RESULTS OF A SOIL GAS SURVEY, WEST DIVIDE CREEK AREA NEAR SILT, COLORADO

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November 15, 2004

1. EXECUTIVE SUMMARY:

An FID/PID walking survey was successfully used to screen a 10 section area around the West Divide Creek seeps for additional soil gas seeps. Cooperative efforts and communication among of residents in the area, helped to supplement a grid-based survey design to adequately cover such a large area. New thermogenic gas seeps were identified on EnCana's P3 production pad and immediately to the south, along a small. linear patch of ground at the Dietrich property. Gas samples collected in field and analyzed at several different laboratories establish that the seeps are of thermogenic origin. Although the available chemical evidence shows that the soil gases have been somewhat altered and oxidized, the alteration is not so extreme as to entirely obscure their origin. The composition of soil gas sampled at the Dietrich property and dissolved gas sampled from the Dietrich water well appears to be more closely related to the composition of bradenhead gas samples from four gas production wells on the P3 pad than to the gas composition of samples from the Schwartz 2-15B wellhead and bradenhead. The composition of gas seeps at West Divide Creek, on the other hand, is closely related to the composition of gas sampled from the Schwartz 2-15B wellhead and bradenhead. No new seep areas related to the accidental gas release at the Schwartz well were found.

Since the seeps at the P3 pad were detected, 2 wells on the P3 pad have undergone remedial cementation. Continued monitoring of soil hydrocarbons at the P3 pad and the Dietrich property next year will help establish whether or not the remedial cementation has abated the seeps on the Dietrich property and reduced the moderate dissolved gas concentrations found in the water well.

2. OBJECTIVES:

During the COGCC hearing on the West Divide Creek gas seeps held in Glenwood Springs, Colorado, August 16-17, 2004. Near the end of the hearing, COGCC commissioners expressed an interest in determining if there might be any seeps caused by the gas release from the Schwartz well that may have been overlooked. To address this issue, Dr. Gorody proposed conducting a walking soil gas survey in a large area surrounding the Schwartz well. The results of the survey were to be used as a screening tool to find and subsequently sample any additional thermogenic gas seeps outside of the immediate West Divide Creek seep area.

3. SURVEY DESIGN:

Several factors were considered in designing the walking FID survey covering such a large area. These included terrain, distribution of water wells in the area, geology, climate, proactive discussions with landowners, a truck-mounted baseline air quality survey, and time available to plan and execute the survey.

3.1. Terrain and population:

Divide Creek flows along the western edge of a series of steep NNW-trending ridges such as Uncle Bob Mountain, Flatiron Mountain, Crown Peak, and Center Mountain. These peaks coincide with the axial trend of the Divide Creek structural anticline. Such rugged terrain is regulated by the US forest service and the BLM and there are no residents with water wells in that area. For these reasons, the walking survey was confined to the low-relief alluvial plain valleys. The location of all known water wells in the area is posted on a topographic map illustrated in Figure 1.

On the basis of discussions with EnCana staff, the Colorado Oil and Gas Conservation Commission (COGCC) staff, testimony provided at the COGCC hearing in Glenwood Springs, and our terrain analysis, we decided that the survey should include 10 sections. The sections covered included sections 34 – 36 in T6S-R92W, and sections 1-3, 10-15 in T7S-R92W (Figure 1).

3.2. Geology:

Natural gas production in Piceance Basin tight sand reservoirs is largely controlled by the distribution of natural fracture swarms. For this reason, several types of images were used to determine the location and orientation of linear features near the surface that may correspond to the location of subsurface fractures. The images used were as follows:

1) Topographic maps at 1:24,000 and 1:100,000 scale;
2) A compiled surface geologic map with topography for the Hunter Mesa and Gibson Gulch quadrangles;
3) Black and white aerial photography compiled as orthophoto maps;
4) Compiled SSURGO soil maps;
5) A high resolution infrared aerial image of the Hunter Mesa and Gibson Gulch quadrangles acquired by EnCana in August of 2003;
6) A proprietary aerial aeromagnetic survey provided by EnCana;
7) A proprietary geologic structure survey based on seismic reflection data provided by EnCana.

With the exception of the last two survey maps, all the data used to identify surface lineaments have been provided in the CD ROM accompanying this report. Figure 2 illustrates the linear features compiled from imagery. These linear features were used in the survey design to help guide the survey.

A list of references relevant to the geology and commercial gas production in this area of the Piceance Basin is included in the selected references section of this report. The main subject of interest relevant to this survey is the published data regarding the orientation of stress in this area of the Piceance basin. Results from nearly a decade of US DOE/GRI investigations at the MWX multiwell site, near Mamm Creek, indicated that the direction of maximum principal stress and fracture extension is directed WNW (Figure 2). Thus, gas seeps originating from depth and migrating in open fractures, would be most likely to propagate along NNW-trending fractures.

3.3. Climate

An analysis of NOAA climatic records from the airport near Rifle (KRIL) indicated that the prevailing wind direction in the spring through fall months is from the West. As a result, walking survey transects were designed to extend along a northeasterly direction to optimize the potential for detecting a gas plume downwind of a natural gas seep.

3.4. Interviews with land owners:

Prior to conducting the survey, Jim Viellenave, President of ESN Rocky Mountain services, contacted landowners by phone to advise them of the upcoming survey. At that time, he solicited and noted comments regarding suspected problems on their property that they thought might be related to gas seepage. Prior to conducting the survey in the field, the field crew interviewed landowners in person, and again, landowner comments and concerns were directly and immediately addressed. Several landowners directed the survey crew to specific areas on their property that they wanted surveyed. Everyone contacted was cooperative and helpful. The results all special surveys conducted are documented in this report.

3.5. Divide Creek Seeps:

On several occasions during the EnCana's investigation of the gas seeps along West Divide Creek, EnCana staff members heard landowners express concerns regarding the potential for additional seeps along the creek. They also heard anecdotal stories about other historic seeps along Divide Creek to the south. For these reasons, the survey design was extended to cover the Divide Creek valley southward towards its headwaters. The survey was also extended to investigate the linear drainage valley extending along high ground along Tar Gulch. The planned survey of Tar Gulch was included because its name suggested a historic presence of natural seeps.

Because the gas seeps at West Divide Creek originating from the Schwartz 2-15B well appear to have migrated both updip along bedding and along a NNW-trending fracture trend (Figure 2), and because extension fractures at depth are likely to follow that trend, we decided to concentrate the survey along a NNW-trending corridor. The corridor was designed to be centered along a median line from the Schwartz well to the seeps and cover a 4 km^2 area (1.5 $mi.^2$) with northeast-oriented transects approximately 1 km. long (0.6 miles), and spaced 100 meters (320 feet) apart. The area was to be covered by consistently walking along transects oriented in a northeasterly direction. Designed transects were oriented towards the northeast to maximize the opportunity for intersecting WNW-trending fractures that could direct deeply seated natural towards the surface.

3.6. Baseline truck-mounted IR survey:

Between June 29 and July 3, 2004, ESN Rocky Mountain conducted a truck-mounted baseline air quality survey of all accessible roads in the areas operated by EnCana USA. All of EnCana's production areas, including the the Grass Mesa, Hunter Mesa, Gibson Gulch, Wolf Creek, and Divide Creek Anticline Coalbed Methane units were surveyed. The device used was an infrared gas spectrometer, rented from Apogee Scientific, Inc., that is capable of detecting methane, total volatile hydrocarbons and carbon dioxide simultaneously at sub-ppm concentrations. Detection limits for the device are 0.7 ppm for methane in air and 0.4 ppm for heavy volatile hydrocarbons in air. Heavy hydrocarbons are undifferentiated, and are reported as propane equivalents (propane is used to calibrate the device). Other sensors determined wind speed and direction when the vehicle came to a complete stop. A global positioning system tracked the vehicle's position at all times.

A dashboard-mounted instrument panel showed the concentration of methane, heavy volatile hydrocarbons, and CO2 in real time, sampling the air at a frequency of 100 times a minute (100Hz). This allowed the vehicle to travel at a speed of 20 mph while generating an air quality analysis every 18 feet.

When a hydrocarbon plume was detected, the truck stopped and circled the area until its source area could be identified. More than 300 line miles were surveyed for this preliminary baseline investigation at an average speed of approximately 20 mph. The sensitivity of the instrumentation was excellent. Methane emitted by a lone grazing bull, 25 feet from the truck, was registered at 5.4 ppm. The plume disappeared as the bull roamed away from the truck.

Not all roads were accessible. In the southern half of the area, certain road access to motorized vehicles was prohibited, as posted by the National Forest Service. In the northern half of the area, roads were either fenced off, or were otherwise inaccessible through plowed fields.

Within the area to be surveyed on foot with the FID/PID device, the only large natural gas seep detected with the IR survey was on the P3 well pad. However, at the time the truck-mounted survey was conducted, the seep was thought to have originated from the production infrastructure. The pad was under construction, and as yet, the Arbaney 3-16C well had not been capped. Outside of the planned survey area, to the southwest along the axis of the Divide Creek anticline, other natural seeps were detected along Clear Creek. We had hoped to sample these seeps for this survey, but poor weather prevented us from reaching those targets. Those sites will be sampled next year, following the thaw season.

As indicated from the results of the truck mounted survey, there were several areas where gas plumes were detected within the oil and gas production infrastructure (purple gas well symbols in figure 3). These plumes were specifically re-investigated on foot with the FID survey to confirm the origin of the gas plumes.

3.7. Final Grid Design

The final survey grid design (Figure 4) was programmed into portable GPS units to guide the surveyors on the ground. The illustration shows the location of EnCana's closest production wells within the area, the location of the Divide Creek seeps, and the linear features extracted from the available imagery. The NW-trending corridor on either side of the line between the Schwartz 2-15B well and the West Divide Creek seeps, has the highest line density. The remaining area is covered by NE-trending transects that are spaced approximately 300 meters (nearly 1000 feet or 2 tenths of a mile) apart.

3.8. Protocols

Once the grid survey design was finalized, UGCI and ESN Rocky Mountain Services prepared a proposal to conduct the survey for review by EnCana and COGCC staff. The proposal was approved by both Encana and the COGCC. The COGCC's approval was conditional on clarifying certain points in the proposal and including special isotopic analyses in the final report. A copy of the COGCC approval letter, dated September 7, 2004, is presented in Appendix A. The final proposal outlining the scope of work is presented in Appendix B.

EnCana and ESN subsequently mailed a notice to landowners announcing the intent conduct the survey (Appendix C.) This was followed up by letters requesting access to private property (Appendix D), and a request for liability waivers (Appendix E).

A description of the instruments used for the survey, survey procedures, and soil gas sampling protocols were submitted to EnCana staff prior to conducting the survey. A thorough and complete description of the instruments and sampling protocols used for this survey is presented in Appendix F.

4. SUMMARY OF DATA AVAILABLE ON CD ROM:

4.1. Spreadsheet summary of available data.

The results of this survey have been compiled in an Excel spread sheet named "Survey and laboratory Data", and is included in the CD ROM accompanying this report. There are 7 worksheets on this spreadsheet, each representing a subset of information.

4.1.1. Worksheet 1 – Property access data:

105 landowners were contacted to obtain permission to access their property. A printout of the worksheet is included in Appendix G. The type of consent used to access their property for this survey is noted as verbal, written, not required, or no response. Most of the responses were verbal. Only one landowner, Ms. Kirsty MacMaster, failed to respond to repeated phone messages and written

solicitations. A "Y" in the special request column indicates that a landowner made a special request to have some part of their property surveyed.

4.1.2. Worksheet 2 – Grid points:

This worksheet records the NAD 27 referenced easting and northing coordinate grid points (in UTM meters) used to plan and guide the survey. A plot of these points is provided in Figure 4. A DBase IV file of the data "Grid points for fid traverses_(project 40237).dbf" is included in the Location Data file on the CD ROM accompanying this report.

