2010 COLORADO RULE 608 COMPLIANCE REPORT

RATON BASIN, COLORADO

NOVEMBER 2010

Prepared for:

XTO ENERGY, INC.
Aztec, New Mexico

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EXECUTIVE SUMMARY

LT Environmental, Inc. (LTE) completed tasks for the 2010 Colorado Rule 608 Compliance Program on behalf of XTO Energy, Inc. (XTO) in order to comply with the Colorado Oil and Gas Conservation Commission (COGCC) Rule 608 with respect to XTO's operations in Las Animas County, Colorado (Project Area, Figure 1). LTE followed the COGCC-approved Work Plan ,dated May 5, 2010, which applies to the following subsections of Rule 608:

- 608(a) – Assessment and monitoring of plugged and abandoned (P&A) production wells within one-quarter (¼) mile of proposed coalbed methane (CBM) wells;
- 608(b) – Water well sampling; and
- 608(c) – Coal outcrop and coal mine monitoring.

CBM production wells installed during 2010 were not located in the vicinity of any P&A production wells or water wells where additional research and/or field activities were warranted.

LTE identified, through previous investigations and a 2010 ground survey, six seep areas within the 2010 Project Area (Figure 2). Methane seepage was reported in the vicinity of each area during the 2010 assessment activities.

Only one sample (Apogee ID13) was analyzed for the methane isotopic composition for carbon and hydrogen. Based on analytical results, the methane gas detected at Apogee 13 appears to be biogenic in origin.

Infrared (IR) imagery acquisition was conducted along the Vermejo Formation within the Project Area. Field verification of suspect areas was limited to those areas where property access was granted. No methane was detected in any of the suspect areas that were investigated.

One natural spring was sampled for water quality. The water type appears to be predominately sodium and potassium bicarbonate. Dissolved methane for the water sample Spring01 was detected at a concentration of 0.109 milligrams per liter (mg/L,) which is below the 2 mg/L threshold to analyze the gas composition and carbon and hydrogen isotopes of methane. In addition to collecting a water sample, subsurface soil gas measurements were collected around the natural spring. Methane was not detected at any of the soil gas measurement locations.

LTE, at the direction of XTO plans to continue conducting Rule 608 compliance activities in Las Animas County in accordance with the COGCC-approved Work Plan as XTO's development activities expand.

SECTION 1.0

INTRODUCTION

LT Environmental, Inc. (LTE) has prepared this 2010 Colorado Rule 608 Compliance Report on behalf of XTO Energy, Inc. (XTO) to summarize tasks completed to comply with the Colorado Oil and Gas Conservation Commission (COGCC) Rule 608 with respect to XTO's operations in Las Animas County, Colorado (Project Area, Figure 1). Activities followed the COGCC-approved Work Plan previously submitted on May 5, 2010.

1.1 OBJECTIVE

The objective of the Rule 608 Compliance Program is to meet necessary compliance requirements associated with the drilling and installation of coalbed methane (CBM) wells in the State of Colorado. This Rule 608 Compliance Program applies to the following subsections of Rule 608 from the 600 Series Safety Regulations of the COGCC as amended on March 30, 2009:

- 608(a) – Assessment and monitoring of plugged and abandoned (P&A) production wells within one-quarter (¼) mile of proposed CBM wells;
- 608(b) – Water well sampling; and
- 608(c) – Coal outcrop and coal mine monitoring.

1.2 PROJECT AREA

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

The Raton Basin is an asymmetric synclinal basin with the axis of the La Veta syncline oriented roughly north-south and passing through Weston, Colorado, which is immediately east of the area defined by XTO for future drilling. The Raton Formation outcrops over approximately 50 percent (%) of the Project Area. The discontinuous nature of the coal beds both in the subsurface and on the surface makes it difficult to identify and/or correlate individual continuous coal beds from the subsurface producing zone to the surface coal outcrop.

XTO's planned drilling area is located on the western side of the La Veta syncline indicating that the formations encountered within the Project Area are dipping to the east. The Vermejo Formation consists of sandstone, interbedded siltstone, shale, carbonaceous shale, and coal that accumulated above the fluvial-deltaic sequences of the Trinidad Sandstone (Stevens, et al. 1992). The Vermejo Formation outcrops along the west edge of the syncline basin, which equates to the west side of the Project Area. Of the more than 90,000-acre Project Area, the Vermejo Formation

outcrop covers approximately 2%. The Raton and Vermejo Formation outcrops are depicted on Figure 1.

1.3 SCOPE OF WORK

XTO plans to drill CBM production wells in the Raton Basin over the next three years. The 2010 Project Area, planned CBM production well locations, geology, recorded P&A production well locations, water well locations, topography, and mine features are illustrated on Figure 2.

The scope of work for the 2010 Rule 608 Compliance Program included the following tasks:

- Task 1: Assessment of P&A Production Wells;
- Task 2: Water Well Sampling;
- Task 3: Ground Survey to Locate Methane Seeps on the Raton Formation Outcrop;
- Task 4: Infrared Aerial Imagery and Field Verification Along the Vermejo Formation and the Quinto, Tercio, and Vega Mines;
- Task 5: Field Mapping of Known Seep Areas;
- Task 6: Natural Spring Surveys; and
- Task 7: Reporting.

1.4 ORGANIZATION OF THE REPORT

This report is organized into five sections, including this introduction (Section 1.0), which presents the objectives of the study and discusses the scope of work related to the project. The field methods and equipment are described in Section 2.0. The 2010 results are summarized in Section 3.0. The conclusions of the 2010 work are in Section 4.0. The report references are included in Section 5.0. Tables, figures, and appendices follow the text in separate appendices.

SECTION 2.0

FIELD METHODS

2.1 2010 PROJECT AREA

The 2010 Project Area consisted of XTO's planned 2010 CBM production wells and included a 2-mile radius around those planned production wells. Within the 2-mile radius, LTE conducted detailed flux surveys at nine identified methane seep locations within the Raton Formation and five suspect areas along the Vermejo Formation. In addition to detailed flux surveys, LTE collected field measurements and analytical samples from one natural spring in the North Fork Apache Canyon.

The location of the identified methane seep areas, suspect areas, and the natural spring are illustrated on Figure 2.

2.2 PROPERTY ACCESS

Prior to conducting 2010 field activities, LTE, with the cooperation of XTO's land department, acquired landowner information from the Las Animas County Assessor's Office. LTE and XTO cross-referenced parcel data for the 2010 Project Area to identify owners of parcels located in the area of study. LTE attempted to gain access to all properties where fieldwork was planned, but was denied access to several properties; and as a result, no investigation activities were conducted on those properties. The 2010 property owner and access information is presented in Table 1.

2.3 ASSESSMENT OF PLUGGED AND ABANDONED PRODUCTION WELLS

Addressing surveys of P&A production wells per Rule 608(a) is accomplished on a well-by-well basis. P&A production wells are identified through the Colorado Oil and Gas Information System (COGIS) and if any are identified meeting the proper criteria; a soil gas survey are conducted around the P&A production well.

A review for all P&A production wells within the ¼-mile radius from planned 2010 CBM production wells was conducted by XTO. No P&A production wells were identified within a ¼-mile radius of any planned 2010 XTO CBM production well. As a result, further review of P&A production wells for 2010 was not required. In addition, no soil gas surveys were required around any P&A production well during the 2010 Colorado Rule 608 Compliance Program.

2.4 WATER WELL SAMPLING

Addressing water well sampling per Rule 608(b) is accomplished on a well-by-well basis. Water well sampling is based on the following criteria set forth in Rule 608(b):

1. If a conventional gas well or P&A production well is located within a ¼-mile of a planned XTO CBM well, then the closest two water wells within a one-half (½) mile radius of the conventional gas well or P&A well will be sampled;

2. If there are no conventional gas wells or P&A production wells located within ¼-mile radius of a planned XTO CBM well, then any water well located within ¼-mile radius of the planned XTO CBM well will be sampled. If there are more than two water wells located within the ¼-mile radius of the planned XTO CBM well, the closest two water wells will be selected and sampled;

3. If there are no water wells located within a ¼-mile radius of the planned XTO CBM well, the closest water well within a ½-mile radius of the planned XTO CBM well will be selected and sampled; or

4. If there is no water well located within a ½-mile radius of the planned XTO CBM well, no sampling is required.

A review of water wells within the 2010 Project Area, and meeting the requirements set forth in subsection 608(b), identified one water well (Permit Number 39685) that met the second criteria for sampling. However, the two planned XTO CBM production wells (New Elk 22-13 and New Elk 22-14) nearest to the water well were not installed during 2010. As a result, no water wells were sampled during the 2010 Colorado Rule 608 Compliance Program. Water well #39685 will be sampled at a later date, prior to the drilling of New Elk 22-13 and New Elk 22-14.

2.5 GROUND SURVEY WITHIN RATON FORMATION

Ground surveys along the Raton Formation were conducted to meet the requirements of Rule 608(c). The survey was completed in a manner similar to the initial ground survey completed by Apogee Scientific, Inc. (Apogee) for the COGCC in 2000 and the survey performed by LTE and Apogee for the COGCC in 2007.

The technique involves using a vehicle-mounted leak detection system (LDS) to survey the Project Area using the existing roadway network as a reasonable means to cover the formations and identify seep areas. The LDS is an infrared spectrometer (IRS)-based gas analyzer designed to locate methane emission sources from mobile platforms (cars, trucks, helicopters, ATVs, etc.) in real time. The LDS system measures methane, total hydrocarbons, and carbon dioxide with sub-parts per million (ppm) detection limits and displays the data in real time on the control computer. The LDS also incorporates a global positioning system (GPS) that records the track taken by the survey vehicle. Wind direction and ambient temperature sensors are also mounted on the survey vehicle. This is the same method of survey utilized by the COGCC during the past two monitoring events and appears to be the most effective method for monitoring large areas. Appendix A contains the specifications of the LDS system.

As the survey vehicle was driven, any increase in methane concentration above the local background concentration was marked and investigated to attempt to identify a potential source of the methane plume. Marking a potential seep area involved recording the latitude, longitude, wind speed, wind direction, temperature, and other pertinent data about the location.

The initial ground survey was limited to those accessible roads that were within the 2010 Project Area. The survey area will increase as the drilling program progresses over the next three years.

2.6 INFRARED AERIAL IMAGERY AND FIELD VERIFICATION ALONG THE VERMEJO FORMATION AND MINES

A regional reconnaissance for methane seepage along the Vermejo Formation outcrop and the Quinto, Tercio, and Vega mines was conducted using infrared (IR) aerial imagery and field verification of suspect areas. This survey method was selected due to high topographic relief and due to few roads that access this area as compared to the Raton Formation outcrop areas in the basin.

2.6.1 Infrared Aerial Imagery Acquisition

An IR camera mounted on an aircraft was used to collect high resolution, low altitude imagery. The imagery was georeferenced and rectified using digital elevation model (DEM) ortho-correction. Since methane seepage frequently affects vegetative conditions, the IR imagery was used as the key indicator of potential seepage. The images were reviewed for suspect seep areas, which were defined as areas with IR reflectance anomalies generally caused by dead or stressed vegetation. The IR imagery cannot detect the presence or absence of methane; therefore, each suspect area identified in the imagery was field-verified to determine if methane seepage was present.

IR imagery acquisition was conducted by Agro Engineering, Inc. (Agro) of Alamosa, Colorado. Agro flew over the Vermejo Formation outcrop using an IR camera mounted on an aircraft at 1-meter to 1.5-meter resolution. This reconnaissance flight was performed during the peak vegetation condition in order to be effective. Once the imagery was acquired, Agro georeferenced the imagery and provided it to LTE for interpretation.

Identified suspect areas along the Vermejo Formation that were within a 2-mile radius of planned 2010 CBM production wells and appeared to contain dead or stressed vegetation or an anomalous IR reflectance signature were delineated as polygons on the imagery and uploaded to a GPS unit for field verification.

Upon completion of the imagery review activities, field verification of suspect areas was conducted with the goal of identifying the presence or absence of methane seepage. The field personnel were equipped with the aerial imagery, topographic maps, a digital camera, and a GPS.

The IR reconnaissance flight was conducted on June 15, 2010. Field verification of the suspect areas was completed on September 8, 2010.

2.6.2 Subsurface Soil Gas Measurements

For each suspect area, a traditional subsurface soil gas survey was conducted within the polygons.

A Mine Safety Appliances (MSA) GasPort® multi-gas meter is used 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 soil or

outcrop materials is limited. Where probe refusal occurs, measurements are taken at the depth bored.

Once the rod is removed from the ground, a 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, the multi-gas meter is attached 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.

The multi-gas meter is capable of detecting methane in concentrations from 0 to 100%, oxygen concentrations from 0 to 25%, carbon monoxide concentrations from 0 to 1,000 parts per million (ppm), and hydrogen sulfide concentrations from 0 to 100 ppm. Specifications for the multi-gas meter are included in Appendix A.

The maximum concentrations of methane, carbon monoxide, and hydrogen sulfide; and the minimum concentration of oxygen at each sampling location are recorded. Data are recorded in a field notebook and a hand-held Trimble GeoXT® GPS unit, which is discussed further in the following subsection.

2.6.3 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 is downloaded later for processing and reporting.

The GPS unit location data are collected in the World Geodetic System 1984 (WGS 84) and projected in Universal Transverse Mercator (UTM) Zone 13 South, North American Datum 1983 (NAD 83) for use in an ArcView® project file. On average, 25 GPS log points are collected for each point feature in order to obtain more accurate positioning.

Readings collected with the GPS unit can be located with 1-meter accuracy. However, the terrain and forest canopy 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 cannot obtain a signal, field personnel will note measurement data on their field reference maps. Specifications of the GPS unit are included in Appendix A.

2.7 DETAILED MAPPING OF SEEP AREAS

To be compliant with Rule 608(c), annual detailed mapping of the previously identified 19 methane seeps that were within the 2010 Project Area was performed.

Field mapping of known or newly identified seeps consists of utilizing a portable flux meter to measure the magnitude and extent of methane seepage, within the survey area. The measurements are collected using a sampling grid approach.

Grids for detailed mapping areas consisted of varying numbers of squares, spaced 50 feet or 200 feet apart, depending on site-specific needs. The smaller grid spacings are used to map known methane seep areas of relatively small extent. A flux measurement is collected at the corner of each grid square. When methane is detected along the outer edges of the mapping area, additional grid points are developed and measured to determine the extent of methane seepage. Where appropriate, photographs of vegetative conditions, visible seeps, and sensitive receptors are collected.

Full color spectrum aerial photographs were used as base maps for field use and figures for reporting. The geologic contacts depicted on the aerial photographic maps were derived from geologic maps prepared by the Colorado Geological Survey (CGS) and digitized. Accuracy of the formation contact is reduced when aerial photographs are viewed at a smaller scale.

Detailed mapping of the known and newly identified seeps was conducted from August 10, 2010 to August 13, 2010 and September 8 and 9, 2010.

2.7.1 Flux Measurements

The flux of soil gases moving across the soil surface to the atmosphere is measured using the West Systems® portable gas flux meter (flux meter). The flux meter has been used to measure soil gas seepage on the Raton Formation in the Raton Basin in Colorado. The portable flux meter measures the flux of methane, hydrogen sulfide, and carbon dioxide by employing individual gas-specific sensors that records the increases, if any, of gas concentrations over time for a given surface area. These increase in concentration over time are proportional to the flux of each gas.

The flux meter components include an accumulation chamber connected by circulation tubes to the gas detector unit. At each sampling point, the accumulation chamber is placed on the ground surface to capture gas seeping from the ground. A fan in the chamber continuously mixes the gases in the chamber during the measurement process. A pump moves gases in the accumulation chamber to the detector unit. After passing through the detector unit, gases are returned to the chamber. This closed loop process allows soil gases discharging to the chamber to increase 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 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 (moles/m^2·day).

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

The accuracy of the total flux estimation within the Project Area was influenced by the ability of the grid spacing system to represent the actual flux on a detailed level relative to the subsurface fracture system, coal quality, and stratigraphy within the Raton Formation.

The methane sensor within the flux meter unit has a range of 60 parts per million (ppm) to 50,000 ppm. The flux meter methane measurement range is 0.2 to 300 moles/m^2·day. Methane fluxes below 0.2 moles/m^2·day are detectable with decreased accuracy. As a result, reporting of methane fluxes will not include values less than 0.2 moles/m^2·day.

The carbon dioxide sensor has a full-scale range of 0 to 20,000 ppm and flux measurement range of 0 to 600 moles/m^2·day at an accuracy of ±25%.

The hydrogen sulfide detector has a full-scale range of 0 to 20 ppm and a flux measurement range of 0.0025 to 0.5 moles/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's accumulation chamber. Therefore, the flux meter can underestimate hydrogen sulfide flux by as much as 10%. For this reason, hydrogen sulfide values less than 0.0025 moles/m^2·day will not be reported. Information on the West Systems portable gas flux meter is provided in Appendix A.

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

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

2.7.2 Soil Gas Analysis

While conducting detailed mapping of known and new methane seep areas, gas samples were collected from the various known seep areas for which no existing isotopic information exists and for those newly identified seeps that were identified by Apogee during the 2010 ground survey. During the 2007 Phase II Seep Investigation conducted for the COGCC, gas samples were collected from many of the known seeps in the Raton Basin. As a result, re-sampling these seeps was not performed.

Gas samples were collected from the area within each seep with the highest observed methane concentration. Field personnel used a hand pump attached to tubing inserted into a borehole driven by a slide hammer. The tubing was purged of the ambient air and a Cali-5-bond® Mylar bag was filled with a sample of the gas within the borehole for analysis of the following:

- Fixed Gas Chromatography: hydrogen (H_2), argon (Ar), nitrogen (N_2), oxygen (O_2), carbon dioxide (CO_2), and hydrogen sulfide (H_2S);

- Hydrocarbon Gas Chromatography: methane, ethane, propane, i-butane, n-butane, i-pentane, n-pentane, and hexane+; and

- Isotopic Analysis: carbon and hydrogen isotopes of methane, carbon isotopes of CO_2, and carbon isotopes of ethane and propane.

Isotopic analysis was dependent on the gas concentration present in the sample. Gas seep concentrations of methane, carbon dioxide, and ethane vary greatly and at times are insufficient to conduct isotopic analysis.

The samples were packaged and shipped by a Department of Transportation (DOT) certified hazardous materials shipper to Isotech.

The gas composition and isotopic analysis data was evaluated to determine the significant aspects of the gas composition assessment for each seep area. The objective was to have a data set that assists in the identification of potential sources of the gas seep and observe and evaluate seep characteristics across the Project Area.

Gas samples were collected during the detailed mapping of the known seeps and newly identified seeps.

2.8 NATURAL SPRING MONITORING

Surveys of natural springs are performed on a well-by-well basis. Only natural springs identified on United States Geological Survey (USGS) topographic maps that were within the 2010 Project Area were surveyed.

Once a natural spring was identified, water samples were collected. At each natural spring, field personnel located the position and elevation using a GPS. A discharge rate was measured, when possible, using a graduated cylinder and stopwatch. Water quality measurements, including pH, total dissolved solids (TDS), specific conductance (SC), oxidation-reduction potential (ORP), and temperature were collected using a YSI® 556 meter. The equipment specifications for the water quality field meter are provided in Attachment A.

Water samples from the natural spring were 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 6010/6020;

- Dissolved Metals [selenium (Se), manganese (Mn)] by EPA Method 6010/6020;

- Alkalinity (carbonate/bicarbonate) by EPA Method 300;

- Major Anions [chloride (Cl), sulfate (SO_4), bromide (Br), and fluoride (F)] by EPA Method 300;

- pH by EPA Method150.1;

- SC by MCA Method WW 120.1;
- Nitrate/Nitrite as Nitrogen (N) by EPA Method 353.3;
- TDS by EPA Method 160.1;
- Dissolved Methane by Method RSK 175;
- Sodium Adsorption Ratio (SAR) by Louisiana Department of Natural Resources (LaDNR) Statewide Order Number 29B; and
- Bacteria by IRB/SRB/SLYM/ Coliform.

Laboratory-provided sample bottles were filled with water for analysis of the parameters identified above. All water samples collected were submitted in a cooler under strict chain-of-custody documentation to Accutest Mountain States (Accutest) located in Wheat Ridge, Colorado.

The natural spring analytical data was evaluated to determine the significant aspects of the baseline water quality assessment as related to water quality standards. The primary objective was to evaluate the geochemical data in light of the potential or existing impacts from historic or future oil and gas exploration and production, and comparisons to existing water quality standards and existing regional water quality information.

The natural spring, located in the North Fork of Apache Canyon, was sampled on August 13, 2010.

SECTION 3.0

RESULTS

3.1 GROUND SURVEY OF THE RATON AND VERMEJO FORMATIONS

Apogee conducted the ground survey along assessable roads within the 2010 Project Area. The ground survey was conducted on June 15, 2010 and covered approximately 106 miles of roadway.

Apogee identified seep areas L-99, L100, and L-109 within the 2010 Project Area. Seep L-99 corresponded with previously identified seep 623 from the 2007 survey. The seep will be identified as seep area 623/L-99 from this point forward. Seep L-100 was located in the vicinity of previously identified seeps 21, 33, and 617 during the 2007 survey. Seep areas 21 and 617 appear to be from the same seep and as a result, the seep will be identified as seep area 21/617 from this point forward. Seep areas 33 and L-100 appear to be from the same seep area and as such, the seep will be identified as seep area 33/L-100 from this point forward.

Appendix B includes the ground survey report prepared by Apogee.

3.2 INFRARED AERIAL IMAGERY AND FIELD VERIFCATION

Due to poor weather conditions during the spring of 2010, the IR aerial imagery flight was postponed until June 15, 2010. The fly-over of the Vermejo Formation, and the Tercio, Quinto, and Vega mines was conducted after 11 am so that shadows would not affect the overall quality of the IR images and not produce additional suspect areas due to the shadow affect.

LTE reviewed the IR images of the Vermejo Formation within the 2010 Project Area. LTE identified 12 suspect areas for field verification (Figure 3). Due to property access denial and limitations, LTE was only able to map five suspect areas (Areas 8 through 12) along the Vermejo Formation. The three mines were not reviewed since they were not within the 2010 Project Area. In the event that future CBM production wells are near any of the mines, IR imagery will be reviewed for suspect areas and mapped for verification. As observed in other areas with methane seeps, the seeps do not dramatically change from year to year and as a result, the IR imagery from 2010 should still be valid for one to three additional years with the approval of the COGCC.

LTE conducted field verification of the five accessible suspect areas on September 8, 2010. LTE did not identify methane at any of the five accessible suspect areas along the Vermejo Formation. Suspect area #11 was identified as a pond that was not full at the time of the IR imagery acquisition. During the field verification, the pond was filled with water and as a result, subsurface gas measurements were collected around the perimeter of the pond. No visual bubbles were observed on the surface of the pond water.

Subsurface gas measurement locations are illustrated on Figures 4 and 5.

3.3 FIELD MAPPING OF SEEP AREAS

This section describes the results of the detailed flux mapping conducted from August 10, 2010 through August 13, 2010 and from September 8 to September 9, 2010. LTE mapped six previously identified seep areas and three new seeps areas identified during the 2010 ground survey within the 2010 Project Area. Below is a list of the seeps mapped for the 2010 Rule 608 Compliance Program:

- Apogee ID 623/L-99;
- Apogees ID 21/617;
- Apogee ID 33/L-100;
- Apogee ID 13:
- Apogee ID L-109; and
- Apogee ID 14.

Methane and carbon dioxide flux measurements are summarized by seep area in Table 2. Methane and carbon dioxide measurements are presented on Figures 6 through 15. Flux data are included as Appendix C.

3.3.1 Overall Methane Results

The 2010 detailed mapping resulted in detectable methane flux recorded at 32 of the 358 sample locations. Detected methane flux values of each measured location area for the 2010 Project Area ranged from 0.0 moles/m^2·day to a maximum of 75 moles/m^2·day (Seep area 13). Methane flux results for each seep area are discussed in Section 3.3.5.

3.3.2 Overall Carbon Dioxide Results

The 2010 detailed mapping resulted in detecting carbon dioxide flux at 308 of the 358 sample locations. Carbon dioxide flux values of each measured location area for the 2010 Project Area ranged from 0.0005 moles/m^2·day to a maximum 24.6 moles/m^2·day for the 2010 Project Area.

3.3.3 Overall Hydrogen Sulfide Results

Hydrogen sulfide flux (though barely above sensor detection limits) was recorded at 243 sample locations. The flux meter is a highly sensitive field meter capable of detecting very low flux rates of hydrogen sulfide. However, only 15 points were slightly above the unit's reliable detection limit of 0.0025 moles/m^2·day. Given the flux meter's accuracy of ±25%, the majority of these measured values are not considered to pose a threat to human health.

Due to the very low values of hydrogen sulfide measured during the 2010 detailed mapping program, maps of hydrogen sulfide measurements were not deemed useful and therefore, not prepared.

3.3.4 Total Flux Volume Estimations

LTE estimated the total volumetric flux of methane and carbon dioxide by combining generally contiguous areas of interest of the Raton outcrop in Las Animas County. Flux data were interpolated and gridded, then contoured and processed to estimate total volumetric flux.

The results were converted to volumetric flux rates common to the natural gas production industry in units of thousand cubic feet per day (MCFD). For a better perspective of the methane flux and carbon dioxide flux rates, LTE converted the mass flux values into volumetric flux units of cubic feet per day (CFD), assuming equal areas. The unit conversion is based on the molecular weight of the gas and the density of the gas at approximately 7,400 feet above mean sea level. For methane flux, the calculation is as follows:

$$\frac{\text{mol } CH_4}{\text{day}} \times \frac{16.04276 \text{ g } CH_4}{\text{mol } CH_4} \times \frac{0.0698 \text{ ft}^3 CH_4}{\text{g } CH_4} = \frac{\text{ft}^3 CH_4}{\text{day}}$$

For example,

$$1.0 \text{ mole/day } CH_4 = 1.12 \text{ CFD } CH_4$$

For carbon dioxide flux, the calculation is as follows:

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

For example,

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

The volumetric flux values calculated herein are estimates and may not represent actual values for the specific areas. Interpolation calculation techniques are highly sensitive to data skewness and can result in large changes in calculated flux values based on measurements made at only a few locations. A discussion of the methods and calculations used to determine total methane flux is presented in Appendix D.

3.3.5 Seep Area Results

Seep Areas 623 and L-99

Seep areas 623 and L-99 are located along County Road 21.6, approximately one mile northwest of Highway 12. Seep area L-99 was identified by Apogee during the 2010 ground survey and appears to coincide with Apogee's previously identified seep 623. LTE mapped 78 points around the seep area with a total volumetric flux of 0.07 MCFD.

A summary of the flux measurements for seep area 623 /L-99 is presented in Table 2. Figures 6 and 7 illustrate flux measurements and contours for methane and carbon dioxide, respectively.

Seep Areas 21/ 617 and 33/L-100

Seep areas 21/ 617 and 33/L-100 are located along Highway 12 between County Roads 23.2 and 23.3. Apogee identified seep areas 21, 33, and 617 during a previous ground survey conducted in 2007.

Detailed mapping of the two seep areas was limited to the north side of Highway 12 due to a steep slope on the south side that terminated at the North Fork of the Purgatoire River. LTE mapped 74 points around the four identified seep areas, which had a total volumetric flux of 0.03 MCFD.

