0.00	0.00	4000.00	25.0	0.0	0.0	8/3/2011	11:33:51am	7760.457	1229078.942	2432409.391
COLUMBINE MINE	20.6	0.00	0.00	0.00	3000.00	19.1	0.0	0.0	8/3/2011	11:37:59am	7741.584	1229125.841	2432412.615
COLUMBINE MINE	20.6	0.00	0.00	0.00	3000.00	19.4	0.0	0.0	8/3/2011	11:41:04am	7748.578	1229126.939	2432361.332

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
COLUMBINE MINE	20.5	0.00	0.00	0.00	3000.00	21.3	0.0	0.0	8/3/2011	11:43:59am	7749.833	1229122.746	2432304.199
COLUMBINE MINE	20.2	0.00	0.00	0.00	5000.00	17.7	0.0	0.0	8/3/2011	11:46:56am	7722.105	1229179.478	2432313.936
COLUMBINE MINE	20.4	0.00	0.00	0.00	5000.00	17.1	0.0	0.0	8/3/2011	11:49:36am	7729.948	1229181.604	2432364.046
COLUMBINE MINE	20.6	0.00	0.00	0.00	3000.00	17.3	0.0	0.0	8/3/2011	11:53:20am	7730.757	1229177.947	2432411.281
COLUMBINE MINE	20.5	0.00	0.00	0.00	3000.00	18.5	0.0	0.0	8/3/2011	11:56:13am	7712.234	1229173.893	2432462.743
COLUMBINE MINE	19.4	0.00	0.00	0.00	15000.00	32.7	0.0	0.0	8/3/2011	11:58:49am	7715.255	1229176.014	2432509.837
COLUMBINE MINE	20.3	0.00	0.00	0.00	4000.00	19.8	0.0	0.0	8/3/2011	12:01:36pm	7723.478	1229131.908	2432513.400
COLUMBINE MINE	20.3	0.00	0.00	0.00	4000.00	31.8	0.0	0.0	8/3/2011	12:04:28pm	7726.536	1229126.375	2432459.410
TRIPLE S MINE	19.6	0.00	0.00	0.00	9000.00	23.9	0.0	0.0	7/29/2011	11:16:37am	7536.539	1235200.091	2425374.054
TRIPLE S MINE	20.3	0.00	0.00	0.00	5000.00	23.1	0.0	0.0	7/29/2011	11:28:40am	7551.406	1235204.219	2425319.446
TRIPLE S MINE	20.2	0.00	0.00	0.00	5000.00	22.5	0.0	0.0	7/29/2011	11:31:43am	7547.549	1235194.783	2425276.782
TRIPLE S MINE	20.6	0.00	0.00	0.00	1000.00	20.5	0.0	0.0	7/29/2011	11:35:50am	7546.420	1235145.513	2425269.844
TRIPLE S MINE	19.9	0.00	0.00	0.00	7000.00	31.1	0.0	0.0	7/29/2011	11:39:25am	7537.553	1235096.375	2425279.120
TRIPLE S MINE	20.4	0.00	0.00	0.00	1000.00	59.2	0.0	0.0	7/29/2011	11:42:25am	7520.338	1235049.277	2425274.439
TRIPLE S MINE	20.1	0.00	0.00	0.00	2000.00	44.7	0.0	0.0	7/29/2011	11:45:09am	7508.560	1234997.504	2425271.179
TRIPLE S MINE	20.2	0.00	0.00	0.00	0.00	53.6	0.0	0.0	7/29/2011	11:48:18am	7505.917	1234994.878	2425220.706
TRIPLE S MINE	20.1	0.00	0.00	0.00	0.00	42.4	0.0	0.0	7/29/2011	11:50:50am	7526.778	1235044.239	2425226.460
TRIPLE S MINE	20.2	0.00	0.00	0.00	0.00	34.9	0.0	0.0	7/29/2011	11:53:37am	7549.379	1235102.193	2425223.184
TRIPLE S MINE	19.9	0.00	0.00	0.00	4000.00	34.1	0.0	0.0	8/1/2011	11:41:49am	7513.851	1235000.868	2425177.232
TRIPLE S MINE	19.8	0.00	0.00	1.00	6000.00	31.7	0.0	0.0	8/1/2011	11:44:01am	7534.836	1235054.251	2425175.906
TRIPLE S MINE	19.8	0.00	0.00	0.00	6000.00	50.1	0.0	0.0	8/1/2011	11:46:07am	7535.414	1235103.263	2425177.733
TRIPLE S MINE	19.4	0.00	0.00	0.00	6000.00	35.5	0.0	0.0	8/1/2011	11:48:33am	7552.091	1235150.160	2425225.248
TRIPLE S MINE	20.5	0.00	0.00	0.00	1000.00	17.6	0.0	0.0	8/1/2011	11:51:23am	7547.135	1235153.057	2425172.104
TRIPLE S MINE	20.3	0.00	0.00	0.00	1000.00	33.1	0.0	0.0	8/1/2011	11:54:15am	7545.427	1235199.088	2425175.976
TRIPLE S MINE	20.3	0.00	0.00	0.00	2000.00	31.5	0.0	0.0	8/1/2011	11:56:12am	7548.004	1235202.659	2425227.648
TRIPLE S MINE	20.5	0.00	0.00	0.00	2000.00	32.6	0.0	0.0	8/1/2011	11:59:03am	7548.038	1235249.655	2425222.775
TRIPLE S MINE	20.4	0.00	0.00	0.00	3000.00	19.1	0.0	0.0	8/1/2011	12:01:27pm	7550.445	1235257.040	2425175.342
TRIPLE S MINE	20.1	0.00	0.00	11.00	4000.00	30.7	0.0	0.0	8/1/2011	12:03:54pm	7552.432	1235302.915	2425172.031
TRIPLE S MINE	19.8	0.00	0.00	0.00	8000.00	18.1	0.0	0.0	8/1/2011	12:06:17pm	7551.328	1235296.547	2425221.456
TRIPLE S MINE	20.3	0.00	0.00	0.00	4000.00	21.3	0.0	0.0	8/1/2011	12:08:46pm	7551.607	1235300.236	2425275.220
TRIPLE S MINE	20.4	0.00	1.00	0.00	1000.00	23.2	0.0	0.0	8/1/2011	12:13:40pm	7551.535	1235255.001	2425274.113
TRIPLE S MINE	19.0	0.00	1.00	0.00	17000.00	29.0	0.0	0.0	8/1/2011	12:15:55pm	7551.196	1235253.462	2425325.266
TRIPLE S MINE	20.1	0.00	0.00	0.00	4000.00	29.0	0.0	0.0	8/1/2011	12:17:53pm	7548.882	1235302.273	2425320.649
TRIPLE S MINE	19.9	0.00	0.00	0.00	7000.00	32.2	0.0	0.0	8/1/2011	12:20:41pm	7555.637	1235351.718	2425330.192
TRIPLE S MINE	19.7	0.00	0.00	0.00	8000.00	26.7	0.0	0.0	8/1/2011	12:22:37pm	7550.087	1235350.622	2425273.384
TRIPLE S MINE	19.6	0.00	0.00	0.00	7000.00	27.6	0.0	0.0	8/1/2011	12:24:41pm	7553.829	1235346.591	2425217.118
TRIPLE S MINE	20.9	0.00	0.00	0.00	1000.00	37.2	0.0	0.0	8/1/2011	12:26:42pm	7558.058	1235356.923	2425171.173
TRIPLE S MINE	19.9	0.00	0.00	3.00	9000.00	0.0	0.0	0.0	8/1/2011	12:29:38pm	7559.056	1235405.642	2425173.248
TRIPLE S MINE	19.2	0.00	0.00	0.00	17000.00	26.1	0.0	0.0	8/1/2011	12:31:55pm	7563.953	1235458.075	2425172.626
TRIPLE S MINE	20.5	0.00	0.00	0.00	2000.00	18.7	0.0	0.0	8/1/2011	12:34:30pm	7563.694	1235456.279	2425224.933
TRIPLE S MINE	20.3	0.00	0.00	0.00	6000.00	22.1	0.0	0.0	8/1/2011	12:36:57pm	7556.230	1235403.600	2425216.167
TRIPLE S MINE	20.2	0.00	0.00	0.00	5000.00	36.7	0.0	0.0	8/1/2011	12:39:37pm	7551.592	1235402.592	2425272.046
TRIPLE S MINE	20.7	0.00	0.00	0.00	2000.00	35.4	0.0	0.0	8/1/2011	12:41:41pm	7554.973	1235453.054	2425275.237
TRIPLE S MINE	20.4	0.00	0.00	0.00	6000.00	25.0	0.0	0.0	8/1/2011	12:44:24pm	7558.737	1235451.108	2425323.057
TRIPLE S MINE	18.4	0.00	0.00	0.00	22000.00	33.7	0.0	0.0	8/1/2011	12:47:08pm	7559.826	1235459.351	2425368.335
TRIPLE S MINE	19.9	0.00	0.00	0.00	5000.00	25.1	0.0	0.0	8/1/2011	12:49:58pm	7554.859	1235401.870	2425322.114

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
TRIPLE S MINE	20.3	0.00	0.00	1.00	4000.00	24.7	0.0	0.0	8/1/2011	12:52:35pm	7552.558	1235412.296	2425374.089
TRIPLE S MINE	19.8	0.00	0.00	0.00	8000.00	24.8	0.0	0.0	8/1/2011	12:55:03pm	7553.272	1235361.567	2425369.997
TRIPLE S MINE	20.4	0.00	0.00	0.00	2000.00	25.1	0.0	0.0	8/1/2011	12:57:16pm	7549.383	1235312.382	2425371.934
TRIPLE S MINE	19.7	0.00	0.00	0.00	9000.00	32.3	0.0	0.0	8/1/2011	01:00:27pm	7546.557	1235248.204	2425364.966
TRIPLE S MINE	20.0	0.00	0.00	0.00	7000.00	33.3	0.0	0.0	8/1/2011	01:03:02pm	7559.619	1235256.688	2425422.367
TRIPLE S MINE	20.2	0.00	0.00	0.00	5000.00	19.8	0.0	0.0	8/1/2011	01:05:51pm	7551.488	1235307.968	2425423.912
TRIPLE S MINE	19.5	0.00	0.00	0.00	9000.00	38.4	0.0	0.0	8/1/2011	01:08:50pm	7553.275	1235354.918	2425422.923
TRIPLE S MINE	19.9	0.00	0.00	0.00	7000.00	18.1	0.0	0.0	8/1/2011	01:11:32pm	7551.687	1235408.656	2425425.870
TRIPLE S MINE	20.8	0.00	0.00	0.00	2000.00	17.6	0.0	0.0	8/1/2011	01:14:18pm	7556.988	1235450.113	2425424.527
TRIPLE S MINE	20.3	0.00	0.00	0.00	3000.00	18.7	0.0	0.0	8/1/2011	01:17:31pm	7555.708	1235452.035	2425465.847
TRIPLE S MINE	20.5	0.00	0.00	0.00	3000.00	15.6	0.0	0.0	8/1/2011	01:20:25pm	7553.764	1235406.829	2425481.765
TRIPLE S MINE	20.5	0.00	0.00	0.00	1000.00	19.7	0.0	0.0	8/1/2011	01:23:55pm	7552.814	1235361.314	2425470.064
TRIPLE S MINE	19.6	0.00	0.00	0.00	14000.00	23.7	0.0	0.0	8/1/2011	01:26:13pm	7551.176	1235313.125	2425467.514
TRIPLE S MINE	20.6	0.00	1.00	0.00	3000.00	49.9	0.0	0.0	8/1/2011	01:29:28pm	7548.642	1235254.377	2425470.464
TRIPLE S MINE	20.6	0.00	0.00	0.00	0.00	22.4	0.0	0.0	8/1/2011	01:32:32pm	7542.107	1235209.351	2425467.728
TRIPLE S MINE	20.7	0.00	0.00	2.00	1000.00	27.8	0.0	0.0	8/1/2011	01:38:37pm	7546.940	1235207.694	2425418.795
TRIPLE S MINE	20.9	0.00	0.00	0.00	2000.00	23.1	0.0	0.0	8/1/2011	01:40:51pm	7527.203	1235153.665	2425418.984
TRIPLE S MINE	20.7	0.00	0.00	0.00	2000.00	20.1	0.0	0.0	8/1/2011	01:43:29pm	7528.712	1235158.196	2425374.725
TRIPLE S MINE	20.4	0.00	0.00	0.00	4000.00	30.8	0.0	0.0	8/1/2011	01:46:44pm	7541.556	1235148.587	2425316.687
TRIPLE S MINE	20.3	0.00	0.00	1.00	3000.00	63.0	0.0	0.0	8/1/2011	01:50:16pm	7527.292	1235105.728	2425327.427
TRIPLE S MINE	20.2	0.00	0.00	2.00	6000.00	55.6	0.0	0.0	8/1/2011	01:52:25pm	7522.067	1235102.073	2425369.864
TRIPLE S MINE	20.2	0.00	0.00	0.00	4000.00	26.8	0.0	0.0	8/1/2011	01:55:54pm	7516.386	1235113.103	2425425.817
TRIPLE S MINE	19.9	0.00	0.00	0.00	6000.00	18.2	0.0	0.0	8/2/2011	08:43:37am	7506.369	1234989.847	2425311.723
TRIPLE S MINE	18.8	0.00	0.00	0.00	15000.00	18.5	0.0	0.0	8/2/2011	08:47:58am	7502.391	1235001.375	2425367.618
TRIPLE S MINE	17.5	0.00	0.00	0.00	28000.00	18.4	0.0	0.0	8/2/2011	08:50:21am	7503.857	1235000.181	2425423.323
TRIPLE S MINE	19.9	0.00	0.00	0.00	3000.00	17.8	0.0	0.0	8/2/2011	08:52:53am	7505.502	1234997.809	2425470.784
TRIPLE S MINE	19.8	0.00	0.00	0.00	7000.00	19.4	0.0	0.0	8/2/2011	08:55:43am	7507.274	1235000.230	2425525.517
TRIPLE S MINE	19.1	0.00	0.00	0.00	7000.00	18.2	0.0	0.0	8/2/2011	08:59:19am	7505.069	1235048.435	2425523.750
TRIPLE S MINE	19.6	0.00	0.00	0.00	3000.00	17.1	0.0	0.0	8/2/2011	09:02:34am	7503.206	1235101.086	2425523.035
TRIPLE S MINE	18.5	0.00	0.00	0.00	21000.00	19.1	0.0	0.0	8/2/2011	09:05:14am	7509.690	1235151.706	2425524.242
TRIPLE S MINE	19.5	0.00	1.00	0.00	10000.00	20.6	0.0	0.0	8/2/2011	09:09:04am	7510.714	1235199.242	2425575.843
TRIPLE S MINE	18.3	0.00	0.00	0.00	22000.00	21.4	0.0	0.0	8/2/2011	09:11:11am	7516.815	1235197.327	2425611.089
TRIPLE S MINE	19.6	0.00	0.00	0.00	7000.00	19.5	0.0	0.0	8/2/2011	09:13:11am	7512.444	1235252.005	2425627.210
TRIPLE S MINE	19.7	0.00	0.00	0.00	6000.00	16.7	0.0	0.0	8/2/2011	09:15:37am	7549.337	1235293.925	2425622.282
TRIPLE S MINE	20.1	0.00	0.00	0.00	2000.00	15.9	0.0	0.0	8/2/2011	09:17:45am	7558.388	1235352.057	2425627.118
TRIPLE S MINE	19.7	0.00	0.00	0.00	8000.00	19.3	0.0	0.0	8/2/2011	09:19:56am	7553.945	1235402.601	2425629.332
TRIPLE S MINE	20.1	0.00	0.00	0.00	3000.00	20.6	0.0	0.0	8/2/2011	09:22:30am	7556.335	1235447.648	2425623.855
TRIPLE S MINE	20.0	0.00	0.00	0.00	5000.00	21.1	0.0	0.0	8/2/2011	09:24:15am	7560.393	1235453.183	2425572.412
TRIPLE S MINE	19.7	0.00	0.00	0.00	6000.00	16.1	0.0	0.0	8/2/2011	09:26:33am	7555.274	1235449.741	2425523.818
TRIPLE S MINE	19.6	0.00	0.00	0.00	8000.00	18.6	0.0	0.0	8/2/2011	09:28:31am	7555.103	1235396.525	2425525.956
TRIPLE S MINE	20.4	0.00	0.00	0.00	5000.00	16.4	0.0	0.0	8/2/2011	09:30:35am	7564.742	1235399.103	2425570.125
TRIPLE S MINE	19.7	0.00	1.00	0.00	10000.00	15.3	0.0	0.0	8/2/2011	09:32:53am	7534.104	1235349.202	2425574.111
TRIPLE S MINE	20.2	0.00	0.00	0.00	3000.00	17.2	0.0	0.0	8/2/2011	09:35:55am	7553.009	1235342.333	2425520.813
TRIPLE S MINE	19.8	0.00	0.00	0.00	7000.00	18.1	0.0	0.0	8/2/2011	09:37:59am	7560.752	1235301.107	2425522.647
TRIPLE S MINE	20.0	0.00	0.00	0.00	6000.00	18.6	0.0	0.0	8/2/2011	09:40:49am	7552.356	1235298.170	2425573.826
TRIPLE S MINE	20.1	0.00	0.00	0.00	4000.00	19.4	0.0	0.0	8/2/2011	09:46:14am	7539.890	1235237.660	2425579.739