4.1.3. Worksheet 3 – Track logs:

There are three categories of track logs available on this worksheet. Each point corresponds to a NAD 27-referenced northing and easting coordinate (in UTM meters). The first category is a list of all track points downloaded from a GPS tracking device at the end of each day. These are numbered in consecutive order from 1 to 26,007. The second category of track points had to be digitized for those times when data could not be directly downloaded from a GPS recorder. Track points were digitized when the GPS was inadvertently turned off, when the instrument became inverted while walking, or when the battery lost power during the survey. 11 tracks comprising 879 points were digitized and added to the total track data. The third category of track points refers to special features of the survey. These are described in detail in the subsequent worksheet. A dBase IV file of the data "FID Survey Track Data.dbf" is included in the Location Data file on the CD ROM accompanying this report.

Track data were downloaded from each of three different GPS receivers used for this survey. Three Garmin ETREX Vista model receiver and recorder units (designated in the table as A, B, and C) were used for the survey. These devices allow waypoints to be programmed ahead of time so that they can be displayed in real time to provide a spatial reference point for the surveyor. The devices are also equipped with software that provides real time differential corrections resulting in a real time tracking accuracy of +/- 3 meters. In all, the track points represent a total of approximately 210 line miles surveyed. This estimate includes the calculated distance between registered way points (168 miles), the unrecorded distance between start and end points of each traverse, the estimated distance between track points not recorded when receivers were not sensing a satellite signal, and the estimated length of digitized traverses.

The total track data has been plotted and presented in Figure 5. There is excellent agreement between the planned and actual traverses taken. Areas not covered include pastures that were avoided a the request of landowners and 240 acre area where access to the land and permission to conduct the survey could not be obtained.

4.1.4. Worksheet 4 – Special Features:

Each special feature refers to a NAD 27 referenced northing and easting coordinate (in UTM meters) where a special feature is documented. There are 12 categories of special features documented in this worksheet. The summary worksheet is presented in Appendix H. The categories are defined as follows:

1) ***Gas detected:*** This category refers to the location of a hit detected by either the FID of PID gas detectors while surveying the ground. Where relevant, readings obtained on FID and PID detectors for each category of measurement are recorded on the sheet in ppm units. The source of gases detected will be described in a later section.
2) ***Residence:*** This category refers to the location of detailed surveys conducted at the request of a landowner in the immediate vicinity of their home. No hydrocarbons were detected in soils around any home surveyed. The Chandler, Eicher, Flaherty, Staufer, Griffin, Lloyd, and homes, and Thompson cabins were all surveyed.
3) ***Water system:*** This category refers to the location of sniffing surveys conducted at the request of a home owner in their water well or near flowing water conveyed through the plumbing system leading from the well to the home. The water system at the Burnett home and the Last Chance Ranch / Tom Lloyd properties were surveyed. Methane was detected in the water system of the Last Chance Ranch.
4) ***Spring:*** This category refers to the location of detailed surveys conducted at the request of a home owner at or near springs on their property. Any other springs noted during the survey are also included. Springs on the Flaherty, Langegger, Miller, and Staufer properties, and the Last Dance Ranch, were surveyed. Hydrocarbons were detected at the Langegger and Staufer springs.
5) ***Pond:*** This category refers to the location of detailed surveys conducted at the request of a home owner at or near ponds on their property. Any other ponds noted during the survey are also included. Ponds on the BLM, Currie, Flaherty, Howell, Langegger, Morris, Okagawa, Schoonmaker, Staufer, and West, properties were surveyed. Hydrocarbons were detected at the Langegger and Schoonmaker ponds.
6) ***Vegetation:*** This category refers to the location of detailed surveys conducted at the request of a home owner anywhere that stressed vegetation was observed. Hydrocarbons were not detected anywhere in areas where the field crew was directed to sniff the soil. Stressed vegetation seems is associated with areas of spring discharge containing saline and sodic water, areas that are poorly irrigated, and areas infested with insects, such as the pine beetle.
7) ***Infrastructure:*** This category refers to the location of producing well pad sites or pipelines where a special survey was conducted to detect gas emanating from the gas production infrastructure. Small hydrocarbon plumes were detected at the Calpine Last Dance 9-3, Calpine 10-3,

EnCana 146 Well 2, EnCana 146 Well 3, EnCana pad #130, and the Gibson Gulch Well 13-30. A leaky well head valve that shut down the FID with more than 5% methane in air was found at the Gibson Gulch 4-31 well.

8) ***Bradenhead:*** This category refers to the location of wells on the P3 pad where samples of bradenhead gas were collected for chromatographic and isotopic analysis. The results of laboratory analyses for gas samples collected from bradenheads, is presented in Appendix K. The results will be discussed in a later section.
9) ***Soil probe:*** This category refers to the location of soil probes used to detect and sample gas in soils. A summary of the data reported for gas samples collected with soil probes is presented in Appendices J and K. Soil probes installed at the Eicher, Thompson, and Griffin properties contained background concentrations of methane. Soil probes installed at EnCana's P3 pad and on the Deitrich property contained thermogenic gas. The results of the laboratory analyses will be discussed in a later section.
10) ***Outcrop:*** This category refers to the location of Tertiary bedrock outcrops where the strike and dip of sandstones was measured.
11) ***Soil Sample:*** This category refers to the location of salt crusts near springs where a salt and soil sample was collected for the analysis of salt composition. The laboratory results of the salt crust analyses are presented in Appendix J. Salt crusts were composed principally of sodium sulfate, indicating an origin from the evaporation of saline spring water discharge.
12) ***View:*** This category refers to the location of scenic points of interests documented with digital photography.

Descriptions associated with each location on this worksheet provide summaries of land owner requests, comments, and summaries from field notes.

In all, 144 special features brought to the attention of the survey crew were investigated during the survey. A graphic summary showing the location of all these features is presented in Figure 6.

4.1.5. Worksheet 5 – Photo Index

136 photographs documenting special features observed during this survey are available for review in the file named "ESN Survey photos" on the CD ROM accompanying this report. Each photo includes the acquisition date in the file name. An index of photo file names in consecutive order, a description of the features photographed, and a thumbnail index of all photos is presented in Appendix I.

4.1.6. Worksheet 6 – Isotech Job 5477

Gas samples collected from soil gas probes and the bradenheads on EnCana's P3 pad were sent to Isotech Laboratories for chromatographic and stable isotopic analyses. The samples sent were the only ones with sufficiently high gas concentrations to be analyzed for their stable isotope content. Results are presented in Appendix K.

4.1.7. Empact Schwartz Data

Samples collected from the Schwartz 2-15B wellhead and bradenhead on October 24, 2004 were sent to Empact Analytical Systems, Inc. for an extended gas analysis. This chromatographic analysis includes all the sample components found in the fluid collected, not just the C1 – C6+ gaseous analyses routinely provided by Isotech Laboratories. The analytical results are presented in Appendix L.

4.2. CD ROM data

A CD ROM containing all the data used and generated for this investigation is available with this report. A list of files is presented in Appendix M. There is project folder in the CD ROM for use in ArcView. All the files can be copied into a any directory of choice. After copying the files, the Arc View project can be activated by opening the "ir and fid survey results.apr" file with a text editor. A find and replace function will allow the "D:\" directory to be changed into whatever directory the files were copied.

5. HYDROCARBONS DETECTED

5.1. Methods:

The distribution of soil gas hydrocarbon plumes detected, soil gas probes, and bradenhead gas is plotted in Figure 7. Four different methods (two field methods, and two laboratory methods) were used in this study to determine the origin of the hydrocarbon plumes found. As discussed in Appendix F, two types of gas detectors were used in the field. The Flame Ionization Detector (FID) is most sensitive to the presence of methane, whereas the Photo Ionization Detector (PID) is sensitive to the presence of the heavier volatile hydrocarbons. Accordingly, when only the FID registers a plume and the PID does not, this usually indicates the presence of biogenic gas (of microbial origin). Background methane concentrations in air were on the order of 2 – 3 ppm; explosive concentrations of methane in air are on the order of 50,000 ppm.

The presence of heavier hydrocarbons detected by the PID indicates the presence of thermogenic gas seeps. Soil probes were installed in several areas to collect gas for laboratory analysis. Two types of laboratory analyses were conducted to characterize gas samples, chromatography and stable isotope mass spectrometry.

5.2. FID/PID Results: Biogenic gas detected:

Biogenic gas was detected at the following locations:

1) Langegger Pond 2 - This location is north of the West Divide Creek seep area. Concentrations found at the north end of the pond were 250 ppm at the north shore of the pond, 30 ppm along the south shore, and 18 ppm along the east shore.
2) Last Chance Ranch water well (belonging to Tom Lloyd) and Lloyd residence water faucet – Methane concentrations found by the well head at the water well in the Dry Hollow Creek valley were 2700 ppm; 300 ppm methane levels were detected at an outside faucet at the home. Many dissolved gas samples have been collected from this water well since March of 2004, and the concentrations were sufficiently high to get reliable stable isotopic results. The dissolved methane found in water from this well is of biogenic origin.
3) Schoonmaker Pond – This site was visited twice. The first time, on Oct. 11, 122 ppm of methane was detected. The second time the site was visited to install a soil gas probe, no methane was detected. A soil gas sample could not be taken at that time.
4) Gas samples from soil gas probes installed at the Eicher, Griffin, and Thompson properties were analyzed and found to contain 2-3 ppm background levels of methane. Traces of pentane detected in laboratory analyses (Appendix J)appear to have originated from contamination of the rubber tubing used in the soil gas probes.

5.3. FID/PID Results: Thermogenic gas detected:

Thermogenic gas samples were detected on the Langegger property in the area of the known gas seeps on West Divide Creek. Samples from this area have already been characterized and were not collected for this study. The remaining thermogenic gas samples found on this survey were detected and identified in the following sequence of events.

5.3.1. Altering the survey plan to investigate a seep on the P3 pad.

Sometime during the week of September 20, 2004, Mr. Jamie Adkins of the COGCC reported seeing bubbles in standing water near the Magic 10-2 well on EnCana's P3 production pad. As a result, the survey crew decided to complete their work on the Langegger property, and move the survey to the area surrounding the P3 pad. We decided to conduct a closely spaced walking survey with the FID and PID detectors to cover an area between the creek north of the P3 production pad, and the Dietrich property. This survey extended the closely-spaced survey in the original survey plan. We included the Dietrich property because the COGCC issued EnCana an NOAV as a result of gas composition data reported from a dissolved gas sample collected at the Dietrich water well on July 22, 2004.

5.3.2. Sampling at the P3 pad.

On Oct. 1, 2004, the ESN field crew, headed by John Fontana, sampled bradenhead gases from the P3 well pad. At the time, there were other contractor crews on site testing bradenhead pressures. The 5 bradenheads, from south to north on the P3 pad, the Magic 10-1, Arbaney 3-16C, Magic 10-1A, Magic 10-2, and the Arbaney 3-15C (Figure 8), were systematically connected in series using a pipe connection with ball valves separating each bradenhead valve. Gas pressure was relieved by opening each bradenhead valve, one at a time. Testing revealed that only one bradenhead on the Magic 10-1 continued to flow and build pressure after venting gas pressures. Pressure build-up upon shutin on that bradenhead valve reached a maximum value of 230 psi (equivalent to gas displacing a column of water 535 feet high).

Bradenhead gas from the Magic 10-1, Arbaney 3-16C, Magic 10-2, and the Arbaney 3-15C were diverted to Cali-Bond5^{TM} bags to collect the gas as each bradenhead was vented. There was no flow from the Magic 10-1A, and no sample was collected from that well. Bag samples were then sent to Isotech Labs for chromatographic and stable isotope analysis.

On Oct. 6, soil gas samples were collected from seeps near each of the producing wells on pad P3 using a series of steel soil probes lined with rubber tubing to convey the gas for sampling. The probes were driven to a uniform depth of 3 feet below the surface. Soil gas samples, collected in CaliBond-5^{TM} bags, were sent to Isotech Labs for analysis.