A summary of the flux measurements for seep areas 21/ 617 and 33/L-100 is presented in Table 2. Figures 8 and 9 illustrate flux measurements and contours for methane and carbon dioxide, respectively.

Seep Area 13

Seep area 13 is located south of Highway 12 on a Division of Wildlife lease road within the Apache Canyon. Seep area 13 was identified by Apogee during a previous ground survey conducted in 2007. LTE mapped 29 points around the seep area, which had a total volumetric flux of 10.74 MCFD.

A summary of the flux measurements for seep area 13 is presented in Table 2. Figures 10 and 11 illustrate flux measurements and contours for methane and carbon dioxide, respectively.

Seep Area L-109

Seep area L-109 is located approximately 3,000 feet southwest of seep area 13 along a Division of Wildlife lease road within the North Fork Apache Canyon. The seep was identified during the 2010 ground survey conducted by Apogee. LTE mapped 89 points around the seep area, which had a total volumetric flux of 0.03 MCFD.

A summary of the flux measurements for seep area L-109 is presented in Table 2. Figures 11 and 12 illustrate flux measurements and contours for methane and carbon dioxide, respectively.

Seep Area 14

Seep Area 14 is located approximately 6,200 feet southwest of seep area L-109 on the Division of Wildlife lease road within the North Fork Apache Canyon. This seep was identified during a previous ground survey conducted by Apogee in 2007. LTE mapped 94 points around the seep area, which had a total volumetric flux of 0.56 MCFD.

A summary of the flux measurements for seep area 14 is presented in Table 2. Figures 13 and 14 illustrate flux measurements and contours for methane and carbon dioxide, respectively.

3.3.6 Gas Composition and Isotopic Analytical Results

Gas samples were collected from seep areas 13, 14, L-100, L-109, and 623/L-99 where the highest flux measurements were recorded for each respective seep area.

Of the five gas samples collected from the seep areas, only sample Apogee ID 13 had a sufficient concentration of methane (65.81%) to analyze for isotopes of carbon and hydrogen of methane. Results of the analysis indicated the gas seeping from Seep area 13 was a mixture of subsurface and near surface microbial gases and not thermogenic in origin.

Alan Jeffrey, PhD, senior geochemist with DPRA/Zymax Forensics of Escondido, California, reviewed the gas composition and isotopic data. Dr. Jeffery agreed that the isotopic composition of the methane gas from Apogee ID 13 fell within biogenic origins. However, methane isotopic analysis for other samples within the Raton Basin show a trend towards the Apogee ID 13 sample (Figure 16). In addition, Apogee ID 13 has very low ethane/methane ratio with the other gases in the basin. Dr. Jeffery believes that the data suggests that the Apogee ID 13 gas is linked to the other gases in the basin, and is not simply an isolated swamp gas.

Through some research of methane gas in the Raton Basin that Dr. Jeffery evaluated, it appears that the much of the gas in the Raton Basin is associated with coal seams. Coal gas has unusual isotopic characteristics, and according to a number of geochemists (Rice, 1993; Zhou et al, 2005) CBM can be both biogenic and thermogenic in origin. Biogenic CBM can be formed in two ways:

- Early stage - Microbial methane, which is formed during deposition of organic matter that will later form coal, is trapped in the organic matrix and
- Late stage – Microbial methane formed in groundwater percolating through established coal seams

In the San Juan Basin, gas in high production zones has been identified as predominantly biogenic in origin (Zuou et al, 2005).

Other work (Smith et al, 1985) has shown that isotopically light methane may be released in the early stages of gas desorption of coal, with the isotope ratio becoming heavier as desorption proceeds. All this evidence indicates that isotopically light biogenic methane is a component of coalbed methane, and can be the origin of major gas production, as in the San Juan Basin.

Through this information, Dr. Jeffery concluded the Apogee ID 13 gas has a biogenic origin, and contains methane that is likely formed by a mix of CO_2 reduction and fermentation. The gas was likely formed biogenically in coalbeds rather than as an isolated swamp gas. Apogee ID 13 gas falls within a continuum of gases in the Raton Basin, with the isotopically lighter gases likely having a biogenic coalbed origin, and the isotopically heavier gases having a thermogenic coalbed origin.

Apogee ID 14 was the only other gas sample that contained any detectable methane (0.0036%) but was too low for further isotopic analysis.

Ethane was detected at a very low concentration in Apogee ID 13 and as a result, no isotopic analysis was conducted by the laboratory.

Results of the gas composition and isotopic analysis are summarized on Table 3. Laboratory analytical reports are included in Appendix E. Isotopic analytical results are depicted on Figure 16, which illustrates how the methane gas origin is identified using a cross-plot of the carbon and hydrogen isotopes of methane.

3.4 NATURAL SPRING SURVEY

One natural spring was identified in the North Fork of Apache Canyon, within the 2010 Project Area. As a result, a water sample (Spring01) from the natural spring was sampled as part of the 2010 Rule 608 Compliance Program. LTE was onsite on August 13, 2010 to collect field parameters and water samples from the natural spring.

The location of the natural spring is presented on Figure 2 and a detailed spring location map is depicted on Figure 17.

3.4.1 Field Observations

The North Fork Apache Canyon natural spring was identified as a pooled area of water and was not flowing at the time of the fieldwork. As a result, flow rate readings were not collected. LTE field personnel did observe what appeared to be a pipe that was connected to the natural spring and a windmill platform. The pipe appeared to be filled in with sand to approximately one foot below the top of the well casing.

LTE collected field parameters from the pooled water from the natural spring, which was documented in the field logbook. The 2010 field observations and measurements for the natural spring are summarized in Table 4.

3.4.2 Sampling and Analysis

Dissolved methane was detected in water from Spring01 at a concentration of 0.109 mg/L. This concentration is well below the 2 mg/L threshold used by the COGCC to identify water for further investigation of the origin of the methane in the water.

By plotting the major anions (Cl, SO_4, Br, and F) and major cations (Na, Ca, Mg, K, Fe) that are dissolved in the natural spring water sample on a Stiff diagram, the water type can be presented graphically. The water from Spring01 indicates it is predominately sodium and potassium bicarbonate.

Laboratory analytical results for the natural spring sample are summarized in Table 5. A Stiff Diagram illustrating the water type is depicted on Figure 18. Natural spring analytical results are presented in Appendix F.

3.4.3 Subsurface Soil Gas Measurements

During the 2010 natural spring sampling event, 13 subsurface soil gas measurements were collected at Spring01 using traditional subsurface soil-gas sampling techniques and the multi-gas meter. Subsurface methane was not detected in any of the subsurface soil gas probes at the measured natural spring. Figure 17 depicts subsurface soil gas probe locations around the natural spring.

SECTION 4.0

CONCLUSIONS

The 2010 Rule 608 Compliance Program met the requirements of subsections a, b, and c of the COGCC Rule 608. CBM production wells installed during 2010 were not in the vicinity of any P&A production wells or water wells where additional research and/or field activities were warranted.

LTE identified, through previous investigations and a 2010 ground survey, six seep areas within the 2010 Project area. Detailed mapping in the six seep areas identified methane gas near all six seep areas.

Gas samples were collected from the seep areas and due to low methane concentration and/or no methane concentration detected by Isotech, only one sample (Apogee ID 13) was analyzed for its methane isotopic composition of the carbon and hydrogen isotopes. The analytical result indicates the methane gas detected at seep area Apogee ID 13 appears to be biogenic in origin. The remaining seep locations have not been determined as to the origin of the methane that was detected.

IR imagery was conducted along the Vermejo Formation within the Project Area. Field verification of suspect areas occurred within the 2010 Project Area and was limited to those areas where access was granted. No methane was detected in any of the subsurface points within the suspect areas.

One natural spring was sampled for water quality analysis. The water type appears to be predominately sodium and potassium bicarbonate. Dissolved methane for the water sample Spring01 was detected at a concentration of 0.109 milligrams per liter (mg/L) which is below the 2 mg/L threshold to analyze the gas composition and carbon and hydrogen isotopes of methane. In addition to collecting a water sample, subsurface soil gas measurements were collected around the natural spring. Methane was not detected at any of the measurement locations.

LTE, at the direction of XTO, plans to continue conducting Rule 608 compliance activities in Las Animas County in accordance with the COGCC-approved Work Plan as XTO's development activities expand.

SECTION 5.0

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TABLES

TABLES

TABLE 1
PROPERTY OWNER AND ACCESS INFORMATION
2010 COLORADO RULE 608 COMPLIANCE REPORT
LAS ANIMAS COUNTY, COLORADO

XTO ENERGY, INC.

PARCEL NUMBER	OWNER NAME	MAILING ADDRESS	PROPERTY ACCESS LOCATION			PERMISSION GRANTED
			SECTION	TOWNSHIP	RANGE	
10136500	Mr. and Mrs. Arguello	P.O. Box 275, Boone Colorado 81025	13	33S	68W	Yes - 7/17/10
13200620	Bar Nothing Ranches LLC	6916 Broadacre Road Avondale, Colorado 81022	8-9-17-19-20-21-29	33S	68W	No - Access granted after field work completed
10586001	Mr. and Mrs. DeAngelis	209 Estrella Street, Trinidad Colorado 81082	20-21	33S	68W	Yes - 8/23/10
12284300	Ms. Lori and Eli Shalev / Ms. Michelle Garcia	8533 Highway 12, Weston Colorado	21	33S	68W	No - Did not receive permission prior to field work
14032700	Ms. Barbara and Ms. Margaret Sisneros	1724 Cypress Street, Pueblo Colorado 81004	21	33S	68W	No - 8/28/10
14533403	Mr. John Toupal	360 South Monroe Street, Suite 400 Denver, Colorado 80209	29-32	33S	68W	Yes - 8/24/10
14370304	Mr. Peter and Mrs. Jean A Vellejo	4255 South Park Bluff Drive, Anchorage	19	33S	68W	Yes - 8/2/10
11071130	Mr. and Mrs. Weiler	6840 Crystal Springs, Bull Valley Illinois 60012	28-29	33S	68W	Yes - 8/31/10

TABLE 2
METHANE FLUX DATA
2010 COLORADO RULE 608 COMPLIANCE REPORT
LAS ANIMAS COUNTY, COLORADO

XTO ENERGY, INC.

Mapping Area	Total Number of Sample Points	Methane Flux					Carbon Dioxide Flux			
		Number of Sample Points with CH_4*	Number of Sample Points with CH_4 above reporting limit**	Minimum** (moles/m2·day)	Maximum** (moles/m2·day)	Total Flux (MCFD)***	Number of Sample Points with CO_2	Minimum*** (moles/m2·day)	Maximum*** (moles/m2·day)	Total Flux (MCFD)
Apogee ID L-99/623	78	14	4	0.20	0.39	0.07	68	0.066	3.32	24.14
Apogee IDs 33/L-100 and 21/617	74	26	1	0.27	0.27	0.03	62	0.0005	8.55	11.04
Apogee ID 13	29	20	8	0.20	72	10.74	24	0.148	24.6	22.64
Apogee ID L-109	83	13	3	0.24	0.32	0.03	73	0.005	3.23	15.35
Apogee ID 14	94	25	16	0.21	0.35	0.56	81	0.021	3.32	22.87

Notes:

CH_4 - Methane

CO_2 - Carbon dioxide

moles/m^2·day - moles per meter squared per day

MCFD - thousand cubic feet per day

-- - No data available

* - Points where flux values were above 0.000 moles/m^2·day

** - Only points where flux values were above the reporting limit of 0.2 moles/m^2·day

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

TABLE 3
GAS COMPOSISITON AND ISOTOPIC ANALYSIS
2010 COLORADO RULE 608 COMPLIANCE REPORT
LAS ANIMAS COUNTY, COLORADO

XTO ENERGY, INC.

Sample Name	Sample Date	He (%)	H2 (%)	Ar (%)	O_2 (%)	CO_2 (%)	N_2 (%)	CO (%)	C_1 (%)	C_2 (%)	C_2H_4 (%)	C_3 (%)	iC_4 (%)	nC_4 (%)	iC_5 (%)	nC_5 (%)	C_6+ (%)	$\delta^{13}C_1$ (‰)	δDC_1 (‰)	Specific Gravity	BTU
Apogee ID 13	8/10/2010	0	0	0.460	1.83	3.66	28.24	0	65.81	0.0038	0	0	0	0	0	0	0	-64.65	-264.8	0.72	667
Apogee ID L-109	8/11/2010	0	0	0.935	20.62	0.35	78.1	0	0	0	0	0	0	0	0	0	0	NA	NA	1.001	0
Apogee ID 14	8/12/2010	0	0	0.935	20.94	0.16	77.96	0	0.0036	0	0	0	0	0	0	0	0	NA	NA	1.001	0
Apgee ID 623/L-99	8/13/2010	0	0	0.933	20.07	1.05	77.95	0	0	0	0	0	0	0	0	0	0	NA	NA	1.005	0
Apogee ID L-100	8/13/2010	0	0	0.931	20.95	0.072	78.05	0	0	0	0	0	0	0	0	0	0	NA	NA	1.000	0

Notes:

He - Helium
H_2 - Hydrogen
Ar - Argon
O_2 - Oxygen
CO_2 - Carbon Dioxide
N_2 - Nitrogen
CO - Carbon Monoxide
C_1 - Methane
C_2 - Ethane
C_2H_4 - Ethylene
C_3 - Propane
iC_4 - Isobutane
nC_4 - Butane
iC_5 - Isopentane
nC_5 - Pentane
C_{6+} - Hexanes +
$\delta^{13}C_1$ - Carbon isotope of Methane
δDC_1 - Hydrogen isotope of Methane
% - percent
‰ - per milion
BTU - British Thermal Units (At 60 degrees Fahrenheit and 14.7 psia)
NA - Not analyzed due to insufficient concentration for analysis

TABLE 4
NATURAL SPRING FIELD OBSERVATIONS AND MEASUREMENTS
2010 COLORADO RULE 608 COMPLIANCE REPORT
LAS ANIMAS COUNTY, COLORADO

XTO ENERGY, INC.

Natural Spring	Location	2010 Field Observations / Notes	Inspection Date	Specific Electrical Conductance (µS/cm)	pH (Units)	ORP (mV)	Temperature (^{0}C)	DO (mg/L)	TDS (mg/L)	FLOW RATES (Gallons/Minute)
Spring01	North Fork Apache Canyon	No methane detected with 4-gas meter on 9/7/10	8/13/2010	381	9.2	140.5	22.4	10.25	247	NM

Notes:

Blank cells indicate no measurement
µS/cm - microSiemens per centimeter
ORP - oxidation reduction potential
mV - millivolts
mg/L - milligrams per liter
^{0}C - degrees celsius
TDS - total dissolved solids
ppm - parts per million
NM - Not Measured
DO - dissolved oxygen

TABLE 5
NATURAL SPRING ANALYTICAL RESULTS
2010 COLORADO RULE 608 COMPLIANCE REPORT
LAS ANIMAS COUNTY, COLORADO

XTO ENGERGY, INC.

Natural Spring	Location	Sample Date	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Manganese (mg/L)	Selenium (mg/L)	Carbonate (mg/L)	Bicarbonate (mg/L)	TDS (mg/L)	SAR	Specific Conductivity (umhos/cm)	pH
Spring01	North Fork Apache Canyon	8/13/2010	3.4	0.652	97.7	1.41	0.021	<0.00080	<5.0	205	280	11.4	364	10.13

Natural Spring	Location	Sample Date	Sulfate (mg/L)	Chloride (mg/L)	Bromide (mg/L)	Fluoride (mg/L)	Hydrogen Sulfide (mg/L)	Nitrogen as Nitrate (mg/L)	Nitrogen as Nitrite (mg/L)	Iron Reducing Bacteria (cfu/ml)	Slime Forming Bacteria (cfu/ml)	Sulfate Reducing Bacteria (cfu/ml)	Dissolved Methane (mg/L)
Spring01	North Fork Apache Canyon	8/13/2010	2.9	3.3	<0.20	0.74	<0.50	<0.23	<0.061	500	>350,000	700,000	0.109

Notes:
mg/L - milligrams per liter
TDS - Total dissolved solids
SAR - Sodium adsorption ratio
umhos/cm - Microohms per centimeter
cfu/ml - Coliform units per milliliter
< - less than the laboratory reporting limit

FIGURES

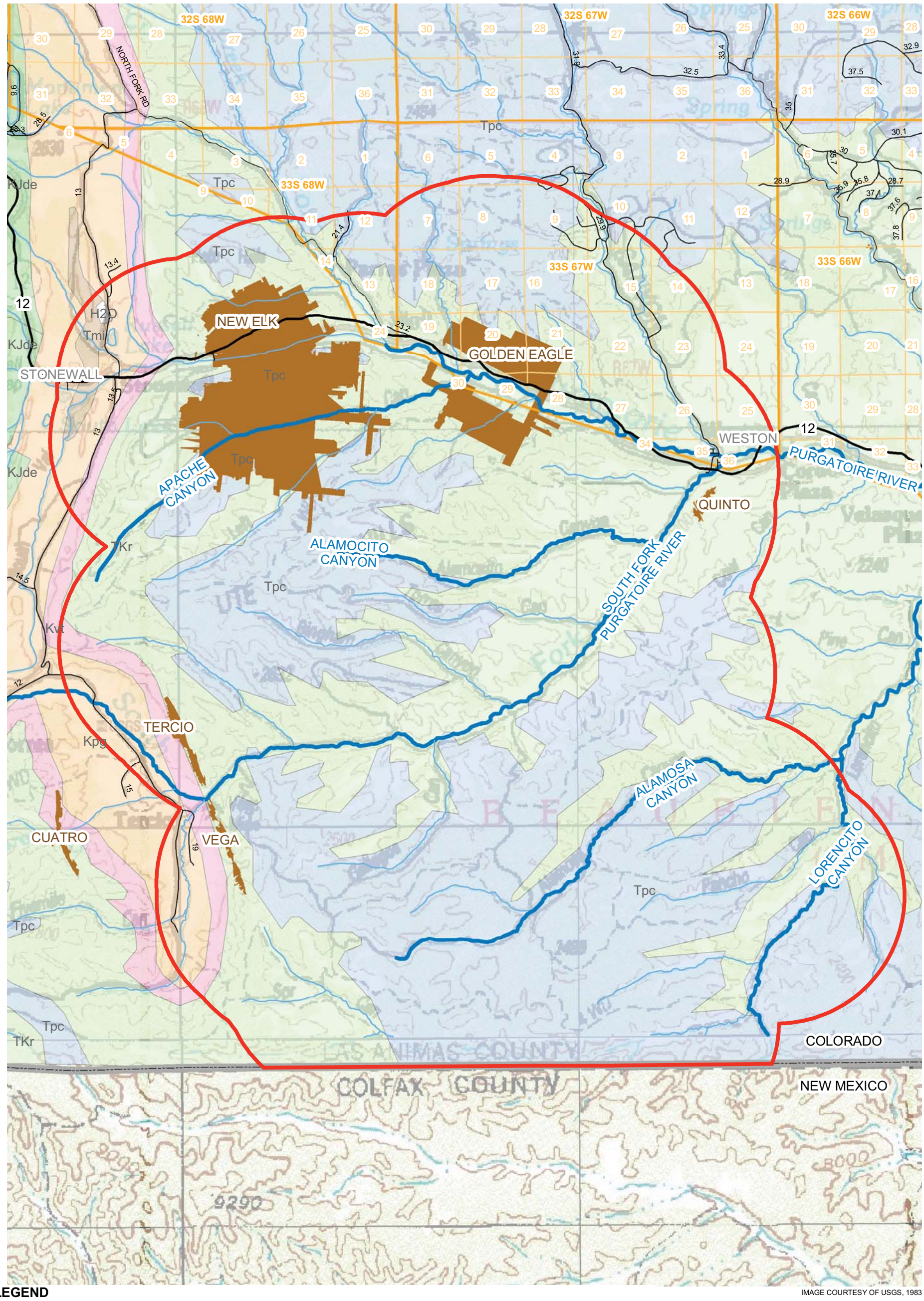

IMAGE COURTESY OF USGS, 1983

LEGEND

- PROJECT AREA
- COLORADO STATE LINE
- TOWNSHIP AND RANGE LINES
- LEWICKI MINE BOUNDARIES

GEOLOGIC CONTACTS (TWETO, 1979)

- Tmi - MIDDLE TERTIARY INTRUSIVE ROCKS
- Tpc - POISON CANYON FORMATION
- TKr - RATON FORMATION
- Kvt - VERMEJO FORMATION
- Kpg - PIERRE SHALE FORMATION
- KJde - DAKOTA FORMATION
- P[Ps - SANGRE DE CRISTO FORMATION

- ROAD
- OTHER WATER SOURCE
- MAJOR DRAINAGE

0 1.5 3
Miles

N

FIGURE 1
PROJECT AREA MAP
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO

XTO ENERGY, INC

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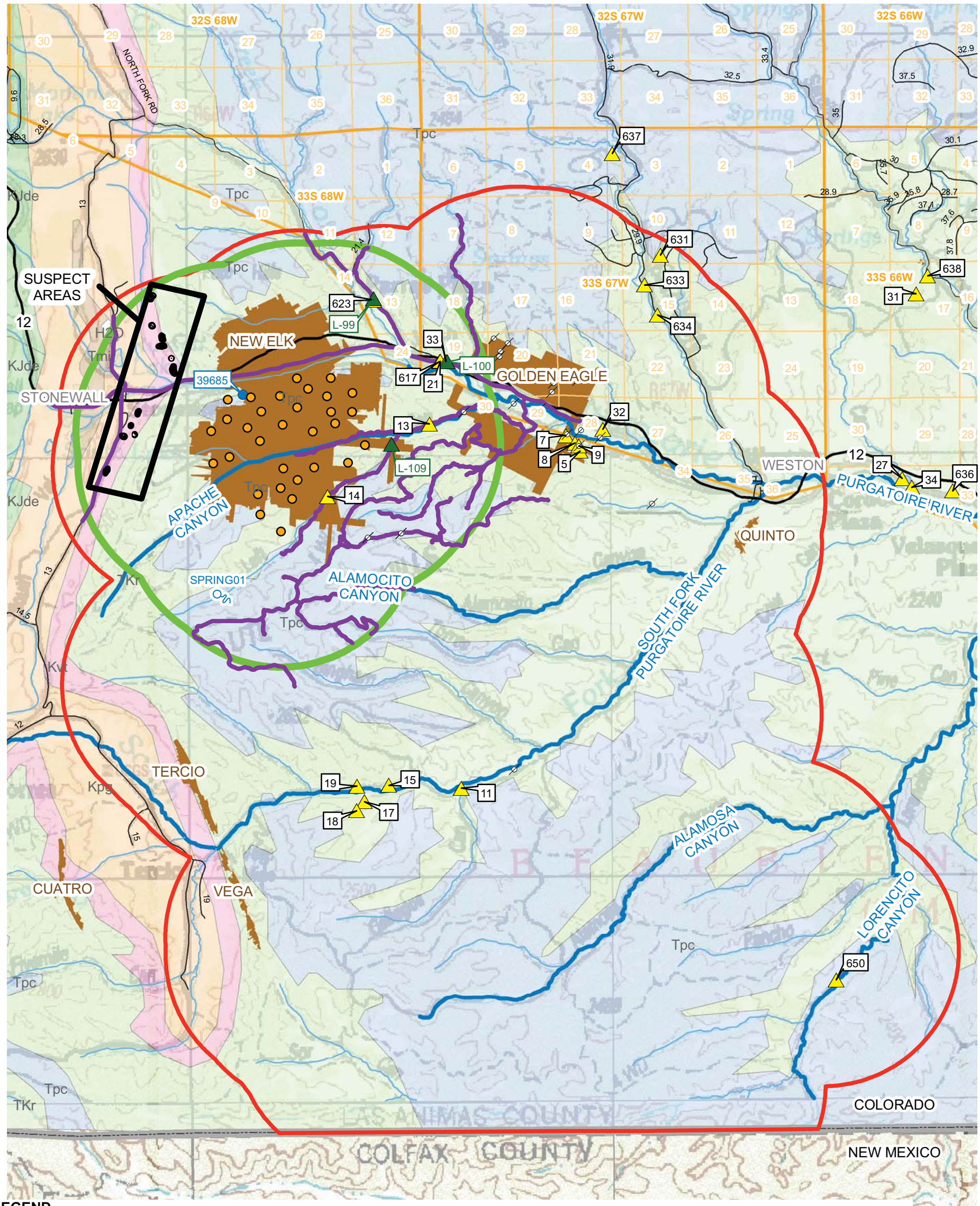

LEGEND

- 2010 PLANNED COALBED METHANE (CBM) PRODUCTION WELL
- APOGEE ID L-99 — 2010 IDENTIFIED METHANE SEEP
- APOGEE ID 5 — PREVIOUSLY IDENTIFIED METHANE SEEP
- ABANDONED WELL
- PERMIT # — WATER WELL (0.5 MILES OF 2010 PLANNED/DRILLED CBM WELL)
- SPRING01 — SPRING
- SUSPECT AREA
- 2010 PROJECT AREA
- PROJECT AREA
- COLORADO STATE LINE
- TOWNSHIP AND RANGE LINES
- LEWICKI MINE BOUNDARIES

GEOLOGIC CONTACTS (TWETO, 1979)

- Tmi - MIDDLE TERTIARY INTRUSIVE ROCKS
- Tpc - POISON CANYON FORMATION
- TKr - RATON FORMATION
- Kvt - VERMEJO FORMATION
- Kpg - PIERRE SHALE FORMATION
- KJde - DAKOTA FORMATION
- P[Ps - SANGRE DE CRISTO FORMATION

- ROAD
- 2010 APOGEE SURVEY ROUTE
- OTHER WATER SOURCE
- MAJOR DRAINAGE

IMAGE COURTESY OF USGS, 1983

0 1.5 3
Miles

N

FIGURE 2
2010 PROJECT AREA MAP
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO