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
TRIPLE S MINE	19.9	0.00	0.00	0.00	6000.00	19.7	0.0	0.0	8/2/2011	09:48:24am	7537.580	1235250.212	2425533.402
TRIPLE S MINE	20.1	0.00	0.00	0.00	6000.00	19.2	0.0	0.0	8/2/2011	09:51:19am	7521.320	1235202.754	2425524.018
TRIPLE S MINE	19.9	0.00	0.00	0.00	7000.00	16.0	0.0	0.0	8/2/2011	09:55:54am	7513.009	1235156.717	2425484.234
TRIPLE S MINE	18.6	0.00	0.00	0.00	17000.00	23.5	0.0	0.0	8/2/2011	09:57:55am	7507.926	1235097.305	2425472.838
TRIPLE S MINE	19.8	0.00	0.00	0.00	6000.00	19.0	0.0	0.0	8/2/2011	09:59:56am	7506.505	1235056.798	2425479.783
TRIPLE S MINE	20.4	0.00	0.00	0.00	2000.00	19.0	0.0	0.0	8/2/2011	10:02:05am	7507.459	1235049.573	2425425.570
TRIPLE S MINE	18.8	0.00	0.00	0.00	16000.00	21.2	0.0	0.0	8/2/2011	10:03:54am	7509.422	1235044.608	2425371.972
TRIPLE S MINE	20.3	0.00	0.00	0.00	2000.00	34.2	0.0	0.0	8/2/2011	10:05:37am	7511.295	1235054.512	2425321.380
STOLLSTEIMER CREEK SITE	20.1	0.00	0.00	0.00	2000.00	14.3	0.0	0.0	7/28/2011	09:56:08am	6599.789	1185974.587	2471878.034
STOLLSTEIMER CREEK SITE	20.0	0.00	0.00	0.00	1000.00	30.3	0.0	0.0	7/28/2011	09:59:30am	6596.229	1185999.414	2471875.693
STOLLSTEIMER CREEK SITE	20.2	0.00	0.00	0.00	1000.00	34.3	0.0	0.0	7/28/2011	10:01:15am	6594.842	1186024.228	2471880.103
STOLLSTEIMER CREEK SITE	20.4	0.00	0.00	0.00	3000.00	27.5	0.0	0.0	7/28/2011	10:03:32am	6595.632	1186050.013	2471878.795
STOLLSTEIMER CREEK SITE	19.9	0.00	0.00	0.00	4000.00	29.0	0.0	0.0	7/28/2011	10:05:27am	6594.222	1186077.967	2471875.450
STOLLSTEIMER CREEK SITE	20.1	0.00	1.00	0.00	1000.00	34.9	0.0	0.0	7/28/2011	10:08:04am	6590.876	1186104.069	2471876.003
STOLLSTEIMER CREEK SITE	20.3	0.00	0.00	0.00	0.00	44.3	0.0	0.0	7/28/2011	10:09:55am	6588.162	1186127.169	2471875.803
STOLLSTEIMER CREEK SITE	20.3	0.00	0.00	0.00	0.00	39.8	0.0	0.0	7/28/2011	10:13:37am	6585.259	1186177.865	2471878.566
STOLLSTEIMER CREEK SITE	20.3	0.00	0.00	0.00	1000.00	41.6	0.0	0.0	7/28/2011	10:14:59am	6592.647	1186173.159	2471926.053
STOLLSTEIMER CREEK SITE	20.1	0.00	0.00	0.00	1000.00	41.4	0.0	0.0	7/28/2011	10:17:08am	6597.455	1186177.371	2471977.502
STOLLSTEIMER CREEK SITE	20.4	0.00	0.00	0.00	0.00	41.6	0.0	0.0	7/28/2011	10:18:40am	6603.110	1186174.879	2472028.585
STOLLSTEIMER CREEK SITE	19.9	0.00	0.00	0.00	0.00	27.0	0.0	0.0	7/28/2011	10:20:38am	6618.988	1186125.890	2472027.432
STOLLSTEIMER CREEK SITE	19.8	0.00	0.00	0.00	2000.00	23.3	0.0	0.0	7/28/2011	10:22:31am	6623.819	1186077.719	2472025.109
STOLLSTEIMER CREEK SITE	19.6	0.00	1.00	0.00	1000.00	18.7	0.0	0.0	7/28/2011	10:25:20am	6631.678	1186027.604	2472025.449
STOLLSTEIMER CREEK SITE	20.1	0.00	1.00	0.00	3000.00	41.2	0.0	0.0	7/28/2011	10:28:01am	6633.480	1185972.347	2472021.960
STOLLSTEIMER CREEK SITE	19.8	0.00	1.00	0.00	5000.00	39.0	0.0	0.0	7/28/2011	10:31:21am	6640.748	1185924.486	2472025.720
STOLLSTEIMER CREEK SITE	19.8	0.00	1.00	0.00	5000.00	21.4	0.0	0.0	7/28/2011	10:33:52am	6642.277	1185876.042	2472025.888
STOLLSTEIMER CREEK SITE	19.3	0.00	1.00	0.00	5000.00	15.8	0.0	0.0	7/28/2011	10:36:42am	6639.446	1185823.316	2472022.476
STOLLSTEIMER CREEK SITE	19.5	0.00	1.00	0.00	3000.00	15.5	0.0	0.0	7/28/2011	10:39:44am	6634.023	1185780.206	2472023.360
STOLLSTEIMER CREEK SITE	19.9	0.00	1.00	0.00	1000.00	35.9	0.0	0.0	7/28/2011	10:41:53am	6628.089	1185725.345	2472026.303
STOLLSTEIMER CREEK SITE	19.8	0.00	1.00	0.00	1000.00	28.3	0.0	0.0	7/28/2011	10:44:15am	6620.402	1185723.660	2471976.167
STOLLSTEIMER CREEK SITE	20.0	0.00	1.00	1.00	0.00	50.2	0.0	0.0	7/28/2011	10:47:30am	6624.655	1185722.242	2471931.511
STOLLSTEIMER CREEK SITE	19.8	0.00	0.00	0.00	1000.00	58.3	0.0	0.0	7/28/2011	10:50:38am	6645.942	1185721.668	2471877.420
STOLLSTEIMER CREEK SITE	19.5	0.00	1.00	0.00	1000.00	48.6	0.0	0.0	7/28/2011	10:55:42am	6647.676	1185727.078	2471822.770
STOLLSTEIMER CREEK SITE	19.6	0.00	0.00	0.00	2000.00	35.6	0.0	0.0	7/28/2011	10:58:31am	6642.287	1185718.086	2471774.698
STOLLSTEIMER CREEK SITE	19.9	0.00	0.00	0.00	1000.00	41.0	0.0	0.0	7/28/2011	11:01:17am	6619.822	1185723.913	2471727.299
STOLLSTEIMER CREEK SITE	19.7	0.00	1.00	0.00	1000.00	35.4	0.0	0.0	7/28/2011	11:04:26am	6601.772	1185725.060	2471676.711
STOLLSTEIMER CREEK SITE	20.1	0.00	0.00	0.00	0.00	29.9	0.0	0.0	7/28/2011	11:08:48am	6581.406	1185719.014	2471622.815
STOLLSTEIMER CREEK SITE	20.2	0.00	0.00	0.00	2000.00	21.1	0.0	0.0	7/28/2011	11:13:08am	6575.407	1185722.917	2471573.102
STOLLSTEIMER CREEK SITE	20.1	0.00	0.00	0.00	1000.00	35.9	0.0	0.0	7/28/2011	11:15:54am	6575.010	1185773.870	2471573.246
STOLLSTEIMER CREEK SITE	20.0	0.00	0.00	0.00	2000.00	21.2	0.0	0.0	7/28/2011	11:18:04am	6569.364	1185820.844	2471574.740
STOLLSTEIMER CREEK SITE	20.1	0.00	0.00	0.00	1000.00	20.2	0.0	0.0	7/28/2011	11:19:47am	6566.860	1185877.192	2471577.332
STOLLSTEIMER CREEK SITE	20.4	0.00	0.00	0.00	2000.00	44.0	0.0	0.0	7/28/2011	11:22:01am	6558.775	1185917.827	2471574.274
STOLLSTEIMER CREEK SITE	20.3	0.00	0.00	0.00	1000.00	20.4	0.0	0.0	7/28/2011	11:24:09am	6554.113	1185970.981	2471577.749
STOLLSTEIMER CREEK SITE	20.3	0.00	0.00	0.00	1000.00	26.1	0.0	0.0	7/28/2011	11:26:30am	6548.606	1186016.693	2471580.618
STOLLSTEIMER CREEK SITE	20.5	0.00	0.00	0.00	0.00	29.3	0.0	0.0	7/28/2011	11:29:13am	6535.285	1186066.713	2471575.088
STOLLSTEIMER CREEK SITE	20.6	0.00	0.00	0.00	0.00	31.2	0.0	0.0	7/28/2011	11:31:57am	6516.891	1186119.481	2471573.224
STOLLSTEIMER CREEK SITE	20.5	0.00	0.00	0.00	1000.00	41.9	0.0	0.0	7/28/2011	11:34:14am	6507.856	1186164.085	2471576.417