5.3.3. Gas seeps discovered near the Dietrich Property:

On Oct. 4, five gas seeps (Dietrich Seeps 1-5 in Appendix H) were discovered just north of the driveway entrance to the Dietrich. The seeps were found within an area approximately 234m (767’) long and 34m (111)’ wide along a patchy linear trend of stressed and dead vegetation (Figure 9). The patches are characterized by the presence of salt encrustations (Figure 10) which when analyzed, revealed that the salts were composed principally of thenardite (sodium sulfate, Appendix J.) Such salts originate from periodic discharge of saline, sodic water discharge along a spring, which account for the stressed vegetation. Natural gas was emanating from seeps (red stars in Figure 9) within the dry creek bed going northward towards the P3 pad. The range in seep concentrations measured with the FID at the surface was between 4.5 and 175 ppm.

A soil probe was installed at the location of Dietrich Seep 1 (Figure 10), the strongest seep of the five detected. The groundwater level was 18” below the surface. Gas readings from the soil probe were 8 ppm on the PID, indicating that the gas contained hydrocarbons heavier than methane. Readings from the FID had to be attenuated, and registered 100% gas saturation. 300 cc of gas was pumped from the soil probe, diverted to a Cali-5-Bond™ bag, labeled as the C5 seep, and sent to Isotech Labs for chromatographic and isotopic analysis.

5.3.4. Gas sampling and quality

Soil gas samples from the P3 pad and the C5 seep area were collected with Cali-Bond 5™ bags that are specifically designed for collecting these types of gas samples. Sometimes, this collection method can introduce unacceptably high air concentrations. Sampling quality can be readily checked by plotting the total hydrocarbon volume collected against the ratio of oxygen to argon (O_2/Ar). Because argon is inert (non-reactive in nature), it can be used as a conservative tracer of air contamination. Poor quality samples will have very low hydrocarbon concentrations contaminated with high volumes of ambient air. Samples contaminated with ambient air will have O_2/Ar ratios equal to the ambient ratio in the atmosphere of 22.43.

Figure 14 shows a plot of these two variables. Samples collected from the Schwartz 2-15B bradenhead, the Arbaney 3-16C bradenhead, and Twin Creek production wells contain highly concentrated hydrocarbon volumes with a small amount of contaminant air. Samples containing lower hydrocarbon volumes, such as those from the Magic 10-1, C5, and Arbaney 3-15C seeps, contain modified air with low oxygen contents that reflect reducing conditions in the soil. Values from the Dietrich well also reflect the reducing conditions of the water in the well. The data therefore show that the quality of the samples is excellent.

5.3.5. Gas composition data: stable isotopes of methane

Gas samples were analyzed for the stable isotope ratios of carbon and deuterium in methane (Figures 15 and 16) and the stable isotope ratios of carbon in ethane and propane (Figure 16 and 17). Data from the gas seep samples collected at West Divide Creek this year have been included in the figures for purposes of comparison. Stable carbon isotope ratios for methane in the range of delta -40 to -43 per mil are characteristic of a thermogenic gas origin.

Figure 15 shows that the soil probe gas data from the P3 pad and the Dietrich C5 location are scattered towards more positive ratios for carbon and deuterium in methane. These samples have been affected by methanotrophic bacteria in soil that consume methane. Methanotrophic (methane-oxidizing) bacteria consume methane containing light isotopes at a higher rate than methane containing heavy isotopes, a process known as kinetic fractionation. Such action leaves the residual pool of methane enriched in the heavier isotopes. On this basis we can establish that the soils surrounding the Magic 10-2 bradenhead contain the least-altered methane.

Figure 16 also shows the influence of methane oxidation among the West Divide Creek seep samples; sample data show stretched carbon isotope ratios between -42.5 and -40.75 per mil, and stretched deuterium ratios between -210 and -193 per mil. Another trend commonly observed in soil samples among Rocky Mountain basins relates to the occurrence of biogenic methane (of microbial origin). Pure biogenic methane in groundwater contains very negative carbon isotope ratios, on the order of -76 per mil, and deuterium values between -200 and -210 per mil. Addition of bacterial methane to methane of thermogenic origin drives isotopic ratios towards more negative values (trend of blue arrow shown in Figure 16). The scatter towards more positive stable carbon isotope ratios observed in Divide Creek and Dietrich water well samples indicates the influence of mixed biogenic methane.

Potential sources for thermogenic gas are also shown in Figure 17. These include the Schwartz 2-15B, Brown 11-2C, Twin Creek 1-15B, and Morgan 12-14B wellhead and bradenhead samples, and the P3 bradenhead samples from the Arbaney 3-15C, Arbaney 3-16C, Magic 10-1, Magic 10-1A and Magic 10-2 wells. Produced gas or wellhead samples are not likely to be altered, whereas bradenhead samples may be altered as a result of bacterially-mediated reactions in the surrounding shallow soil environment. For this reason, it is important to routinely sample both the produced and bradenhead gas samples (if available) from any given well at any given time.

Well head and bradenhead samples from the Schwartz 2-15B well collected in September show that the bradenhead gas samples have been oxidized by bacteria. Only one bradenhead gas sample was collected from the Schwartz well in April at the time the West Divide Creek seeps were discovered. A produced gas sample from the Schwartz well, collected in October, was analyzed using only chromatography by Empact Laboratories (Appendix L). This analysis documents the composition of the total produced fluids (not just the C1 – C5 gaseous components).

All the data from the Schwartz well (circles connected with a purple line in Figure 16) occupy a region in the graph that is distinct from the bradenhead gas samples on the P3 pad (circled in orange). Although such differences suggest that the methane from the Schwartz well, and the P3 bradenheads come from different sources, it could be argued that the methane in the P3 bradenhead samples are bacterially oxidized from a Schwartz well source.

The sample data points from seeps in West Divide Creek stretch across the range of produced gas and bradenhead values. However, if the most negative values represent the least altered gas samples, then they originate at values corresponding to the stable isotopic composition of methane in the Schwartz 2-15B well. The soil gas and Dietrich water well data points, on the other hand, stretch outside of the values obtained from the P3 pad bradenhead samples. The least-altered gas samples would therefore correspond to the methane values found in bradenhead samples from the P3 pad. Although such differences suggest that West Divide Creek seeps and soil gas samples come from different sources, it could also be argued that the methane in the P3 bradenhead samples are bacterially oxidized from a Schwartz well source.

5.3.6. Gas composition data: stable carbon isotopes of ethane and propane.

The stable carbon isotope data for ethane and propane are more diagnostic of thermogenic gas origins among these samples than the stable isotope data for methane. Figure 17 shows that the data points fall into two main groups circled in orange and purple. As with the methane isotope data, the soil gas data points from the P3 pads, the C5 Dietrich soil gas sample, and the dissolved gas in the Dietrich water well are distributed along a line spanning a 2 per mil difference in ethane and propane isotope ratios. However, the other data from wellhead, bradenhead, and West Divide Creek seep samples cluster tightly across a range 0.5 per mil in a different region on the graph.

The enlargement of Figure 17 shown on Figure 18 further illustrates that the seeps at West Divide Creek are most similar to the ethane and propane carbon isotopes sampled from the Schwartz 12-15B well. Dissolved gas samples from the Dietrich water well yield values that are most similar to the ethane and propane carbon isotopes sampled from the Magic 10-1, and Arbaney 3-15C bradenheads.

5.3.7. Gas composition data: Gas component ratios

Figure 19 shows that the gas samples found in all soil gas samples and the Dietrich water well is of thermogenic origin. If methane (C_1) and ethane (C_2) were of purely biogenic origin, then the C_1/C_2 ratio would be greater than 1000. Values less than 50 are characteristic of thermogenic sources. On that basis, thermogenic C_1/C_2 ratios for the Morgan 12-14B wellhead and bradenhead samples are distinct from all others in the area.

The influence of bacterial alteration is illustrated in Figure 19. Bacterially-mediated oxidation reactions drive isotope ratios to more positive values as the C_1/C_2 ratio increases. The ratio increases because bacteria consume ethane at a greater rate than they consume methane. Thus the thermogenic gas found in soil probes at the P3 pad and on the Dietrich property has been significantly altered. The least altered sample originates in soil near the Magic 10-2 well.

The effects of adding biogenic methane to the gas mix in soils is also evident in Figure 19. Small quantities of biogenic methane will result in more negative carbon isotope values while the C_1/C_2 ratio increases. We can observe such an influence of biogenic gas on a sample of dissolved gas collected from the Dietrich water well.

Figure 20 shows the relationship between the ratio of ethane to propane (C_3), and the ratio of the sum of the butane (C_4) isomers to the sum of the pentane (C_5) isomers. Sample data points are mostly clustered. Wellhead and bradenhead samples from the Morgan 12-14B plot in a distinctly different region on the graph. An enlargement of the clustered data points is presented in Figure 21. This graph shows that the West Divide Creek samples cluster with the data from the Schwartz 2-15B wellhead and bradenhead samples (purple circle), whereas the soil probe data from the P3 pad and the dissolved gas samples from the Dietrich water well cluster with the data from the P3 pad bradenhead samples (orange circle). The stretch in data points in both clusters is due to bacterially-mediated hydrocarbon alteration. Bacterially-mediated oxidation reactions preferentially attack the largest molecules first. Such alteration increases the C_2/C_3 and the C_4/C_5 ratios. Alteration obscures the origin of the gas found in the C5 Deitrich soil probe.

A plot of the butane and pentane isomer ratios is presented in Figure 22. Again, the gas sample data points are clustered, and the gas samples from the Morgan 12-14B wellhead and bradenhead fall in a distinctly different area. An enlargement of the clustered data points is presented in Figure 23. Even among the clustered data points, there is a large amount of scatter in the data. Sample data points from the West Divide Creek seep are stretched as a result of bacterially-mediated hydrocarbon alteration. This occurs because bacterially-mediated oxidation reactions preferentially attack the normal alkanes of butane and pentane. The alteration of thermogenic gas dissolved in the Dietrich water well and occurring in the C5 soil probe is too great to establish its origin using these ratios.

5.4. Discussion

Based on a geologic structure map on the base of the Rollins sandstone (Figure 11), and a surface geologic map of the Hunter Mesa Quadrangle (on CD ROM), the axis of the Divide Creek Anticline trends to the northwest through sections 10, 11 and 14 of T7S-R92W. Two outcrop measurements made during this survey in section 11 (Outcrop 2 and Outcrop 3), show surface dips of 10° to the E-NE on the east side of the anticline. The P3 pad and the Dietrich property seeps are immediately east of the axial trend. Accordingly, if free gas were to migrate updip along bedding planes and permeable matrix from the P3 pad, it would migrate towards the south.

Based on the topography and drainage patterns in the area, groundwater and surface waters are generally flowing to the north and northwest in this area of the basin, towards the Colorado River. Well water data provide evidence that there are two confined and stratified intermediate depth aquifers in the area. Above an approximate average depth of 150’ below the surface, the upper confined aquifer is composed principally of moderately saline sodium sulfate-type type water with minor amounts of sodium bicarbonate. Below 150’, the lower confined aquifer is principally composed of more saline sodium chloride type water containing high concentrations of dissolved biogenic methane. Surface waters and unconfined alluvial aquifers are composed of dilute, calcium bicarbonate type waters.

During September of this year, nearby Lloyd #2 and Vallario water wells contained a mixture of upper and lower confined aquifer fluids composed of between 82 and 98% NaCl; the Balcomb well, was composed of 36% NaCl, and the Duncan, Eubanks, and Dietrich wells contained between 8 and 13% NaCl. Each of these wells also show evidence of increasing NaCl contributions to well water as seasonal surface recharge rates decline. Mixtures of this type occur because the well bores physically connect the two different confined aquifers.