XTO ENERGY, INC

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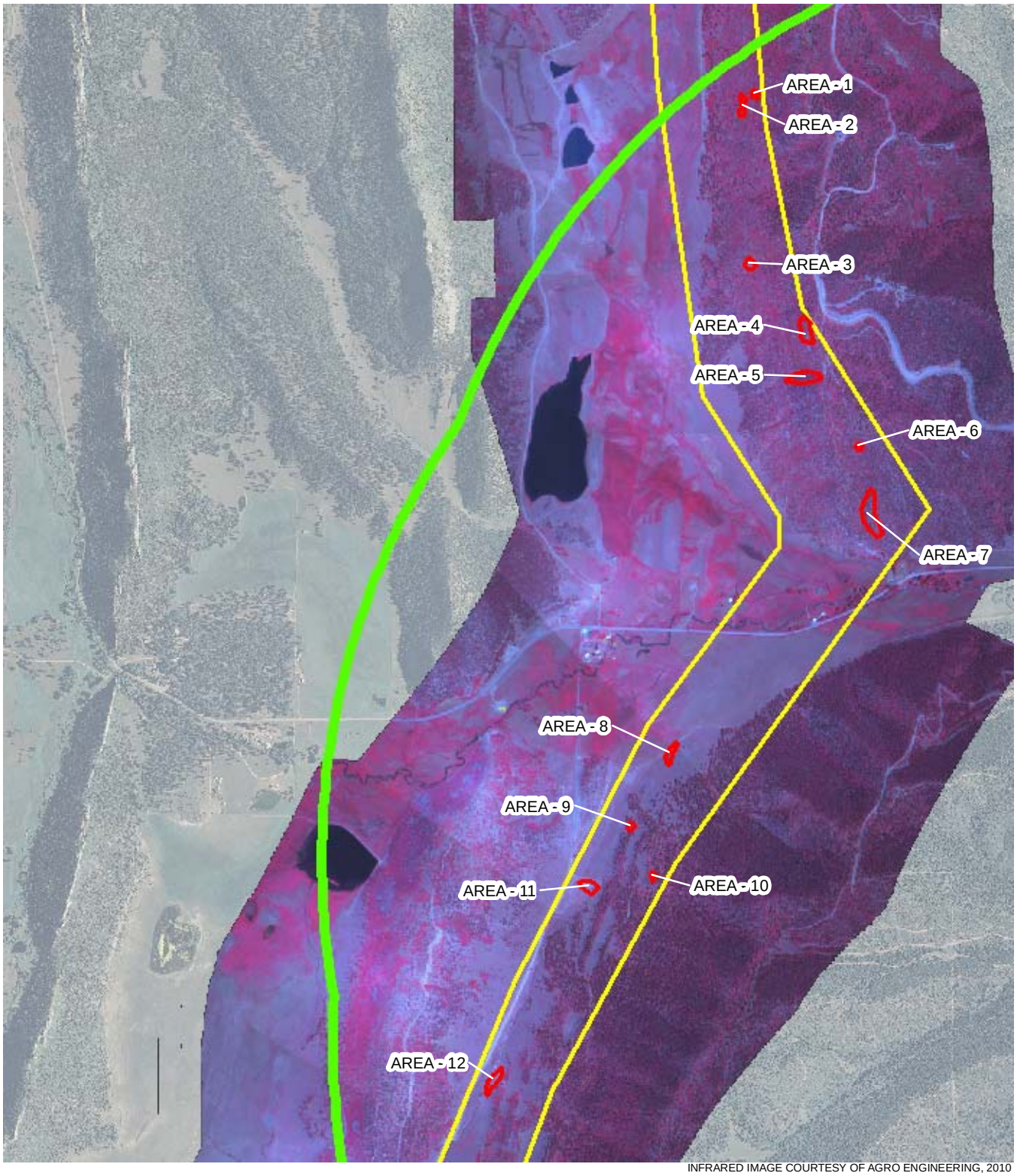

INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2010

0 2,000 4,000
Feet

N

LEGEND

SUSPECT AREAS

2010 PROJECT AREA

Kvt - VERMEJO FORMATION BOUNDARY

GAS SEEP SURVEY PERFORMED ON SEPTEMBER 8, 2010

FIGURE 3
INFRARED IMAGE OF VERMEJO FORMATION
SUSPECT SEEP AREAS
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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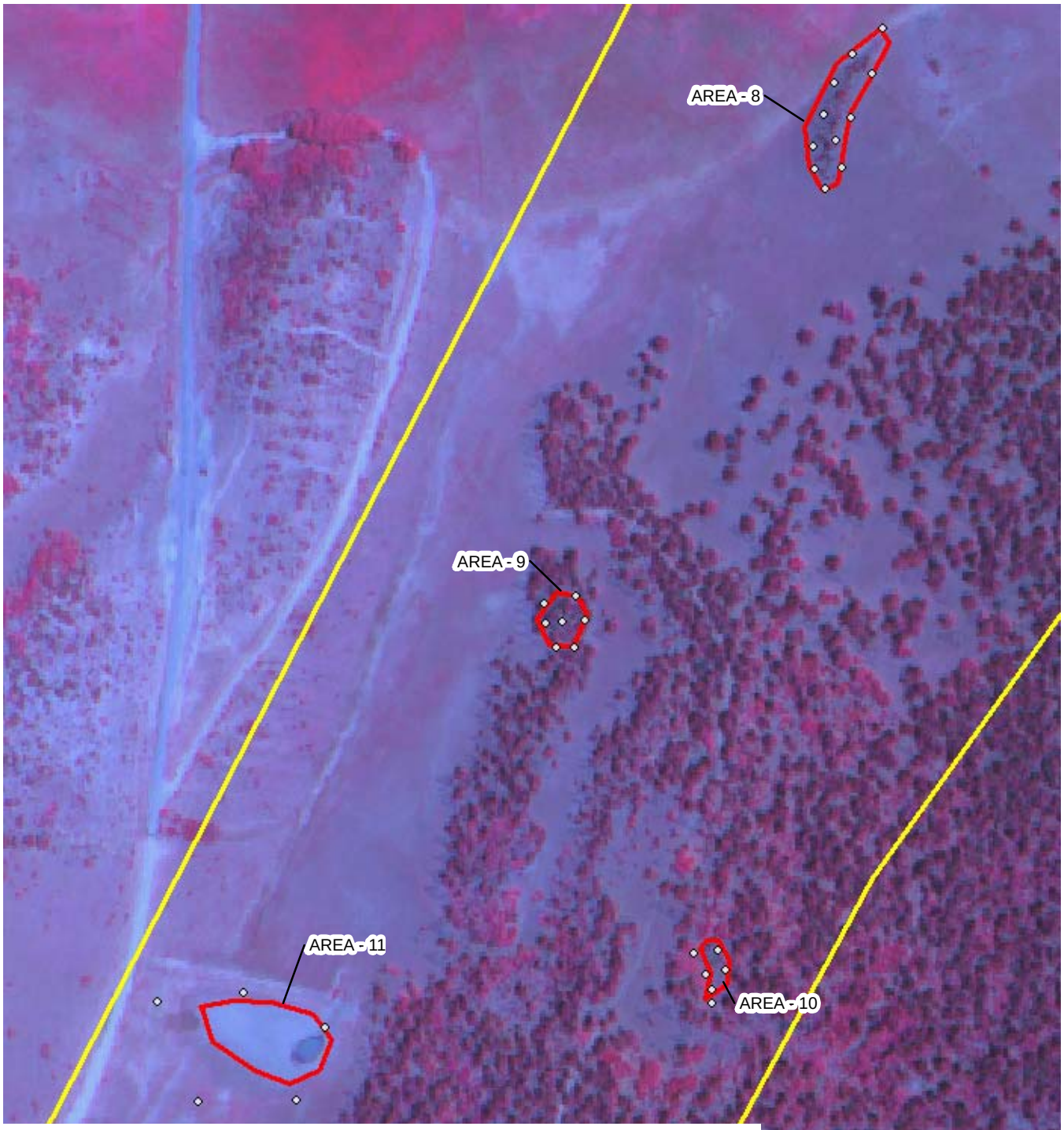

LEGEND

SUBSURFACE METHANE MEASUREMENTS

- 0 PARTS PER MILLION (ppm)
- 1 ppm - 500 ppm
- 501 ppm - 5 PERCENT (%)
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

Kvt - VERMEJO FORMATION BOUNDARY

SUSPECT AREA

GAS SEEP SURVEY PERFORMED ON SEPTEMBER 8, 2010

INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2010

0 300 600

Feet

N

FIGURE 4
DETAILED SUSPECT AREA MAP
AREAS 8 THROUGH 11
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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LEGEND

SUBSURFACE METHANE MEASUREMENTS

- 0 PARTS PER MILLION (ppm)
- 1 ppm - 500 ppm
- 501 ppm - 5 PERCENT (%)
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

GAS SEEP SURVEY PERFORMED ON SEPTEMBER 8, 2010

Kvt - VERMEJO FORMATION BOUNDARY

SUSPECT AREA

INFRARED IMAGE COURTESY OF AGRO ENGINEERING, 2010

0 200 400

Feet

N

FIGURE 5
DETAILED SUSPECT AREA MAP
AREA 12
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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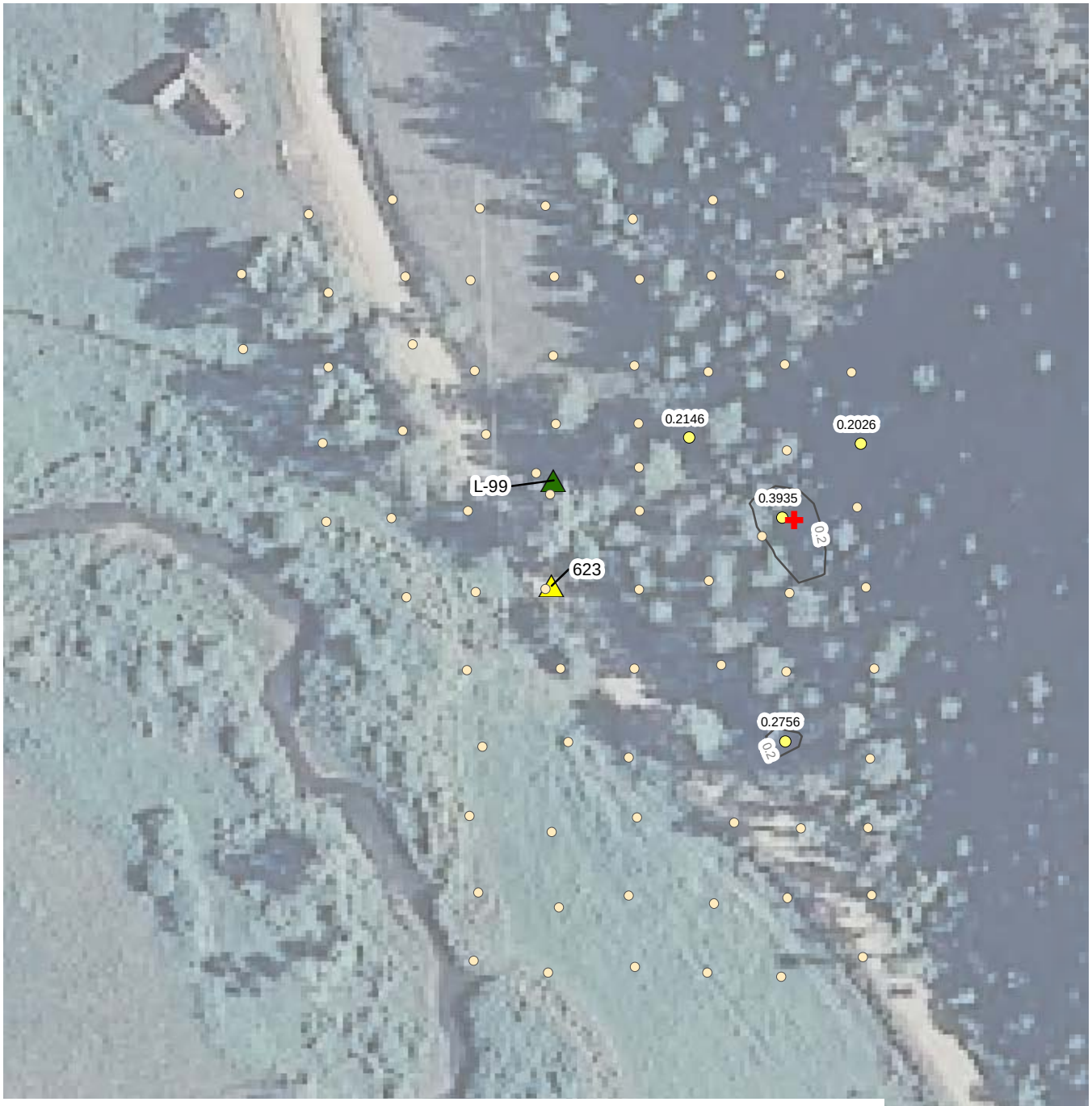

LEGEND

METHANE (CH_4) FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.50001 - 1.0000
- 1.0001 - 10.0000
- 10.001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

CH_4 FLUX CONTOUR (mol/m^2 • day)

CONTOUR INTERVAL VARIES

mol/m^2 • day - MOLES PER SQUARE METER PER DAY
CH_4 LESS THAN 0.2 mol/m^2 • day IS NOT LABELED

GAS SEEP SURVEY PERFORMED ON AUGUST 10 & 12-13, 2010

APOGEE ID L-99
2010 IDENTIFIED METHANE SEEP

APOGEE ID 623
PREVIOUSLY IDENTIFIED METHANE SEEP

GAS SAMPLE

0 100 200
Feet

IMAGE COURTESY OF USDA/NRCS, 2009

N

FIGURE 6
METHANE FLUX CONTOURS
APOGEE ID 623/L-99
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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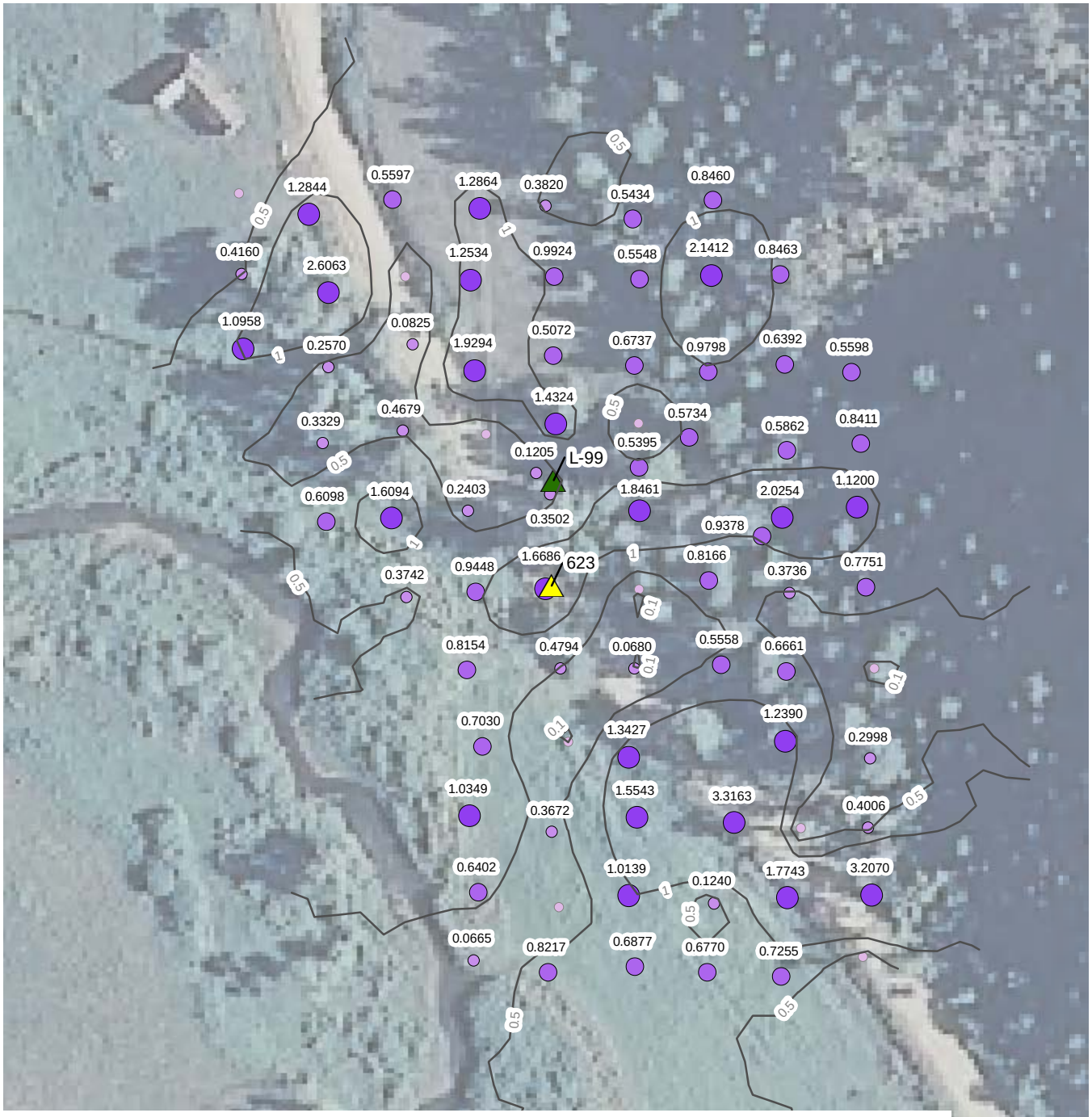

LEGEND

CARBON DIOXIDE (CO_2) FLUX MEASUREMENT ($mol/m^2 \cdot day$)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 25.0000

CO_2 FLUX CONTOUR ($mol/m^2 \cdot day$)
CONTOUR INTERVAL VARIES

APOGEE ID L-99
2010 IDENTIFIED METHANE SEEP

APOGEE ID 623
PREVIOUSLY IDENTIFIED METHANE SEEP

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

$mol/m^2 \cdot day$ - MOLES PER SQUARE METER PER DAY
CO_2 EQUAL TO 0.0000 $mol/m^2 \cdot day$ IS NOT LABELED

GAS SEEP SURVEY PERFORMED ON AUGUST 10 & 12-13, 2010

FIGURE 7
CARBON DIOXIDE FLUX CONTOURS
APOGEE ID 623/L-99
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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LEGEND

METHANE (CH_4) FLUX MEASUREMENT ($mol/m^2 \cdot day$)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.50001 - 1.0000
- 1.0001 - 10.0000
- 10.001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

CH_4 FLUX CONTOUR ($mol/m^2 \cdot day$)
CONTOUR INTERVAL VARIES

$mol/m^2 \cdot day$ - MOLES PER SQUARE METER PER DAY
CH_4 LESS THAN 0.2 $mol/m^2 \cdot day$ IS NOT LABELED

GAS SEEP SURVEY PERFORMED ON AUGUST 10 &13 & SEPTEMBER 8-9, 2010

APOGEE ID L-99
2010 IDENTIFIED METHANE SEEP

APOGEE ID 623
PREVIOUSLY IDENTIFIED METHANE SEEP

GAS SAMPLE

0 150 300
Feet

IMAGE COURTESY OF USDA/NRCS, 2009

N

FIGURE 8
METHANE FLUX CONTOURS
APOGEE IDS 21/617 AND 33/L-100
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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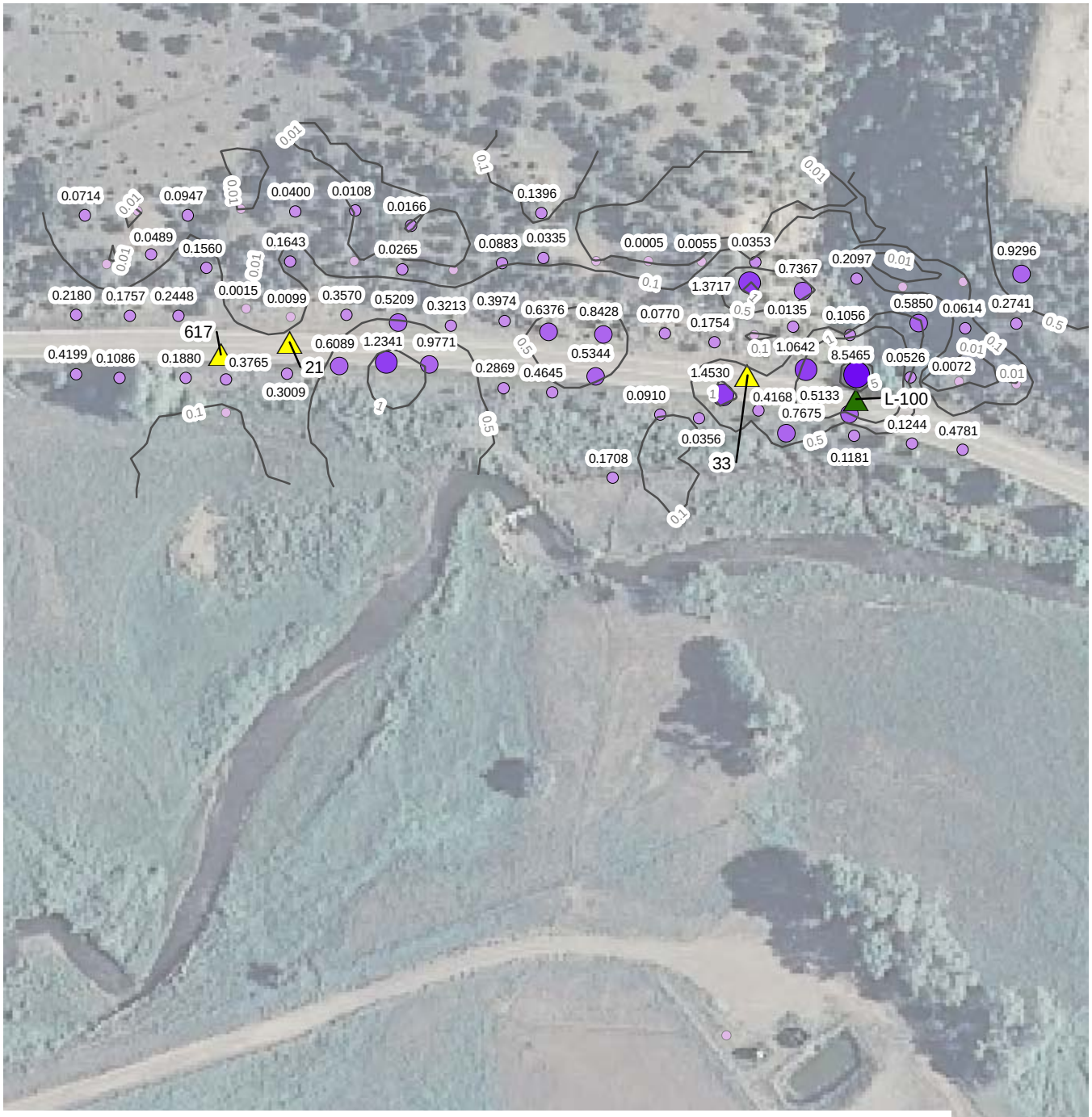

LEGEND

CARBON DIOXIDE (CO_2) FLUX MEASUREMENT (mol/m^2 • day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 25.0000

CO_2 FLUX CONTOUR (mol/m^2 • day)

CONTOUR INTERVAL VARIES

APOGEE ID L-99
2010 IDENTIFIED METHANE SEEP

APOGEE ID 623
PREVIOUSLY IDENTIFIED METHANE SEEP

IMAGE COURTESY OF USDA/NRCS, 2009

0 150 300
Feet

N

mol/m^2 • day - MOLES PER SQUARE METER PER DAY
CO_2 EQUAL TO 0.0000 mol/m^2 • day IS NOT LABELED

GAS SEEP SURVEY PERFORMED ON AUGUST 10 &13 & SEPTEMBER 8-9, 2010

FIGURE 9
CARBON DIOXIDE FLUX CONTOURS
APOGEE IDS 21/617 AND 33/L-100
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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LEGEND

METHANE (CH_4) FLUX MEASUREMENT ($mol/m^2 \cdot day$)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.50001 - 1.0000
- 1.0001 - 10.0000
- 10.001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

CH_4 FLUX CONTOUR ($mol/m^2 \cdot day$)

CONTOUR INTERVAL VARIES

$mol/m^2 \cdot day$ - MOLES PER SQUARE METER PER DAY
CH_4 LESS THAN 0.2 $mol/m^2 \cdot day$ IS NOT LABELED

GAS SEEP SURVEY PERFORMED ON AUGUST 10, 2010

APOGEE ID L-99
2010 IDENTIFIED METHANE SEEP

APOGEE ID 623
PREVIOUSLY IDENTIFIED METHANE SEEP

GAS SAMPLE

0 100 200
Feet

IMAGE COURTESY OF USDA/NRCS, 2009

N

FIGURE 10
METHANE FLUX CONTOURS
APOGEE ID 13
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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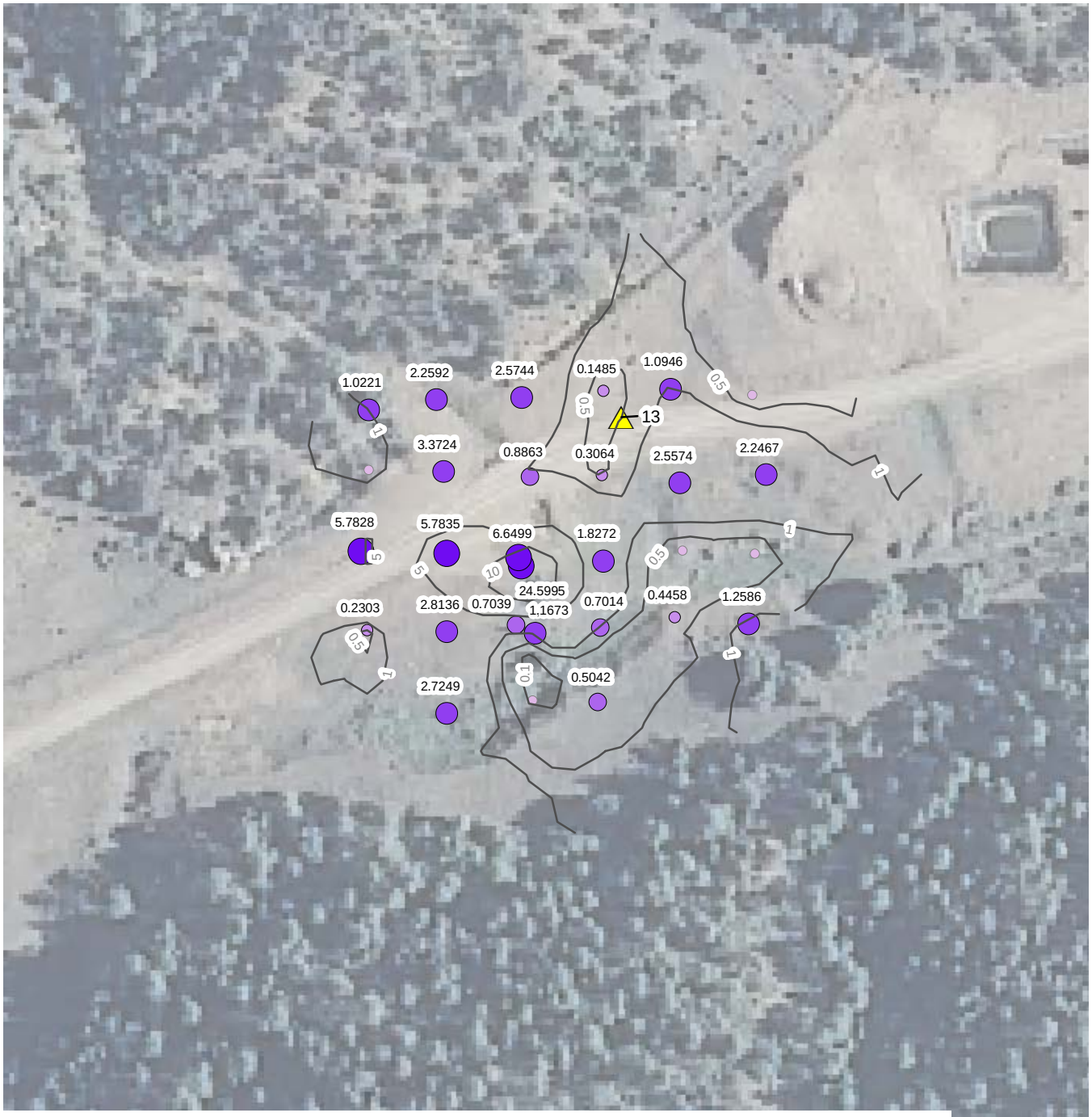