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
STOLLSTEIMER CREEK SITE	20.7	0.00	0.00	0.00	0.00	44.0	0.0	0.0	7/28/2011	11:37:41am	6528.815	1186176.866	2471626.704
STOLLSTEIMER CREEK SITE	20.7	0.00	0.00	0.00	0.00	23.3	0.0	0.0	7/28/2011	11:39:44am	6548.569	1186165.620	2471674.684
STOLLSTEIMER CREEK SITE	20.5	0.00	0.00	0.00	1000.00	39.1	0.0	0.0	7/28/2011	11:41:53am	6562.450	1186165.372	2471726.029
STOLLSTEIMER CREEK SITE	20.7	0.00	0.00	0.00	1000.00	41.3	0.0	0.0	7/28/2011	11:43:49am	6570.342	1186169.945	2471773.066
STOLLSTEIMER CREEK SITE	20.6	0.00	0.00	0.00	0.00	57.6	0.0	0.0	7/28/2011	11:45:47am	6578.500	1186173.941	2471826.916
STOLLSTEIMER CREEK SITE	20.1	0.00	0.00	0.00	3000.00	54.7	0.0	0.0	7/28/2011	11:48:38am	6582.576	1186120.224	2471823.531
STOLLSTEIMER CREEK SITE	20.4	0.00	0.00	0.00	0.00	65.1	0.0	0.0	7/28/2011	11:51:35am	6584.809	1186070.789	2471823.330
STOLLSTEIMER CREEK SITE	20.3	0.00	1.00	0.00	0.00	56.5	0.0	0.0	7/28/2011	11:54:22am	6580.741	1186017.912	2471825.189
STOLLSTEIMER CREEK SITE	20.2	0.00	1.00	0.00	0.00	40.2	0.0	0.0	7/28/2011	12:02:49pm	6575.331	1186067.162	2471773.672
STOLLSTEIMER CREEK SITE	20.6	0.00	0.00	1.00	0.00	22.9	0.0	0.0	7/28/2011	12:05:20pm	6574.894	1186120.352	2471772.463
STOLLSTEIMER CREEK SITE	20.7	0.00	0.00	0.00	0.00	58.7	0.0	0.0	7/28/2011	12:07:26pm	6568.890	1186120.984	2471721.868
STOLLSTEIMER CREEK SITE	20.5	0.00	0.00	0.00	0.00	44.7	0.0	0.0	7/28/2011	12:09:53pm	6564.257	1186068.442	2471721.568
STOLLSTEIMER CREEK SITE	20.6	0.00	0.00	0.00	1000.00	33.5	0.0	0.0	7/28/2011	12:12:19pm	6568.413	1186020.658	2471723.860
STOLLSTEIMER CREEK SITE	20.8	0.00	0.00	0.00	0.00	37.0	0.0	0.0	7/28/2011	12:15:59pm	6573.785	1186018.877	2471777.412
STOLLSTEIMER CREEK SITE	20.9	0.00	0.00	0.00	3000.00	17.5	0.0	0.0	7/28/2011	12:17:56pm	6576.322	1185970.546	2471771.595
STOLLSTEIMER CREEK SITE	20.8	0.00	0.00	0.00	1000.00	24.8	0.0	0.0	7/28/2011	12:21:04pm	6580.932	1185966.377	2471827.600
STOLLSTEIMER CREEK SITE	21.0	0.00	0.00	0.00	0.00	52.7	0.0	0.0	7/28/2011	12:23:00pm	6583.919	1185919.399	2471826.104
STOLLSTEIMER CREEK SITE	20.9	0.00	0.00	0.00	0.00	49.2	0.0	0.0	7/28/2011	12:25:28pm	6601.981	1185919.361	2471875.107
STOLLSTEIMER CREEK SITE	20.9	0.00	0.00	0.00	0.00	48.1	0.0	0.0	7/28/2011	12:27:34pm	6619.331	1185917.258	2471925.527
STOLLSTEIMER CREEK SITE	21.1	0.00	0.00	0.00	0.00	38.2	0.0	0.0	7/28/2011	12:29:36pm	6620.752	1185970.905	2471929.079
STOLLSTEIMER CREEK SITE	21.0	0.00	0.00	0.00	0.00	52.5	0.0	0.0	7/28/2011	12:32:09pm	6610.707	1186017.487	2471925.483
STOLLSTEIMER CREEK SITE	21.0	0.00	0.00	0.00	0.00	68.9	0.0	0.0	7/28/2011	12:34:14pm	6605.182	1186069.335	2471927.940
STOLLSTEIMER CREEK SITE	20.8	0.00	0.00	1.00	0.00	58.6	0.0	0.0	7/28/2011	12:36:44pm	6597.089	1186120.958	2471928.205
STOLLSTEIMER CREEK SITE	21.0	0.00	0.00	0.00	0.00	54.4	0.0	0.0	7/28/2011	12:39:11pm	6608.005	1186118.889	2471976.114
STOLLSTEIMER CREEK SITE	20.8	0.00	0.00	0.00	2000.00	34.4	0.0	0.0	7/28/2011	12:41:38pm	6618.301	1186072.466	2471982.332
STOLLSTEIMER CREEK SITE	20.6	0.00	0.00	0.00	0.00	50.8	0.0	0.0	7/28/2011	12:43:54pm	6619.933	1186024.095	2471979.494
STOLLSTEIMER CREEK SITE	20.8	0.00	0.00	0.00	0.00	47.8	0.0	0.0	7/28/2011	12:46:28pm	6629.418	1185973.385	2471978.120
STOLLSTEIMER CREEK SITE	20.7	0.00	0.00	0.00	1000.00	48.9	0.0	0.0	7/28/2011	12:48:38pm	6636.428	1185914.620	2471972.809
STOLLSTEIMER CREEK SITE	29.8	0.00	0.00	1.00	0.00	54.6	0.0	0.0	7/28/2011	12:50:43pm	6636.297	1185871.342	2471985.012
STOLLSTEIMER CREEK SITE	20.5	0.00	0.00	0.00	0.00	47.1	0.0	0.0	7/28/2011	12:52:47pm	6624.707	1185821.039	2471984.905
STOLLSTEIMER CREEK SITE	20.5	0.00	1.00	1.00	0.00	63.4	0.0	0.0	7/28/2011	12:55:33pm	6612.625	1185771.927	2471983.131
STOLLSTEIMER CREEK SITE	20.2	0.00	1.00	0.00	0.00	51.2	0.0	0.0	7/28/2011	12:57:24pm	6618.311	1185765.030	2471928.830
STOLLSTEIMER CREEK SITE	20.5	0.00	0.00	0.00	1000.00	27.1	0.0	0.0	7/28/2011	12:59:47pm	6635.413	1185770.313	2471876.469
STOLLSTEIMER CREEK SITE	20.5	0.00	0.00	0.00	2000.00	27.1	0.0	0.0	7/28/2011	01:01:42pm	6640.284	1185765.258	2471823.998
STOLLSTEIMER CREEK SITE	20.4	0.00	0.00	0.00	2000.00	38.8	0.0	0.0	7/28/2011	01:04:12pm	6615.602	1185824.508	2471828.466
STOLLSTEIMER CREEK SITE	20.9	0.00	0.00	0.00	0.00	24.0	0.0	0.0	7/28/2011	01:07:59pm	6612.003	1185819.986	2471876.400
STOLLSTEIMER CREEK SITE	20.7	0.00	1.00	0.00	0.00	59.6	0.0	0.0	7/28/2011	01:09:48pm	6601.496	1185824.009	2471928.215
STOLLSTEIMER CREEK SITE	20.5	0.00	0.00	0.00	0.00	60.3	0.0	0.0	7/28/2011	01:11:54pm	6613.497	1185873.535	2471928.949
STOLLSTEIMER CREEK SITE	20.4	0.00	0.00	0.00	2000.00	57.8	0.0	0.0	7/28/2011	01:13:58pm	6591.240	1185878.515	2471872.527
STOLLSTEIMER CREEK SITE	20.7	0.00	0.00	0.00	1000.00	22.8	0.0	0.0	7/28/2011	01:16:13pm	6590.797	1185881.300	2471824.158
STOLLSTEIMER CREEK SITE	20.6	0.00	0.00	0.00	1000.00	58.6	0.0	0.0	7/28/2011	01:18:39pm	6604.674	1185873.947	2471778.076
STOLLSTEIMER CREEK SITE	20.4	0.00	1.00	0.00	0.00	68.8	0.0	0.0	7/28/2011	01:21:45pm	6591.538	1185921.598	2471779.280
STOLLSTEIMER CREEK SITE	20.5	0.00	0.00	0.00	0.00	52.2	0.0	0.0	7/28/2011	01:23:58pm	6588.017	1185933.448	2471727.626
STOLLSTEIMER CREEK SITE	20.6	0.00	0.00	0.00	0.00	55.8	0.0	0.0	7/28/2011	01:26:09pm	6579.806	1185976.406	2471727.021
STOLLSTEIMER CREEK SITE	20.6	0.00	0.00	2.00	0.00	62.3	0.0	0.0	7/28/2011	01:28:29pm	6573.635	1185972.727	2471674.779
STOLLSTEIMER CREEK SITE	20.9	0.00	0.00	0.00	0.00	30.4	0.0	0.0	7/28/2011	01:30:32pm	6563.951	1186022.273	2471677.156

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
STOLLSTEIMER CREEK SITE	20.4	0.00	0.00	0.00	0.00	61.1	0.0	0.0	7/28/2011	01:32:22pm	6556.409	1186081.503	2471672.609
STOLLSTEIMER CREEK SITE	20.5	0.00	0.00	0.00	0.00	44.4	0.0	0.0	7/28/2011	01:34:11pm	6556.470	1186125.728	2471671.961
STOLLSTEIMER CREEK SITE	20.2	0.00	0.00	0.00	4000.00	18.9	0.0	0.0	7/29/2011	09:32:35am	6629.832	1185766.884	2471772.065
STOLLSTEIMER CREEK SITE	20.3	0.00	0.00	0.00	1000.00	19.5	0.0	0.0	7/29/2011	09:36:13am	6612.319	1185768.094	2471728.891
STOLLSTEIMER CREEK SITE	20.2	0.00	0.00	0.00	1000.00	20.5	0.0	0.0	7/29/2011	09:38:47am	6596.549	1185766.557	2471678.684
STOLLSTEIMER CREEK SITE	20.2	0.00	0.00	0.00	2000.00	19.0	0.0	0.0	7/29/2011	09:41:08am	6583.995	1185767.027	2471623.497
STOLLSTEIMER CREEK SITE	20.1	0.00	0.00	0.00	3000.00	19.9	0.0	0.0	7/29/2011	09:42:48am	6582.343	1185813.265	2471623.845
STOLLSTEIMER CREEK SITE	19.9	0.00	0.00	0.00	2000.00	22.8	0.0	0.0	7/29/2011	09:45:36am	6589.585	1185820.784	2471672.486
STOLLSTEIMER CREEK SITE	20.1	0.00	0.00	0.00	2000.00	19.5	0.0	0.0	7/29/2011	09:47:30am	6605.455	1185817.781	2471724.590
STOLLSTEIMER CREEK SITE	19.8	0.00	0.00	0.00	2000.00	26.6	0.0	0.0	7/29/2011	09:50:10am	6619.973	1185813.224	2471784.890
STOLLSTEIMER CREEK SITE	19.9	500.00	0.00	0.00	2000.00	19.1	0.0	0.0	7/29/2011	09:52:31am	6597.116	1185873.366	2471725.913
STOLLSTEIMER CREEK SITE	20.1	0.00	0.00	0.00	3000.00	21.3	0.0	0.0	7/29/2011	09:55:53am	6587.019	1185878.538	2471680.923
STOLLSTEIMER CREEK SITE	19.8	0.00	0.00	0.00	5000.00	23.8	0.0	0.0	7/29/2011	09:58:27am	6574.845	1185873.917	2471624.505
STOLLSTEIMER CREEK SITE	19.8	500.00	0.00	0.00	2000.00	25.2	0.0	0.0	7/29/2011	10:02:18am	6569.639	1185924.835	2471628.138
STOLLSTEIMER CREEK SITE	20.0	0.00	0.00	0.00	4000.00	41.6	0.0	0.0	7/29/2011	10:05:17am	6583.013	1185917.558	2471681.229
STOLLSTEIMER CREEK SITE	19.8	0.00	1.00	0.00	2000.00	21.4	0.0	0.0	7/29/2011	10:08:12am	6563.973	1185969.846	2471627.566
STOLLSTEIMER CREEK SITE	19.8	0.00	0.00	0.00	1000.00	18.2	0.0	0.0	7/29/2011	10:11:02am	6553.729	1186024.695	2471621.954
STOLLSTEIMER CREEK SITE	20.1	0.00	0.00	0.00	1000.00	19.4	0.0	0.0	7/29/2011	10:12:38am	6548.867	1186075.550	2471627.483
STOLLSTEIMER CREEK SITE	20.1	0.00	1.00	0.00	1000.00	25.7	0.0	0.0	7/29/2011	10:14:22am	6541.615	1186119.673	2471631.160
CHIMNEY ROCK MINE	20.2	1000.00	1.00	0.00	2000.00	19.6	0.0	0.0	7/27/2011	08:45:23am	6621.281	1185972.667	2469876.403
CHIMNEY ROCK MINE	19.3	1000.00	1.00	0.00	8000.00	24.3	0.0	0.0	7/27/2011	10:01:46am	6621.809	1185917.744	2469873.040
CHIMNEY ROCK MINE	19.1	500.00	0.00	0.00	9000.00	29.0	0.0	0.0	7/27/2011	10:11:50am	6620.531	1185870.888	2469876.126
CHIMNEY ROCK MINE	19.2	500.00	0.00	0.00	2000.00	30.0	0.0	0.0	7/27/2011	10:14:35am	6620.974	1185824.628	2469877.380
CHIMNEY ROCK MINE	20.1	500.00	0.00	0.00	2000.00	27.9	0.0	0.0	7/27/2011	10:17:13am	6621.849	1185771.032	2469875.026
CHIMNEY ROCK MINE	20.2	500.00	0.00	0.00	3000.00	28.3	0.0	0.0	7/27/2011	10:20:39am	6623.958	1185719.557	2469878.710
CHIMNEY ROCK MINE	20.2	0.00	0.00	0.00	1000.00	25.5	0.0	0.0	7/27/2011	10:23:32am	6624.167	1185768.101	2469926.260
CHIMNEY ROCK MINE	19.7	0.00	0.00	0.00	6000.00	24.4	0.0	0.0	7/27/2011	10:26:34am	6625.027	1185821.886	2469924.375
CHIMNEY ROCK MINE	19.6	500.00	0.00	0.00	3000.00	28.2	0.0	0.0	7/27/2011	10:28:39am	6626.378	1185869.863	2469926.311
CHIMNEY ROCK MINE	20.7	500.00	0.00	0.00	3000.00	27.6	0.0	0.0	7/27/2011	10:32:26am	6626.936	1185920.453	2469923.631
CHIMNEY ROCK MINE	28.7	500.00	0.00	0.00	1000.00	27.3	0.0	0.0	7/27/2011	10:35:12am	6624.115	1185977.931	2469925.526
CHIMNEY ROCK MINE	20.8	0.00	0.00	0.00	1000.00	27.1	0.0	0.0	7/27/2011	10:37:23am	6624.521	1186022.956	2469928.966
CHIMNEY ROCK MINE	17.7	500.00	0.00	0.00	23000.00	29.5	0.0	0.0	7/27/2011	10:39:51am	6625.080	1186022.638	2469976.203
CHIMNEY ROCK MINE	17.6	0.00	0.00	0.00	22000.00	29.5	0.0	0.0	7/27/2011	10:42:42am	6612.344	1186017.390	2470026.695
CHIMNEY ROCK MINE	16.5	0.00	0.00	0.00	24000.00	33.7	0.0	0.0	7/27/2011	10:46:03am	6591.186	1186023.900	2470075.034
CHIMNEY ROCK MINE	20.6	0.00	0.00	0.00	3000.00	35.2	0.0	0.0	7/27/2011	10:48:32am	6577.614	1186021.995	2470125.205
CHIMNEY ROCK MINE	20.8	500.00	0.00	0.00	1000.00	37.4	0.0	0.0	7/27/2011	10:50:45am	6585.274	1185974.531	2470124.880
CHIMNEY ROCK MINE	21.0	0.00	0.00	0.00	0.00	34.5	0.0	0.0	7/27/2011	10:55:06am	6570.580	1185972.437	2470176.302
CHIMNEY ROCK MINE	20.5	500.00	0.00	0.00	2000.00	33.1	0.0	0.0	7/27/2011	10:59:10am	6595.319	1185923.624	2470128.440
CHIMNEY ROCK MINE	20.1	0.00	0.00	0.00	2000.00	37.0	0.0	0.0	7/27/2011	11:02:27am	6578.750	1185920.295	2470176.253
CHIMNEY ROCK MINE	18.5	0.00	0.00	0.00	14000.00	33.0	0.0	0.0	7/27/2011	11:05:18am	6607.966	1185871.713	2470124.256
CHIMNEY ROCK MINE	19.3	0.00	0.00	0.00	7000.00	38.0	0.0	0.0	7/27/2011	11:10:39am	6614.057	1185824.083	2470123.535
CHIMNEY ROCK MINE	19.6	0.00	0.00	0.00	4000.00	40.4	0.0	0.0	7/27/2011	11:14:15am	6616.410	1185772.415	2470126.654
CHIMNEY ROCK MINE	19.0	500.00	0.00	0.00	11000.00	44.5	0.0	0.0	7/27/2011	11:16:49am	6624.428	1185774.351	2470077.805
CHIMNEY ROCK MINE	20.7	0.00	0.00	0.00	1000.00	35.5	0.0	0.0	7/27/2011	11:19:41am	6623.131	1185723.349	2470075.094
CHIMNEY ROCK MINE	20.1	0.00	0.00	0.00	3000.00	34.6	0.0	0.0	7/27/2011	11:22:27am	6623.980	1185770.722	2470027.549
CHIMNEY ROCK MINE	21.0	0.00	0.00	0.00	0.00	35.3	0.0	0.0	7/27/2011	11:25:17am	6624.627	1185768.622	2469977.457