Based on Hanson parameters derived using conductivity and sodium adsorption ratios for water from most well samples in the Dry Hollow Creek area, the water should not be regularly used for irrigation. The observed high sodicity and salinity reduces soil permeability, and impedes the ability of plant roots to take up nutrients. Evaporite crusts sampled on the surface on the Dietrich property are principally composed of sodium sulfate. Intermediate depth groundwaters are discharging water in springs along a NE-trending linear drainage valley on the Dietrich property. This indicates that normally confined, intermediate depth, saline and sodic aquifer fluids are communicating with the surface though fractures. Such artesian seepage across fractures affects plant growth and stresses vegetation. Any free phase natural gas migrating in the subsurface is also likely to find discharge points along permeable fractures.

As evident on the high resolution infrared image shown in Figure 12, there is a strong NW-trending linear boundary to the vegetation (red zones) along a tributary to Dry Hollow Creek. This lineation, defining the linear creek bed, rotates abruptly to the NNE along the creek bed at the exact location of the Dietrich Seep 1 seep and C5 soil probe. When the infrared image is enlarged (Figure 13), the patchy areas of vegetative stress observed while surveying along the creek bed are clearly visible as patches of pink. The patches are significantly larger than the pixel resolution of the infrared image. These images document the influence that fractures and faults have on surface and groundwater flow in the area. The infrared image was acquired in August 2003 (David Uhl, personnal communication), predating accidental gas release at the Schwartz 2-15B well.

The bottom hole location of the Magic 10-1 well bore (Figure 11), when projected vertically to the surface, is within 100 meters of the C5 gas seep. The surface projection of the downhole well trajectory shows that the well is optimally oriented to intersect the local extensional fracture direction. This may have allowed gas to seep towards the surface in areas where the cement integrity along the casing annulus may have been compromised. Gas flow from depth through the annulus was confirmed on the basis of the bradenhead tests conducted on October 1st. Temperature logs from the Arbaney 3-15C also showed a need for remedial cementation. Among the gas data shown in figures 15-23, the two bradenhead gas samples with the most consistently similar gas compositions were sampled from the Arbaney 3-15C and Magic 10-1 bradenheads. It appears that the two well bores, one vertical and the other directional, were in communication via fractures that served as conduits for underlying thermogenic gas. Since the P3 pads were discovered, both well bores have been remedially cemented.

Figure 24 shows a composite geologic and topographic map with compiled lineaments and the location of biogenic and thermogenic gas seeps. Based on the distribution of fracture patterns and the equidistance of the thermogenic gas seeps on either side of the Schwartz 2-15B well, it is possible that the P3 pad seeps may have originated from the Schwartz well. EnCana's proprietary seismic data also shows that there are numerous deep-seated, basement controlled, NW-trending sheer fault patterns in the area that may be connected between the Schwartz well and the P3 pad. The figures in this report, showing gas composition data, also reveal that the thermogenic gas composition in the Schwartz wellhead and bradenhead is variable. This could signify that gas mixing is occurring at depth within fractures, or that the gas is being sourced from more than one geologic interval. However, the stable isotope data for ethane and propane shown in Figure 17, and the C_2/C_3 vs. total C_4/C_5 ratios points shown in figure 21, appear diagnostic enough to differentiate the gas sources from depth at the Schwartz well and the P3 pad wells.

5.5. Conclusions and Recommendations:

No new seeps attributable to the accidental gas release of the Schwartz 2-15B well were found during this FID/PID walking survey. New seeps, discovered on the Dietrich property, appear to have originated from production wells on EnCana's P3 pad noted to have high bradenhead pressures. The gas composition of a single Dietrich soil gas seep sample is similar to the composition of dissolved thermogenic gas sampled from the Dietrich water well. However, both types of samples exhibit a large amount of bacterially-mediated alteration.

We recommend that the immediate area around the Dietrich property be surveyed once again after next years winter thaw. Additional soil probe sampling on the property will help determine if the gas flow from the P3 pads has been abated.

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7. LIST OF FIGURE CAPTIONS:

Figure 1. Topography, distribution of water wells (blue dots), offset producing well pad locations, and Divide Creek Seep locations (red stars), used to guide survey design.

Figure 2. Linear features compiled from topography, surface geologic maps, and infrared aerial imagery.

Figure 3. Results of truck mounted IR survey. The purple lines document the roads surveyed within the area of the planned FID survey. The stars mark the natural gas seeps at the P3 Pad and a minor plume found near a pond and stream (SA-152). The purple gas well symbols denote detected hydrocarbon plumes that are related to production infrastructure.

Figure 4. Grid plan programmed into the GPS unit used to guide the ground survey.

Figure 5. Survey track points plotted on a 1:100,000 topographic map. Measured lineaments (in blue) have been included to show the extent to which they were covered in the survey.

Figure 6. Graphic summary showing the location of special features addressed during the survey.

Figure 7. Map of soil gas hydrocarbons (stars) detected during the survey. The location of soil gas probes is marked with purple circles with star centers. The survey track is green. Offset EnCana gas producing wells are marked with blue asterisks. EnCana's Magic 101, 101-A, 102, and Arbaney 3-15C and 3-16C gas wells are close together and lumped in the area labeled the P3 pad seeps.

Figure 8. Five producing wells on the EnCana P3 pad. North is to the right, and the Magic 10-1 well is on the left.

Figure 9. Field sketch showing distribution of gas seeps found at the Dietrich property and location of soil probe source for the Dietrich C5 sample.

Figure 10. Installing Dietrich C5 soil probe in area of highest soil gas concentrations detected at Dietrich Seep 1. Stressed vegetation visible on left hand side of this photo composite. Salt crusts show up as white spots on bare soil.

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Figure 14: Data showing the good quality of soil and bradenhead gas samples collected for hydrocarbon analysis.

Figure15. Stable isotope results for carbon and deuterium in methane.

Figure 16. Enlargement of stable methane and deuterium isotope ratios outlined in red on Figure 15.

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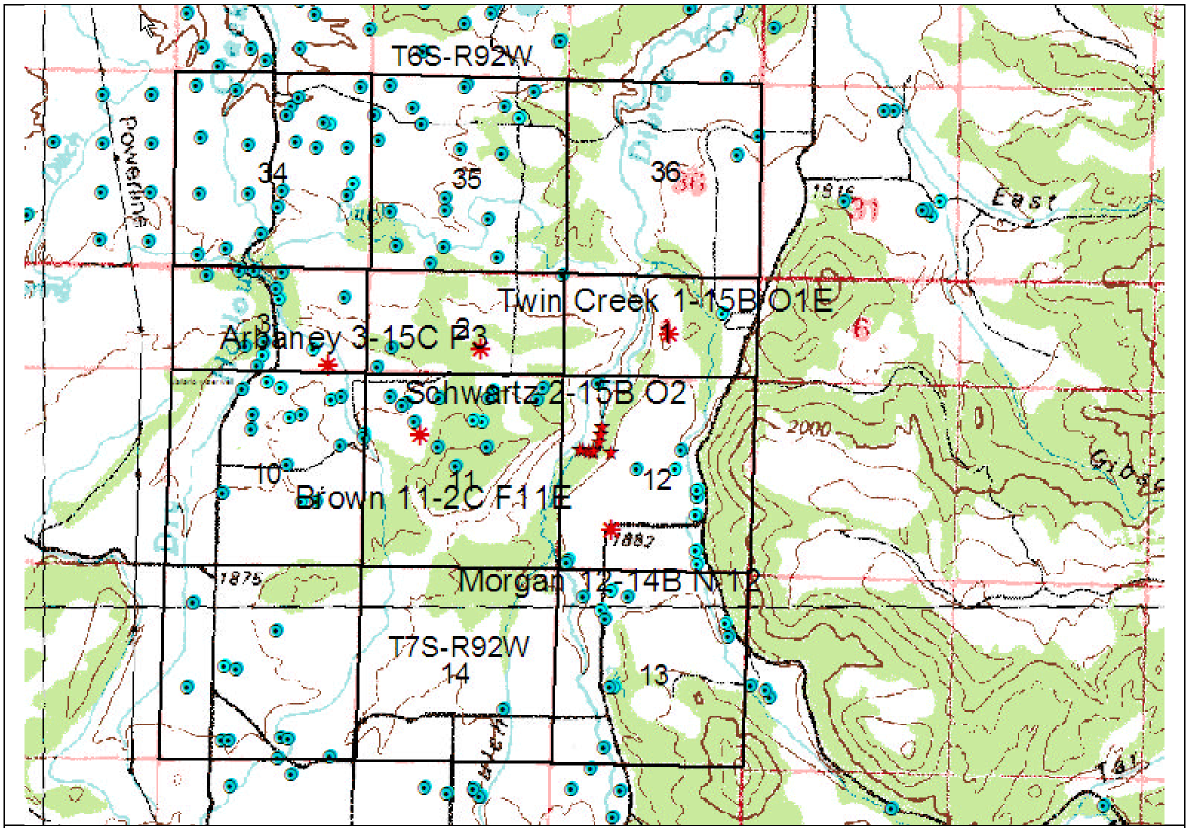
8. FIGURES



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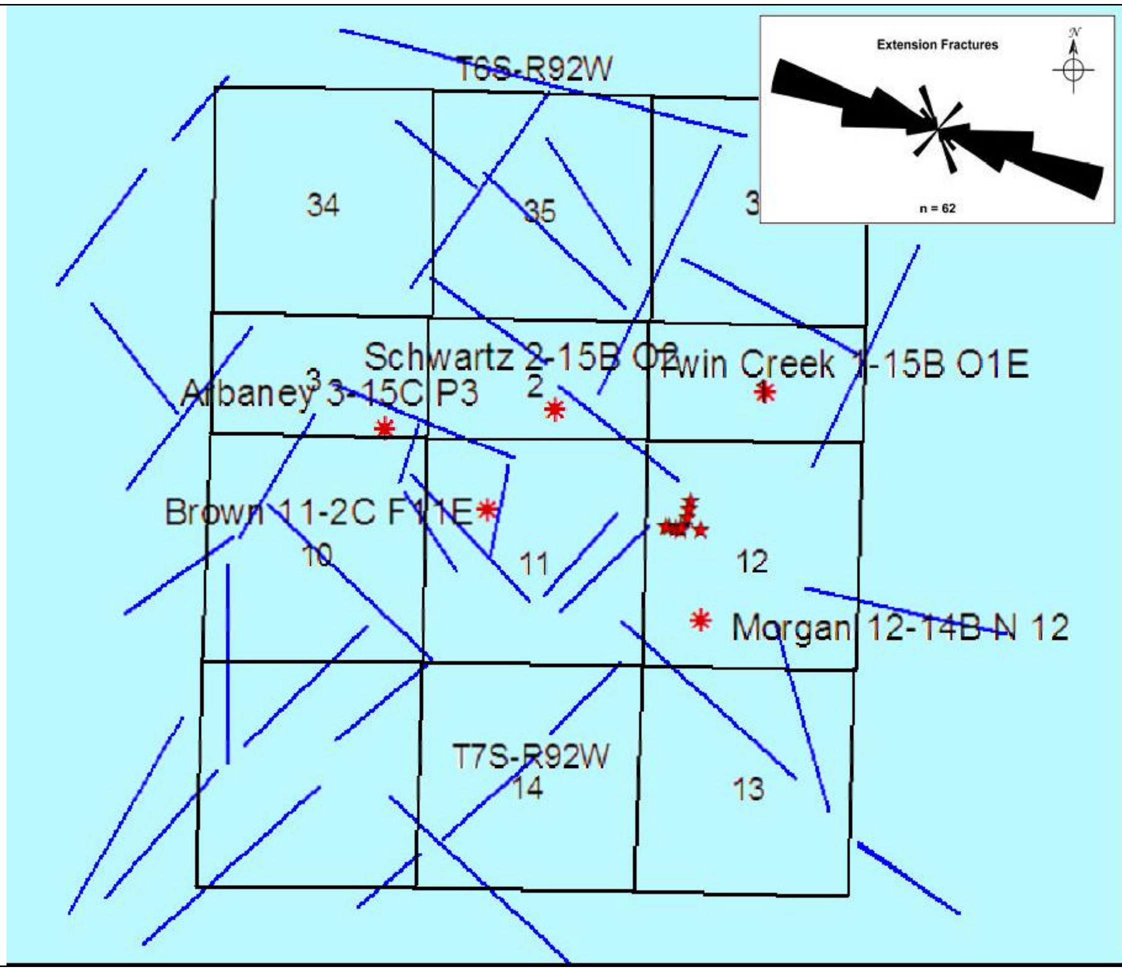