LEGEND

CARBON DIOXIDE (CO_2) FLUX MEASUREMENT (mol/m^2 • day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 25.0000

CO_2 FLUX CONTOUR (mol/m^2 • day)

CONTOUR INTERVAL VARIES

APOGEE ID L-99
2010 IDENTIFIED METHANE SEEP

APOGEE ID 623
PREVIOUSLY IDENTIFIED METHANE SEEP

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

mol/m^2 • day - MOLES PER SQUARE METER PER DAY
CO_2 EQUAL TO 0.0000 mol/m^2 • day IS NOT LABELED

GAS SEEP SURVEY PERFORMED ON AUGUST 10, 2010

FIGURE 11
CARBON DIOXIDE FLUX CONTOURS
APOGEE ID 13
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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LEGEND

METHANE (CH_4) FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.50001 - 1.0000
- 1.0001 - 10.0000
- 10.001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

CH_4 FLUX CONTOUR (mol/m^2 • day)

CONTOUR INTERVAL VARIES

mol/m^2 • day - MOLES PER SQUARE METER PER DAY
CH_4 LESS THAN 0.2 mol/m^2 • day IS NOT LABELED

GAS SEEP SURVEY PERFORMED ON AUGUST 10-11, 2010

APOGEE ID L-99
2010 IDENTIFIED METHANE SEEP

APOGEE ID 623
PREVIOUSLY IDENTIFIED METHANE SEEP

GAS SAMPLE

0 100 200
Feet

IMAGE COURTESY OF USDA/NRCS, 2009

N

FIGURE 12
METHANE FLUX CONTOURS
APOGEE ID L-109
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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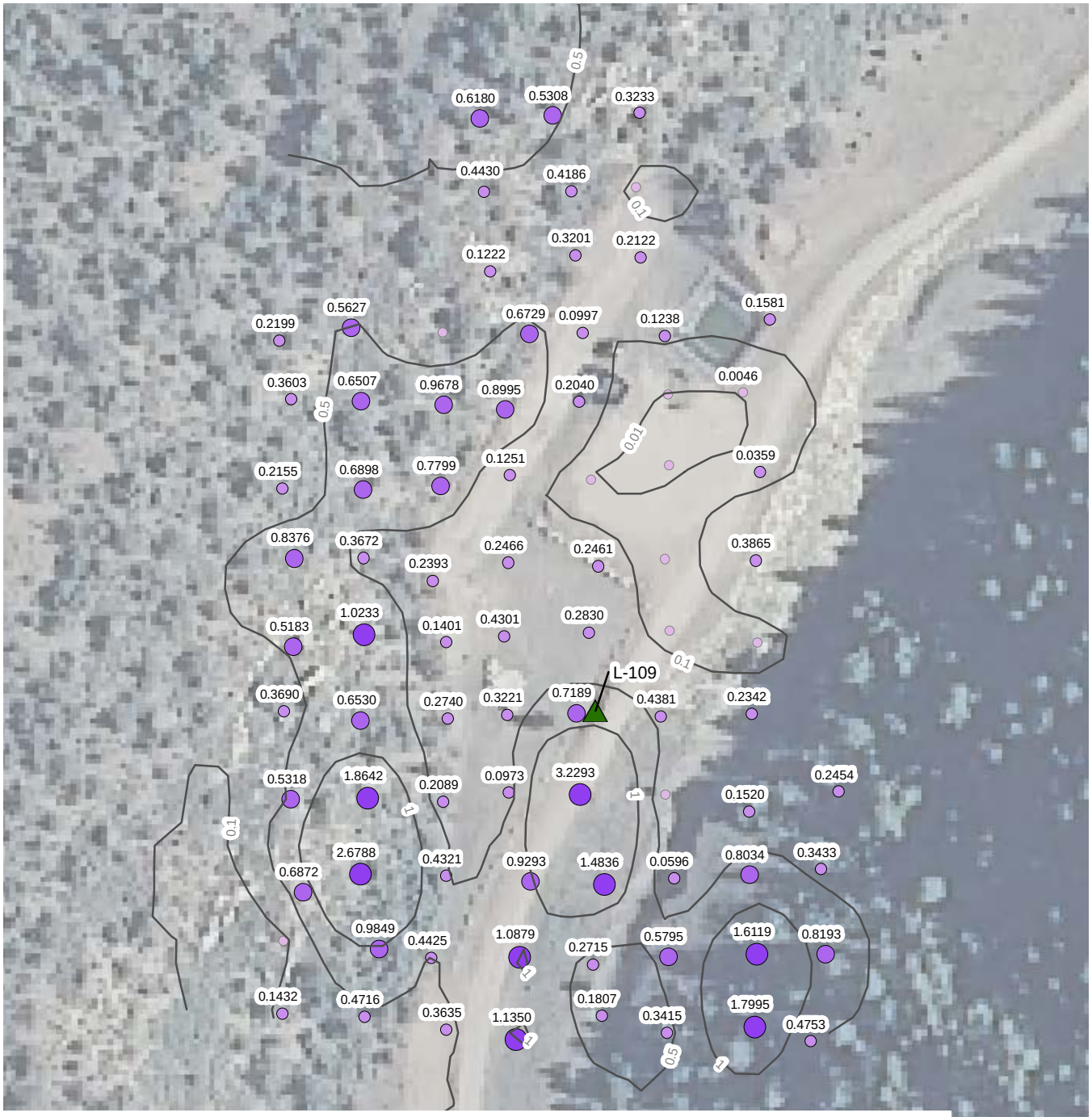

LEGEND

CARBON DIOXIDE (CO_2) FLUX MEASUREMENT (mol/m^2 • day)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 25.0000

CO_2 FLUX CONTOUR (mol/m^2 • day)

CONTOUR INTERVAL VARIES

APOGEE ID L-99
2010 IDENTIFIED METHANE SEEP

APOGEE ID 623
PREVIOUSLY IDENTIFIED METHANE SEEP

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

mol/m^2 • day - MOLES PER SQUARE METER PER DAY
CO_2 EQUAL TO 0.0000 mol/m^2 • day IS NOT LABELED

GAS SEEP SURVEY PERFORMED ON AUGUST 10-11, 2010

FIGURE 13
CARBON DIOXIDE FLUX CONTOURS
APOGEE ID L-109
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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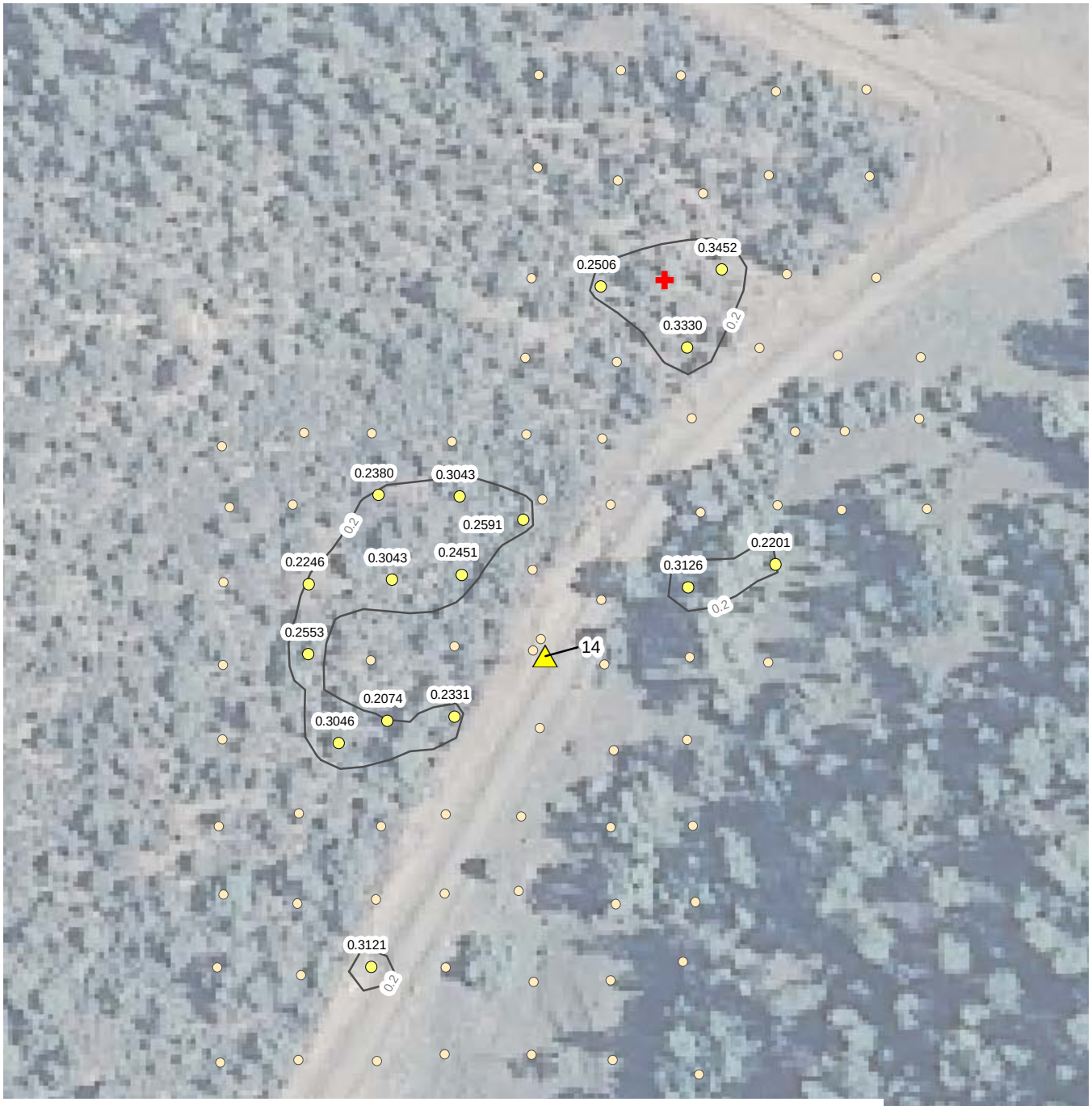

LEGEND

METHANE (CH_4) FLUX MEASUREMENT (mol/m ^{2} • day)

- 0.0000 - 0.1999
- 0.2000 - 0.5000
- 0.50001 - 1.0000
- 1.0001 - 10.0000
- 10.001 - 50.0000
- 50.0001 - 100.0000
- 100.0001 - 200.0000

CH_4 FLUX CONTOUR (mol/m^2 • day)

CONTOUR INTERVAL VARIES

mol/m^2 • day - MOLES PER SQUARE METER PER DAY
CH_4 LESS THAN 0.2 mol/m^2 • day IS NOT LABELED

GAS SEEP SURVEY PERFORMED ON AUGUST 11-12, 2010

APOGEE ID L-99
2010 IDENTIFIED METHANE SEEP

APOGEE ID 623
PREVIOUSLY IDENTIFIED METHANE SEEP

GAS SAMPLE

0 100 200
Feet

IMAGE COURTESY OF USDA/NRCS, 2009

N

FIGURE 14
METHANE FLUX CONTOURS
APOGEE ID 14
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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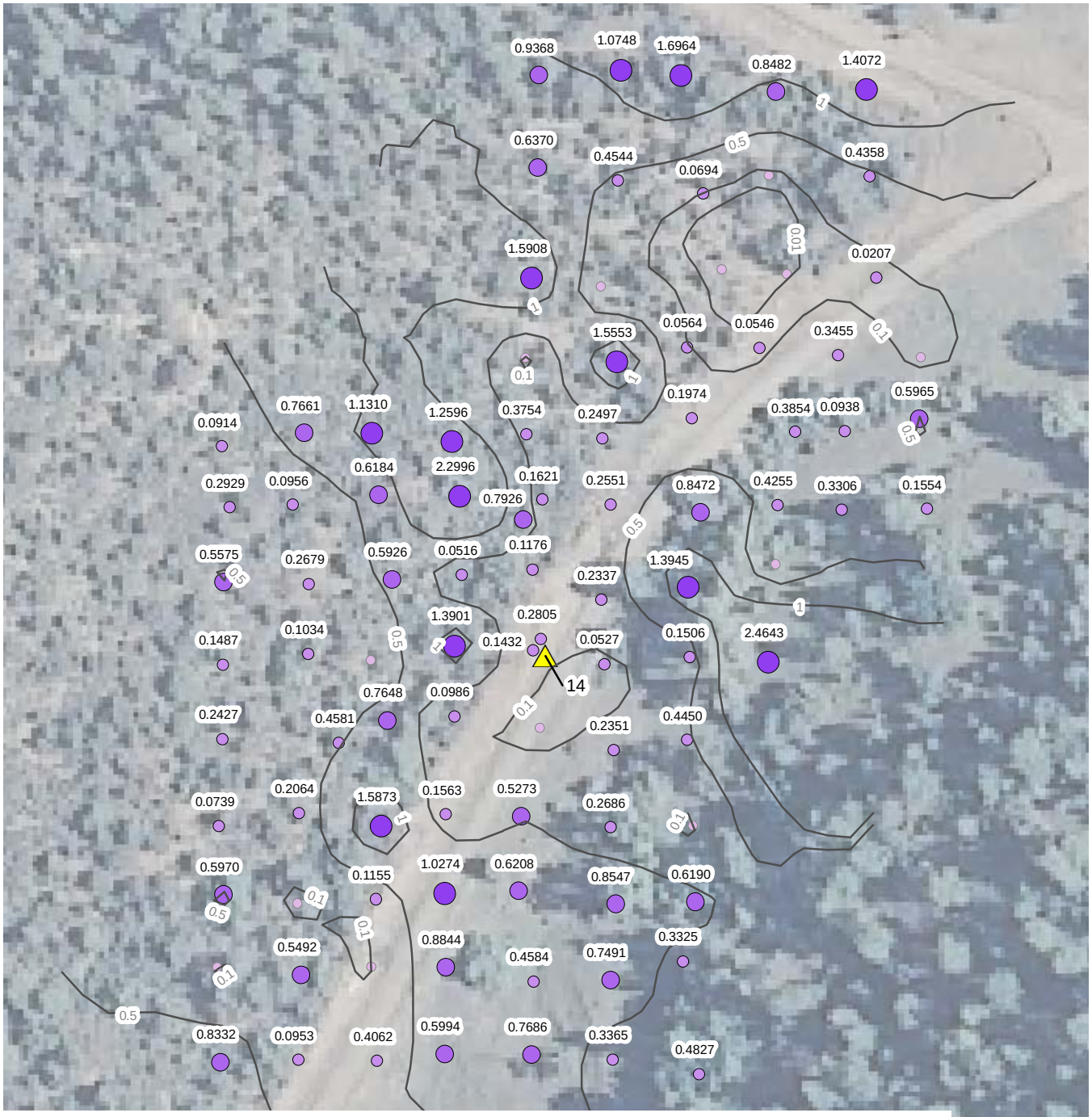

LEGEND

CARBON DIOXIDE (CO_2) FLUX MEASUREMENT ($mol/m^2 \cdot day$)

- 0.0000 - 0.0100
- 0.0101 - 0.5000
- 0.5001 - 1.0000
- 1.0001 - 5.0000
- 5.0001 - 25.0000

CO_2 FLUX CONTOUR ($mol/m^2 \cdot day$)

CONTOUR INTERVAL VARIES

APOGEE ID L-99
2010 IDENTIFIED METHANE SEEP

APOGEE ID 623
PREVIOUSLY IDENTIFIED METHANE SEEP

IMAGE COURTESY OF USDA/NRCS, 2009

0 100 200
Feet

N

$mol/m^2 \cdot day$ - MOLES PER SQUARE METER PER DAY
CO_2 EQUAL TO 0.0000 $mol/m^2 \cdot day$ IS NOT LABELED

GAS SEEP SURVEY PERFORMED ON AUGUST 11-12, 2010

FIGURE 15
CARBON DIOXIDE FLUX CONTOURS
APOGEE ID 14
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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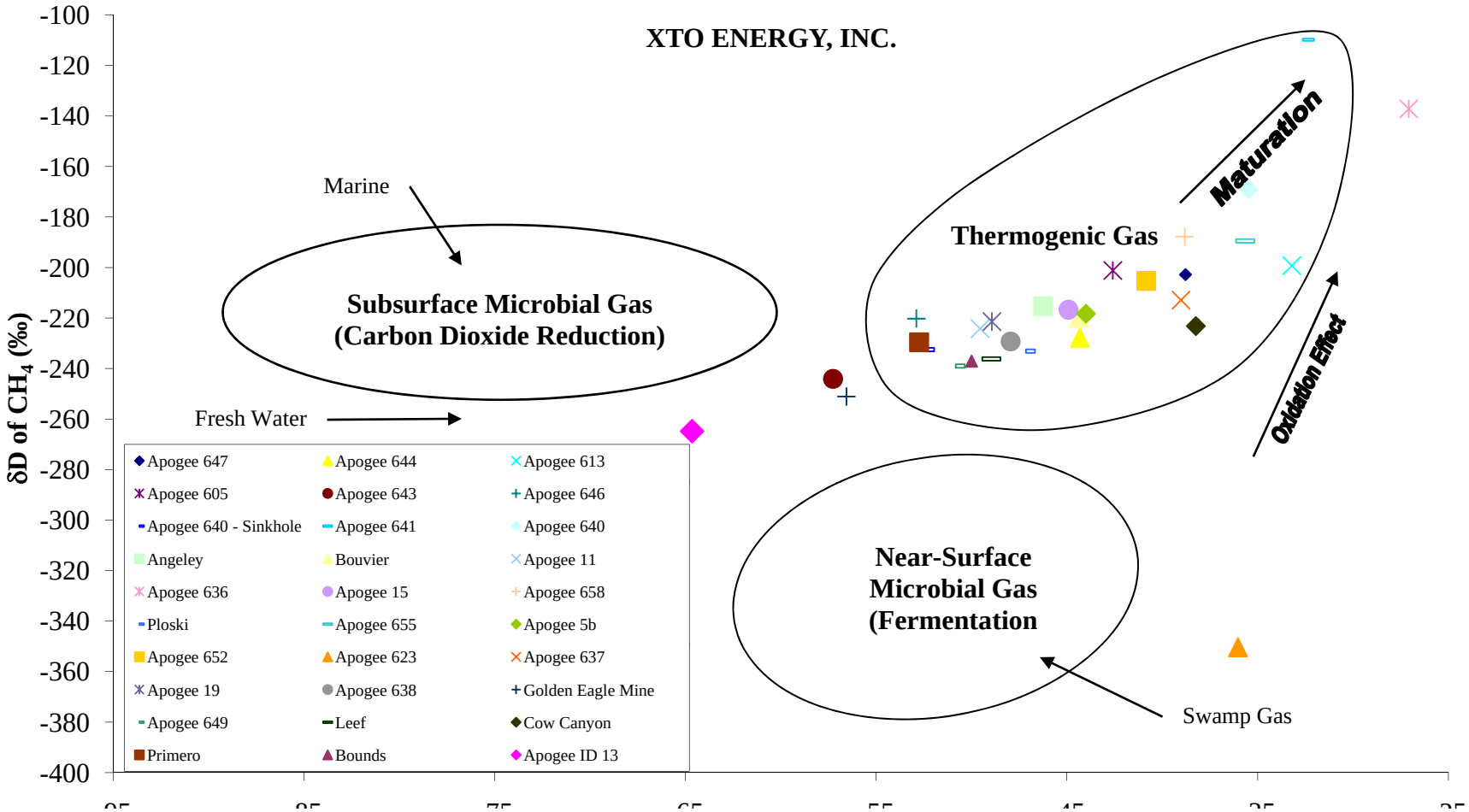
FIGURE 16
ISOTOPIC ANALYSIS - APOGEE ID 13
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO



Source: Coleman et al., 1995

IMAGE COURTESY OF USDA/NRCS, 2009

LEGEND

SPRING

SUBSURFACE METHANE MEASUREMENTS

- 0 PARTS PER MILLION (ppm)
- 1 ppm - 500 ppm
- 501 ppm - 5 PERCENT (%)
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

GAS SEEP SURVEY PERFORMED ON SEPTEMBER 7, 2010

0 100 200

Feet

N

FIGURE 17
NATURAL SPRING LOCATION MAP
NORTH FORK APACHE CANYON NATURAL SPRING
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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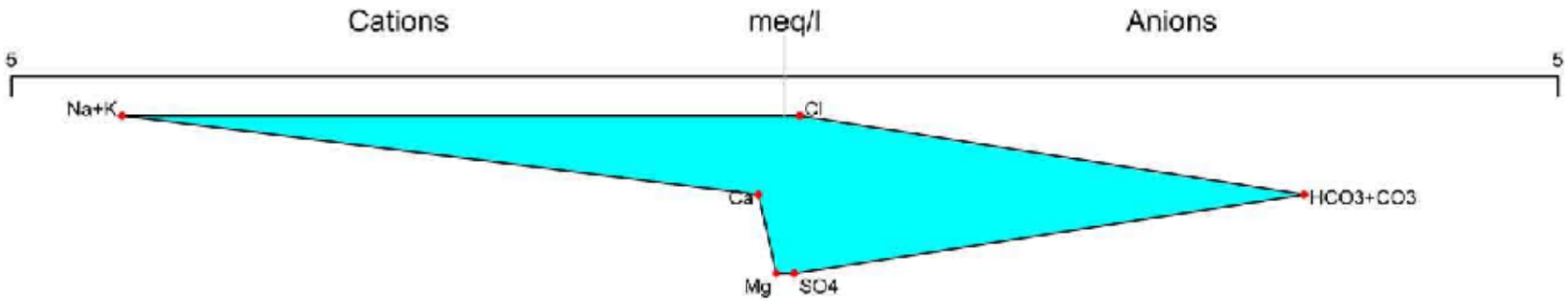

FIGURE 18
STIFF DIAGRAM
NORTH FORK APACHE CANYON NATURAL SPRING
COLORADO RULE 608 COMPLIANCE REPORT
RATON BASIN, LAS ANIMAS COUNTY, COLORADO
XTO ENERGY, INC.

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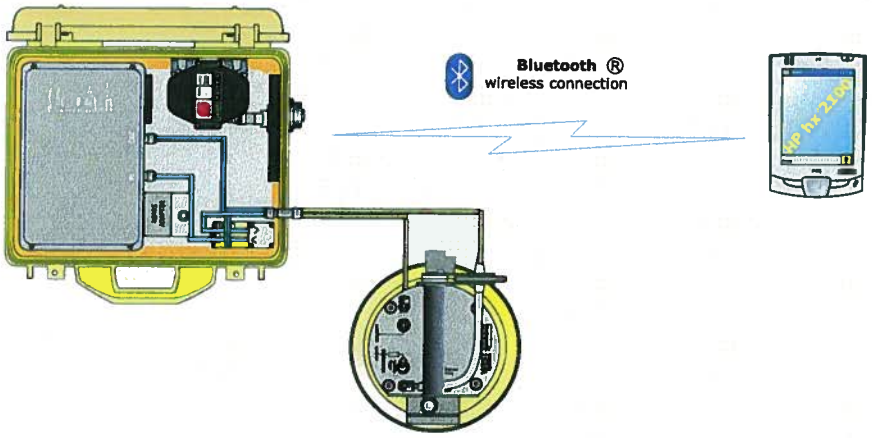
APPENDIX A

EQUIPMENT SPECIFICATIONS

WEST Systems portable soil flux meter

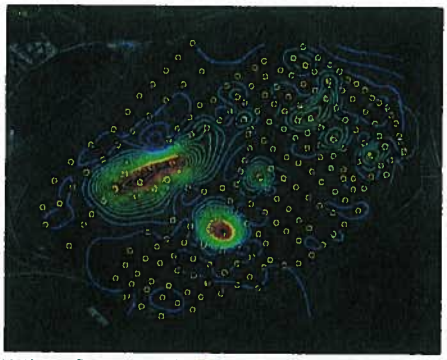
for Carbon dioxide, Methane and Hydrogen sulfide fluxes

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

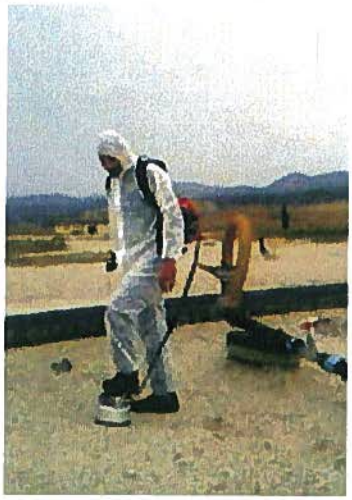
Palm top computer: PocketPC Color Display based on Windows Mobile operating system.
- PalmTop with cables, 0.3 Kg/0.7 lbs.
- Size 125mm (4.8") x 82mm (3.2") * 25 mm (1").

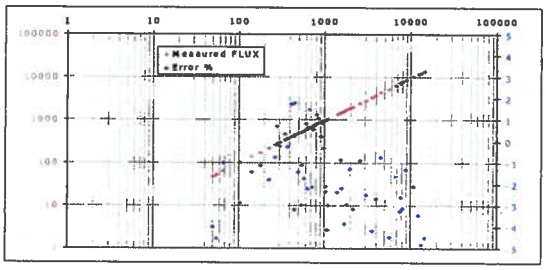
Software The instrument is supplied with a custom software, FluxManager, which allows recording and visualization of the increase in concentration of the target gas in the accumulation chamber, and then the flux calculations. The obtained measurements can be saved on the palmtop computer and then transferred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

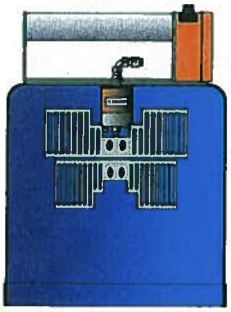
Finally we improved the connection between the instrument and the palmtop that now is based on BlueTooth wireless embedded device.





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 landifll.



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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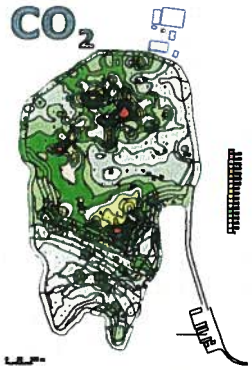


CO_2 - LI820

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.

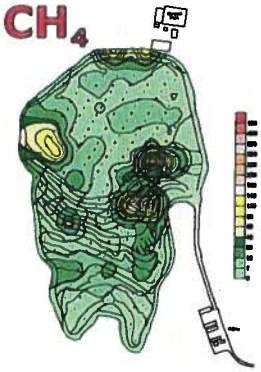
The precision depends on the measured flux:

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%)



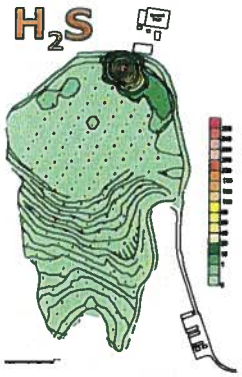
WS-HC CH^4

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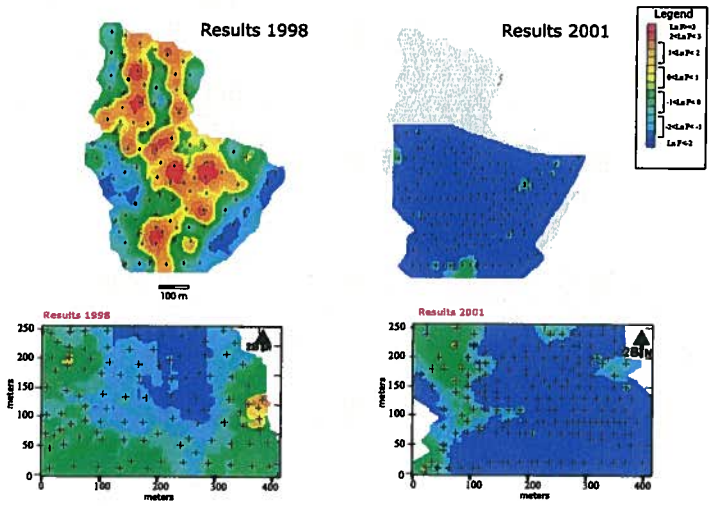
Application on a landfill: mapping the biogas non controlled emissions.