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
CHIMNEY ROCK MINE	19.2	0.00	0.00	0.00	10000.00	39.3	0.0	0.0	7/27/2011	11:27:28am	6625.537	1185823.086	2469974.094
CHIMNEY ROCK MINE	21.0	0.00	0.00	0.00	2000.00	31.3	0.0	0.0	7/27/2011	11:29:41am	6624.538	1185875.286	2469974.450
CHIMNEY ROCK MINE	21.1	0.00	0.00	0.00	2000.00	37.6	0.0	0.0	7/27/2011	11:31:42am	6624.363	1185926.400	2469975.996
CHIMNEY ROCK MINE	20.9	0.00	0.00	0.00	4000.00	37.3	0.0	0.0	7/27/2011	11:33:30am	6625.217	1185976.314	2469975.035
CHIMNEY ROCK MINE	20.3	0.00	0.00	0.00	6000.00	48.0	0.0	0.0	7/27/2011	11:36:28am	6618.524	1185975.556	2470023.916
CHIMNEY ROCK MINE	20.4	0.00	0.00	0.00	5000.00	44.8	0.0	0.0	7/27/2011	11:38:57am	6603.475	1185971.438	2470074.515
CHIMNEY ROCK MINE	19.6	500.00	0.00	0.00	11000.00	47.4	0.0	0.0	7/27/2011	11:41:30am	6612.756	1185921.327	2470077.524
CHIMNEY ROCK MINE	19.5	500.00	0.00	0.00	11000.00	43.7	0.0	0.0	7/27/2011	11:44:06am	6622.620	1185869.273	2470077.085
CHIMNEY ROCK MINE	21.1	0.00	0.00	0.00	2000.00	38.3	0.0	0.0	7/27/2011	11:46:19am	6624.723	1185816.721	2470077.166
CHIMNEY ROCK MINE	21.5	0.00	0.00	0.00	1000.00	46.6	0.0	0.0	7/27/2011	11:48:52am	6622.815	1185818.352	2470025.384
CHIMNEY ROCK MINE	21.0	500.00	0.00	0.00	2000.00	40.2	0.0	0.0	7/27/2011	11:51:53am	6623.032	1185874.188	2470024.899
CHIMNEY ROCK MINE	20.0	0.00	0.00	0.00	1000.00	38.7	0.0	0.0	7/27/2011	11:54:53am	6621.205	1185923.406	2470026.881
CHIMNEY ROCK MINE	19.1	0.00	0.00	0.00	21000.00	41.9	0.0	0.0	7/27/2011	12:14:45pm	6620.723	1186023.722	2469878.093
CHIMNEY ROCK MINE	20.4	500.00	0.00	0.00	3000.00	44.4	0.0	0.0	7/27/2011	12:17:29pm	6621.667	1186021.791	2469825.919
CHIMNEY ROCK MINE	20.4	0.00	0.00	0.00	5000.00	44.0	0.0	0.0	7/27/2011	12:19:39pm	6621.552	1185969.074	2469828.909
CHIMNEY ROCK MINE	20.1	0.00	0.00	0.00	8000.00	42.2	0.0	0.0	7/27/2011	12:21:21pm	6621.417	1185919.001	2469825.983
CHIMNEY ROCK MINE	20.7	0.00	0.00	0.00	2000.00	44.4	0.0	0.0	7/27/2011	12:23:02pm	6620.714	1185869.522	2469823.329
CHIMNEY ROCK MINE	20.6	500.00	0.00	0.00	3000.00	44.3	0.0	0.0	7/27/2011	12:24:45pm	6621.201	1185819.191	2469827.081
CHIMNEY ROCK MINE	20.3	0.00	0.00	0.00	4000.00	37.4	0.0	0.0	7/27/2011	12:26:57pm	6618.168	1185768.493	2469827.261
CHIMNEY ROCK MINE	20.7	10000.00	0.00	0.00	2000.00	30.6	0.0	0.0	7/27/2011	12:30:26pm	6614.860	1185721.886	2469822.382
CHIMNEY ROCK MINE	19.4	10000.00	0.00	0.00	10000.00	39.9	0.0	0.0	7/27/2011	12:32:28pm	6602.024	1185674.244	2469827.586
CHIMNEY ROCK MINE	21.0	0.00	0.00	0.00	1000.00	36.1	0.0	0.0	7/27/2011	12:34:33pm	6592.194	1185623.240	2469826.645
CHIMNEY ROCK MINE	18.9	0.00	0.00	0.00	8000.00	38.0	0.0	0.0	7/27/2011	12:37:38pm	6615.234	1185671.657	2469875.921
CHIMNEY ROCK MINE	19.2	0.00	0.00	1.00	9000.00	41.8	0.0	0.0	7/27/2011	12:43:27pm	6607.090	1185770.199	2469771.660
CHIMNEY ROCK MINE	20.4	0.00	0.00	0.00	8000.00	42.3	0.0	0.0	7/27/2011	12:45:35pm	6589.612	1185771.758	2469728.591
CHIMNEY ROCK MINE	21.3	0.00	0.00	0.00	0.00	36.1	0.0	0.0	7/27/2011	12:47:30pm	6571.017	1185776.078	2469678.646
CHIMNEY ROCK MINE	21.3	0.00	0.00	0.00	1000.00	44.0	0.0	0.0	7/27/2011	12:49:35pm	6577.064	1185824.938	2469670.700
CHIMNEY ROCK MINE	21.2	0.00	0.00	0.00	2000.00	36.6	0.0	0.0	7/27/2011	12:51:55pm	6588.213	1185870.516	2469676.560
CHIMNEY ROCK MINE	19.6	0.00	0.00	0.00	10000.00	39.4	0.0	0.0	7/27/2011	12:54:22pm	6599.726	1185916.394	2469679.273
CHIMNEY ROCK MINE	20.8	0.00	0.00	0.00	4000.00	39.2	0.0	0.0	7/27/2011	12:57:00pm	6604.951	1185967.092	2469677.784
CHIMNEY ROCK MINE	18.9	0.00	0.00	0.00	12000.00	38.3	0.0	0.0	7/27/2011	12:58:58pm	6616.210	1186017.744	2469674.935
CHIMNEY ROCK MINE	20.7	0.00	0.00	0.00	3000.00	47.7	0.0	0.0	7/27/2011	01:01:04pm	6621.396	1186071.617	2469672.769
CHIMNEY ROCK MINE	20.6	0.00	0.00	0.00	5000.00	44.0	0.0	0.0	7/27/2011	01:03:28pm	6622.250	1186121.490	2469677.987
CHIMNEY ROCK MINE	21.2	0.00	0.00	0.00	3000.00	49.7	0.0	0.0	7/27/2011	01:05:38pm	6622.416	1186172.625	2469670.031
CHIMNEY ROCK MINE	20.3	0.00	0.00	0.00	8000.00	42.0	0.0	0.0	7/27/2011	01:07:06pm	6620.872	1186217.453	2469673.282
CHIMNEY ROCK MINE	19.4	500.00	0.00	0.00	12000.00	48.1	0.0	0.0	7/27/2011	01:10:02pm	6619.577	1186218.145	2469728.102
CHIMNEY ROCK MINE	20.5	0.00	0.00	0.00	1000.00	48.5	0.0	0.0	7/27/2011	01:12:20pm	6618.171	1186272.671	2469728.468
CHIMNEY ROCK MINE	21.1	500.00	0.00	0.00	1000.00	41.9	0.0	0.0	7/27/2011	01:14:30pm	6619.503	1186223.552	2469776.429
CHIMNEY ROCK MINE	21.0	0.00	0.00	0.00	1000.00	49.6	0.0	0.0	7/27/2011	01:16:14pm	6619.680	1186273.690	2469769.660
CHIMNEY ROCK MINE	20.8	0.00	0.00	0.00	1000.00	51.0	0.0	0.0	7/27/2011	01:18:09pm	6617.154	1186220.241	2469829.924
CHIMNEY ROCK MINE	21.0	500.00	0.00	0.00	2000.00	47.0	0.0	0.0	7/27/2011	01:19:44pm	6618.773	1186223.709	2469881.383
CHIMNEY ROCK MINE	20.6	0.00	0.00	0.00	2000.00	44.7	0.0	0.0	7/27/2011	01:21:54pm	6618.372	1186274.694	2469876.655
CHIMNEY ROCK MINE	20.7	0.00	1.00	0.00	2000.00	49.9	0.0	0.0	7/27/2011	01:23:55pm	6616.821	1186223.677	2469930.814
CHIMNEY ROCK MINE	20.8	0.00	0.00	0.00	1000.00	44.3	0.0	0.0	7/27/2011	01:26:45pm	6617.629	1186220.625	2469977.665
CHIMNEY ROCK MINE	20.8	10000.00	0.00	0.00	4000.00	53.0	0.0	0.0	7/27/2011	01:28:14pm	6598.773	1186227.439	2470023.599
CHIMNEY ROCK MINE	20.1	0.00	0.00	0.00	10000.00	53.1	0.0	0.0	7/27/2011	01:30:06pm	6596.562	1186275.875	2470022.339