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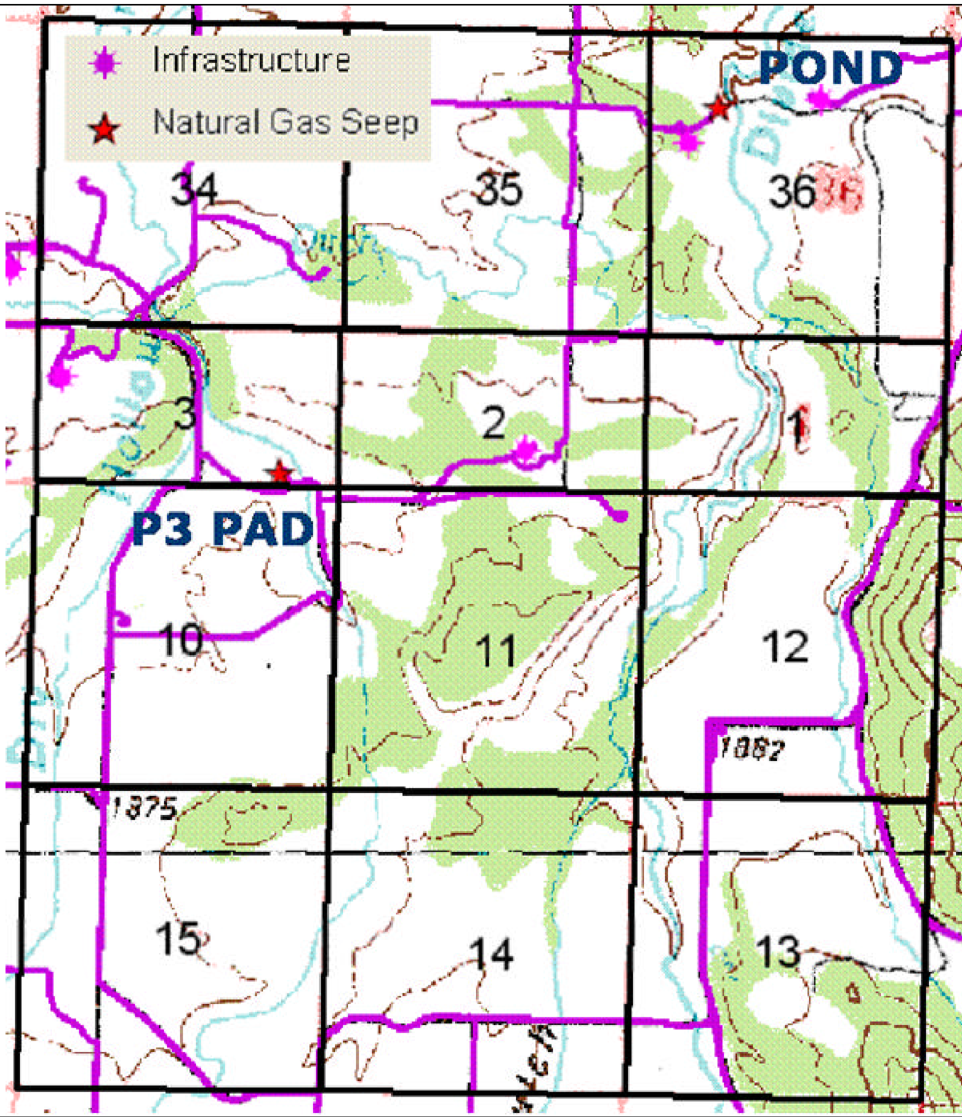

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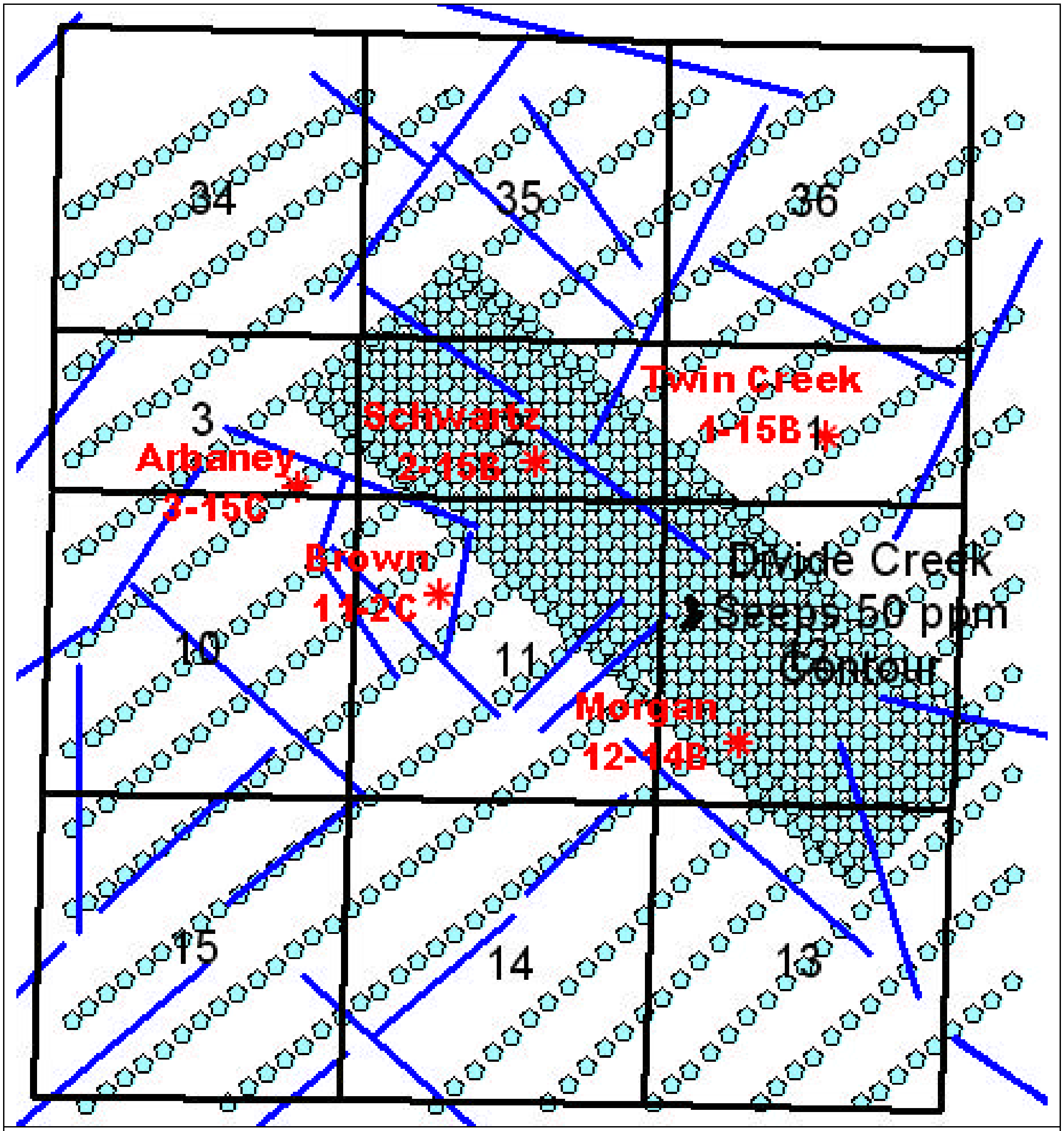

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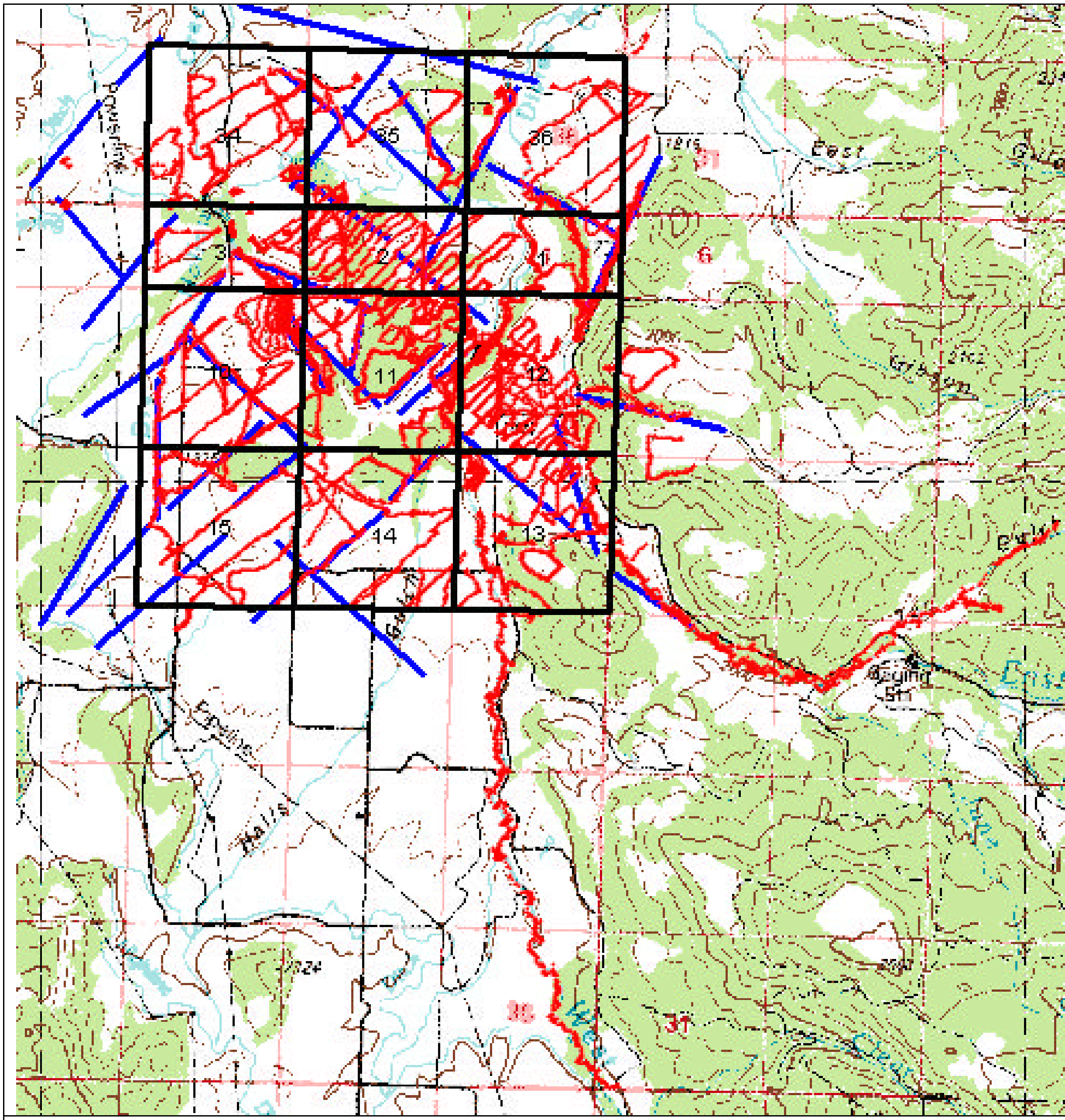