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.

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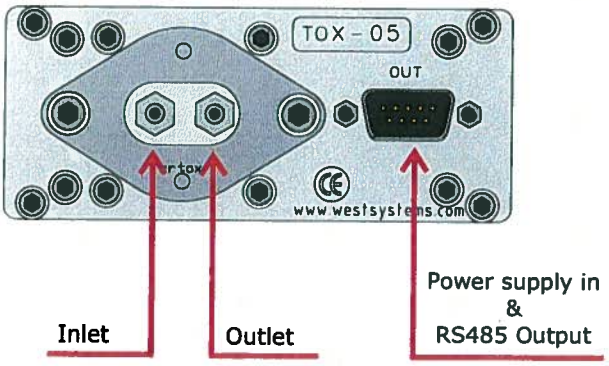
WEST Systems
West Systems Srl
Via Molise 3 - Zona Ind. Gello - 56025 Pontedera (PI) Italy
Phone +39 0587 294216 www.westsystems.com
Fax +39 0587 296068 g.virgili@westsystems.com

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)

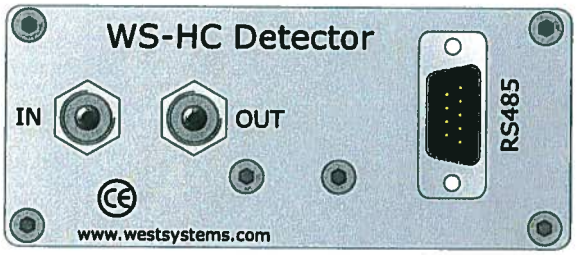
Full scale range is 50000 ppm of methane.

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

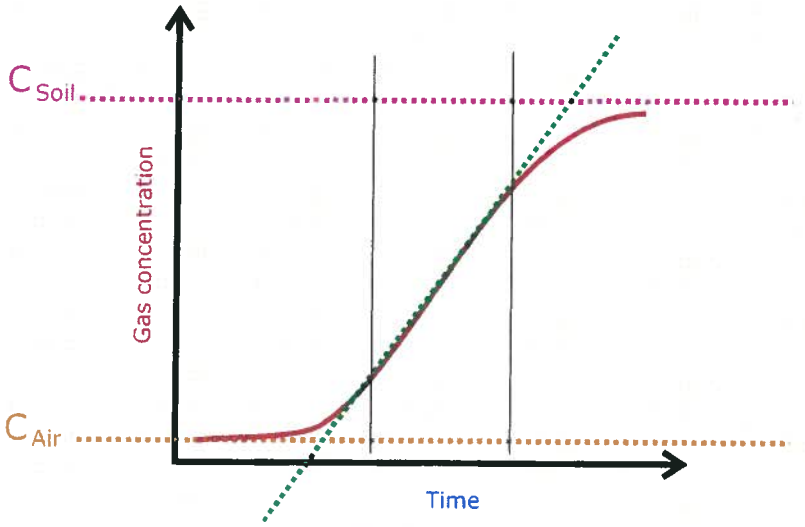
Relative Humidity Range: 0 to 95% RH, Non-Condensing

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}
- **T_k** is the air temperature expressed in Kelvin degree
- **V** is the chamber net volume in cubic meters
- **A** is the chamber inlet net area in square meters.

The dimensions of the A.c.K. are

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

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

An example:

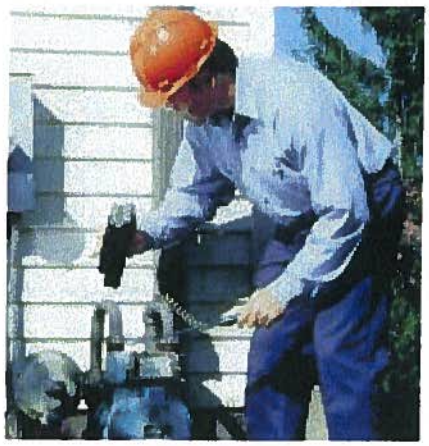
You're using the accumulation chamber B, the slope of the flux curve is 2.5 ppm/sec, the barometric pressure is 1008 mBar (HPa) and the air temperature is 22 °C.
From the table B get the value that correspond to the barometric pressure and temperature. In this case I get the value computed for 25°C and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

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

Gasport® Gas Tester

MSA

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



Applications

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

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

Features and Benefits

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

Specifications

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

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

The answer for gas utilities' gas detection needs

Gasport® Gas Tester

Ordering Information

Battery Chargers

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

Battery Packs

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

Sensors

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

Protective Boots

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

Sampling Equipment

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

Sampling Accessories

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

Calibration Check Equipment

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

Accessories

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

Approvals

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

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

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

Gasport Gas Tester Kits

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

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

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

ID 08-04-27-MC / May 2000

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MSA International
Phone (412) 967-3354
FAX (412) 967-3451

Offices and representatives worldwide
For further information:

MSA

GeoXT

The total GPS platform for all your GIS field requirements

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

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

High-accuracy integrated GPS

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

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

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

Optimized productivity

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

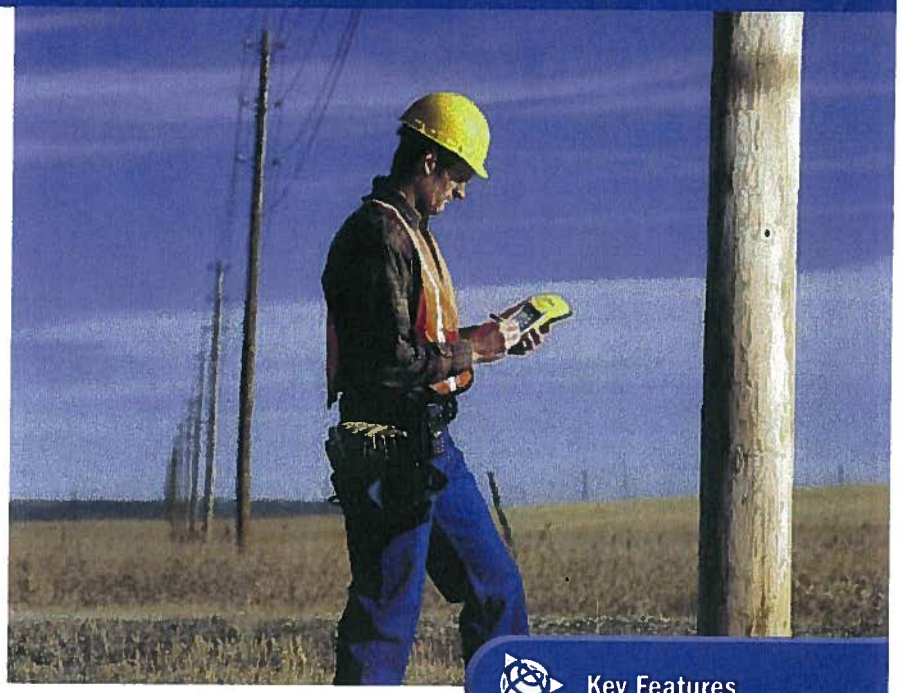
Windows Mobile includes familiar Microsoft productivity tools, including Pocket Word, Pocket Excel, and Pocket Outlook®. Pocket Outlook lets you synchronize e-mails, contacts, appointments, and data with your office computer, so whether you're in the office or in the field, you're always up to date.

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

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

All the memory you need

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



Key Features

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

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

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

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

Trimble.

GeoXT

The total GPS platform for all your GIS field requirements

Standard features

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

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

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

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

Optional Features

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

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

Specifications subject to change without notice.

Technical specifications

Physical

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

Environmental

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

Input/output

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

GPS

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

Accuracy (RMS)[4] after differential correction

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

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

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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

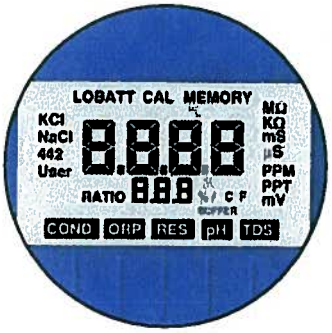
Built-in IR Port allows you to conveniently download your data to a computer. **(Requires Myron L uDock™ Accessory Package)**

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: SS20Z, SSQ and SSG

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

Hard protective case (small)
MODEL: UPP

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

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

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

Built on Trust

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

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 B

APOGEE SCIENTIFIC, INC - GROUND SURVEY OF SELECTED AREAS IN THE RATON BASIN FOR METHANE ANOMOLIES

Ground Survey of Selected Areas in the Raton Basin for Methane Anomalies

June 30, 2010

Prepared by:

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Prepared for:

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4600 West 60th Avenue
Arvada, Colorado 80003

Introduction

Apogee Scientific, Inc. (ASI) conducted a ground methane survey of selected areas in the Raton Basin for LT Environmental, Inc. in order to help locate methane gas seeps in the area. The one day survey was conducted on June 15, 2010 using a 4-wheel drive vehicle equipped with an infrared-based gas detector developed by ASI. This gas detector was designed to find leaks in natural gas pipelines, and is referred to as the Apogee Leak Detection System (LDS). The LDS is a three-channel instrument capable of measuring methane (CH_4), total hydrocarbons (HC) and carbon dioxide (CO_2) at sub part per million (PPM) concentrations and a speed of 10 samples per second. The vehicle was also equipped with a Global Positioning System (GPS) based navigation system and a wind speed and wind direction sensor. Additional information on the LDS is available at http://apogee-sci.com/LDS.html.

The LDS was mounted in the rear of the survey vehicle. Ambient air was collected at the front of the vehicle at a height of approximately 1 feet above the ground, passed through a filter to remove particles and other debris from the air stream, and was carried to the LDS through 2 inch diameter pipe. The delay time between gas entering the entrance of the collection system and being detected by the LDS was approximately 1 second.

The survey vehicle was driven on all public roads on the survey area (Figure 1). Any increase in ambient methane concentration above the local background was investigated. If an obvious cause for the methane anomaly was found, such as an upwind gas well, cow pasture or swamp, the anomaly was tagged as such.

The survey vehicle was stopped at approximately 30 minute intervals to allow collection of wind speed and direction data. These measurements were made in flat, open areas.

A total of 3 methane anomalies were identified that appear to be either methane seeps or venting from coal mines. All three anomalies were also detected in the 2001 or 2007 surveys conducted by ASI. It is interesting to note that the peak methane concentration measured at these methane seep locations is lower than what was measured in 2007 which were lower than those measured on 2001. The cause of the apparent downward trend in methane concentrations is unknown.

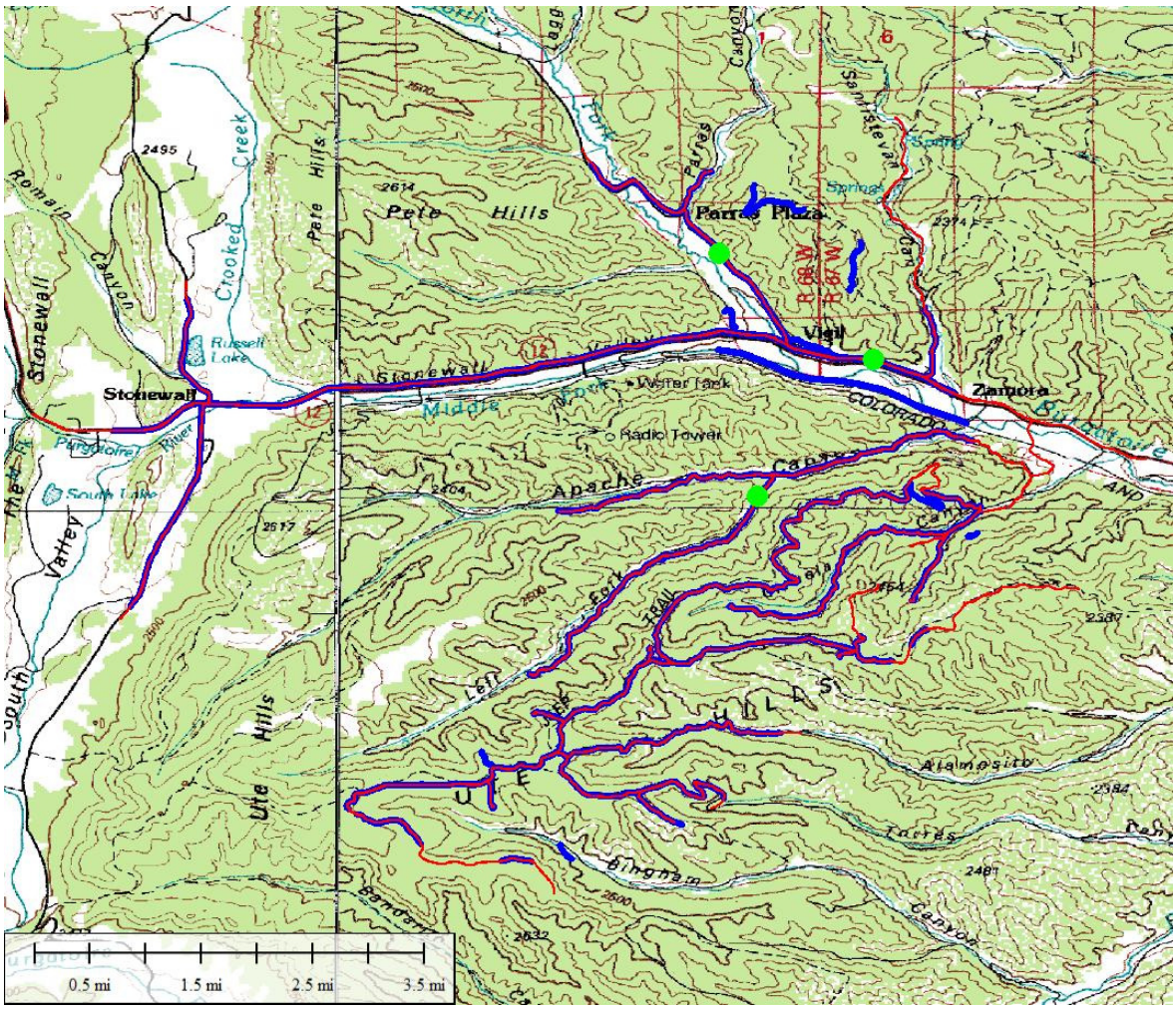

Figure 1. The roads driven by the survey vehicle for this survey (red lines), the route driven during the 2007 survey (blue lines) and the locations of the methane seeps (green dots).

Table 1. Supplemental Data

Filename	Description
Seeps.ZIP	A ZIP file containing an ESRI shapefile of the potential methane seep locations.
Seeps.xls	An EXCEL spreadsheet containing information about the potential methane seep locations.
WindData.ZIP	A ZIP file containing an ESRI shapefile of the wind speed and direction data. The wind speed is in units of miles per hour and wind direction is in degrees.
WindData.xls	An EXCEL spreadsheet containing wind speed and direction data.
Track.ZIP	A ZIP file containing an ESRI shapefile of the path driven by the survey vehicle.

Note: All shapefiles use the WGS84 geographic coordinate system with units of degrees (European Petroleum Survey Group (espg) code: 4326)

APPENDIX C

FLUX METER DATA

ContourGp	AreaAbbre	SitePt	Easting	Northing	CH4flux	CO2flux	H2Sflux	Date
Seep13	13	RB81010_2	3164487	1174580	0	2.557399	0.001567	8/10/2010
Seep13	13	RB81010_2	3164489	1174536	0.311927	0	0.002351	8/10/2010
Seep13	13	RB81010_2	3164438	1174530	0.071059	1.82715	0.00209	8/10/2010
Seep13	13	RB81010_2	3164437	1174585	0.152306	0.306441	0.002351	8/10/2010
Seep13	13	RB81010_2	3164438	1174639	0.027971	0.148482	0.001568	8/10/2010
Seep13	13	RB81010_2	3164481	1174640	0.041417	1.094559	0	8/10/2010
Seep13	13	RB81010_2	3164534	1174636	0.06999	0	0	8/10/2010
Seep13	13	RB81010_2	3164543	1174585	0.045527	2.246688	0.001561	8/10/2010
Seep13	13	RB81010_2	3164535	1174534	0.042421	0	0	8/10/2010
Seep13	13	RB81010_2	3164531	1174489	0.089527	1.258584	0.003123	8/10/2010
Seep13	13	RB81010_3	3164484	1174494	0.201147	0.445772	0.003405	8/10/2010
Seep13	13	RB81010_3	3164436	1174487	0	0.701382	0.000781	8/10/2010
Seep13	13	RB81010_3	3164381	1174488	0	0.703884	0.002611	8/10/2010
Seep13	13	RB81010_3	3164385	1174527	72.02421	24.59946	0.001566	8/10/2010
Seep13	13	RB81010_3	3164383	1174532	0	6.649914	0.001305	8/10/2010
Seep13	13	RB81010_3	3164337	1174535	0.897212	5.783531	0.000778	8/10/2010
Seep13	13	RB81010_3	3164281	1174536	0.897098	5.782794	0.000778	8/10/2010
Seep13	13	RB81010_3	3164285	1174485	0	0.230271	0.002573	8/10/2010
Seep13	13	RB81010_3	3164337	1174484	0.130684	2.813573	0.00283	8/10/2010
Seep13	13	RB81010_3	3164394	1174483	0.209484	1.167345	0.002316	8/10/2010
Seep13	13	RB81010_4	3164434	1174439	0	0.504151	0.002572	8/10/2010
Seep13	13	RB81010_4	3164392	1174440	0.032296	0	0.000513	8/10/2010
Seep13	13	RB81010_4	3164337	1174431	0.052046	2.724874	0.001795	8/10/2010
Seep13	13	RB81010_4	3164390	1174584	2.748205	0.886328	0.001538	8/10/2010
Seep13	13	RB81010_4	3164385	1174635	0	2.574376	0.001538	8/10/2010
Seep13	13	RB81010_4	3164330	1174633	0.12611	2.259213	0.001538	8/10/2010
Seep13	13	RB81010_4	3164335	1174587	0.764606	3.372416	0.001794	8/10/2010
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Seep14	14	RB81010_1	3156492	1168970	0	0.143159	0.000252	8/11/2010
Seep14	14	RB81010_1	3156442	1168972	0.139863	1.390097	0.001004	8/11/2010
Seep14	14	RB81010_1	3156388	1168963	0	0	0.001757	8/11/2010
Seep14	14	RB81010_1	3156398	1168924	0.207446	0.764816	0.000753	8/11/2010
Seep14	14	RB81010_1	3156442	1168927	0.233092	0.098606	0	8/11/2010
Seep14	14	RB81010_1	3156497	1168919	0	0	0	8/11/2010
Seep14	14	RB81010_1	3156492	1169022	0	0.117609	0.0005	8/11/2010
Seep14	14	RB81010_1	3156486	1169053	0.259107	0.792578	0.00025	8/11/2010
Seep14	14	RB81010_1	3156498	1169066	0.176323	0.162067	0	8/11/2010
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Seep14	14	RB81010_1	3156348	1169012	0.224599	0.267878	0.000995	8/11/2010
Seep14	14	RB81010_1	3156401	1169015	0.304297	0.592618	0	8/11/2010
Seep14	14	RB81010_1	3156446	1169018	0.245095	0.05156	0	8/11/2010
Seep14	14	RB81010_1	3156347	1168967	0.255307	0.103368	0	8/11/2010
Seep14	14	RB81010_1	3156367	1168910	0.304598	0.458141	0	8/11/2010
Seep14	14	RB81010_1	3156388	1168766	0.312107	0	0.000495	8/11/2010
Seep14	14	RB81010_1	3156391	1168809	0	0.115494	0	8/11/2010
Seep14	14	RB81010_1	3156394	1168856	0	1.587274	0.000743	8/11/2010
Seep14	14	RB81010_1	3156436	1168864	0.151354	0.156301	0.000989	8/11/2010

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Seep14	14	RB81010_2	3156588	1169340	0	1.696411	0.00102	8/12/2010
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Seep14	14	RB81010_2	3156746	1169060	0	0.155438	0.000768	8/12/2010
L100etal	L-100, 21,	RB81010_1	3165837	1179423	0	0.513346	0.001047	8/10/2010
L100etal	L-100, 21,	RB81010_1	3165843	1179460	0	8.546516	0.000262	8/10/2010
L100etal	L-100, 21,	RB81010_1	3165895	1179458	0	0.052624	0.001833	8/10/2010
L100etal	L-100, 21,	RB81010_2	3165943	1179454	0.197043	0.007186	0	8/13/2010
L100etal	L-100, 21,	RB81010_2	3165948	1179505	0.272442	0.061392	0	8/13/2010
L100etal	L-100, 21,	RB81010_2	3165904	1179510	0.142953	0.584953	0	8/13/2010
L100etal	L-100, 21,	RB81010_2	3165888	1179545	0	0	0	8/13/2010
L100etal	L-100, 21,	RB81010_2	3165843	1179553	0.163658	0.209694	0	8/13/2010
L100etal	L-100, 21,	RB81010_2	3165791	1179541	0	0.736718	0	8/13/2010
L100etal	L-100, 21,	RB81010_2	3165740	1179549	0	1.371719	0.000689	8/13/2010
L100etal	L-100, 21,	RB81010_2	3165782	1179507	0	0.013521	0.000229	8/13/2010
L100etal	L-100, 21,	RB81010_2	3165837	1179499	0.198003	0.105647	0	8/13/2010
L100etal	L-100, 21,	RB81010_2	3165794	1179465	0.125794	1.064182	0	8/13/2010
L100etal	L-100, 21,	RB81010_2	3165744	1179499	0.175681	0	0	8/13/2010
L100etal	L-100, 21,	RB81010_3	3165749	1179426	0	0.416834	0	8/13/2010
L100etal	L-100, 21,	RB81010_3	3165775	1179404	0	0.767524	0.001608	8/13/2010
L100etal	L-100, 21,	RB81010_3	3165841	1179402	0.034873	0.118067	0.000228	8/13/2010
L100etal	L-100, 21,	RB81010_3	3165897	1179394	0	0.124372	0.000228	8/13/2010
L100etal	L-100, 21,	RB81010_3	3165946	1179388	0	0.478056	0.000228	8/13/2010
L100etal	L-100, 21,	RB81010_3	3165998	1179452	0	0	0.000455	8/13/2010
L100etal	L-100, 21,	RB81010_3	3165998	1179510	0	0.274072	0	8/13/2010
L100etal	L-100, 21,	RB81010_3	3166003	1179558	0	0.929575	0.000454	8/13/2010
L100etal	L-100, 21,	RB81010_3	3165947	1179550	0	0	0.000227	8/13/2010
L100etal	L-100, 21,	RB90810_1	3165653	1179422	0	0.091029	0	9/9/2010
L100etal	L-100, 21,	RB90810_1	3165608	1179361	0.04707	0.170838	0.000478	9/9/2010
L100etal	L-100, 21,	RB90810_1	3165502	1179447	0.010154	0.286904	0.000945	9/9/2010
L100etal	L-100, 21,	RB90810_1	3165549	1179443	0	0.464545	0.000471	9/9/2010
L100etal	L-100, 21,	RB90810_1	3165591	1179459	0	0.534382	0.000705	9/9/2010
L100etal	L-100, 21,	RB90810_1	3165430	1179470	0	0.97714	0.000942	9/9/2010
L100etal	L-100, 21,	RB90810_1	3165388	1179472	0	1.234131	0.000703	9/9/2010
L100etal	L-100, 21,	RB90810_1	3165343	1179469	0.020594	0.60894	0.000468	9/9/2010
L100etal	L-100, 21,	RB90810_1	3165292	1179461	0.010047	0.300945	0.000935	9/9/2010

L100etal	L-100, 21,	RB90810_	3165234	1179456	0.104975	0.376512	0.000233	9/9/2010
L100etal	L-100, 21,	RB90810_	3165234	1179424	0	0	0.000698	9/9/2010
L100etal	L-100, 21,	RB90810_	3165194	1179457	0.00791	0.187972	0.000698	9/9/2010
L100etal	L-100, 21,	RB90810_	3165187	1179517	0.055969	0.244779	0.000697	9/9/2010
L100etal	L-100, 21,	RB90810_	3165140	1179517	0	0.175745	0.000464	9/9/2010
L100etal	L-100, 21,	RB90810_	3165088	1179518	0	0.217957	0.000464	9/9/2010
L100etal	L-100, 21,	RB90810_	3165088	1179461	0	0.419949	0.000232	9/9/2010
L100etal	L-100, 21,	RB90810_	3165131	1179458	0	0.10864	0.000699	9/9/2010
L100etal	L-100, 21,	RB90810_	3165253	1179524	0	0.00149	0	9/9/2010
L100etal	L-100, 21,	RB90810_	3165296	1179516	0	0.009896	0.000495	9/9/2010
L100etal	L-100, 21,	RB90810_	3165350	1179518	0	0.357001	0.000247	9/9/2010
L100etal	L-100, 21,	RB90810_	3165400	1179511	0	0.520871	0.000738	9/9/2010
L100etal	L-100, 21,	RB90810_	3165451	1179508	0	0.321282	0.000983	9/9/2010
L100etal	L-100, 21,	RB90810_	3165503	1179513	0	0.39736	0.000735	9/9/2010
L100etal	L-100, 21,	RB90810_	3165546	1179502	0	0.637627	0.000492	9/9/2010
L100etal	L-100, 21,	RB90810_	3165599	1179499	0	0.84282	0.001463	9/9/2010
L100etal	L-100, 21,	RB90810_	3165658	1179500	0.044437	0.076976	0	9/9/2010
L100etal	L-100, 21,	RB90810_	3165706	1179492	0.034784	0.17537	0	9/9/2010
L100etal	L-100, 21,	RB90810_	3165714	1179441	0	1.452994	0.000482	9/9/2010
L100etal	L-100, 21,	RB90810_	3165691	1179418	0.054055	0.035556	0.00024	9/9/2010
L100etal	L-100, 21,	RB9810_6	3165746	1179570	0	0.035297	0	9/8/2010
L100etal	L-100, 21,	RB9810_6	3165694	1179570	0	0.005455	0	9/8/2010
L100etal	L-100, 21,	RB9810_6	3165642	1179570	0	0.000473	0.000473	9/8/2010
L100etal	L-100, 21,	RB9810_6	3165592	1179570	0	0	0.000473	9/8/2010
L100etal	L-100, 21,	RB9810_6	3165540	1179573	0	0.033535	0.000236	9/8/2010
L100etal	L-100, 21,	RB9810_7	3165538	1179616	0	0.139584	0.000472	9/8/2010
L100etal	L-100, 21,	RB9810_7	3165501	1179569	0	0.088327	0.000471	9/8/2010
L100etal	L-100, 21,	RB9810_7	3165453	1179562	0.174197	0	0	9/8/2010
L100etal	L-100, 21,	RB9810_7	3165404	1179562	0	0.026527	0	9/8/2010
L100etal	L-100, 21,	RB9810_7	3165357	1179570	0	0	0	9/8/2010
L100etal	L-100, 21,	RB9810_7	3165295	1179570	0.16787	0.164343	0.000235	9/8/2010
L100etal	L-100, 21,	RB9810_7	3165264	1179570	0	0	0	9/8/2010
L100etal	L-100, 21,	RB9810_7	3165215	1179564	0.040648	0.156014	0.00047	9/8/2010
L100etal	L-100, 21,	RB9810_7	3165161	1179577	0	0.048891	0.000235	9/8/2010
L100etal	L-100, 21,	RB9810_7	3165118	1179567	0	0	0	9/8/2010
L100etal	L-100, 21,	RB9810_8	3165097	1179614	0	0.071364	0.00047	9/8/2010
L100etal	L-100, 21,	RB9810_8	3165148	1179618	0.040364	0	0	9/8/2010
L100etal	L-100, 21,	RB9810_8	3165196	1179614	0.066345	0.094711	0	9/8/2010
L100etal	L-100, 21,	RB9810_8	3165248	1179620	0	0	0	9/8/2010
L100etal	L-100, 21,	RB9810_8	3165300	1179618	0.069696	0.039993	0.000234	9/8/2010
L100etal	L-100, 21,	RB9810_8	3165359	1179619	0.085767	0.01075	0	9/8/2010
L100etal	L-100, 21,	RB9810_8	3165412	1179605	0.145267	0.016582	0	9/8/2010
L109	L-109	RB81010_	3161388	1173133	0	0.779938	0.002842	8/11/2010
L109	L-109	RB81010_	3161430	1173182	0	0.899494	0	8/11/2010
L109	L-109	RB81010_	3161446	1173231	0	0.672897	0	8/11/2010
L109	L-109	RB81010_	3161473	1173322	0.316769	0.418569	0.001034	8/11/2010
L109	L-109	RB81010_	3161514	1173325	0	0	0.001292	8/11/2010
L109	L-109	RB81010_	3161517	1173280	0	0.212154	0.002326	8/11/2010
L109	L-109	RB81010_	3161475	1173281	0	0.320115	0.004654	8/11/2010
L109	L-109	RB81010_	3161420	1173271	0	0.122181	0.000775	8/11/2010
L109	L-109	RB81010_	3161416	1173322	0	0.442953	0	8/11/2010
L109	L-109	RB81010_	3161414	1173369	0	0.617961	0.001032	8/11/2010