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
CHIMNEY ROCK MINE	19.5	0.00	0.00	0.00	3000.00	53.3	0.0	0.0	7/27/2011	01:31:57pm	6573.765	1186226.365	2470078.200
CHIMNEY ROCK MINE	20.8	0.00	1.00	0.00	0.00	53.6	0.0	0.0	7/27/2011	01:34:52pm	6553.473	1186230.112	2470126.238
CHIMNEY ROCK MINE	20.6	0.00	1.00	0.00	1000.00	51.2	0.0	0.0	7/27/2011	01:37:00pm	6551.423	1186174.236	2470125.775
CHIMNEY ROCK MINE	20.6	0.00	0.00	0.00	1000.00	50.1	0.0	0.0	7/27/2011	01:39:13pm	6558.810	1186124.061	2470124.218
CHIMNEY ROCK MINE	18.9	0.00	0.00	0.00	9000.00	54.5	0.0	0.0	7/27/2011	01:41:57pm	6563.483	1186071.047	2470127.323
CHIMNEY ROCK MINE	19.5	0.00	0.00	0.00	4000.00	56.6	0.0	0.0	7/27/2011	01:45:24pm	6579.923	1186070.459	2470076.243
CHIMNEY ROCK MINE	20.3	500.00	0.00	0.00	2000.00	52.1	0.0	0.0	7/27/2011	01:47:19pm	6577.715	1186124.515	2470073.618
CHIMNEY ROCK MINE	19.4	500.00	0.00	0.00	3000.00	56.4	0.0	0.0	7/27/2011	01:51:19pm	6576.668	1186176.263	2470072.064
CHIMNEY ROCK MINE	19.8	500.00	0.00	0.00	5000.00	58.3	0.0	0.0	7/27/2011	01:53:45pm	6598.477	1186174.701	2470022.585
CHIMNEY ROCK MINE	19.8	0.00	0.00	0.00	3000.00	57.9	0.0	0.0	7/27/2011	01:55:54pm	6600.024	1186117.552	2470024.019
CHIMNEY ROCK MINE	20.2	500.00	0.00	0.00	1000.00	57.2	0.0	0.0	7/27/2011	01:57:53pm	6602.621	1186066.533	2470024.725
CHIMNEY ROCK MINE	19.5	500.00	0.00	0.00	6000.00	56.3	0.0	0.0	7/27/2011	02:00:12pm	6618.469	1186069.226	2469974.369
CHIMNEY ROCK MINE	19.2	0.00	0.00	0.00	12000.00	49.0	0.0	0.0	7/27/2011	02:02:15pm	6616.747	1186119.571	2469975.753
CHIMNEY ROCK MINE	20.1	500.00	0.00	0.00	4000.00	51.2	0.0	0.0	7/27/2011	02:04:15pm	6615.214	1186171.001	2469977.535
CHIMNEY ROCK MINE	20.8	0.00	0.00	0.00	0.00	49.5	0.0	0.0	7/27/2011	02:05:49pm	6617.924	1186169.587	2469926.623
CHIMNEY ROCK MINE	20.8	0.00	0.00	0.00	0.00	50.5	0.0	0.0	7/27/2011	02:07:35pm	6619.270	1186118.884	2469925.146
CHIMNEY ROCK MINE	20.6	0.00	0.00	0.00	2000.00	47.4	0.0	0.0	7/27/2011	02:09:34pm	6620.063	1186071.457	2469921.882
CHIMNEY ROCK MINE	20.8	500.00	0.00	0.00	1000.00	49.9	0.0	0.0	7/27/2011	02:12:01pm	6620.290	1186071.058	2469874.874
CHIMNEY ROCK MINE	21.0	500.00	0.00	0.00	0.00	55.7	0.0	0.0	7/27/2011	02:18:38pm	6620.564	1186122.214	2469869.988
CHIMNEY ROCK MINE	21.1	0.00	0.00	0.00	0.00	57.0	0.0	0.0	7/27/2011	02:21:13pm	6620.046	1186173.985	2469872.218
CHIMNEY ROCK MINE	20.9	0.00	0.00	0.00	0.00	51.9	0.0	0.0	7/27/2011	02:23:07pm	6619.982	1186174.148	2469822.184
CHIMNEY ROCK MINE	20.9	1500.00	0.00	0.00	1000.00	51.0	0.0	0.0	7/27/2011	02:24:36pm	6620.208	1186125.564	2469821.785
CHIMNEY ROCK MINE	21.2	500.00	0.00	0.00	0.00	50.8	0.0	0.0	7/27/2011	02:26:36pm	6620.273	1186072.420	2469826.755
CHIMNEY ROCK MINE	21.1	500.00	0.00	0.00	0.00	48.3	0.0	0.0	7/27/2011	02:28:20pm	6620.131	1186078.065	2469775.462
CHIMNEY ROCK MINE	21.1	500.00	0.00	0.00	0.00	49.3	0.0	0.0	7/27/2011	02:29:53pm	6619.749	1186130.476	2469780.077
CHIMNEY ROCK MINE	20.6	500.00	0.00	0.00	2000.00	48.6	0.0	0.0	7/27/2011	02:31:37pm	6619.651	1186178.878	2469773.674
CHIMNEY ROCK MINE	20.8	1000.00	0.00	0.00	2000.00	50.7	0.0	0.0	7/27/2011	02:33:38pm	6620.387	1186176.760	2469723.167
CHIMNEY ROCK MINE	20.3	500.00	0.00	0.00	6000.00	55.4	0.0	0.0	7/27/2011	02:35:35pm	6620.862	1186124.238	2469723.616
CHIMNEY ROCK MINE	16.1	0.00	0.00	0.00	28000.00	51.3	0.0	0.0	7/27/2011	02:37:36pm	6623.560	1186071.733	2469725.644
CHIMNEY ROCK MINE	18.5	0.00	0.00	0.00	16000.00	53.9	0.0	0.0	7/27/2011	02:40:17pm	6623.557	1186027.811	2469725.890
CHIMNEY ROCK MINE	20.9	500.00	0.00	0.00	3000.00	45.7	0.0	0.0	7/27/2011	02:42:30pm	6620.882	1185977.200	2469726.374
CHIMNEY ROCK MINE	17.3	500.00	0.00	0.00	19000.00	51.4	0.0	0.0	7/27/2011	02:44:38pm	6614.458	1185923.816	2469723.952
CHIMNEY ROCK MINE	18.9	0.00	0.00	0.00	14000.00	49.9	0.0	0.0	7/27/2011	02:46:32pm	6608.459	1185877.401	2469727.712
CHIMNEY ROCK MINE	21.0	0.00	0.00	0.00	1000.00	57.1	0.0	0.0	7/27/2011	02:48:40pm	6596.818	1185824.129	2469722.374
CHIMNEY ROCK MINE	16.4	1000.00	0.00	0.00	23000.00	48.7	0.0	0.0	7/27/2011	02:50:54pm	6614.996	1185824.187	2469777.069
CHIMNEY ROCK MINE	20.8	0.00	0.00	0.00	3000.00	48.5	0.0	0.0	7/27/2011	02:53:10pm	6619.275	1185873.831	2469774.126
CHIMNEY ROCK MINE	18.7	0.00	0.00	0.00	14000.00	48.8	0.0	0.0	7/27/2011	02:54:56pm	6619.619	1185924.233	2469776.895
CHIMNEY ROCK MINE	20.7	0.00	0.00	0.00	2000.00	55.1	0.0	0.0	7/27/2011	02:57:34pm	6621.863	1185978.211	2469774.687
CHIMNEY ROCK MINE	20.9	0.00	0.00	0.00	3000.00	51.2	0.0	0.0	7/27/2011	02:59:05pm	6622.626	1186026.281	2469772.955
CHIMNEY ROCK MINE	20.3	500.00	0.00	0.00	3000.00	26.3	0.0	0.0	8/1/2011	09:32:46am	6621.924	1186273.972	2469676.616
CHIMNEY ROCK MINE	17.8	10000.00	0.00	0.00	21000.00	31.5	0.0	0.0	8/1/2011	09:35:32am	6622.288	1186227.494	2469623.107
CHIMNEY ROCK MINE	17.5	500.00	0.00	0.00	21000.00	28.9	0.0	0.0	8/1/2011	09:38:14am	6619.739	1186174.223	2469620.704
CHIMNEY ROCK MINE	17.0	0.00	0.00	0.00	22000.00	25.8	0.0	0.0	8/1/2011	09:40:22am	6617.168	1186122.895	2469625.168
CHIMNEY ROCK MINE	19.2	0.00	0.00	0.00	12000.00	27.5	0.0	0.0	8/1/2011	09:42:24am	6605.452	1186172.484	2469575.342
CHIMNEY ROCK MINE	15.8	500.00	0.00	0.00	29000.00	22.0	0.0	0.0	8/1/2011	09:44:20am	6608.288	1186221.604	2469572.944
CHIMNEY ROCK MINE	19.2	500.00	0.00	0.00	7000.00	28.9	0.0	0.0	8/1/2011	09:46:52am	6587.851	1186222.486	2469527.454

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
CHIMNEY ROCK MINE	18.9	500.00	0.00	0.00	9000.00	22.6	0.0	0.0	8/1/2011	09:48:46am	6583.657	1186171.843	2469526.549
CHIMNEY ROCK MINE	19.3	0.00	0.00	0.00	4000.00	24.2	0.0	0.0	8/1/2011	09:52:47am	6575.610	1186119.039	2469524.799
CHIMNEY ROCK MINE	19.8	0.00	0.00	0.00	1000.00	18.6	0.0	0.0	8/1/2011	09:54:55am	6560.609	1186128.456	2469483.394
CHIMNEY ROCK MINE	19.6	0.00	0.00	0.00	1000.00	19.7	0.0	0.0	8/1/2011	09:56:59am	6561.495	1186178.793	2469478.773
CHIMNEY ROCK MINE	19.6	0.00	0.00	0.00	2000.00	18.0	0.0	0.0	8/1/2011	09:59:16am	6562.934	1186223.423	2469476.122
CHIMNEY ROCK MINE	19.7	0.00	0.00	0.00	2000.00	0.0	0.0	0.0	8/1/2011	10:01:45am	6563.354	1186275.863	2469477.424
CHIMNEY ROCK MINE	19.4	0.00	0.00	0.00	4000.00	21.6	0.0	0.0	8/1/2011	10:04:43am	6581.785	1186270.975	2469517.364
CHIMNEY ROCK MINE	19.4	0.00	0.00	0.00	6000.00	29.8	0.0	0.0	8/1/2011	10:07:18am	6606.739	1186273.067	2469574.498
CHIMNEY ROCK MINE	18.1	0.00	0.00	0.00	16000.00	29.1	0.0	0.0	8/1/2011	10:09:17am	6621.893	1186269.413	2469623.667
CHIMNEY ROCK MINE	19.6	0.00	0.00	0.00	2000.00	25.1	0.0	0.0	8/1/2011	10:11:11am	6614.486	1186323.543	2469626.519
CHIMNEY ROCK MINE	19.6	0.00	0.00	0.00	3000.00	32.2	0.0	0.0	8/1/2011	10:12:41am	6623.654	1186321.942	2469675.783
CHIMNEY ROCK MINE	19.7	0.00	0.00	0.00	2000.00	33.0	0.0	0.0	8/1/2011	10:16:44am	6620.052	1186274.324	2469822.890
CHIMNEY ROCK MINE	20.1	0.00	0.00	0.00	1000.00	40.7	0.0	0.0	8/1/2011	10:18:15am	6620.541	1186274.656	2469927.251
CHIMNEY ROCK MINE	17.3	0.00	0.00	0.00	23000.00	42.9	0.0	0.0	8/1/2011	10:19:43am	6616.794	1186275.560	2469974.158
CHIMNEY ROCK MINE	18.1	0.00	0.00	0.00	9000.00	42.3	0.0	0.0	8/1/2011	10:23:14am	6577.437	1186271.578	2470075.252
CHIMNEY ROCK MINE	19.3	0.00	0.00	0.00	3000.00	46.3	0.0	0.0	8/1/2011	10:26:16am	6561.375	1186017.974	2470171.803
CHIMNEY ROCK MINE	18.8	0.00	0.00	0.00	5000.00	49.8	0.0	0.0	8/1/2011	10:29:00am	6586.927	1185872.728	2470175.525
CHIMNEY ROCK MINE	18.6	0.00	1.00	0.00	9000.00	37.1	0.0	0.0	8/1/2011	10:30:34am	6615.854	1185723.475	2470121.885
CHIMNEY ROCK MINE	19.2	0.00	0.00	0.00	4000.00	39.9	0.0	0.0	8/1/2011	10:32:32am	6620.944	1185724.624	2470023.743
CHIMNEY ROCK MINE	19.4	0.00	0.00	0.00	1000.00	35.5	0.0	0.0	8/1/2011	10:35:36am	6619.920	1185727.103	2469924.885
CHIMNEY ROCK MINE	19.6	0.00	0.00	0.00	1000.00	31.2	0.0	0.0	8/1/2011	10:36:51am	6619.041	1185671.491	2469925.966
CHIMNEY ROCK MINE	18.3	0.00	0.00	0.00	8000.00	34.3	0.0	0.0	8/1/2011	10:39:24am	6604.863	1185620.757	2469870.856
CHIMNEY ROCK MINE	19.5	0.00	0.00	0.00	2000.00	28.0	0.0	0.0	8/1/2011	10:41:15am	6577.921	1185624.599	2469775.934
CHIMNEY ROCK MINE	18.7	0.00	0.00	0.00	7000.00	33.4	0.0	0.0	8/1/2011	10:42:51am	6586.182	1185670.885	2469775.200
CHIMNEY ROCK MINE	18.7	0.00	0.00	0.00	7000.00	32.1	0.0	0.0	8/1/2011	10:44:24am	6597.271	1185724.869	2469775.562
CHIMNEY ROCK MINE	19.9	0.00	0.00	0.00	2000.00	30.0	0.0	0.0	8/1/2011	10:49:16am	6600.986	1186122.032	2469577.671
CHIMNEY ROCK COAL	20.5	0.00	1.00	0.00	2000.00	18.8	0.0	0.0	8/4/2011	09:22:21am	6581.380	1185067.937	2473630.504
CHIMNEY ROCK COAL	20.5	0.00	1.00	0.00	2000.00	17.2	0.0	0.0	8/4/2011	09:28:14am	6595.680	1185069.685	2473686.711
CHIMNEY ROCK COAL	20.4	0.00	1.00	0.00	2000.00	16.3	0.0	0.0	8/4/2011	09:31:03am	6625.733	1185064.881	2473729.969
CHIMNEY ROCK COAL	20.5	0.00	1.00	0.00	1000.00	18.0	0.0	0.0	8/4/2011	09:34:04am	6637.049	1185063.062	2473780.938
CHIMNEY ROCK COAL	20.3	500.00	1.00	0.00	4000.00	16.1	0.0	0.0	8/4/2011	09:37:13am	6626.448	1185066.396	2473832.097
CHIMNEY ROCK COAL	20.4	500.00	1.00	0.00	1000.00	17.6	0.0	0.0	8/4/2011	09:40:33am	6641.347	1185064.668	2473874.694
CHIMNEY ROCK COAL	20.6	0.00	0.00	0.00	1000.00	20.7	0.0	0.0	8/4/2011	09:43:37am	6656.144	1185059.539	2473931.897
CHIMNEY ROCK COAL	20.6	0.00	0.00	0.00	1000.00	18.3	0.0	0.0	8/4/2011	09:47:20am	6686.086	1185012.556	2473929.880
CHIMNEY ROCK COAL	20.7	0.00	0.00	0.00	1000.00	22.6	0.0	0.0	8/4/2011	09:50:07am	6668.714	1185014.158	2473883.955
CHIMNEY ROCK COAL	20.5	0.00	0.00	0.00	1000.00	20.4	0.0	0.0	8/4/2011	09:52:07am	6643.371	1185014.081	2473836.146
CHIMNEY ROCK COAL	20.5	0.00	0.00	0.00	0.00	32.8	0.0	0.0	8/4/2011	09:54:28am	6653.657	1185022.264	2473780.514
CHIMNEY ROCK COAL	20.2	0.00	0.00	0.00	2000.00	21.2	0.0	0.0	8/4/2011	09:56:44am	6650.623	1185014.107	2473730.529
CHIMNEY ROCK COAL	20.6	0.00	1.00	0.00	1000.00	16.2	0.0	0.0	8/4/2011	09:59:54am	6638.184	1185011.169	2473686.431
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	4000.00	16.8	0.0	0.0	8/4/2011	10:04:09am	6598.676	1185019.114	2473633.630
CHIMNEY ROCK COAL	20.3	0.00	1.00	0.00	4000.00	22.4	0.0	0.0	8/4/2011	10:06:55am	6589.464	1185019.554	2473585.531
CHIMNEY ROCK COAL	20.2	0.00	1.00	0.00	2000.00	28.7	0.0	0.0	8/4/2011	10:09:18am	6589.211	1185069.921	2473582.520
CHIMNEY ROCK COAL	20.3	0.00	0.00	0.00	1000.00	33.5	0.0	0.0	8/4/2011	10:12:36am	6585.883	1185121.965	2473579.729
CHIMNEY ROCK COAL	20.3	0.00	0.00	0.00	2000.00	21.2	0.0	0.0	8/4/2011	10:15:44am	6575.265	1185119.312	2473632.433
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	5000.00	29.0	0.0	0.0	8/4/2011	10:18:21am	6567.221	1185168.068	2473635.647
CHIMNEY ROCK COAL	19.8	0.00	0.00	0.00	8000.00	25.7	0.0	0.0	8/4/2011	10:20:22am	6555.567	1185223.459	2473633.765