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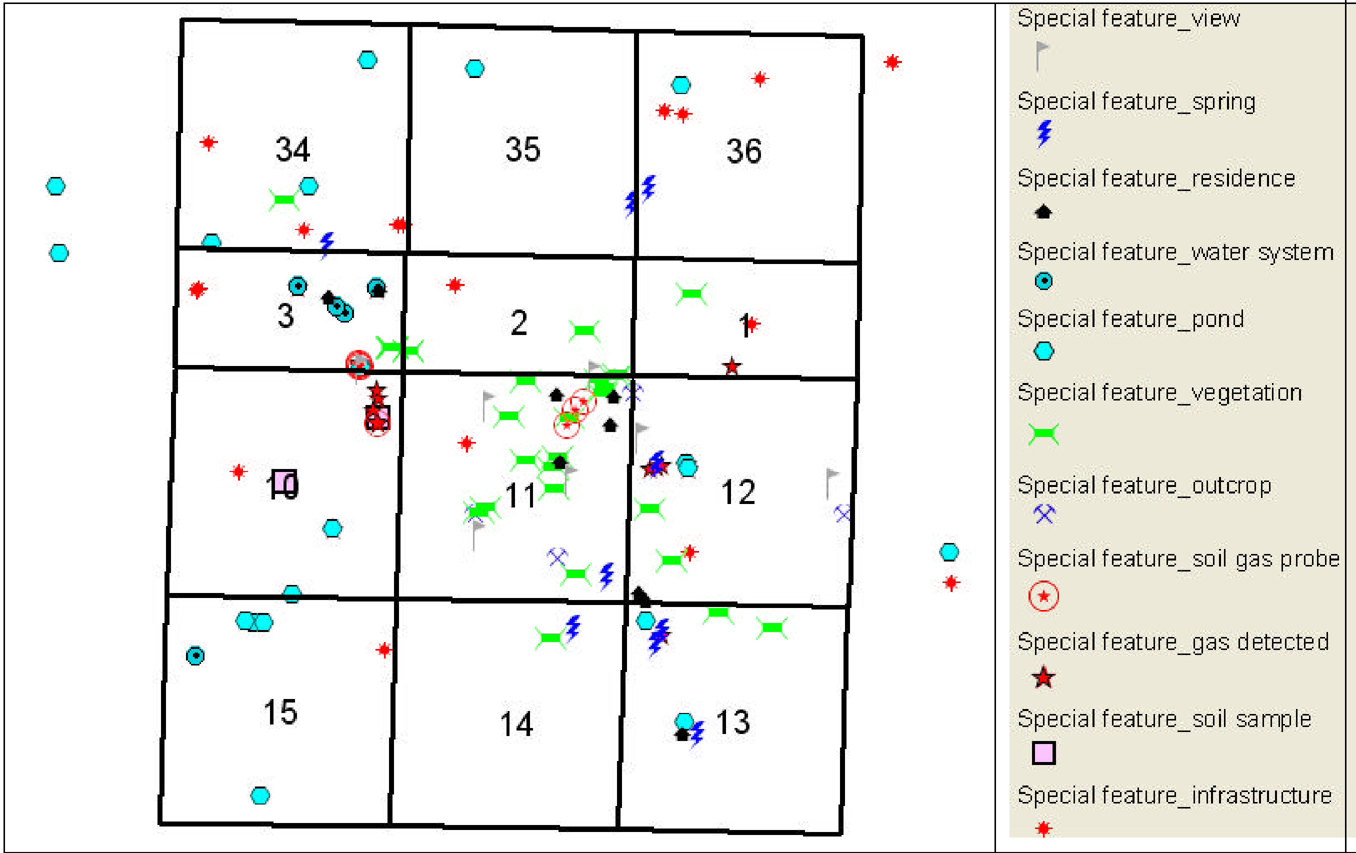

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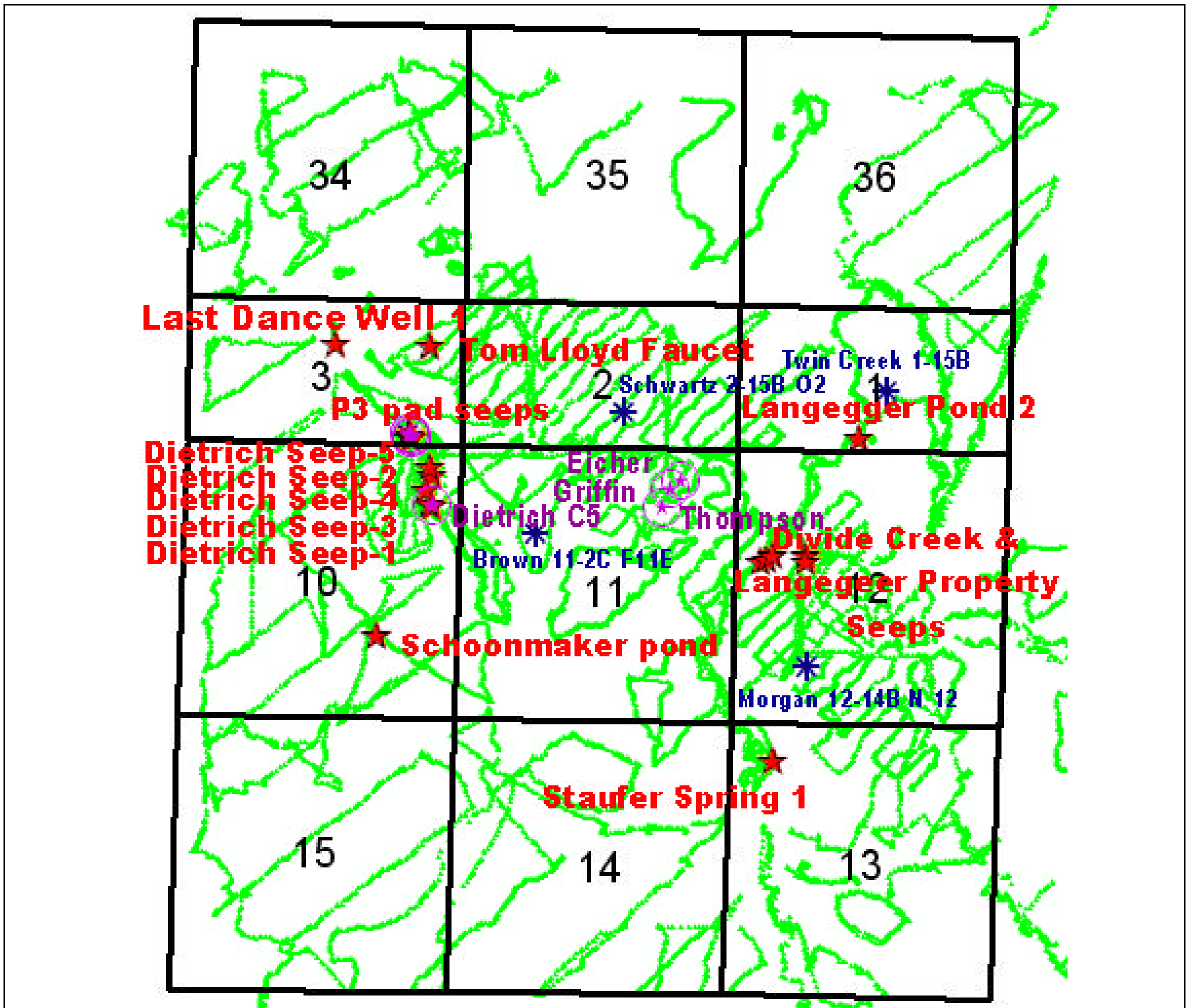

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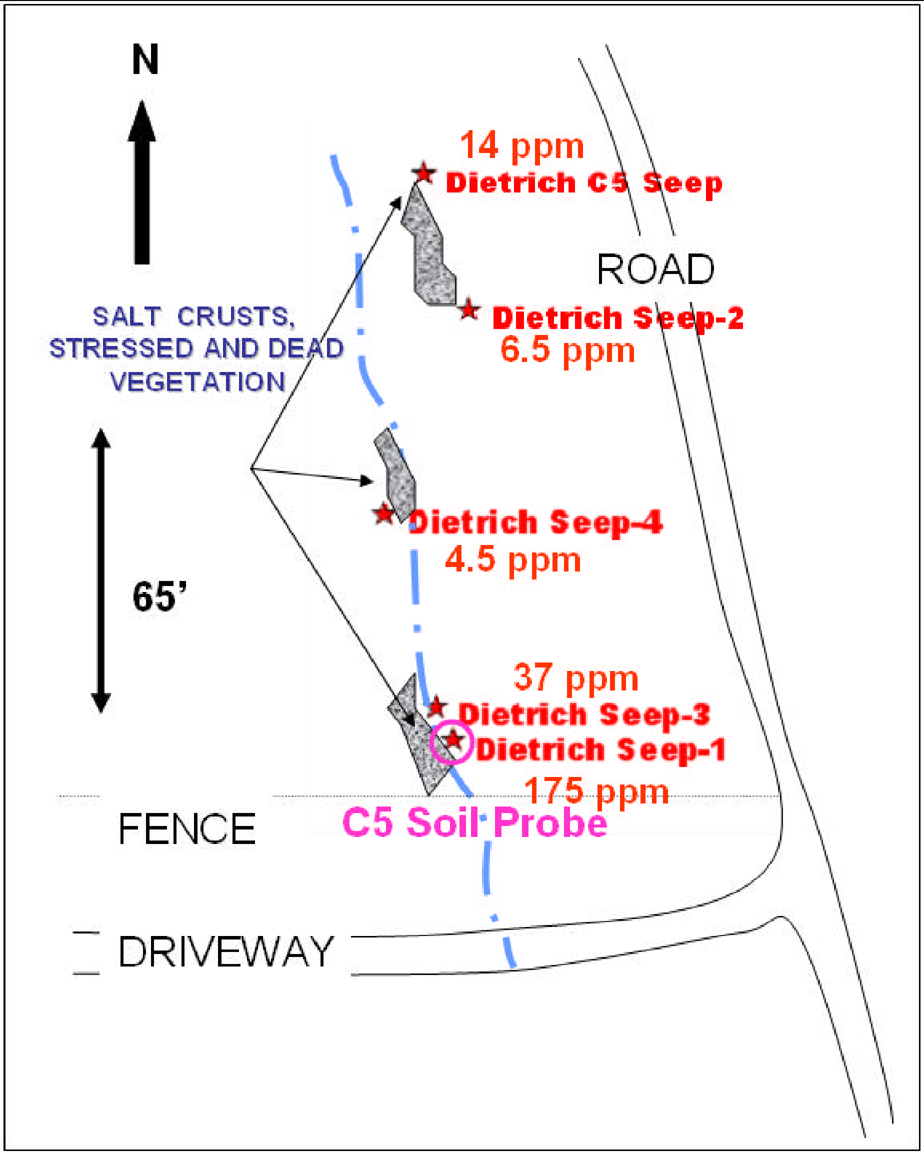

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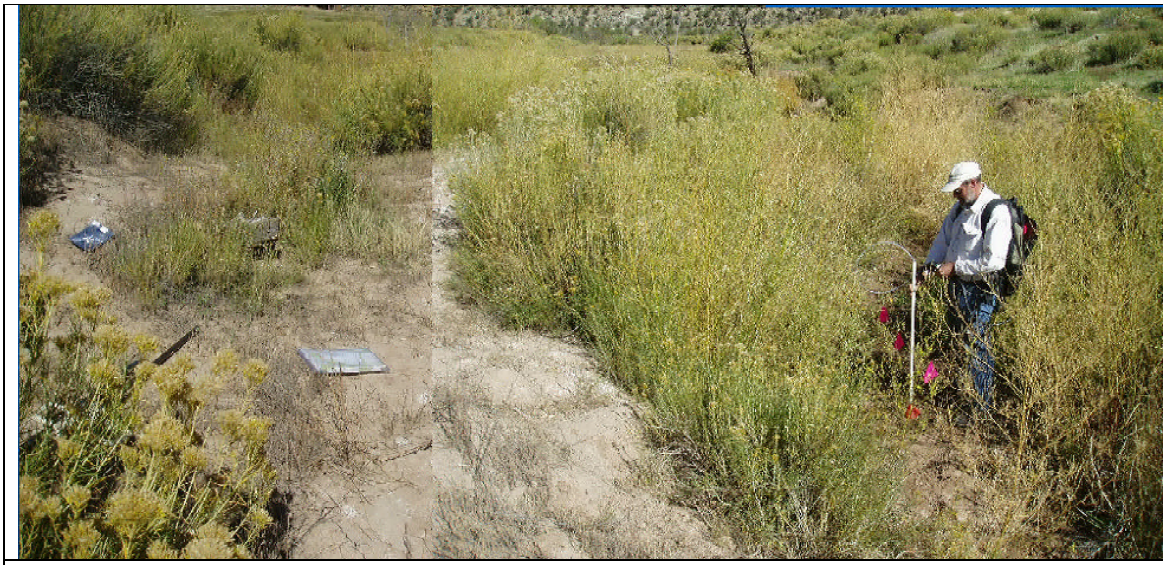