L109	L-109	RB81010_	3161461	1173371	0	0.530786	0.000774	8/11/2010
L109	L-109	RB81010_	3161517	1173373	0	0.323258	0.002836	8/11/2010
L109	L-109	RB81010_	3161284	1173226	0	0.219859	0.001289	8/11/2010
L109	L-109	RB81010_	3161292	1173188	0	0.360267	0.004378	8/11/2010
L109	L-109	RB81010_	3161286	1173131	0	0.215542	0.00412	8/11/2010
L109	L-109	RB81010_	3161294	1173086	0	0.83764	0.001805	8/11/2010
L109	L-109	RB81010_	3161293	1173029	0	0.518347	0.000778	8/11/2010
L109	L-109	RB81010_	3161287	1172988	0	0.369049	0.006701	8/11/2010
L109	L-109	RB81010_	3161292	1172931	0.252626	0.531803	0.001804	8/11/2010
L109	L-109	RB81010_	3161299	1172871	0	0.687246	0	8/11/2010
L109	L-109	RB81010_	3161287	1172840	0	0	0.000516	8/11/2010
L109	L-109	RB81010_	3161286	1172793	0	0.143179	0	8/11/2010
L109	L-109	RB81010_	3161433	1173139	0	0.125139	0.000513	8/11/2010
L109	L-109	RB81010_	3161485	1173136	0	0	0	8/11/2010
L109	L-109	RB81010_	3161535	1173146	0	0	0	8/11/2010
L109	L-109	RB81010_	3161594	1173142	0	0.035891	0	8/11/2010
L109	L-109	RB81010_	3161583	1173193	0	0.004615	0.000513	8/11/2010
L109	L-109	RB81010_	3161535	1173192	0	0	0	8/11/2010
L109	L-109	RB81010_	3161478	1173187	0	0.204042	0.002307	8/11/2010
L109	L-109	RB81010_	3161480	1173231	0	0.099714	0.001282	8/11/2010
L109	L-109	RB81010_	3161533	1173229	0	0.123778	0.004357	8/11/2010
L109	L-109	RB81010_	3161601	1173240	0	0.158118	0.001281	8/11/2010
L109	L-109	RB81010_4	3161476	1172986	0	0.718903	0.001764	8/10/2010
L109	L-109	RB81010_5	3161484	1173038	0	0.282975	0.001512	8/10/2010
L109	L-109	RB81010_5	3161429	1173036	0	0.430117	0.001006	8/10/2010
L109	L-109	RB81010_5	3161431	1172985	0.087566	0.322082	0.000755	8/10/2010
L109	L-109	RB81010_5	3161432	1172935	0	0.097296	0.001003	8/10/2010
L109	L-109	RB81010_5	3161478	1172934	0	3.229312	0.001767	8/10/2010
L109	L-109	RB81010_5	3161533	1172934	0.048397	0	0.001003	8/10/2010
L109	L-109	RB81010_5	3161530	1172984	0.037368	0.438138	0.001505	8/10/2010
L109	L-109	RB81010_5	3161536	1173040	0	0	0.001515	8/10/2010
L109	L-109	RB81010_5	3161533	1173086	0	0	0.001003	8/10/2010
L109	L-109	RB81010_5	3161490	1173081	0	0.246061	0.000752	8/10/2010
L109	L-109	RB81010_6	3161432	1173083	0	0.246563	0.001003	8/10/2010
L109	L-109	RB81010_6	3161383	1173072	0	0.239289	0.001254	8/10/2010
L109	L-109	RB81010_6	3161392	1173032	0	0.140087	0.000752	8/10/2010
L109	L-109	RB81010_6	3161393	1172983	0	0.274049	0.001003	8/10/2010
L109	L-109	RB81010_6	3161390	1172929	0	0.208939	0.000752	8/10/2010
L109	L-109	RB81010_6	3161392	1172882	0	0.432064	0.000752	8/10/2010
L109	L-109	RB81010_6	3161446	1172878	0	0.929314	0.000752	8/10/2010
L109	L-109	RB81010_6	3161494	1172876	0	1.48358	0.001003	8/10/2010
L109	L-109	RB81010_6	3161539	1172880	0.06482	0.059584	0.001247	8/10/2010
L109	L-109	RB81010_6	3161587	1172882	0	0.803355	0.000997	8/10/2010
L109	L-109	RB81010_7	3161592	1172831	0	1.611906	0.000747	8/10/2010
L109	L-109	RB81010_7	3161535	1172830	0	0.579469	0.000996	8/10/2010
L109	L-109	RB81010_7	3161486	1172825	0.034627	0.271536	0.000498	8/10/2010
L109	L-109	RB81010_7	3161439	1172829	0	1.087918	0.000498	8/10/2010
L109	L-109	RB81010_7	3161382	1172829	0	0.442515	0.000502	8/10/2010
L109	L-109	RB81010_7	3161591	1173085	0	0.386485	0	8/11/2010
L109	L-109	RB81010_7	3161593	1173032	0	0	0	8/11/2010
L109	L-109	RB81010_7	3161589	1172986	0.035599	0.234228	0	8/11/2010
L109	L-109	RB81010_7	3161587	1172923	0	0.151958	0	8/11/2010

L109	L-109	RB81010_	3161634	1172886	0	0.34334	0	8/11/2010
L109	L-109	RB81010_	3161645	1172936	0	0.245359	0	8/11/2010
L109	L-109	RB81010_	3161637	1172831	0.033505	0.819324	0	8/11/2010
L109	L-109	RB81010_	3161627	1172775	0	0.475269	0	8/11/2010
L109	L-109	RB81010_	3161591	1172784	0	1.799472	0.000258	8/11/2010
L109	L-109	RB81010_	3161534	1172781	0	0.341536	0.000258	8/11/2010
L109	L-109	RB81010_	3161492	1172791	0	0.180692	0.000258	8/11/2010
L109	L-109	RB81010_	3161437	1172776	0.040242	1.135026	0	8/11/2010
L109	L-109	RB81010_	3161392	1172783	0	0.363539	0	8/11/2010
L109	L-109	RB81010_	3161339	1172791	0.035323	0.471569	0	8/11/2010
L109	L-109	RB81010_	3161349	1172835	0	0.984919	0	8/11/2010
L109	L-109	RB81010_	3161336	1172883	0	2.67883	0.000517	8/11/2010
L109	L-109	RB81010_	3161341	1172932	0	1.864164	0.000258	8/11/2010
L109	L-109	RB81010_	3161337	1172981	0.030751	0.653	0.000258	8/11/2010
L109	L-109	RB81010_	3161339	1173037	0	1.023297	0.00155	8/11/2010
L109	L-109	RB81010_	3161338	1173086	0.237508	0.367246	0.001034	8/11/2010
L109	L-109	RB81010_	3161338	1173130	0	0.68977	0.001808	8/11/2010
L109	L-109	RB81010_	3161337	1173187	0	0.650692	0.001549	8/11/2010
L109	L-109	RB81010_	3161330	1173235	0	0.562684	0.000258	8/11/2010
L109	L-109	RB81010_	3161389	1173232	0	0	0.002838	8/11/2010
L109	L-109	RB81010_	3161390	1173185	0	0.967775	0.000775	8/11/2010
L99etal	L-99 & 623	RB81010_	3160075	1184341	0	0.350178	0	8/10/2010
L99etal	L-99 & 623	RB81010_	3160082	1184229	0.045682	0.479402	0	8/10/2010
L99etal	L-99 & 623	RB81010_	3160022	1184228	0	0.815407	0.000521	8/10/2010
L99etal	L-99 & 623	RB81010_	3160028	1184279	0	0.944762	0	8/10/2010
L99etal	L-99 & 623	RB81010_	3160023	1184331	0	0.240255	0	8/10/2010
L99etal	L-99 & 623	RB81010_	3160032	1184179	0	0.703036	0.000521	8/10/2010
L99etal	L-99 & 623	RB81010_	3160087	1184182	0	0	0.000261	8/10/2010
L99etal	L-99 & 623	RB81010_	3160126	1184172	0	1.342687	0	8/10/2010
L99etal	L-99 & 623	RB81010_	3160072	1184281	0	1.668572	0	8/10/2010
L99etal	L-99 & 623	RB81010_	3159974	1184531	0	0.559679	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160030	1184525	0.08077	1.286427	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160072	1184527	0	0.382007	0.000256	8/12/2010
L99etal	L-99 & 623	RB81010_	3160129	1184519	0	0.543387	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160181	1184531	0	0.845994	0.000768	8/12/2010
L99etal	L-99 & 623	RB81010_	3160224	1184483	0	0.846327	0.000768	8/12/2010
L99etal	L-99 & 623	RB81010_	3160179	1184482	0	2.141222	0.000256	8/12/2010
L99etal	L-99 & 623	RB81010_	3160133	1184480	0	0.554799	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160078	1184482	0	0.992386	0.000509	8/12/2010
L99etal	L-99 & 623	RB81010_	3160024	1184479	0	1.253366	0.000254	8/12/2010
L99etal	L-99 & 623	RB81010_	3159982	1184482	0	0	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3159987	1184438	0	0.082487	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160027	1184421	0	1.929419	0.001273	8/12/2010
L99etal	L-99 & 623	RB81010_	3160078	1184431	0.165367	0.507225	0.000253	8/12/2010
L99etal	L-99 & 623	RB81010_	3160130	1184424	0.189902	0.673749	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160178	1184420	0.188591	0.979815	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160227	1184425	0	0.639246	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160270	1184420	0	0.559794	0.000508	8/12/2010
L99etal	L-99 & 623	RB81010_	3160228	1184370	0	0.586167	0.00025	8/12/2010
L99etal	L-99 & 623	RB81010_	3160165	1184378	0.214562	0.573421	0.000251	8/12/2010
L99etal	L-99 & 623	RB81010_	3160212	1184314	0.16295	0.937839	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160225	1184326	0.393488	2.02537	0.000251	8/12/2010

L99etal	L-99 & 623	RB81010_	3160276	1184374	0.202627	0.841066	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160274	1184333	0	1.119972	0.000751	8/12/2010
L99etal	L-99 & 623	RB81010_	3160279	1184282	0.191209	0.775096	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160230	1184278	0.194287	0.373552	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160178	1184286	0	0.816626	0.000501	8/12/2010
L99etal	L-99 & 623	RB81010_	3160228	1184227	0	0.666076	0.00025	8/12/2010
L99etal	L-99 & 623	RB81010_	3160285	1184229	0	0	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160282	1184171	0	0.299808	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160227	1184182	0.275601	1.238955	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160067	1184355	0	0.120536	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160186	1184232	0	0.555816	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160194	1184130	0	3.316288	0.000249	8/12/2010
L99etal	L-99 & 623	RB81010_	3160237	1184126	0	0	0.00025	8/12/2010
L99etal	L-99 & 623	RB81010_	3160281	1184127	0	0.400574	0.000499	8/12/2010
L99etal	L-99 & 623	RB81010_	3160283	1184083	0	3.207006	0.000999	8/12/2010
L99etal	L-99 & 623	RB81010_	3160277	1184044	0	0	0.00025	8/12/2010
L99etal	L-99 & 623	RB81010_	3160132	1184133	0	1.554299	0.0005	8/12/2010
L99etal	L-99 & 623	RB81010_	3160076	1184124	0	0.367157	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160023	1184134	0	1.034933	0.00075	8/12/2010
L99etal	L-99 & 623	RB81010_	3160029	1184085	0	0.640165	0.000248	8/12/2010
L99etal	L-99 & 623	RB81010_	3160081	1184076	0	0	0	8/12/2010
L99etal	L-99 & 623	RB81010_	3160181	1184078	0	0.123973	0	8/13/2010
L99etal	L-99 & 623	RB81010_	3160228	1184082	0	1.77426	0.000242	8/13/2010
L99etal	L-99 & 623	RB81010_	3160224	1184031	0	0.725471	0.000958	8/13/2010
L99etal	L-99 & 623	RB81010_	3160177	1184034	0	0.677042	0.000961	8/13/2010
L99etal	L-99 & 623	RB81010_	3160130	1184037	0	0.687656	0.00119	8/13/2010
L99etal	L-99 & 623	RB81010_	3160126	1184083	0	1.013887	0.000478	8/13/2010
L99etal	L-99 & 623	RB81010_	3160074	1184034	0	0.821666	0.000237	8/13/2010
L99etal	L-99 & 623	RB81010_	3160026	1184041	0	0.066475	0.000237	8/13/2010
L99etal	L-99 & 623	RB81010_	3159983	1184275	0	0.374247	0	8/13/2010
L99etal	L-99 & 623	RB81010_	3159973	1184326	0	1.609372	0	8/13/2010
L99etal	L-99 & 623	RB81010_	3159981	1184382	0	0.467858	0.000706	8/13/2010
L99etal	L-99 & 623	RB81010_	3159931	1184324	0	0.609807	0.000939	8/13/2010
L99etal	L-99 & 623	RB81010_	3159929	1184374	0	0.332855	0.000469	8/13/2010
L99etal	L-99 & 623	RB81010_	3159933	1184423	0	0.257045	0.000702	8/13/2010
L99etal	L-99 & 623	RB81010_	3159932	1184471	0	2.60633	0.000701	8/13/2010
L99etal	L-99 & 623	RB81010_	3159920	1184522	0	1.284415	0.001167	8/13/2010
L99etal	L-99 & 623	RB81010_	3159875	1184535	0	0	0.000933	8/13/2010
L99etal	L-99 & 623	RB81010_	3159877	1184483	0	0.416001	0.001864	8/13/2010
L99etal	L-99 & 623	RB81010_	3159877	1184435	0	1.095838	0.000466	8/13/2010
L99etal	L-99 & 623	RB81010_	3160034	1184380	0	0	0.000258	8/10/2010
L99etal	L-99 & 623	RB81010_	3160079	1184387	0	1.432426	0	8/10/2010
L99etal	L-99 & 623	RB81010_	3160133	1184387	0	0	0	8/10/2010
L99etal	L-99 & 623	RB81010_	3160133	1184359	0.068986	0.539489	0.000258	8/10/2010
L99etal	L-99 & 623	RB81010_	3160133	1184331	0	1.846135	0	8/10/2010
L99etal	L-99 & 623	RB81010_	3160133	1184280	0.032424	0	0	8/10/2010
L99etal	L-99 & 623	RB81010_	3160130	1184229	0	0.068013	0.00026	8/10/2010

APPENDIX D

VOLUMETRIC FLUX CALCULATIONS

Grid Volume Computations

Wed Nov 10 10:21:10 2010

Upper Surface

Grid File Name:	P:\XTO Energy\608\2010 Survey\Surfer\L99etal_CH4.grd
Grid Size:	48 rows x 42 columns
X Minimum:	3159774.934
X Maximum:	3160384.557
X Spacing:	14.86885365854
Y Minimum:	1183931.053
Y Maximum:	1184634.927
Y Spacing:	14.976042553188
Z Minimum:	-0.042023489248197
Z Maximum:	0.30013286619111

Lower Surface

Level Surface defined by Z = 0.2

Volumes

Z Scale Factor:	0.0929

Total Volumes by:

Trapezoidal Rule:	-5283.9296673715
Simpson's Rule:	-5284.8679782655
Simpson's 3/8 Rule:	-5286.756715464

Cut & Fill Volumes

Positive Volume [Cut]:	8.022524810802
Negative Volume [Fill]:	5291.9521921823
Net Volume [Cut-Fill]:	-5283.9296673715

Areas

Planar Areas

Positive Planar Area [Cut]:	2345.740202042
Negative Planar Area [Fill]:	306284.00675684

Blanked Planar Area:	120468.03254311
Total Planar Area:	429097.779502

Surface Areas

Positive Surface Area [Cut]:	2345.7405144589
Negative Surface Area [Fill]:	306284.01013818

Grid Volume Computations

Fri Oct 08 15:54:12 2010

Upper Surface

Grid File Name:	P:\XTO Energy\608\2010 Work\2010 Survey\Surfer\L99etal_CO2.grd
Grid Size:	48 rows x 42 columns
X Minimum:	3159774.934
X Maximum:	3160384.557
X Spacing:	14.86885365854
Y Minimum:	1183931.053
Y Maximum:	1184634.927
Y Spacing:	14.976042553188
Z Minimum:	-0.12868335683341
Z Maximum:	3.0165741820863

Lower Surface

Level Surface defined by Z = 0

Volumes

Z Scale Factor:	0.0929

Total Volumes by:

Trapezoidal Rule:	21738.153592219
Simpson's Rule:	21743.220099121
Simpson's 3/8 Rule:	21707.182633988

Cut & Fill Volumes

Positive Volume [Cut]:	21744.55451644
Negative Volume [Fill]:	6.4009242214003
Net Volume [Cut-Fill]:	21738.153592219

Areas

Planar Areas

Positive Planar Area [Cut]:	307716.03669341
Negative Planar Area [Fill]:	913.71026547761

Blanked Planar Area:	120468.03254311
Total Planar Area:	429097.779502

Surface Areas

Positive Surface Area [Cut]:	307716.48751031
Negative Surface Area [Fill]:	913.71070283162

Grid Volume Computations

Wed Nov 10 10:31:22 2010

Upper Surface

Grid File Name:	P:\XTO Energy\608\2010 Survey\Surfer\L100etal_CH4.grd
Grid Size:	32 rows x 75 columns
X Minimum:	3164988.284
X Maximum:	3166102.823
X Spacing:	15.061337837836
Y Minimum:	1179260.708
Y Maximum:	1179720.354
Y Spacing:	14.827290322579
Z Minimum:	-0.065619733754998
Z Maximum:	0.24219670374758

Lower Surface

Level Surface defined by Z = 0.2

Volumes

Z Scale Factor:	0.0929

Total Volumes by:

Trapezoidal Rule:	-6029.4944965342
Simpson's Rule:	-6054.5008790509
Simpson's 3/8 Rule:	-6025.2527090446

Cut & Fill Volumes

Positive Volume [Cut]:	1.6206477932374
Negative Volume [Fill]:	6031.1151443274
Net Volume [Cut-Fill]:	-6029.4944965342

Areas

Planar Areas

Positive Planar Area [Cut]:	1064.7942146397
Negative Planar Area [Fill]:	350327.38285187

Blanked Planar Area:	160901.21612737
Total Planar Area:	512293.39319389

Surface Areas

Positive Surface Area [Cut]:	1064.7942570612
Negative Surface Area [Fill]:	350327.38621387

Grid Volume Computations

Fri Oct 08 15:54:59 2010

Upper Surface

Grid File Name:	P:\XTO Energy\608\2010 Work\2010 Survey\Surfer\L100etal_CO2.grd
Grid Size:	32 rows x 75 columns
X Minimum:	3164988.284
X Maximum:	3166102.823
X Spacing:	15.061337837836
Y Minimum:	1179260.708
Y Maximum:	1179720.354
Y Spacing:	14.827290322579
Z Minimum:	-0.74940298363265
Z Maximum:	6.8341004309387

Lower Surface

Level Surface defined by Z = 0

Volumes

Z Scale Factor:	0.0929

Total Volumes by:

Trapezoidal Rule:	9656.1519341258
Simpson's Rule:	9717.8248246044
Simpson's 3/8 Rule:	9676.4540007496

Cut & Fill Volumes

Positive Volume [Cut]:	9948.6762726088
Negative Volume [Fill]:	292.52433848303
Net Volume [Cut-Fill]:	9656.1519341258

Areas

Planar Areas

Positive Planar Area [Cut]:	323576.88508611
Negative Planar Area [Fill]:	27815.291980404

Blanked Planar Area:	160901.21612737
Total Planar Area:	512293.39319389

Surface Areas

Positive Surface Area [Cut]:	323577.56622729
Negative Surface Area [Fill]:	27815.325089208

Grid Volume Computations

Wed Nov 10 10:32:09 2010

Upper Surface

Grid File Name:	P:\XTO Energy\608\2010 Survey\Surfer\L109_CH4.grd
Grid Size:	54 rows x 38 columns
X Minimum:	3161184.262
X Maximum:	3161745
X Spacing:	15.155081081078
Y Minimum:	1172675.134
Y Maximum:	1173472.831
Y Spacing:	15.050886792451
Z Minimum:	-0.076921717820016
Z Maximum:	0.3142332971188

Lower Surface

Level Surface defined by Z = 0.2

Volumes

Z Scale Factor:	0.0929

Total Volumes by:

Trapezoidal Rule:	-5884.6147637567
Simpson's Rule:	-5890.3353580628
Simpson's 3/8 Rule:	-5899.4687272665

Cut & Fill Volumes

Positive Volume [Cut]:	2.3655901165863
Negative Volume [Fill]:	5886.9803538733
Net Volume [Cut-Fill]:	-5884.6147637567

Areas

Planar Areas

Positive Planar Area [Cut]:	864.16376067421
Negative Planar Area [Fill]:	324516.79115032

Blanked Planar Area:	121918.06547489
Total Planar Area:	447299.02038588

Surface Areas

Positive Surface Area [Cut]:	864.16400425118
Negative Surface Area [Fill]:	324516.79409335

Grid Volume Computations

Fri Oct 08 15:55:40 2010

Upper Surface

Grid File Name:	P:\XTO Energy\608\2010 Work\2010 Survey\Surfer\L109_CO2.grd
Grid Size:	54 rows x 38 columns
X Minimum:	3161184.262
X Maximum:	3161745
X Spacing:	15.155081081078
Y Minimum:	1172675.134
Y Maximum:	1173472.831
Y Spacing:	15.050886792451
Z Minimum:	-0.31560547161322
Z Maximum:	2.7900835020239

Lower Surface

Level Surface defined by Z = 0

Volumes

Z Scale Factor:	0.0929

Total Volumes by:

Trapezoidal Rule:	13769.787343548
Simpson's Rule:	13778.361939862
Simpson's 3/8 Rule:	13803.099530863

Cut & Fill Volumes

Positive Volume [Cut]:	13827.70061786
Negative Volume [Fill]:	57.913274311407
Net Volume [Cut-Fill]:	13769.787343548

Areas

Planar Areas

Positive Planar Area [Cut]:	317989.19700249
Negative Planar Area [Fill]:	7391.7579084963

Blanked Planar Area:	121918.06547489
Total Planar Area:	447299.02038588

Surface Areas

Positive Surface Area [Cut]:	317989.44624313
Negative Surface Area [Fill]:	7391.7643329919

Grid Volume Computations

Wed Nov 10 10:32:49 2010

Upper Surface

Grid File Name:	P:\XTO Energy\608\2010 Survey\Surfer\Seep13_CH4.grd
Grid Size:	28 rows x 32 columns
X Minimum:	3164181.264
X Maximum:	3164642.681
X Spacing:	14.884419354835
Y Minimum:	1174331.352
Y Maximum:	1174740.239
Y Spacing:	15.143962962967
Z Minimum:	-2.3128987402307
Z Maximum:	46.083937814087

Lower Surface

Level Surface defined by Z = 0.2

Volumes

Z Scale Factor:	0.0929

Total Volumes by:

Trapezoidal Rule:	6166.8146214292
Simpson's Rule:	6100.0898209394
Simpson's 3/8 Rule:	6021.053117638

Cut & Fill Volumes

Positive Volume [Cut]:	8987.3776530694
Negative Volume [Fill]:	2820.5630316402
Net Volume [Cut-Fill]:	6166.8146214292

Areas

Planar Areas

Positive Planar Area [Cut]:	26696.844760514
Negative Planar Area [Fill]:	97503.566824113

Blanked Planar Area:	64467.00129438
Total Planar Area:	188667.41287901

Surface Areas

Positive Surface Area [Cut]:	26730.171348146
Negative Surface Area [Fill]:	97504.186207933

Grid Volume Computations

Fri Oct 08 15:56:22 2010

Upper Surface

Grid File Name:	P:\XTO Energy\608\2010 Work\2010 Survey\Surfer\Seep13_CO2.grd
Grid Size:	28 rows x 32 columns
X Minimum:	3164181.264
X Maximum:	3164642.681
X Spacing:	14.884419354835
Y Minimum:	1174331.352
Y Maximum:	1174740.239
Y Spacing:	15.143962962967
Z Minimum:	-0.10915398894598
Z Maximum:	17.517047259161

Lower Surface

Level Surface defined by Z = 0

Volumes

Z Scale Factor:	0.0929

Total Volumes by:

Trapezoidal Rule:	20390.731318927
Simpson's Rule:	20492.395090013
Simpson's 3/8 Rule:	20384.382695712

Cut & Fill Volumes

Positive Volume [Cut]:	20392.43844433
Negative Volume [Fill]:	1.707125403503
Net Volume [Cut-Fill]:	20390.731318927

Areas

Planar Areas

Positive Planar Area [Cut]:	123595.6711878
Negative Planar Area [Fill]:	604.74039683131