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	6000.00	20.6	0.0	0.0	8/4/2011	10:24:35am	6556.346	1185274.298	2473634.772
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	4000.00	22.7	0.0	0.0	8/4/2011	10:26:57am	6552.896	1185319.652	2473632.269
CHIMNEY ROCK COAL	20.2	0.00	0.00	0.00	2000.00	17.3	0.0	0.0	8/4/2011	10:29:22am	6551.335	1185319.713	2473683.400
CHIMNEY ROCK COAL	20.1	0.00	1.00	0.00	2000.00	34.8	0.0	0.0	8/4/2011	10:31:10am	6547.099	1185320.347	2473731.230
CHIMNEY ROCK COAL	20.0	0.00	0.00	0.00	1000.00	36.8	0.0	0.0	8/4/2011	10:33:13am	6540.743	1185319.853	2473781.289
CHIMNEY ROCK COAL	20.0	0.00	1.00	0.00	1000.00	32.3	0.0	0.0	8/4/2011	10:46:52am	6538.222	1185319.266	2473830.422
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	2000.00	34.7	0.0	0.0	8/4/2011	10:49:54am	6545.716	1185266.608	2473834.231
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	2000.00	33.2	0.0	0.0	8/4/2011	10:52:14am	6549.362	1185268.224	2473778.064
CHIMNEY ROCK COAL	19.8	0.00	1.00	0.00	4000.00	41.7	0.0	0.0	8/4/2011	10:55:09am	6553.911	1185269.037	2473726.705
CHIMNEY ROCK COAL	20.1	0.00	1.00	0.00	1000.00	26.4	0.0	0.0	8/4/2011	10:58:12am	6558.628	1185272.125	2473678.332
CHIMNEY ROCK COAL	20.2	0.00	0.00	0.00	1000.00	22.1	0.0	0.0	8/4/2011	11:01:18am	6560.493	1185212.153	2473685.004
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	2000.00	37.5	0.0	0.0	8/4/2011	11:03:27am	6557.513	1185215.836	2473731.354
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	2000.00	21.6	0.0	0.0	8/4/2011	11:05:38am	6553.875	1185218.256	2473780.583
CHIMNEY ROCK COAL	20.3	0.00	0.00	0.00	1000.00	39.3	0.0	0.0	8/4/2011	11:08:06am	6556.316	1185218.309	2473829.351
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	3000.00	22.9	0.0	0.0	8/4/2011	11:11:13am	6573.218	1185166.133	2473830.053
CHIMNEY ROCK COAL	20.3	0.00	0.00	0.00	0.00	20.3	0.0	0.0	8/4/2011	11:16:01am	6580.739	1185165.343	2473779.224
CHIMNEY ROCK COAL	20.3	0.00	0.00	0.00	1000.00	15.6	0.0	0.0	8/4/2011	11:20:21am	6593.620	1185113.937	2473726.345
CHIMNEY ROCK COAL	20.4	0.00	0.00	0.00	1000.00	31.7	0.0	0.0	8/4/2011	11:26:45am	6584.662	1185113.774	2473678.184
CHIMNEY ROCK COAL	20.5	0.00	0.00	0.00	1000.00	26.4	0.0	0.0	8/4/2011	11:29:36am	6569.496	1185170.654	2473679.439
CHIMNEY ROCK COAL	20.4	0.00	0.00	0.00	3000.00	21.5	0.0	0.0	8/4/2011	11:31:35am	6567.716	1185165.990	2473725.272
CHIMNEY ROCK COAL	20.6	0.00	0.00	0.00	1000.00	17.8	0.0	0.0	8/4/2011	11:35:20am	6608.234	1185110.468	2473775.515
CHIMNEY ROCK COAL	20.5	0.00	0.00	0.00	3000.00	18.7	0.0	0.0	8/4/2011	11:38:40am	6598.984	1185110.564	2473832.772
CHIMNEY ROCK COAL	20.6	0.00	0.00	0.00	1000.00	37.5	0.0	0.0	8/4/2011	11:41:34am	6614.118	1185113.287	2473875.342
CHIMNEY ROCK COAL	20.6	0.00	0.00	0.00	0.00	22.1	0.0	0.0	8/4/2011	11:44:15am	6616.065	1185111.890	2473926.258
CHIMNEY ROCK COAL	20.5	0.00	1.00	0.00	1000.00	27.4	0.0	0.0	8/4/2011	11:48:39am	6662.157	1184965.145	2473827.221
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	2000.00	25.2	0.0	0.0	8/4/2011	11:51:49am	6693.595	1184912.960	2473831.080
CHIMNEY ROCK COAL	20.8	0.00	0.00	0.00	0.00	24.6	0.0	0.0	8/4/2011	11:54:54am	6715.967	1184871.991	2473826.196
CHIMNEY ROCK COAL	20.7	0.00	0.00	0.00	0.00	19.1	0.0	0.0	8/4/2011	11:57:11am	6716.154	1184872.190	2473780.839
CHIMNEY ROCK COAL	20.6	0.00	0.00	0.00	0.00	30.6	0.0	0.0	8/4/2011	12:00:00pm	6712.122	1184868.868	2473728.473
CHIMNEY ROCK COAL	20.6	0.00	0.00	0.00	1000.00	18.0	0.0	0.0	8/4/2011	12:03:04pm	6684.079	1184865.413	2473677.255
CHIMNEY ROCK COAL	20.7	0.00	0.00	0.00	0.00	17.6	0.0	0.0	8/4/2011	12:07:37pm	6656.682	1184875.185	2473631.629
CHIMNEY ROCK COAL	20.5	0.00	0.00	0.00	3000.00	23.8	0.0	0.0	8/4/2011	12:10:11pm	6629.905	1184874.096	2473579.962
CHIMNEY ROCK COAL	20.5	0.00	0.00	0.00	3000.00	17.6	0.0	0.0	8/4/2011	12:13:08pm	6622.576	1184920.232	2473577.386
CHIMNEY ROCK COAL	20.7	0.00	0.00	0.00	1000.00	33.0	0.0	0.0	8/4/2011	12:17:27pm	6633.516	1184922.046	2473622.100
CHIMNEY ROCK COAL	20.7	0.00	0.00	0.00	0.00	25.3	0.0	0.0	8/4/2011	12:20:36pm	6666.854	1184914.281	2473670.786
CHIMNEY ROCK COAL	20.5	0.00	1.00	0.00	2000.00	22.6	0.0	0.0	8/4/2011	12:24:44pm	6690.707	1184920.008	2473728.077
CHIMNEY ROCK COAL	20.7	0.00	0.00	0.00	0.00	26.8	0.0	0.0	8/4/2011	12:26:39pm	6686.043	1184921.895	2473782.821
CHIMNEY ROCK COAL	20.8	0.00	0.00	0.00	0.00	23.7	0.0	0.0	8/4/2011	12:30:14pm	6674.878	1184982.579	2473773.208
CHIMNEY ROCK COAL	20.6	0.00	0.00	0.00	0.00	27.5	0.0	0.0	8/4/2011	12:32:07pm	6665.604	1184973.293	2473725.238
CHIMNEY ROCK COAL	20.6	0.00	0.00	0.00	0.00	22.2	0.0	0.0	8/4/2011	12:34:13pm	6642.026	1184976.974	2473676.672
CHIMNEY ROCK COAL	20.8	0.00	0.00	0.00	2000.00	27.5	0.0	0.0	8/4/2011	12:37:32pm	6619.371	1184982.192	2473631.246
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	8000.00	18.6	0.0	0.0	8/4/2011	12:40:11pm	6589.587	1184979.051	2473574.469
CHIMNEY ROCK COAL	19.8	0.00	0.00	0.00	3000.00	33.6	0.0	0.0	8/4/2011	12:43:36pm	6607.049	1185030.789	2473530.410
CHIMNEY ROCK COAL	20.5	0.00	0.00	0.00	0.00	52.4	0.0	0.0	8/4/2011	12:45:29pm	6614.373	1185079.237	2473529.386
CHIMNEY ROCK COAL	20.3	0.00	1.00	0.00	0.00	65.5	0.0	0.0	8/4/2011	12:47:39pm	6640.977	1185083.323	2473472.544
CHIMNEY ROCK COAL	20.2	0.00	0.00	0.00	0.00	64.8	0.0	0.0	8/4/2011	12:49:45pm	6634.195	1185022.166	2473476.195

APPENDIX G
ABANDONED COAL MINE SOIL GAS AND SURFACE TEMPERATURE MEASUREMENTS

LOCATION	Sub_O2____	Sub_CH4__p	Sub_H2S__p	Sub_CO__pp	Sub_CO2__p	Temp__°C_	FID_1	PID	GPS_Date	GPS_Time	GPS_Height	Northing	Easting
CHIMNEY ROCK COAL	20.3	0.00	0.00	0.00	0.00	63.3	0.0	0.0	8/4/2011	12:52:04pm	6627.210	1184975.408	2473476.462
CHIMNEY ROCK COAL	20.1	0.00	1.00	0.00	0.00	20.9	0.0	0.0	8/4/2011	12:55:43pm	6590.752	1184968.706	2473526.288
CHIMNEY ROCK COAL	19.8	0.00	0.00	0.00	3000.00	40.5	0.0	0.0	8/4/2011	12:57:47pm	6619.981	1184916.239	2473520.625
CHIMNEY ROCK COAL	20.2	0.00	0.00	0.00	3000.00	26.7	0.0	0.0	8/4/2011	12:59:59pm	6580.048	1184869.921	2473520.726
CHIMNEY ROCK COAL	20.3	0.00	1.00	0.00	0.00	56.4	0.0	0.0	8/4/2011	01:02:56pm	6605.535	1184868.973	2473484.179
CHIMNEY ROCK COAL	20.0	0.00	0.00	0.00	1000.00	59.6	0.0	0.0	8/4/2011	01:05:32pm	6643.099	1184868.228	2473434.651
CHIMNEY ROCK COAL	20.3	0.00	0.00	0.00	0.00	62.2	0.0	0.0	8/4/2011	01:07:49pm	6681.747	1184867.840	2473383.683
CHIMNEY ROCK COAL	20.0	0.00	0.00	0.00	0.00	66.7	0.0	0.0	8/4/2011	01:09:27pm	6685.601	1184920.606	2473382.999
CHIMNEY ROCK COAL	20.1	0.00	1.00	0.00	0.00	61.8	0.0	0.0	8/4/2011	01:11:19pm	6673.091	1184969.536	2473383.826
CHIMNEY ROCK COAL	19.8	0.00	1.00	0.00	0.00	65.4	0.0	0.0	8/4/2011	01:13:36pm	6684.267	1185022.653	2473383.201
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	0.00	64.5	0.0	0.0	8/4/2011	01:15:34pm	6695.137	1185070.240	2473384.926
CHIMNEY ROCK COAL	19.9	0.00	1.00	0.00	1000.00	65.9	0.0	0.0	8/4/2011	01:17:42pm	6696.297	1185125.750	2473383.271
CHIMNEY ROCK COAL	20.0	0.00	0.00	0.00	0.00	69.2	0.0	0.0	8/4/2011	01:20:11pm	6687.519	1185177.333	2473383.579
CHIMNEY ROCK COAL	19.9	0.00	1.00	0.00	0.00	68.5	0.0	0.0	8/4/2011	01:23:03pm	6653.598	1185159.902	2473430.372
CHIMNEY ROCK COAL	20.0	0.00	1.00	0.00	0.00	67.9	0.0	0.0	8/4/2011	01:25:08pm	6658.487	1185121.881	2473430.397
CHIMNEY ROCK COAL	19.7	0.00	1.00	0.00	0.00	68.2	0.0	0.0	8/4/2011	01:26:41pm	6638.742	1185059.780	2473428.260
CHIMNEY ROCK COAL	19.8	0.00	1.00	0.00	0.00	67.2	0.0	0.0	8/4/2011	01:28:32pm	6635.775	1185018.445	2473431.443
CHIMNEY ROCK COAL	20.0	0.00	1.00	0.00	0.00	43.7	0.0	0.0	8/4/2011	01:30:14pm	6624.552	1184966.773	2473432.733
CHIMNEY ROCK COAL	19.8	0.00	0.00	0.00	0.00	64.2	0.0	0.0	8/4/2011	01:32:14pm	6623.945	1184915.926	2473430.970
CHIMNEY ROCK COAL	19.8	0.00	0.00	0.00	0.00	64.3	0.0	0.0	8/4/2011	01:34:07pm	6589.383	1184913.238	2473481.213
CHIMNEY ROCK COAL	20.0	0.00	0.00	0.00	2000.00	22.1	0.0	0.0	8/4/2011	01:52:35pm	6549.294	1185325.599	2473577.417
CHIMNEY ROCK COAL	20.4	0.00	0.00	0.00	0.00	30.4	0.0	0.0	8/4/2011	01:58:11pm	6570.497	1185320.359	2473528.730
CHIMNEY ROCK COAL	20.3	0.00	0.00	0.00	0.00	58.2	0.0	0.0	8/4/2011	02:00:39pm	6593.891	1185320.274	2473478.674
CHIMNEY ROCK COAL	20.1	0.00	0.00	0.00	1000.00	47.0	0.0	0.0	8/4/2011	02:02:53pm	6616.640	1185321.590	2473432.948
CHIMNEY ROCK COAL	20.7	0.00	0.00	0.00	0.00	30.7	0.0	0.0	8/4/2011	02:04:55pm	6630.715	1185321.762	2473376.642
CHIMNEY ROCK COAL	20.5	0.00	0.00	0.00	1000.00	25.0	0.0	0.0	8/4/2011	02:06:24pm	6651.718	1185272.197	2473378.810
CHIMNEY ROCK COAL	20.6	0.00	0.00	0.00	1000.00	33.2	0.0	0.0	8/4/2011	02:08:27pm	6664.438	1185223.474	2473378.743
CHIMNEY ROCK COAL	20.6	0.00	0.00	0.00	0.00	47.8	0.0	0.0	8/4/2011	02:11:53pm	6652.514	1185219.704	2473432.483
CHIMNEY ROCK COAL	20.4	0.00	1.00	0.00	0.00	58.6	0.0	0.0	8/4/2011	02:14:08pm	6629.160	1185118.531	2473476.377
CHIMNEY ROCK COAL	20.3	0.00	0.00	0.00	0.00	44.2	0.0	0.0	8/4/2011	02:16:23pm	6630.316	1185169.415	2473479.992
CHIMNEY ROCK COAL	20.0	0.00	1.00	0.00	1000.00	49.8	0.0	0.0	8/4/2011	02:19:16pm	6604.285	1185114.399	2473532.343
CHIMNEY ROCK COAL	19.8	0.00	1.00	0.00	2000.00	35.7	0.0	0.0	8/4/2011	02:21:08pm	6606.636	1185166.073	2473526.118
CHIMNEY ROCK COAL	20.2	0.00	0.00	0.00	1000.00	23.7	0.0	0.0	8/4/2011	02:24:05pm	6562.729	1185177.354	2473586.891
CHIMNEY ROCK COAL	20.4	0.00	0.00	0.00	0.00	58.0	0.0	0.0	8/4/2011	02:26:30pm	6569.704	1185221.388	2473579.073
CHIMNEY ROCK COAL	20.1	0.00	1.00	0.00	0.00	31.2	0.0	0.0	8/4/2011	02:28:06pm	6576.253	1185218.211	2473529.430
CHIMNEY ROCK COAL	20.3	0.00	0.00	0.00	0.00	55.5	0.0	0.0	8/4/2011	02:30:10pm	6606.614	1185218.595	2473481.946
CHIMNEY ROCK COAL	20.3	0.00	1.00	0.00	0.00	54.6	0.0	0.0	8/4/2011	02:33:06pm	6628.032	1185268.260	2473428.689
CHIMNEY ROCK COAL	20.3	0.00	1.00	0.00	0.00	28.8	0.0	0.0	8/4/2011	02:34:44pm	6607.400	1185270.381	2473481.443
CHIMNEY ROCK COAL	20.3	0.00	0.00	0.00	0.00	64.1	0.0	0.0	8/4/2011	02:37:02pm	6589.620	1185277.904	2473532.302
CHIMNEY ROCK COAL	20.2	0.00	1.00	0.00	2000.00	47.6	0.0	0.0	8/4/2011	02:38:20pm	6570.825	1185270.808	2473582.427