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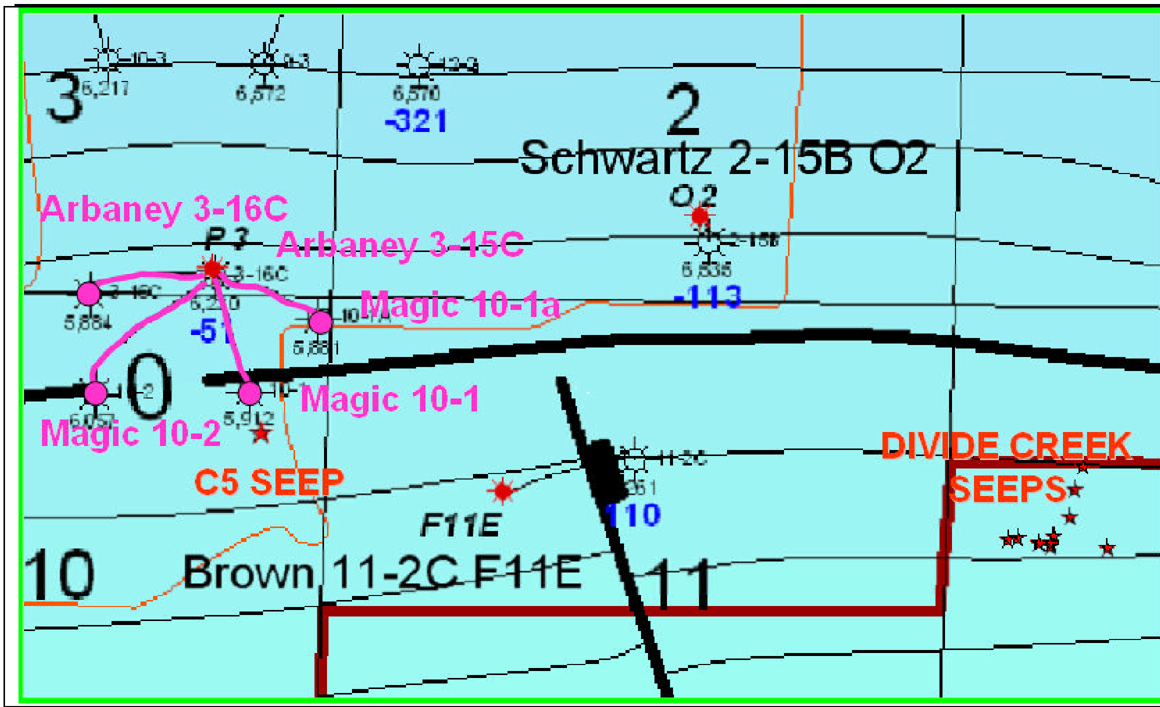

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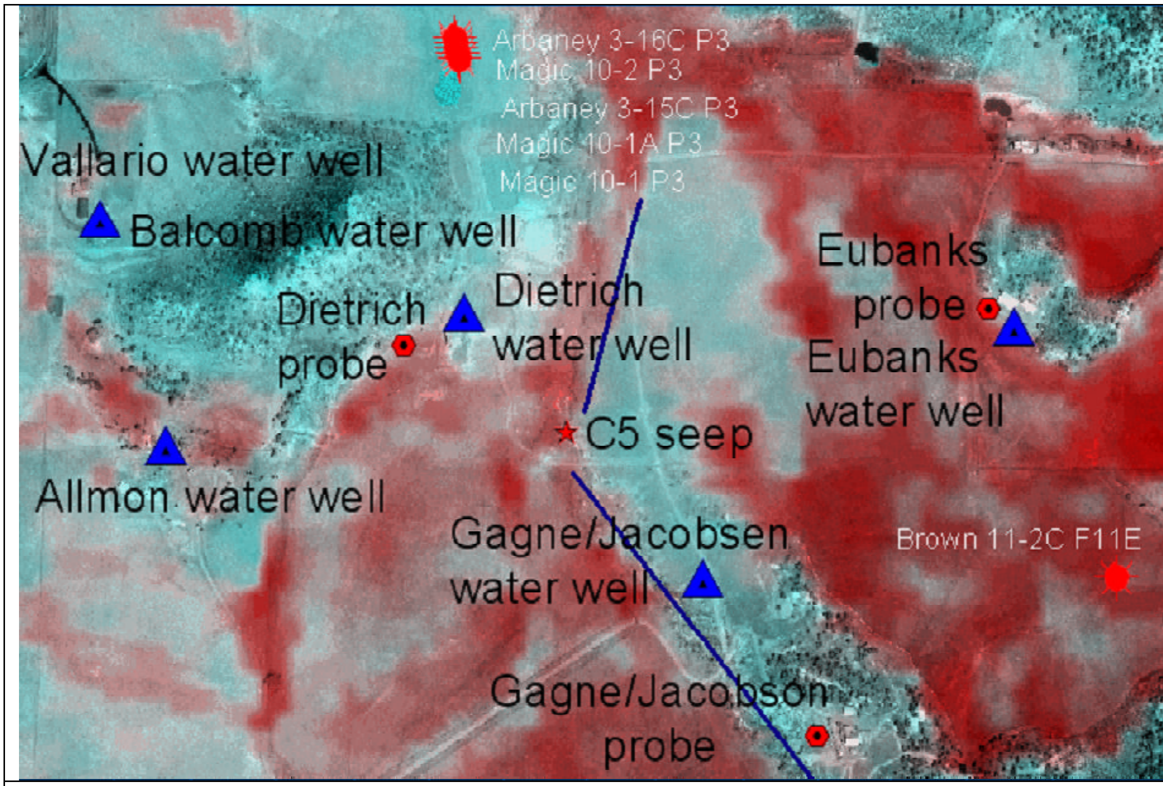

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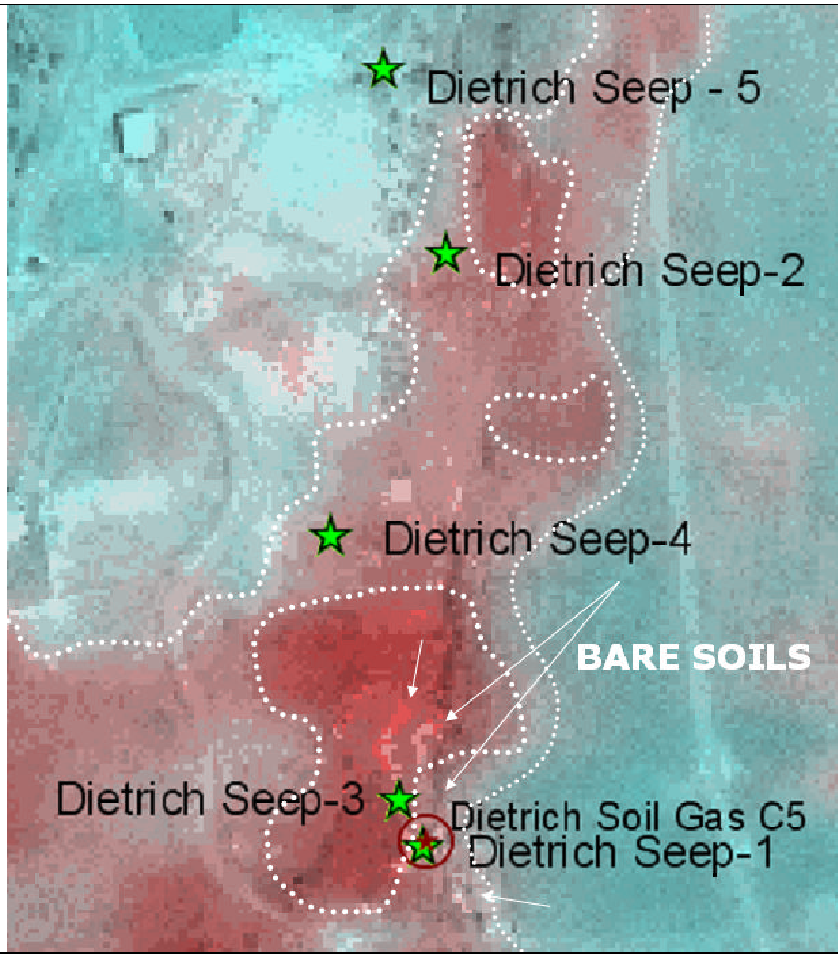

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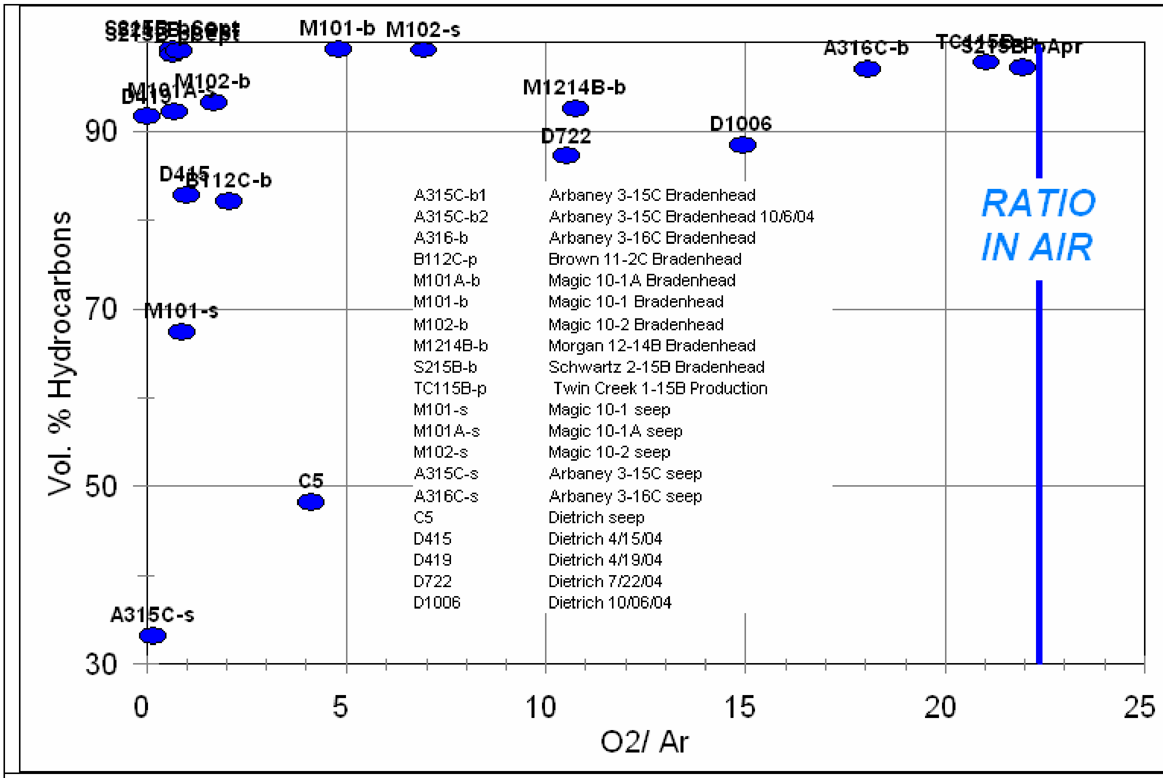