Blanked Planar Area:	64467.00129438
Total Planar Area:	188667.41287901

Surface Areas

Positive Surface Area [Cut]:	123599.59576861
Negative Surface Area [Fill]:	604.74099829868

Grid Volume Computations

Fri Oct 08 15:57:04 2010

Upper Surface

Grid File Name:	P:\XTO Energy\608\2010 Work\2010 Survey\Surfer\Seep14_CO2.grd
Grid Size:	57 rows x 45 columns
X Minimum:	3156188.76
X Maximum:	3156846.317
X Spacing:	14.944477272728
Y Minimum:	1168596.462
Y Maximum:	1169442.977
Y Spacing:	15.116339285712
Z Minimum:	-0.049659325230286
Z Maximum:	2.271189853849

Lower Surface

Level Surface defined by Z = 0

Volumes

Z Scale Factor:	0.0929

Total Volumes by:

Trapezoidal Rule:	20601.471236106
Simpson's Rule:	20690.583323283
Simpson's 3/8 Rule:	20644.780717882

Cut & Fill Volumes

Positive Volume [Cut]:	20608.03690597
Negative Volume [Fill]:	6.5656698638684
Net Volume [Cut-Fill]:	20601.471236106

Areas

Planar Areas

Positive Planar Area [Cut]:	375801.55939884
Negative Planar Area [Fill]:	3494.2601679067

Blanked Planar Area:	177336.04428821
Total Planar Area:	556631.86385496

Surface Areas

Positive Surface Area [Cut]:	375801.82682052
Negative Surface Area [Fill]:	3494.2602492363

Grid Volume Computations

Wed Nov 10 10:33:47 2010

Upper Surface

Grid File Name:	P:\XTO Energy\608\2010 Survey\Surfer\Seep14_CH4.grd
Grid Size:	57 rows x 45 columns
X Minimum:	3156188.76
X Maximum:	3156846.317
X Spacing:	14.944477272728
Y Minimum:	1168596.462
Y Maximum:	1169442.977
Y Spacing:	15.116339285712
Z Minimum:	-0.077508194499671
Z Maximum:	0.32313498277196

Lower Surface

Level Surface defined by Z = 0.2

Volumes

Z Scale Factor:	0.0929

Total Volumes by:

Trapezoidal Rule:	-6088.4328250974
Simpson's Rule:	-6112.1076235317
Simpson's 3/8 Rule:	-6098.8495325866

Cut & Fill Volumes

Positive Volume [Cut]:	84.933073251213
Negative Volume [Fill]:	6173.3658983486
Net Volume [Cut-Fill]:	-6088.4328250974

Areas

Planar Areas

Positive Planar Area [Cut]:	21084.523422738
Negative Planar Area [Fill]:	358211.29614401

Blanked Planar Area:	177336.04428821
Total Planar Area:	556631.86385496

Surface Areas

Positive Surface Area [Cut]:	21084.524787409
Negative Surface Area [Fill]:	358211.30412903

APPENDIX E

GAS COMPOSITION AND ISOTOPIC ANALYTICAL REPORT

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Lab #: 193270 Job #: 13585
Sample Name: Apogee ID 13 Co. Lab#:
Company: LT Environmental
Date Sampled: 8/10/2010
Container: Cali-5-Bond Bag
Field/Site Name: XTO 1003
Location: Raton Basin, CO
Formation/Depth:
Sampling Point:
Date Received: 8/17/2010 Date Reported: 9/22/2010

Component	Chemical mol. %	$\delta^{13}C$ ‰	δD ‰	$\delta^{15}N$ ‰
Carbon Monoxide	nd			
Hydrogen Sulfide	nd			
Helium	nd			
Hydrogen	nd			
Argon	0.460			
Oxygen	1.83			
Nitrogen	28.24			
Carbon Dioxide	3.66	-67.20		
Methane	65.81	-64.65	-264.8	
Ethane	0.0038			
Ethylene	nd			
Propane	nd			
Iso-butane	nd			
N-butane	nd			
Iso-pentane	nd			
N-pentane	nd			
Hexanes +	nd			

Total BTU/cu.ft. dry @ 60deg F & 14.7psia, calculated: 667
Specific gravity, calculated: 0.720

nd = not detected. na = not analyzed. Isotopic composition of carbon is relative to VPDB. Isotopic composition of hydrogen is relative to VSMOW. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Lab #: 193271 Job #: 13585
Sample Name: Apogee ID L-109 Co. Lab#:
Company: LT Environmental
Date Sampled: 8/11/2010
Container: Cali-5-Bond Bag
Field/Site Name: XTO 1003
Location: Raton Basin, CO
Formation/Depth:
Sampling Point:
Date Received: 8/17/2010 Date Reported: 9/22/2010

Component	Chemical mol. %	$\delta^{13}C$ ‰	δD ‰	$\delta^{15}N$ ‰
Carbon Monoxide	nd			
Hydrogen Sulfide	nd			
Helium	nd			
Hydrogen	nd			
Argon	0.935			
Oxygen	20.62			
Nitrogen	78.10			
Carbon Dioxide	0.35			
Methane	nd			
Ethane	nd			
Ethylene	nd			
Propane	nd			
Iso-butane	nd			
N-butane	nd			
Iso-pentane	nd			
N-pentane	nd			
Hexanes +	nd			

Total BTU/cu.ft. dry @ 60deg F & 14.7psia, calculated: 0
Specific gravity, calculated: 1.001

nd = not detected. na = not analyzed. Isotopic composition of carbon is relative to VPDB. Isotopic composition of hydrogen is relative to VSMOW. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Lab #: 193272 Job #: 13585
Sample Name: Apogee ID 14 Co. Lab#:
Company: LT Environmental
Date Sampled: 8/12/2010
Container: Cali-5-Bond Bag
Field/Site Name: XTO 1003
Location: Raton Basin, CO
Formation/Depth:
Sampling Point:
Date Received: 8/17/2010 Date Reported: 9/22/2010

Component	Chemical mol. %	$\delta^{13}C$ ‰	δD ‰	$\delta^{15}N$ ‰
Carbon Monoxide	nd			
Hydrogen Sulfide	nd			
Helium	nd			
Hydrogen	nd			
Argon	0.935			
Oxygen	20.94			
Nitrogen	77.96			
Carbon Dioxide	0.16			
Methane	0.0036			
Ethane	nd			
Ethylene	nd			
Propane	nd			
Iso-butane	nd			
N-butane	nd			
Iso-pentane	nd			
N-pentane	nd			
Hexanes +	nd			

Total BTU/cu.ft. dry @ 60deg F & 14.7psia, calculated: 0
Specific gravity, calculated: 1.001

nd = not detected. na = not analyzed. Isotopic composition of carbon is relative to VPDB. Isotopic composition of hydrogen is relative to VSMOW. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Lab #: 193273 Job #: 13585
Sample Name: Apgee ID 623/L-99 Co. Lab#:
Company: LT Environmental
Date Sampled: 8/13/2010
Container: Cali-5-Bond Bag
Field/Site Name: XTO 1003
Location: Raton Basin, CO
Formation/Depth:
Sampling Point:
Date Received: 8/17/2010 Date Reported: 9/22/2010

Component	Chemical mol. %	$\delta^{13}C$ ‰	δD ‰	$\delta^{15}N$ ‰
Carbon Monoxide	nd			
Hydrogen Sulfide	nd			
Helium	nd			
Hydrogen	nd			
Argon	0.933			
Oxygen	20.07			
Nitrogen	77.95			
Carbon Dioxide	1.05			
Methane	nd			
Ethane	nd			
Ethylene	nd			
Propane	nd			
Iso-butane	nd			
N-butane	nd			
Iso-pentane	nd			
N-pentane	nd			
Hexanes +	nd			

Total BTU/cu.ft. dry @ 60deg F & 14.7psia, calculated: 0
Specific gravity, calculated: 1.005

nd = not detected. na = not analyzed. Isotopic composition of carbon is relative to VPDB. Isotopic composition of hydrogen is relative to VSMOW. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Lab #: 193274 Job #: 13585
Sample Name: Apogee ID L-100 Co. Lab#:
Company: LT Environmental
Date Sampled: 8/13/2010
Container: Cali-5-Bond Bag
Field/Site Name: XTO 1003
Location: Raton Basin, CO
Formation/Depth:
Sampling Point:
Date Received: 8/17/2010 Date Reported: 9/22/2010

Component	Chemical mol. %	$\delta^{13}C$ ‰	δD ‰	$\delta^{15}N$ ‰
Carbon Monoxide	nd			
Hydrogen Sulfide	nd			
Helium	nd			
Hydrogen	nd			
Argon	0.931			
Oxygen	20.95			
Nitrogen	78.05			
Carbon Dioxide	0.072			
Methane	nd			
Ethane	nd			
Ethylene	nd			
Propane	nd			
Iso-butane	nd			
N-butane	nd			
Iso-pentane	nd			
N-pentane	nd			
Hexanes +	nd			

Total BTU/cu.ft. dry @ 60deg F & 14.7psia, calculated: 0
Specific gravity, calculated: 1.000

nd = not detected. na = not analyzed. Isotopic composition of carbon is relative to VPDB. Isotopic composition of hydrogen is relative to VSMOW. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

APPENDIX F

NATURAL SPRINGS ANALYTICAL RESULTS

Mountain States ACCUTEST Laboratories

IT'S ALL IN THE CHEMISTRY

09/03/10

Technical Report for

LT Environmental

Colo Rule 608 Compliance Raton Basin CO

XTO1003

Accutest Job Number: D16334

Sampling Date: 08/13/10

Report to:

LT Environmental
4600 W 60th Ave
Arvada, CO 80003
dmoir@ltenv.com

ATTN: Dan Moir

Total number of pages in report: **61**

ACCUTEST LABORATORIES 50 YEARS 1956-2006

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Jesse L. Smith
Laboratory Director

Client Service contact: Shea Greiner 303-425-6021

Certifications: CO, ID, NE, NM, ND (R-027) (PW) UT (NELAP CO00049)

Test results relate only to samples analyzed.

Sections: 1 2 3 4 5 6 7 8 9

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Sample Summary

LT Environmental

Job No: D16334

Colo Rule 608 Compliance Raton Basin CO
Project No: XTO1003

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D16334-1	08/13/10	11:05	DB	08/16/10	AQ	Ground Water	NATURAL SPRINGS O1
D16334-1A	08/13/10	11:05	DB	08/16/10	AQ	Ground Water	NATURAL SPRINGS O1
D16334-1F	08/13/10	11:05	DB	08/16/10	AQ	Groundwater Filtered	NATURAL SPRINGS O1

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	LT Environmental	**Job No**	D16334
Site:	Colo Rule 608 Compliance Raton Basin CO	**Report Dat**	9/2/2010 2:15:50 PM

On 08/16/2010, one (1) sample 0 Trip Blanks, and 0 Field Blanks were received at Accutest Mountain States (AMS) at a temperature of 4.0°C. The sample was intact and properly preserved, unless noted below. An AMS Job Number of D16334 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GC By Method RSK175 MOD

Matrix AQ **Batch ID:** GFB59

- All samples were analyzed within the recommended method holding time.
- Samples D16560-1MS and D16560-1MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

Metals By Method EPA 200.8

Matrix AQ **Batch ID:** MP2721

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Samples D16431-1FMS and D16431-1FMSD were used as the QC samples for the metals analysis.

Metals By Method SW846 6010B

Matrix AQ **Batch ID:** MP2703

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Samples D16644-1MSD and D16644-1MS were used as the QC samples for the metals analysis.
- The matrix spike (MS) recoveries of Potassium and Sodium are outside control limits. The spike amount is low relative to the sample amount. Refer to the lab control or spike blank for recovery information.

Matrix AQ **Batch ID:** MP2762

- All samples were digested within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Samples D16762-1FMS and D16762-1FMSD were used as the QC samples for the metals analysis.

Wet Chemistry By Method EPA 300/SW846 9056

Matrix AQ **Batch ID:** GP2589

- All samples were prepared within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Samples D16132-5MS and D16132-5MSD were used as the QC samples for the Bromide, Nitrate-N, Nitrite-N, and Chloride analysis.
- The matrix spike (MS) recovery of Chloride is outside control limits. The spike amount is low relative to the sample amount. Refer to lab control or spike blank for recovery information.
- D16334-1 for Nitrate-N: The reporting limit (RL) was raised due to matrix interference.

Matrix AQ **Batch ID:** GP2633

- All samples were prepared within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Samples D16320-1MS and D16320-1MSD were used as the QC samples for the Fluoride analysis.

Wet Chemistry By Method HACH IRB-BART

Matrix AQ **Batch ID:** T:MB2239

- The data for HACH IRB-BART meets quality control requirements.
- Iron Reducing Bacteria: Analysis performed at Accutest Laboratories, Houston, TX.

Wet Chemistry By Method HACH SLYM-BART

Matrix AQ **Batch ID:** T:MB2235

- The data for HACH SLYM-BART meets quality control requirements.
- Slime Forming Bacteria: Analysis performed at Accutest Laboratories, Houston, TX.

Wet Chemistry By Method HACH SRB-BART

Matrix AQ **Batch ID:** T:MB2238

- The data for HACH SRB-BART meets quality control requirements.
- Sulfate Reducing Bacteria: Analysis performed at Accutest Laboratories, Houston, TX.

Wet Chemistry By Method LADNR29B

Matrix AQ **Batch ID:** MP2762

- Sodium Adsorption Ratio: Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+(Mg meq/L)/2]

Wet Chemistry By Method SM18 4500NO3E

Matrix AQ **Batch ID:** R3934

- The data for SM18 4500NO3E meets quality control requirements.
- The following samples were run outside of holding time for method SM18 4500NO3E: D16334-1
- D16334-1 for Nitrate + Nitrite: Calculated as: (Nitrate-N) + (Nitrite-N)

Wet Chemistry By Method SM20 2320B

Matrix	AQ	Batch ID:	GN6006

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Samples D16381-4DUP, D16381-4MS, and D16381-4MSD were used as the QC samples for the Total Alkalinity, as CaCO3 analysis.

Matrix	AQ	Batch ID:	GN6008

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

Matrix	AQ	Batch ID:	GN6009

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

Wet Chemistry By Method SM20 2510B

Matrix	AQ	Batch ID:	GP2560

- Sample D16181-1DUP was used as the QC samples for the Specific Conductivity analysis.

Wet Chemistry By Method SM20 2540C

Matrix	AQ	Batch ID:	GN5952

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample D16336-4DUP was used as the QC sample for the Total Dissolved Solids analysis.

Wet Chemistry By Method SM20 4500 S2 H

Matrix	AQ	Batch ID:	GN5975

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample D16371-1DUP was used as the QC sample for the Hydrogen Sulfide analysis.

Wet Chemistry By Method SM20 4500H

Matrix	AQ	Batch ID:	GN5898

- The following samples were run outside of holding time for method SM20 4500H: D16334-1

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client:	Accutest Mountain States	**Job No**	D16334
Site:	LTENCODE: Colo Rule 608 Compliance Raton Basin CO	**Report Date**	8/26/2010 9:15:07 AM

1 Sample(s) were collected on 08/13/2010 and were received at Accutest on 08/16/2010 properly preserved, at 4.2 Deg. C and intact. These Samples received an Accutest job number of D16334. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section of this report.

Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

Wet Chemistry By Method HACH IRB-BART

Matrix AQ **Batch ID:** MB2239

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

Wet Chemistry By Method HACH SLYM-BART

Matrix AQ **Batch ID:** MB2235

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

Wet Chemistry By Method HACH SRB-BART

Matrix AQ **Batch ID:** MB2238

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.

Accutest Laboratories Gulf Coast (ALGC) certifies that this report meets the project requirements for analytical data produced for the samples as received at ALGC and as stated on the COC. ALGC certifies that the data meets the Data QualityObjectives for precision, accuracy and completeness as specified in the ALGC Quality Manual except as noted above. This report is to be used in its entirety. ALGC is not responsible for any assumptions of data quality if partial data packages are used

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	NATURAL SPRINGS O1		
Lab Sample ID:	D16334-1	**Date Sampled:**	08/13/10
Matrix:	AQ - Ground Water	**Date Received:**	08/16/10
Method:	RSK175 MOD	**Percent Solids:**	n/a
Project:	Colo Rule 608 Compliance Raton Basin CO		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FB2288.D	1	08/23/10	JB	n/a	n/a	GFB59
Run #2							

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	0.109	0.00080	0.00080	mg/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	NATURAL SPRINGS O1		
Lab Sample ID:	D16334-1	**Date Sampled:**	08/13/10
Matrix:	AQ - Ground Water	**Date Received:**	08/16/10
		Percent Solids:	n/a
Project:	Colo Rule 608 Compliance Raton Basin CO		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Alkalinity, Bicarbonate as CaC	205	5.0	mg/l	1	08/23/10	JK	SM20 2320B
Alkalinity, Carbonate	< 5.0	5.0	mg/l	1	08/23/10	JK	SM20 2320B
Alkalinity, Total as CaCO3	207	5.0	mg/l	1	08/23/10	JK	SM20 2320B
Bromide	< 0.20	0.20	mg/l	1	08/17/10 12:06	JML	EPA 300/SW846 9056
Chloride	3.3	0.50	mg/l	1	08/17/10 12:06	JML	EPA 300/SW846 9056
Fluoride	0.74	0.20	mg/l	1	08/24/10 11:35	GH	EPA 300/SW846 9056
Hydrogen Sulfide	< 0.50	0.50	mg/l	1	08/20/10	JK	SM20 4500 S2 H
Iron Reducing Bacteria [a]	500	25	cfu/ml	1	08/17/10 12:00	ATX	HACH IRB-BART
Nitrogen, Nitrate [b]	< 0.23	0.23	mg/l	5	08/17/10 21:33	JML	EPA 300/SW846 9056
Nitrogen, Nitrate + Nitrite [c]	< 0.29	0.29	mg/l	1	08/17/10 21:33	JML	SM18 4500NO3E
Nitrogen, Nitrite	< 0.061	0.061	mg/l	1	08/17/10 12:06	JML	EPA 300/SW846 9056
Slime Forming Bacteria [a]	> 350000	500	cfu/ml	1	08/17/10 12:00	ATX	HACH SLYM-BART
Solids, Total Dissolved	280	10	mg/l	1	08/19/10	JD	SM20 2540C
Specific Conductivity	364	1.0	umhos/cm	1	08/16/10	CJ	SM20 2510B
Sulfate	2.9	0.50	mg/l	1	08/17/10 12:06	JML	EPA 300/SW846 9056
Sulfate Reducing Bacteria [a]	700000	200	cfu/ml	1	08/17/10 12:00	ATX	HACH SRB-BART
pH	10.13		su	1	08/16/10 14:35	JK	SM20 4500H

(a) Analysis performed at Accutest Laboratories, Houston, TX.
(b) Elevated detection limit due to matrix interference.
(c) Calculated as: (Nitrogen, Nitrate) + (Nitrogen, Nitrite)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	NATURAL SPRINGS O1		
Lab Sample ID:	D16334-1A	**Date Sampled:**	08/13/10
Matrix:	AQ - Ground Water	**Date Received:**	08/16/10
		Percent Solids:	n/a
Project:	Colo Rule 608 Compliance Raton Basin CO		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	4.29	2.0	mg/l	1	09/01/10	09/01/10	JM	SW846 6010B [1]	EPA 200.7 [2]
Magnesium	< 1.0	1.0	mg/l	1	09/01/10	09/01/10	JM	SW846 6010B [1]	EPA 200.7 [2]
Sodium	99.5	2.0	mg/l	1	09/01/10	09/01/10	JM	SW846 6010B [1]	EPA 200.7 [2]

(1) Instrument QC Batch: MA945
(2) Prep QC Batch: MP2762

RL = Reporting Limit

Report of Analysis

Client Sample ID:	NATURAL SPRINGS O1		
Lab Sample ID:	D16334-1A	**Date Sampled:**	08/13/10
Matrix:	AQ - Ground Water	**Date Received:**	08/16/10
		Percent Solids:	n/a
Project:	Colo Rule 608 Compliance Raton Basin CO		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	11.4		ratio	1	09/01/10 14:14	JM	LADNR29B

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	NATURAL SPRINGS O1		
Lab Sample ID:	D16334-1F	**Date Sampled:**	08/13/10
Matrix:	AQ - Groundwater Filtered	**Date Received:**	08/16/10
		Percent Solids:	n/a
Project:	Colo Rule 608 Compliance Raton Basin CO		

Dissolved Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	3.40	0.67	mg/l	1	08/29/10	08/30/10	JM	SW846 6010B [3]	SW846 3010A [6]
Iron	1.59	0.12	mg/l	1	08/29/10	08/30/10	JM	SW846 6010B [3]	SW846 3010A [6]
Magnesium	0.652	0.33	mg/l	1	08/29/10	08/30/10	JM	SW846 6010B [3]	SW846 3010A [6]
Manganese	0.0210	0.0020	mg/l	2	08/26/10	08/30/10	GJ	EPA 200.8 [2]	EPA 200.8 [5]
Potassium	1.41	1.0	mg/l	1	08/25/10	08/27/10	JM	SW846 6010B [1]	SW846 3010A [4]
Selenium	< 0.00080	0.00080	mg/l	2	08/26/10	08/30/10	GJ	EPA 200.8 [2]	EPA 200.8 [5]
Sodium	97.7	0.67	mg/l	1	08/29/10	08/30/10	JM	SW846 6010B [3]	SW846 3010A [6]

(1) Instrument QC Batch: MA936
(2) Instrument QC Batch: MA938
(3) Instrument QC Batch: MA939
(4) Prep QC Batch: MP2703
(5) Prep QC Batch: MP2721
(6) Prep QC Batch: MP2728

RL = Reporting Limit

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

LTENCODE 3955

EAT

CHAIN OF CUSTODY

ACCUTEST Laboratories

4036 Youngfield Street, Wheat Ridge, Colorado 80033
TEL. 303-425-6021; 877-737-4521 FAX: 303-425-6854
www.accutest.com

D16334

PAGE 1 OF 1

FED-EX Tracking #: | Bottle Order Control #:
Accutest Quote #: | Accutest Job #:

Client / Reporting Information

Company Name: LT Environmental
Street Address: 4600 West 60th Ave.
City: Arvada State: CO Zip: 80003
Project Contact: Dan Moir E-mail: dmoir@ltenv.com
Phone #: 303-358-8236 Fax #:
Sampler(s) Name(s): Daniel Burns Phone #: 303-829-8486

Project Information

Project Name: Colorado Rule 608 Compliance - Raton Basin, CO
Street:
City: State:
Project #: XTO 1003
Client Purchase Order #:
Project Manager: Dan Moir

Billing Information (if different from Report to)

Company Name:
Street Address:
City: State: Zip:
Attention:

Requested Analysis (see TEST CODE sheet)

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	Number of preserved Bottles: HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	5x Acetate (H2S)	V8015 CH4 / RSK 175	(F, Br, SO4, Cl) Major Anions - EPA 300	pH - EPA 150.1	Specific Conductance - MCAWW 120.1	Nitrate/Nitrite as N - EPA 353.3	Dissolved Metals (Se, Mn) - EPA 6010/6020	Major Cations (Na, Ca, Mg, K, Fe) - EPA 6010/6020	Alkalinity (carbonate/bicarbonate) - EPA 310.1	TDS - EPA 160.1	SAR - LADNR 29B	Bacteria - IRB/SRB/SLYM/Coliform
	Natural Spring 01		8/13/10	1105AM	DB	GW	12					11				1	X	X	X	X	X	X	X	X	X	X	X

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL - Sludge
SED - Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB - Field Blank
EB - Equipment Blank
RB - Rinse Blank
TB - Trip Blank

LAB USE ONLY

Turnaround Time (Business days)

- [X] Std. 10 Business Days
- [ ] UST Analysis 3-5 Days
- [ ] 6 - 9 Day *RUSH*
- [ ] 3 - 5 Day *RUSH*
- [ ] 2 Day *EMERGENCY*
- [ ] 1 Day *EMERGENCY*

Approved By (Accutest PM): / Date:

Emergency & Rush T/A data available VIA Labfax

Data Deliverable Information

- [ ] Level 1
- [ ] Level 2
- [ ] Level 3
- [ ] Level 4

Level 1 = Results Only
Level 2 = Results + QC Summary + Case Narrative
Level 3 = Results + QC Summary + Partial Raw data
Level 4 = Full Deliverable

- [ ] PDF
- [ ] EDD Format
- [ ] Other

Comments / Special Instructions

-lab filter (sediment + particles in samples)

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1		8/16/10 1100	1 A60433	2		2 Jacob Porter 8/16/10
3	Relinquished by Sampler:	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4 12:00
5	Relinquished by:	Date Time:	Received By: 5	Custody Seal # [X] Intact [ ] Not Intact	Preserved where applicable	On ice Cooler Temp. 4.0

4.1 4

CHAIN OF CUSTODY

ACCUTEST

4036 Youngfield St., Wheat Ridge, CO 80033
303-425-6021 FAX: 303-425-6854

Accutest Job #:	D16334
Accutest Quote #:	
AMS P.O. #:	
Project No.:	

Client Information			Subcontract Laboratory Information			Analytical Information
Name: Accutest Mountain States (AMS)			Name: Industrial Lab			
Address: 4036 Youngfield St.			Address: 4046 Youngfield St.			
City: Wheat Ridge,	State: CO	Zip: 80033	City: Wheat Ridge	State: CO	Zip: 80033	
Send Report to: Tiffany Pham			Contact: Sample Management			
Any questions contact: Amanda Kissell						
Phone/Fax #: (303) 425-6021; (303)425-6854			Phone: (303) 287-9691			

Field ID / Point of Collection	Collection Date	Collection Time		Matrix	# of bottles	Preservation HCL	NaOH	HNO3	H2SO4	None	total coliform MPN	Comments
1CC816009-01A												
D16334 -1	8/13/10	11:05 AM		AQ	1						X	
-												
-												
-												
-												
-												
-												

Turnaround Information

[X] 10 Business Day Standard — Approved By:
[ ] Other _____ (Days)

10 Day Turnaround Hardcopy, RUSH is FAX Data unless previously approved.

Data Deliverable Information

- [ ] Commercial "A"
- [ ] Commercial "B"
- [ ] Commercial "BN"
- [ ] Reduced Tier 1
- [ ] Full Tier 1
- [ ] PDF
- [ ] Compact Disk Deliverable
- [ ] Electronic Delivery: _____
- [ ] State Forms
- [ ] Other (Specify) _____

Comments / Remarks

Please use Colorado regulations and RLs.

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by:	Date & Time:	Received By:	Date & Time:
1	8/16/10 2:10	1	8/16/10 2:30
2		2	2
3		3	3

For Subcontract Laborartory Use Only

Seal #: _____ Headspace: Yes [ ] No [ ] NA [ ]
Preserved where applicable: [ ]
Temperature °C _____ On Ice [ ]

D16334: Chain of Custody
Page 2 of 5

Industrial Laboratories Company, Inc. **Date:** *16-Aug-10*

CLIENT: Accutest Mountain States (AMS)
Project:
Lab Order: 100816009

CASE NARRATIVE

Sample D16334-1 was received at IL more than 72 hrs after collection.

D16334: Chain of Custody
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industrial
LABORATORIES
industrial Laboratories is your independent, third party analytical testing laboratory

To: Accutest Mountain States (AMS)
4036 Youngfield St.