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

Density Summary

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

Air-Dry Proximate Analysis Summary

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

In-Situ Proximate Analysis Summary

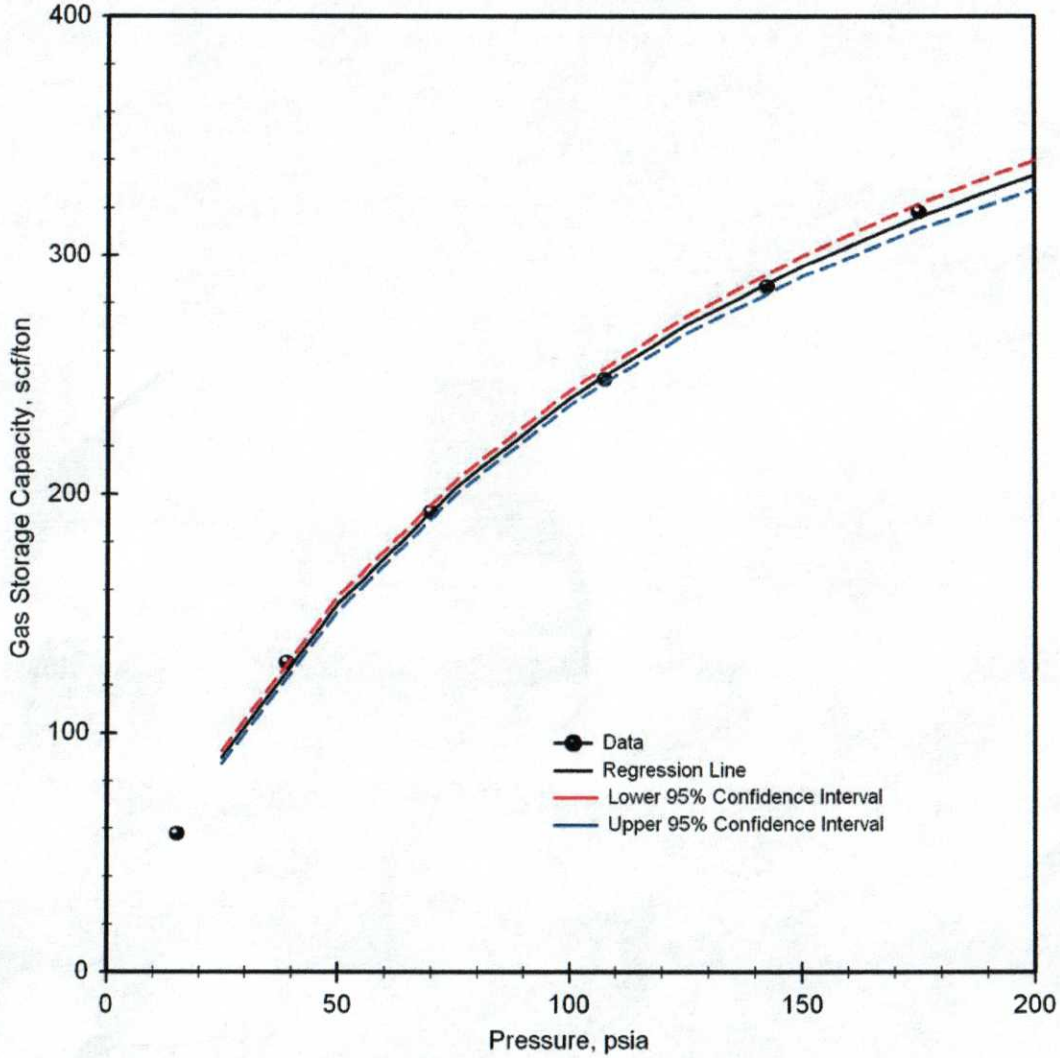
Sample	Top Depth	Bottom Depth	In-Situ Moisture Content	In-Situ Ash Content
	feet	feet	wt frac	wt frac
41680-1	227.80	228.80	0.01960	0.24508
41680-2	229.00	230.00	0.01187	0.13934
41680-3	270.50	271.50	0.02004	0.21040
41680-4	271.60	272.30	0.01401	0.20680
41680-5	273.50	274.50	0.02094	0.51922
Average	-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

Adsorbed Gas Composition Summary

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

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

Sample 41680-2 Adsorption Isotherm Data



Weatherford
LABORATORIES

Sample 41680-4 Adsorption Isotherm Parameters

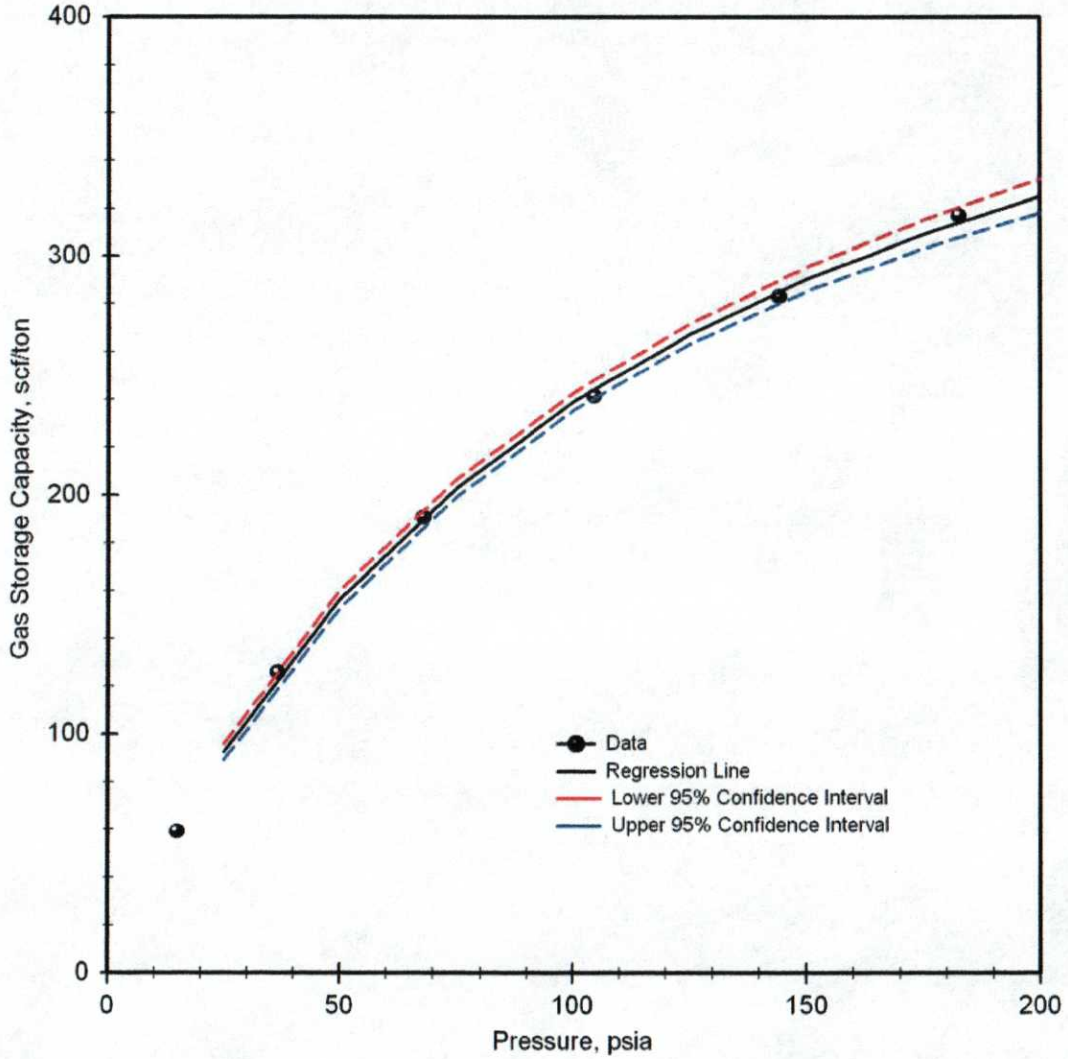
Sample ID	Unit	41680-4
Top Depth	ft	271.60
Bottom Depth	ft	272.30
Isotherm Parameters		
Measurement Gas	-	methane
Measurement Temperature	Deg. F.	60.08
In-Situ Sample Characterization		
Crushed Density	g/cc	1.4268
Moisture Holding Capacity	wt frac	0.0153
Ash Content	wt frac	0.2068
Organic Content	wt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

Sample 41680-4 Adsorption Isotherm Data

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

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

Sample 41680-4 Adsorption Isotherm Data



Weatherford LABORATORIES

Sample 41680-2 Adsorption Isotherm Parameters

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

Sample 41680-2 Adsorption Isotherm Data

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

-Monitoring wells-

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

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

REPORT OF ANALYSIS

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

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

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

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

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

Monte L. Ellis
Laboratory Manager

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

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

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

REPORT OF ANALYSIS

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

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

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

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

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

Monte L. Ellis
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1313 Sherman St, Rm 715
Denver, CO 80203

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

REPORT OF ANALYSIS

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

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

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

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

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

Monte L. Ellis
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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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Laramie, WY 82070 Fax: (307) 721-8956

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

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

REPORT OF ANALYSIS

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

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

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

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

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

Monte L. Ellis
Laboratory Manager

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RESULTS FOR THE COGCC CORE SAMPLES

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

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

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

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

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

COGCC monitoring well samples

GeoMark
Petroleum Services Division

Source Rock Analyses

TOC, Rock-Eval and Maturity Testing

USGS Library Number (S098, R950, R951)

Mark W. Longman

February 28, 2012

218 Higgins Street
Humble, TX 77338
832.644.1184

GeoMark Research, Ltd.

9748 Whithorn Drive
Houston, TX 77095
281.856.9333

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

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SOURCE ROCK ANALYSES

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

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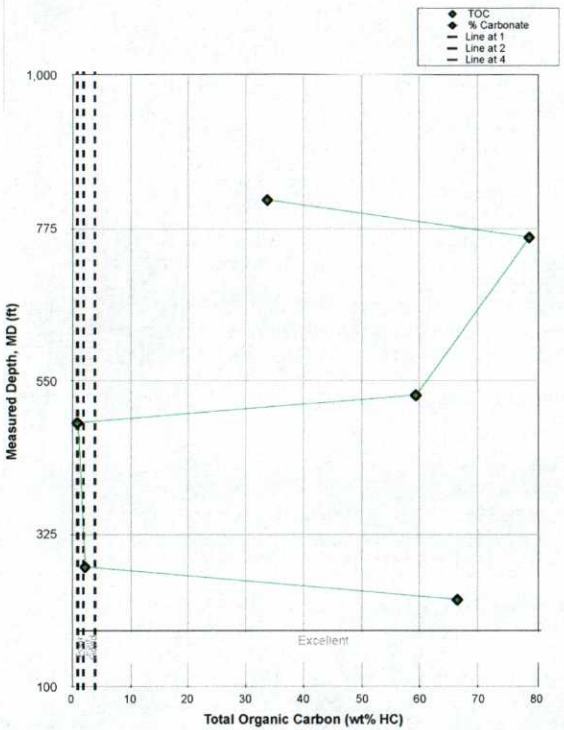
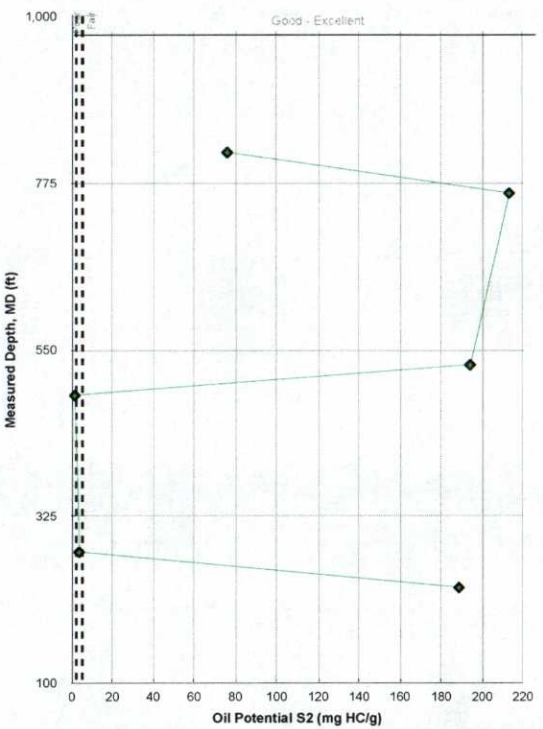
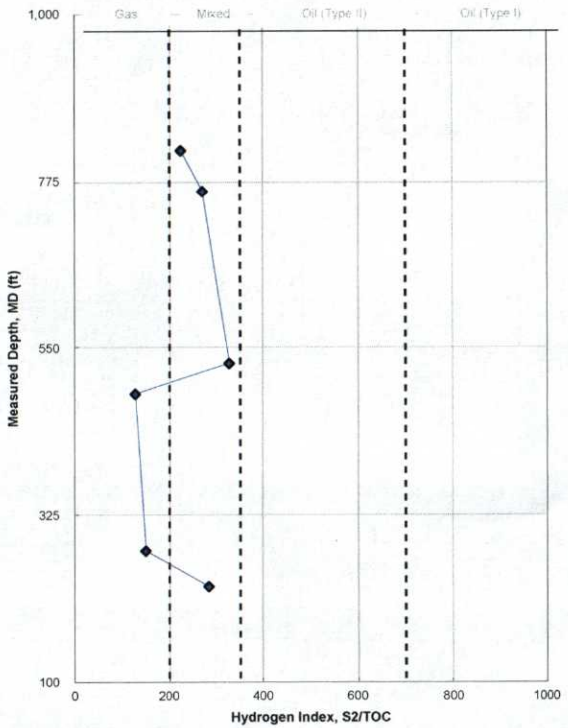
Total Organic Carbon
% Carbonate



Oil Potential, S2



Hydrogen Index, S2/TOC



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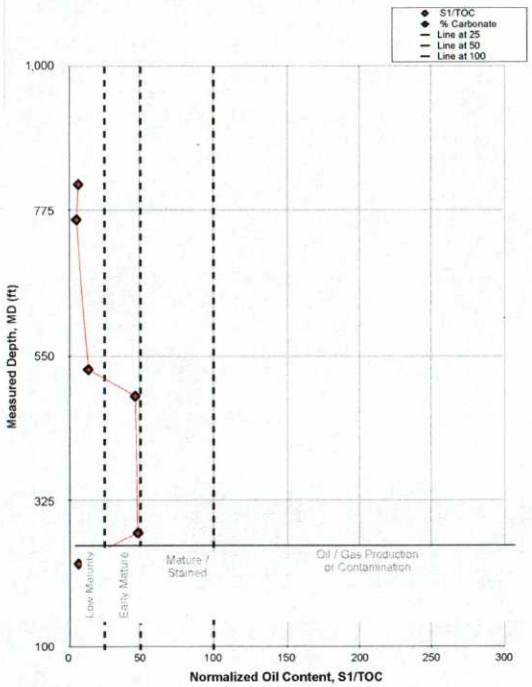
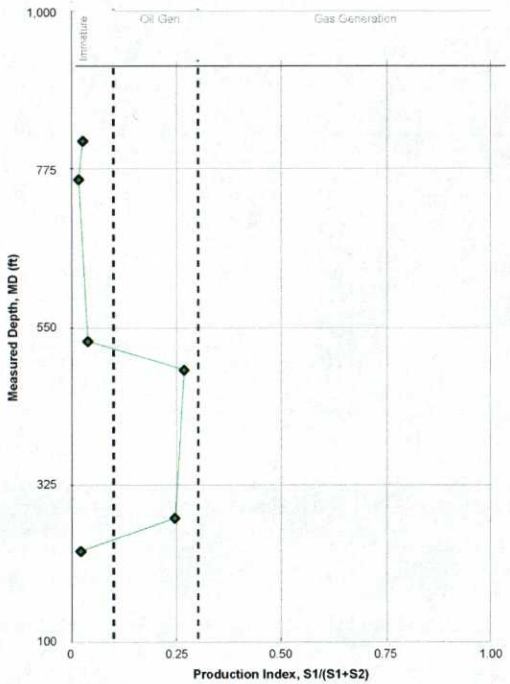
Norm. Oil Content, S1/TOC

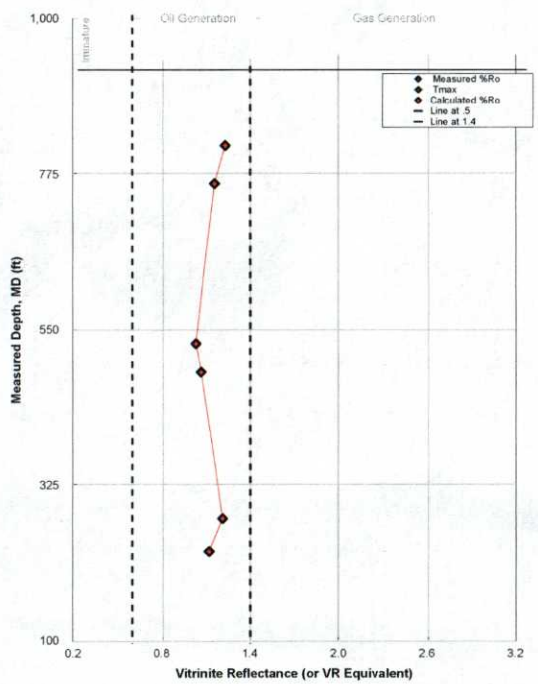


Production Index, S1/(S1+S2)



Maturity Indicators

Tmax (°C)



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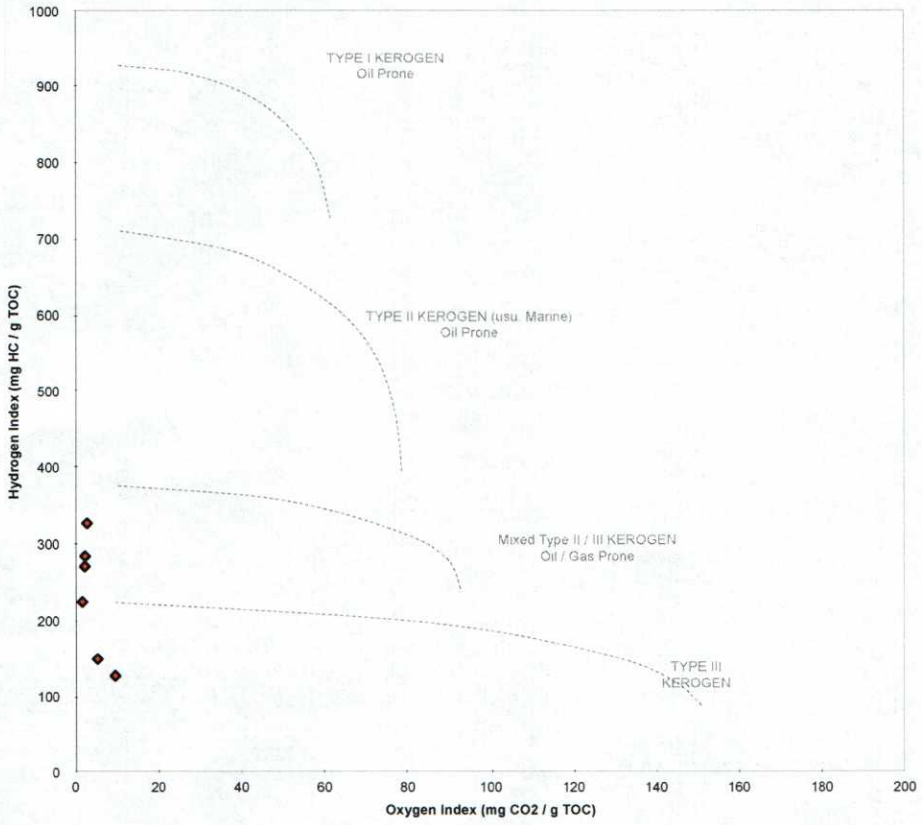
Pseudo Van Krevelen Plot



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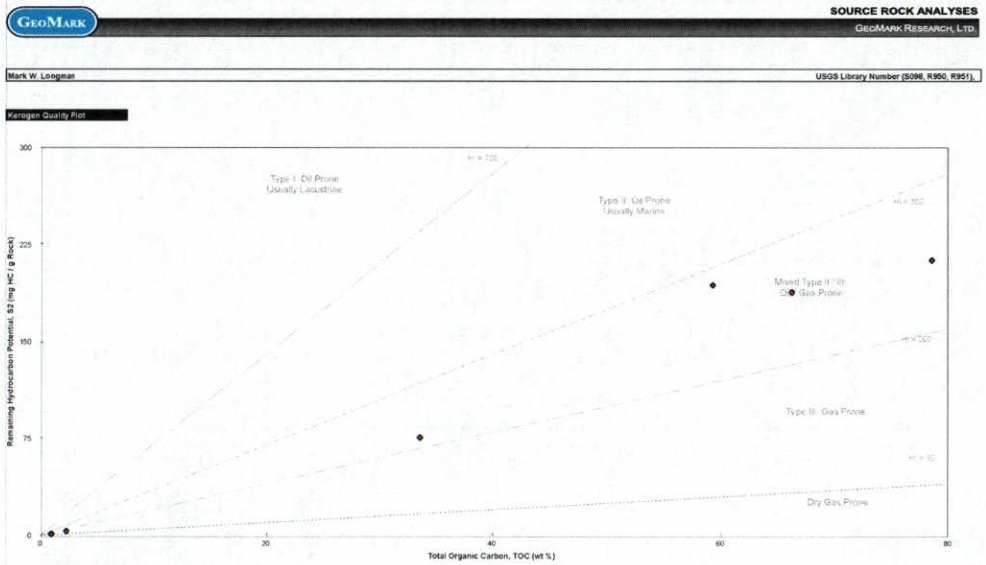

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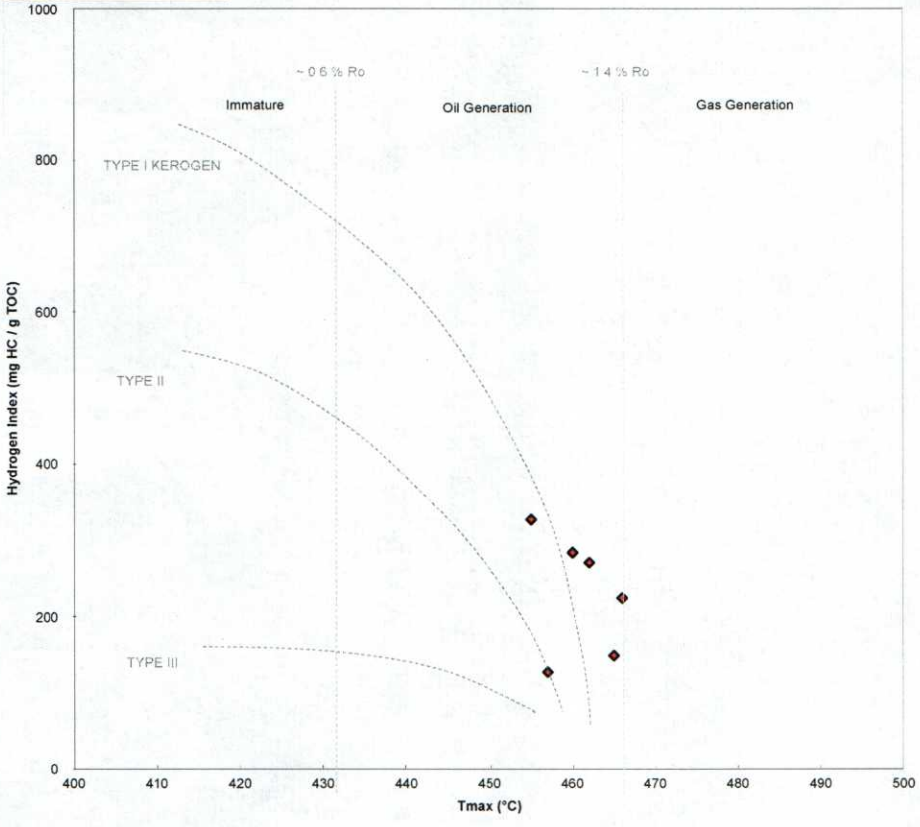
Kerogen Type and Maturity



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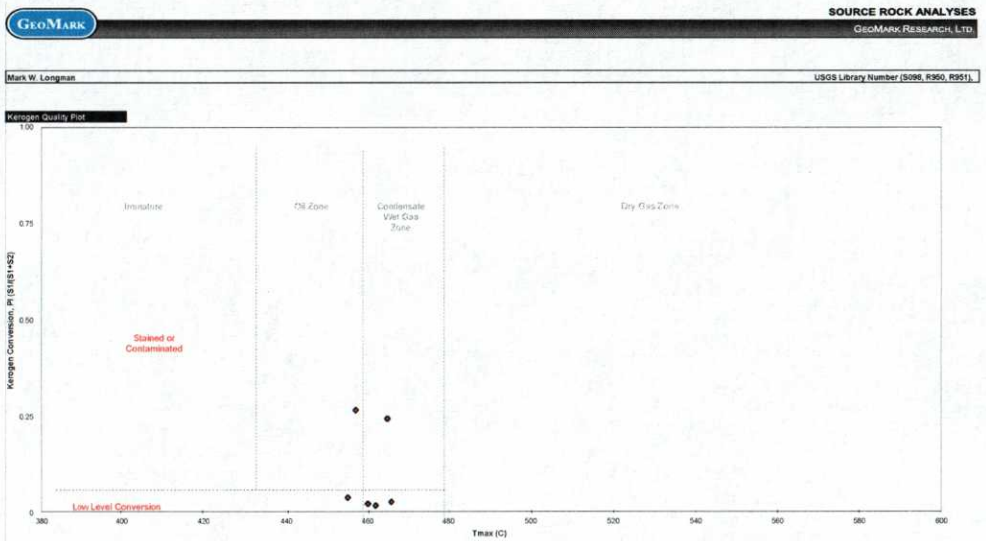

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