Wheat Ridge CO 80033

Attn: Amanda Kissell

TEST REPORT
ACCUTEST - M
Date Received: 8/16/2010
Date Reported: 8/20/2010
PO Number: D16334

Note: Sample test procedures conform to EPA 40CFR136 requirements.

Lab No.	Sample Description	Test Method	Result	Units	MDL	Analysis Date/By
100816009-01A	D16334-1, 8/13/10, 11:05am	* Total Coliforms MPN	<2 Fecal; 17 Total	MPN/100mL		RB
		SM 9221 B				8/16/2010

Department Manager

* = Scope Analysis
\# = Subcontracted Analysis
MDL = Method Detection Limit
ND = Not Detected at the Method Detection Limit
Page: 1 of 1

D16334: Chain of Custody
Page 4 of 5

Job Change Order: D16334_8/31/2010

Requested	8/31/2010	**Received Date:**	8/16/2010
Account Name:	LT Environmental	**Due Date:**	8/30/2010
Project	Colo Rule 608 Compliance Raton Basin CO	**Deliverable:**	COMMBN
CSR:	RR	**TAT (Days):**	0

Sample #: D16334-1

Change: SAR needs to be logged in under "A" fraction. Thanks.

NATURAL SPRINGS O1

Above Changes Per: Scott **Date:** 8/31/2010

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service Representative.

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D16334: Chain of Custody
Page 5 of 5

GC Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D16334
Account: LTENCODE LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GFB59-MB	FB2284.D	1	08/23/10	JB	n/a	n/a	GFB59

The QC reported here applies to the following samples: **Method:** RSK175 MOD

D16334-1

CAS No.	Compound	Result	RL	MDL	Units	Q
74-82-8	Methane	ND	0.00080	0.00080	mg/l	

Blank Spike/Blank Spike Duplicate Summary

Job Number: D16334
Account: LTENCODE LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GFB59-BS	FB2285.D	10	08/23/10	JB	n/a	n/a	GFB59
GFB59-BSD	FB2286.D	10	08/23/10	JB	n/a	n/a	GFB59

The QC reported here applies to the following samples: **Method:** RSK175 MOD

D16334-1

CAS No.	Compound	Spike mg/l	BSP mg/l	BSP %	BSD mg/l	BSD %	RPD	Limits Rec/RPD
74-82-8	Methane	0.5094	0.604	119	0.597	117	1	70-130/30

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D16334
Account: LTENCODE LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D16560-1MS	FB2307.D	10	08/23/10	JB	n/a	n/a	GFB59
D16560-1MSD	FB2308.D	10	08/23/10	JB	n/a	n/a	GFB59
D16560-1	FB2301.D	1	08/23/10	JB	n/a	n/a	GFB59

The QC reported here applies to the following samples: **Method:** RSK175 MOD

D16334-1

CAS No.	Compound	D16560-1 mg/l	Q	Spike mg/l	MS mg/l	MS %	MSD mg/l	MSD %	RPD	Limits Rec/RPD
74-82-8	Methane	0.00149		0.5094	0.536	105	0.527	103	1	70-130/30

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2703
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 08/25/10

Metal	RL	IDL	MDL	MB raw	final
Aluminum	100	7	49		
Antimony	30	1.7	13		
Arsenic	25	2.8	6.5		
Beryllium	10	1.4	4.4		
Boron	50	3.5	19		
Cadmium	10	.22	1.2		
Calcium	400	17	9.2		
Chromium	10	.27	1.6		
Cobalt	5.0	.48	.3		
Copper	5.0	1.6	2.7		
Lead	50	1.3	3.2		
Lithium	2.0	.76	1.6		
Magnesium	200	5.8	12		
Manganese	5.0	.21	.7		
Molybdenum	10	.41	1.2		
Nickel	30	.38	.6		
Phosphorus	100	15	54		
Potassium	1000	380	540	162	<1000
Selenium	50	2.8	7.2		
Silicon	50	12	20		
Silver	30	.98	.3		
Sodium	400	230	23		
Strontium	5.0	.091	3.4		
Thallium	10	3.1	2.1		
Tin	50	14	4.4		
Titanium	10	.098	.7		
Uranium	50	2.2	3.9		
Vanadium	10	.27	.3		
Zinc	30	.76	1.7		

Associated samples MP2703: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2703 Methods: SW846 6010B
Matrix Type: AQUEOUS Units: ug/l

Prep Date: 08/25/10

Metal	D16644-1 Original MS		Spikelot MPICPALL	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	anr				
Barium					
Beryllium					
Boron					
Cadmium	anr				
Calcium	anr				
Chromium	anr				
Cobalt					
Copper	anr				
Iron					
Lead	anr				
Lithium	anr				
Magnesium	anr				
Manganese	anr				
Molybdenum					
Nickel					
Phosphorus	anr				
Potassium	204000	237000	25000	132.0(a)	75-125
Selenium	anr				
Silicon					
Silver	anr				
Sodium	anr				
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc	anr				

Associated samples MP2703: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2703
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2703 Methods: SW846 6010B
Matrix Type: AQUEOUS Units: ug/l

Prep Date: 08/25/10

Metal	D16644-1 Original MSD		Spikelot MPICPALL % Rec		MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	anr					
Barium						
Beryllium						
Boron						
Cadmium	anr					
Calcium	anr					
Chromium	anr					
Cobalt						
Copper	anr					
Iron						
Lead	anr					
Lithium	anr					
Magnesium	anr					
Manganese	anr					
Molybdenum						
Nickel						
Phosphorus	anr					
Potassium	204000	235000	25000	124.0	0.8	20
Selenium	anr					
Silicon						
Silver	anr					
Sodium	anr					
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc	anr					

Associated samples MP2703: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2703
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2703 Methods: SW846 6010B
Matrix Type: AQUEOUS Units: ug/l

Prep Date: 08/25/10

Metal	BSP Result	Spikelot MPICPALL	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Beryllium				
Boron				
Cadmium	anr			
Calcium	anr			
Chromium	anr			
Cobalt				
Copper	anr			
Lead	anr			
Lithium	anr			
Magnesium	anr			
Manganese	anr			
Molybdenum				
Nickel				
Phosphorus	anr			
Potassium	23200	25000	92.8	80-120
Selenium	anr			
Silicon				
Silver	anr			
Sodium	anr			
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc	anr			

Associated samples MP2703: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2721
Matrix Type: AQUEOUS

Methods: EPA 200.8
Units: ug/l

Prep Date: 08/26/10

Metal	RL	IDL	MDL	MB raw	final
Aluminum	50	.28	1.7		
Antimony	0.40	.002	.0064		
Arsenic	0.80	.098	.37		
Barium	2.0	.007	.68		
Beryllium	0.20	.015	.014		
Boron	40	1.9	1.7		
Cadmium	0.10	.045	.0095		
Calcium	400	3.6	170		
Chromium	2.0	.041	.24		
Cobalt	0.20	.0065	.0045		
Copper	2.0	.021	.097		
Iron	40	1.6	7.2		
Lead	0.50	.0024	.017		
Magnesium	100	.13	3.7		
Manganese	1.0	.014	.44	0.23	<1.0
Molybdenum	1.0	.0087	.071		
Nickel	2.0	.0057	.081		
Phosphorus	60	3.6	7.7		
Potassium	200	4	23		
Selenium	0.40	.15	.2	0.36	<0.40
Silver	0.10	.0016	.078		
Sodium	500	1.6	8.1		
Strontium	20	.0079	.13		
Thallium	0.20	.029	.0081		
Tin	10	.012	.092		
Titanium	2.0	.069	.31		
Uranium	0.20	.00076	.0039		
Vanadium	1.0	.1	.48		
Zinc	10	.077	4.1		

Associated samples MP2721: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2721 Methods: EPA 200.8
Matrix Type: AQUEOUS Units: ug/l

Prep Date: 08/26/10

Metal	D16431-1F Original MS		Spikelot MPICPALL	% Rec	QC Limits
Aluminum	anr				
Antimony					
Arsenic	anr				
Barium					
Beryllium					
Boron					
Cadmium	anr				
Calcium	anr				
Chromium	anr				
Cobalt					
Copper	anr				
Iron	anr				
Lead	anr				
Magnesium	anr				
Manganese	8.3	104	100	95.7	70-130
Molybdenum	anr				
Nickel	anr				
Phosphorus					
Potassium					
Selenium	0.45	200	200	99.8	70-130
Silver	anr				
Sodium	anr				
Strontium					
Thallium					
Tin					
Titanium					
Uranium	anr				
Vanadium	anr				
Zinc	anr				

Associated samples MP2721: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2721 Methods: EPA 200.8
Matrix Type: AQUEOUS Units: ug/l

Prep Date: 08/26/10

Metal	D16431-1F Original MSD		Spikelot MPICPALL % Rec		MSD RPD	QC Limit
Aluminum	anr					
Antimony						
Arsenic	anr					
Barium						
Beryllium						
Boron						
Cadmium	anr					
Calcium	anr					
Chromium	anr					
Cobalt						
Copper	anr					
Iron	anr					
Lead	anr					
Magnesium	anr					
Manganese	8.3	104	100	95.7	0.0	10
Molybdenum	anr					
Nickel	anr					
Phosphorus						
Potassium						
Selenium	0.45	199	200	99.3	0.5	12
Silver	anr					
Sodium	anr					
Strontium						
Thallium						
Tin						
Titanium						
Uranium	anr					
Vanadium	anr					
Zinc	anr					

Associated samples MP2721: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2721
Matrix Type: AQUEOUS

Methods: EPA 200.8
Units: ug/l

Prep Date: 08/26/10

Metal	BSP Result	Spikelot MPICPALL	% Rec	QC Limits
Aluminum	anr			
Antimony				
Arsenic	anr			
Barium				
Beryllium				
Boron				
Cadmium	anr			
Calcium	anr			
Chromium	anr			
Cobalt				
Copper	anr			
Iron	anr			
Lead	anr			
Magnesium	anr			
Manganese	107	100	107.0	85-115
Molybdenum	anr			
Nickel	anr			
Phosphorus				
Potassium				
Selenium	226	200	113.0	85-115
Silver	anr			
Sodium	anr			
Strontium				
Thallium				
Tin				
Titanium				
Uranium	anr			
Vanadium	anr			
Zinc	anr			

Associated samples MP2721: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2728
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 08/29/10

Metal	RL	IDL	MDL	MB raw	final
Aluminum	100	7	49		
Antimony	30	1.7	13		
Arsenic	25	2.8	6.5		
Barium	10	.14	2.4		
Beryllium	10	1.4	4.4		
Boron	50	3.5	19		
Cadmium	10	.22	1.2		
Calcium	400	17	9.2	19.0	<400
Chromium	10	.27	1.6		
Cobalt	5.0	.48	.3		
Copper	5.0	1.6	2.7		
Iron	70	7.7	10	31.8	<70
Lead	50	1.3	3.2		
Lithium	2.0	.76	1.6		
Magnesium	200	5.8	12	4.1	<200
Manganese	5.0	.21	.7		
Molybdenum	10	.41	1.2		
Nickel	30	.38	.6		
Phosphorus	100	15	54		
Potassium	1000	380	540		
Selenium	50	2.8	7.2		
Silicon	50	12	20		
Silver	30	.98	.3		
Sodium	400	230	23	206	<400
Strontium	5.0	.091	3.4		
Thallium	10	3.1	2.1		
Tin	50	14	4.4		
Titanium	10	.098	.7		
Uranium	50	2.2	3.9		
Vanadium	10	.27	.3		
Zinc	30	.76	1.7		

Associated samples MP2728: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2728 Methods: SW846 6010B
Matrix Type: AQUEOUS Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2728 Methods: SW846 6010B
Matrix Type: AQUEOUS Units: ug/l

Prep Date: 08/29/10

Metal	D16409-1 Original	MS	Spikelot MPICPALL	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	anr				
Barium	anr				
Beryllium					
Boron					
Cadmium	anr				
Calcium	613000	644000	25000	124.0	75-125
Chromium	anr				
Cobalt					
Copper	anr				
Iron	58300	68400	5000	202.0(a)	75-125
Lead	anr				
Lithium					
Magnesium	174000	202000	25000	112.0	75-125
Manganese	anr				
Molybdenum					
Nickel					
Phosphorus					
Potassium	anr				
Selenium	anr				
Silicon					
Silver	anr				
Sodium	100000	127000	25000	108.0	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc	anr				

Associated samples MP2728: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2728
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2728 Methods: SW846 6010B
Matrix Type: AQUEOUS Units: ug/l

Prep Date: 08/29/10

Metal	D16409-1 Original	MSD	Spikelot MPICPALL	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	anr					
Barium	anr					
Beryllium						
Boron						
Cadmium	anr					
Calcium	613000	632000	25000	76.0	1.9	20
Chromium	anr					
Cobalt						
Copper	anr					
Iron	58300	73600	5000	306.0(a)	7.3	20
Lead	anr					
Lithium						
Magnesium	174000	200000	25000	104.0	1.0	20
Manganese	anr					
Molybdenum						
Nickel						
Phosphorus						
Potassium	anr					
Selenium	anr					
Silicon						
Silver	anr					
Sodium	100000	124000	25000	96.0	2.4	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc	anr					

Associated samples MP2728: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2728
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2728
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date: 08/29/10

Metal	BSP Result	Spikelot MPICPALL	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	anr			
Beryllium				
Boron				
Cadmium	anr			
Calcium	25000	25000	100.0	80-120
Chromium	anr			
Cobalt				
Copper	anr			
Iron	4880	5000	97.6	80-120
Lead	anr			
Lithium				
Magnesium	23700	25000	94.8	80-120
Manganese	anr			
Molybdenum				
Nickel				
Phosphorus				
Potassium	anr			
Selenium	anr			
Silicon				
Silver	anr			
Sodium	25300	25000	101.2	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc	anr			

Associated samples MP2728: D16334-1F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2728
Matrix Type: AQUEOUS

Methods: SW846 6010B
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2762
Matrix Type: AQUEOUS

Methods: LADNR29B, SW846 6010B
Units: ug/l

Prep Date: 09/01/10

Metal	RL	IDL	MDL	MB raw	final
Aluminum	500	35	250		
Antimony	150	8.5	65		
Arsenic	130	14	33		
Barium	50	.7	12		
Beryllium	50	7	22		
Boron	250	18	93		
Cadmium	50	1.1	6		
Calcium	2000	85	46	45.5	<2000
Chromium	50	1.4	8		
Cobalt	25	2.4	1.5		
Copper	25	8	14		
Iron	350	39	50		
Lead	250	6.5	16		
Lithium	10	3.8	8		
Magnesium	1000	29	62	26.0	<1000
Manganese	25	1.1	3.5		
Molybdenum	50	2.1	6		
Nickel	150	1.9	3		
Phosphorus	500	75	270		
Potassium	5000	1900	2700		
Selenium	250	14	36		
Silicon	250	60	100		
Silver	150	4.9	1.5		
Sodium	2000	1200	110	-410	<2000
Strontium	25	.46	17		
Thallium	50	16	11		
Tin	250	70	22		
Titanium	50	.49	3.5		
Uranium	250	11	20		
Vanadium	50	1.4	1.5		
Zinc	150	3.8	8.5		

Associated samples MP2762: D16334-1A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2762
Matrix Type: AQUEOUS

Methods: LADNR29B, SW846 6010B
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2762
Matrix Type: AQUEOUS

Methods: LADNR29B, SW846 6010B
Units: ug/l

Prep Date: 09/01/10

Metal	D16762-1F Original MS		Spikelot MPICPALL	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	12700	135000	125000	97.8	75-125
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Lithium					
Magnesium	4870	122000	125000	93.7	75-125
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silicon					
Silver					
Sodium	3580	127000	125000	98.7	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP2762: D16334-1A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2762
Matrix Type: AQUEOUS

Methods: LADNR29B, SW846 6010B
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2762
Matrix Type: AQUEOUS

Methods: LADNR29B, SW846 6010B
Units: ug/l

Prep Date: 09/01/10

Metal	D16762-1F Original MSD		Spikelot MPICPALL	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium	12700	137000	125000	99.4	1.5	20
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Lithium						
Magnesium	4870	123000	125000	94.5	0.8	20
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silicon						
Silver						
Sodium	3580	129000	125000	100.3	1.6	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP2762: D16334-1A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2762
Matrix Type: AQUEOUS

Methods: LADNR29B, SW846 6010B
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2762
Matrix Type: AQUEOUS

Methods: LADNR29B, SW846 6010B
Units: ug/l

Prep Date: 09/01/10

Metal	BSP Result	Spikelot MPICPALL	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	121000	125000	96.8	80-120
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	117000	125000	93.6	80-120
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	122000	125000	97.6	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP2762: D16334-1A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

QC Batch ID: MP2762
Matrix Type: AQUEOUS

Methods: LADNR29B, SW846 6010B
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Alkalinity, Bicarbonate as CaC	GN6008	5.0	0.0	mg/l	100	101	101.4	90-110%
Alkalinity, Carbonate	GN6009	5.0	0.0	mg/l	100	101	101.4	80-120%
Alkalinity, Total as CaCO3	GN6006	5.0	0.0	mg/l	100	101	101.4	90-110%
Bromide	GP2589/GN5940	0.20	0.0	mg/l	20	19.2	96.0	90-110%
Chloride	GP2589/GN5940	0.50	0.0	mg/l	20	21.2	106.0	90-110%
Fluoride	GP2633/GN6047	0.20	0.0	mg/l	10	9.51	95.1	90-110%
Hydrogen Sulfide	GN5975	0.50	<0.50	mg/l	3.56	3.4	95.5	60-120%
Nitrogen, Nitrate	GP2589/GN5940	0.045	0.0	mg/l	4.52	4.28	94.7	90-110%
Nitrogen, Nitrite	GP2589/GN5940	0.061	0.0	mg/l	6.09	6.14	100.8	90-110%
Phosphate, Ortho	GP2589/GN5940	0.065	0.0	mg/l	9.78	9.51	97.2	90-110%
Solids, Total Dissolved	GN5952	10	0.0	mg/l	400	403	100.8	90-110%
Specific Conductivity	GP2560/GN5892			umhos/cm	99.9	91.9	92.0	90-110%
Sulfate	GP2589/GN5940	0.50	0.0	mg/l	30	29.4	98.0	90-110%
pH	GN5898			su	8.00	8.03	100.4	99.3-100
pH	GN5898			su	8.00	8.03	100.4	99.3-100.7%

Associated Samples:
Batch GN5898: D16334-1
Batch GN5952: D16334-1
Batch GN5975: D16334-1
Batch GN6006: D16334-1
Batch GN6008: D16334-1
Batch GN6009: D16334-1
Batch GP2560: D16334-1
Batch GP2589: D16334-1
Batch GP2633: D16334-1
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Alkalinity, Total as CaCO3	GN6006	D16381-4	mg/l	32.2	31.9	1.1	0-20%
Hydrogen Sulfide	GN5975	D16371-1	mg/l	<0.50	<0.50	0.0	0-20%
Solids, Total Dissolved	GN5952	D16336-4	mg/l	302	304	0.7	0-25%
Specific Conductivity	GP2560/GN5892	D16181-1	umhos/cm	754	742	1.6	0-20%

Associated Samples:
Batch GN5952: D16334-1
Batch GN5975: D16334-1
Batch GN6006: D16334-1
Batch GP2560: D16334-1
(*) Outside of QC limits

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Alkalinity, Total as CaCO3	GN6006	D16381-4	mg/l	32.2	100	126	93.7	80-120%
Bromide	GP2589/GN5940	D16132-5	mg/l	0.30	12.5	13.6	106.4	80-120%
Chloride	GP2589/GN5940	D16132-5	mg/l	70.9	50	133	124.2N(a)	80-120%
Fluoride	GP2633/GN6047	D16320-1	mg/l	0.33	2.5	2.6	90.8	80-120%
Nitrogen, Nitrate	GP2589/GN5940	D16132-5	mg/l	0.079	2.83	3.1	106.9	80-120%
Nitrogen, Nitrite	GP2589/GN5940	D16132-5	mg/l	0.0	1.52	1.8	118.2	80-120%
Phosphate, Ortho	GP2589/GN5940	D16132-5	mg/l	0.0	4.08	4.2	103.1	80-120%

Associated Samples:
Batch GN6006: D16334-1
Batch GP2589: D16334-1
Batch GP2633: D16334-1
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

MATRIX SPIKE DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D16334
Account: LTENCODE - LT Environmental
Project: Colo Rule 608 Compliance Raton Basin CO

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Alkalinity, Total as CaCO3	GN6006	D16381-4	mg/l	32.2	100	127	1.0	20%
Bromide	GP2589/GN5940	D16132-5	mg/l	0.30	12.5	13.3	2.2	20%
Chloride	GP2589/GN5940	D16132-5	mg/l	70.9	50	130	2.3	20%
Fluoride	GP2633/GN6047	D16320-1	mg/l	0.33	2.5	2.6	0.0	20%
Nitrogen, Nitrate	GP2589/GN5940	D16132-5	mg/l	0.079	2.83	3.0	3.3	20%
Nitrogen, Nitrite	GP2589/GN5940	D16132-5	mg/l	0.0	1.52	1.8	0.0	20%
Phosphate, Ortho	GP2589/GN5940	D16132-5	mg/l	0.0	4.08	4.1	2.4	20%

Associated Samples:
Batch GN6006: D16334-1
Batch GP2589: D16334-1
Batch GP2633: D16334-1
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits

Misc. Forms

Custody Documents and Other Forms

(Accutest Laboratories Gulf Coast, Inc.)

Includes the following where applicable:

- Chain of Custody

ACCUTEST

CHAIN OF CUSTODY

4036 Youngfield St., Wheat Ridge, CO 80033
303-425-6021 FAX: 303-425-6854

Accutest Job #:	D16334
Accutest Quote #:	
AMS P.O. #:	
Project No.:	

Client Information			Subcontract Laboratory Information			Analytical Information
Name: Accutest Mountain States (AMS)			Name: Accutest - Gulf Coast			SO4RBAC,SFBAC,IRBAC
Address: 4036 Youngfield St.			Address: 10165 Harwin Dr.			
City: Wheat Ridge,	State: CO	Zip: 80033	City: Houston	State: TX	Zip: 77036	
Send Report to: Tiffany Pham			Contact: Sample Management			
Any questions contact: Amanda Kissell						
Phone/Fax #: (303) 425-6021; (303)425-6854			Phone: (713) 692-9151			

Field ID / Point of Collection	Collection Date	Collection Time		Matrix	# of bottles	Preservation HCL	NaOH	HNO3	H2SO4	None	SO4RBAC,SFBAC,IRBAC					Comments
D16334 -1	8/13/10	11:05 AM		AQ	1						X					
-																
-																
-																
-																
-																
-																

Turnaround Information

[X] 10 Business Day Standard — Approved By:
[ ] Other _____ (Days)

10 Day Turnaround Hardcopy, RUSH is FAX Data unless previously approved.

Data Deliverable Information

- [ ] Commercial "A"
- [ ] Commercial "B"
- [ ] Commercial "BN"
- [ ] Reduced Tier 1
- [ ] Full Tier 1
- [ ] PDF
- [ ] Compact Disk Deliverable
- [ ] Electronic Delivery: _____
- [ ] State Forms
- [ ] Other (Specify) _____

Comments / Remarks

Please use Colorado regulations and RLs.

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by:	Date & Time:	Received By:	Date & Time:
1		8/16/10 1440	1	1
2	FedEX	8-17-10 0940	2 ALGC	2 8-17-10 0940
3			3	3

For Subcontract Laborartory Use Only

Seal #: Headspace: Yes [ ] No [ ] NA [ ]
Preserved where applicable: [ ]
Temperature °C 4.2°C On Ice [X]

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D16334: Chain of Custody
Page 1 of 3
Accutest Laboratories Gulf Coast, Inc.

SAMPLE INSPECTION FORM

Accutest Job Number: D16334 Client: Accutest Mountain States Date/Time Received: 8-17-10 0940

# of Coolers Received: 1 Thermometer #: IR Gun 04 Temperature Adjustment Factor: 0

Cooler Temperatures (initial/adjusted): #1: 4.2°C #2: _____ #3: _____ #4: _____ #5: _____

#6: _____ #7: _____ #8: _____ #9: _____ #10 _____ #11 _____ #12 _____

Method of Delivery: (FEDEX) UPS Accutest Courier Greyhound Delivery Other

COOLER INFORMATION

- [ ] Custody seal missing or not intact
- [ ] Temperature criteria not met
- [ ] Wet ice received in cooler

CHAIN OF CUSTODY

- [ ] Chain of Custody not received
- [ ] Sample D/T unclear or missing
- [ ] Analyses unclear or missing
- [ ] COC not properly executed

SAMPLE INFORMATION

- [ ] Sample containers received broken
- [ ] VOC vials have headspace
- [ ] Sample labels missing or illegible
- [ ] ID on COC does not match label(s)
- [ ] D/T on COC does not match label(s)
- [ ] Sample/Bottles rcvd but no analysis on COC
- [ ] Sample listed on COC, but not received
- [ ] Bottles missing for requested analysis
- [ ] Insufficient volume for analysis
- [ ] Sample received improperly preserved

TRIP BLANK INFORMATION

- [ ] Trip Blank on COC but not received
- [ ] Trip Blank received but not on COC
- [ ] Trip Blank not intact
- [ ] Received Water Trip Blank
- [ ] Received Soil TB

Number of Encores? _____
Number of 5035 kits? _____
Number of lab-filtered metals? _____

Summary of Discrepancies:

TECHNICIAN SIGNATURE/DATE: Dennis Hudelleston 8-17-10

INFORMATION AND SAMPLE LABELING VERIFIED BY: EC 8-17-10

CORRECTIVE ACTIONS

Client Representative Notified: _____ **Date:** _____

By Accutest Representative: _____ **Via:** Phone Email

Client Instructions:

I:\mwalker\form\samplemanagement SM023 Revised 8/11/10

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SAMPLE RECEIPT LOG

JOB #: D16334 DATE/TIME RECEIVED: 8-17-10 0940

CLIENT: Accutest Mountain States INITIALS: DRA

COOLER#	SAMPLE ID	FIELD ID	DATE	MATRIX	VOL	BOTTLE #	LOCATION	PRESERV	PH
1	1	D16334-1	—	W	5 Spec Cup	1	MICRO	1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12
								1 2 3 4 5 6 7 8	<2 >12

DRA 8/17/10

PRESERVATIVES: 1: None 2: HCL 3: HNO3 4: H2SO4 5: NAOH 6: DI 7: MeOH 8: Other

LOCATION: 1: Walk-In #1 (Waters) 2: Walk-In #2 (Soils) VR: Volatile Fridge M: Metals SUB: Subcontract EF: Encore Freezer

Rev 8/13/01 ewp

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D16334: Chain of Custody

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General Chemistry

QC Data Summaries

(Accutest Laboratories Gulf Coast, Inc.)

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D16334
Account: ALMS - Accutest Mountain States
Project: LTENCODE: Colo Rule 608 Compliance Raton Basin CO

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Iron Reducing Bacteria	MB2239	25	<25	cfu/ml				
Slime Forming Bacteria	MB2235	500	<500	cfu/ml				
Sulfate Reducing Bacteria	MB2238	200	<200	cfu/ml				

Associated Samples:
Batch MB2235: D16334-1
Batch MB2238: D16334-1
Batch MB2239: D16334-1
(*) Outside of QC limits