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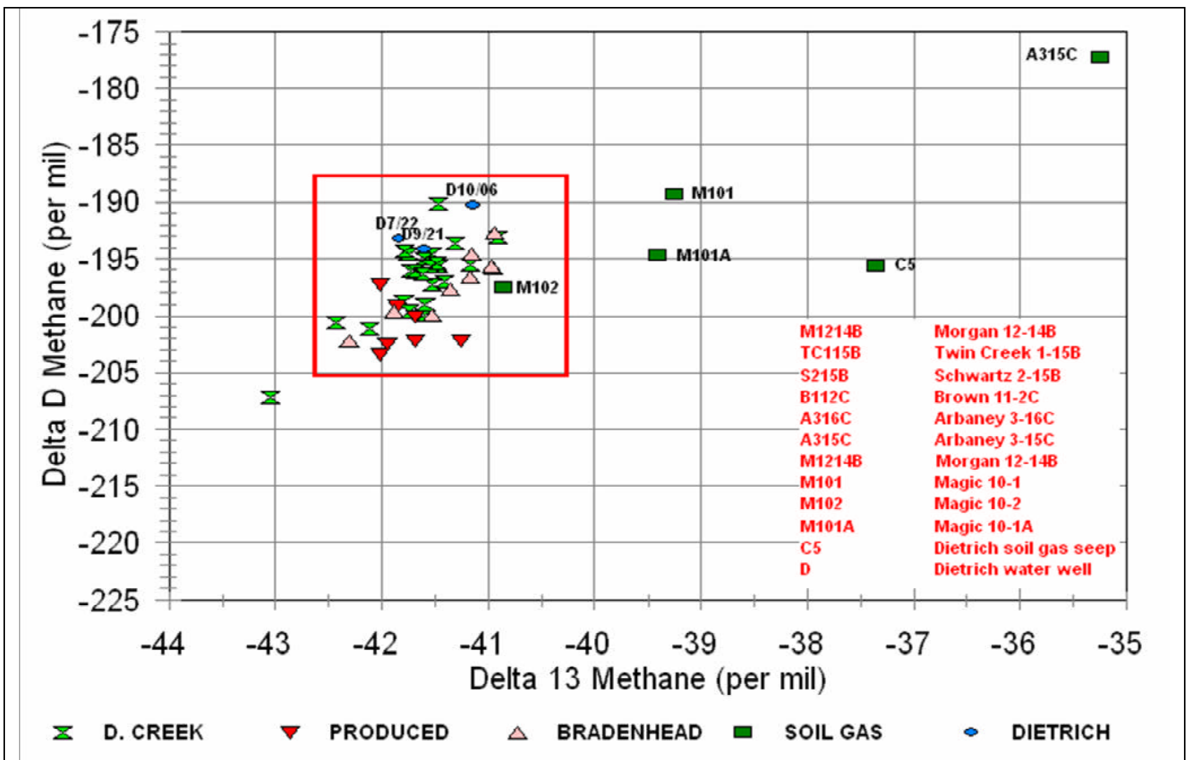

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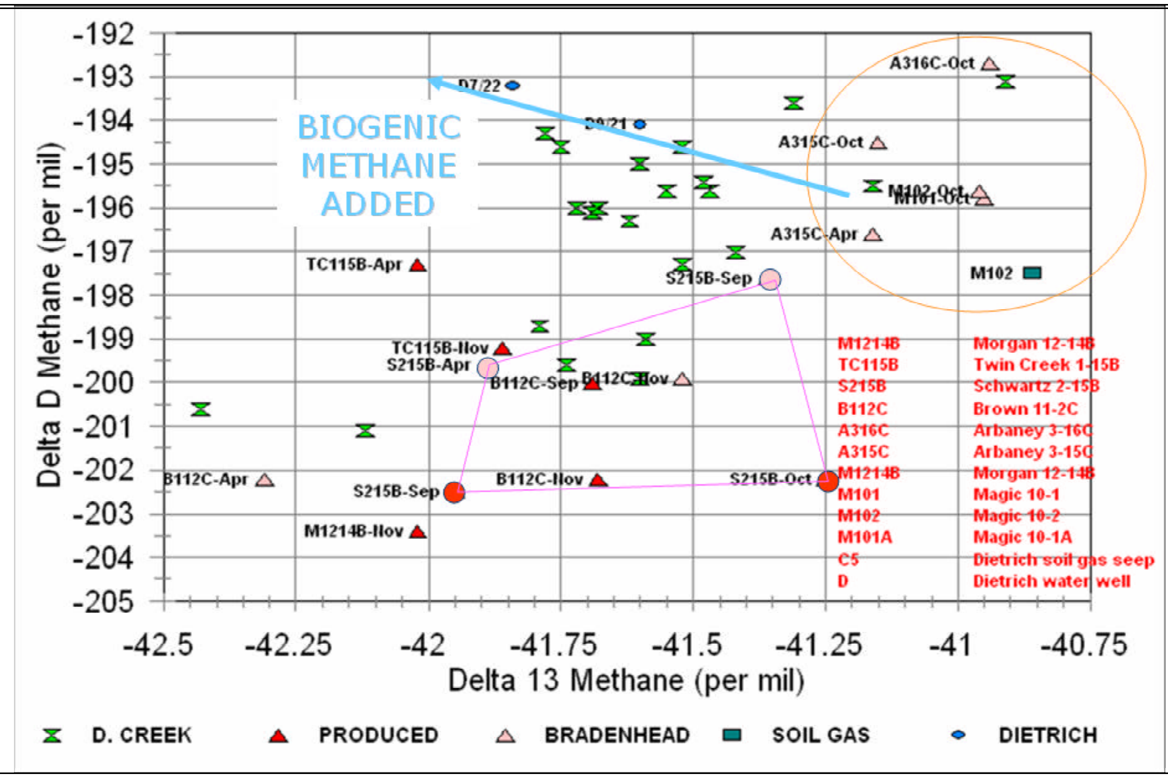

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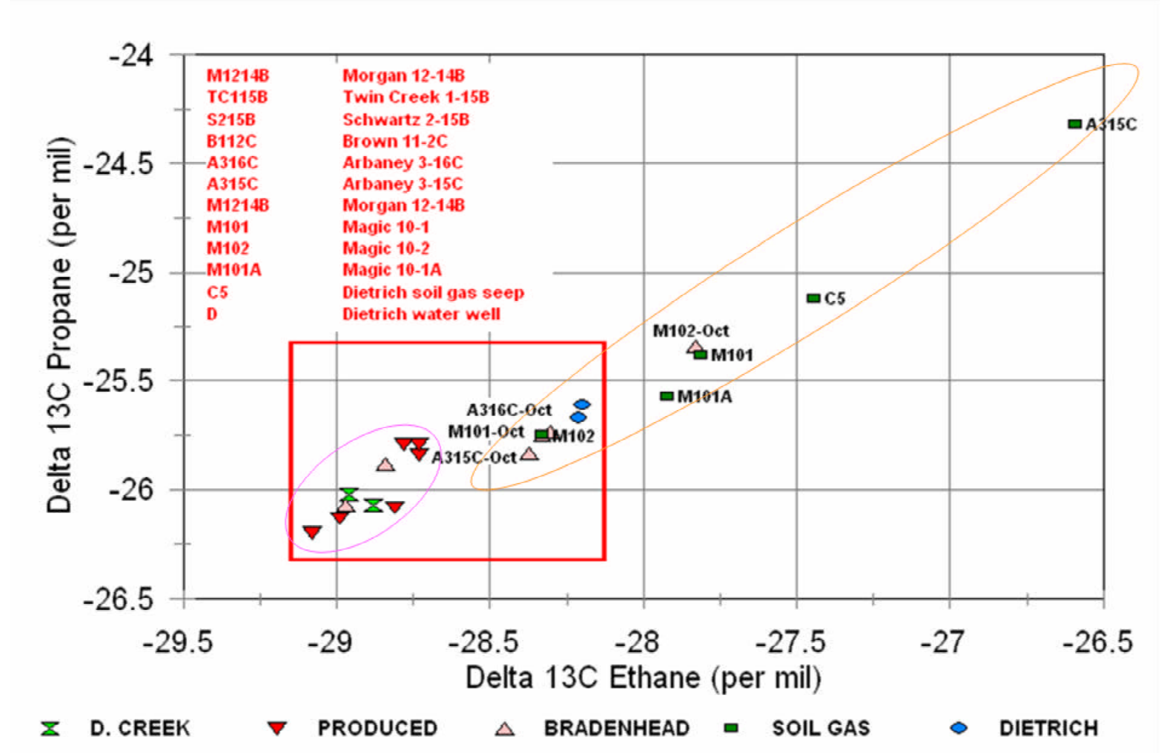

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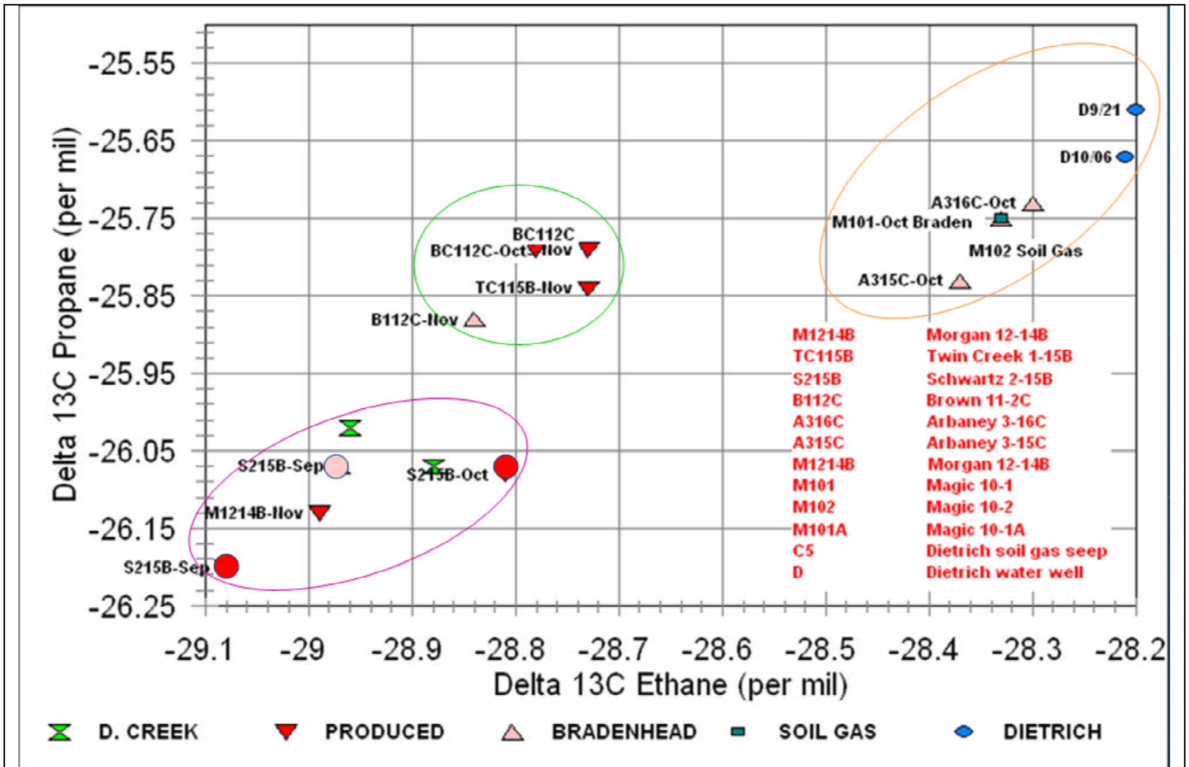

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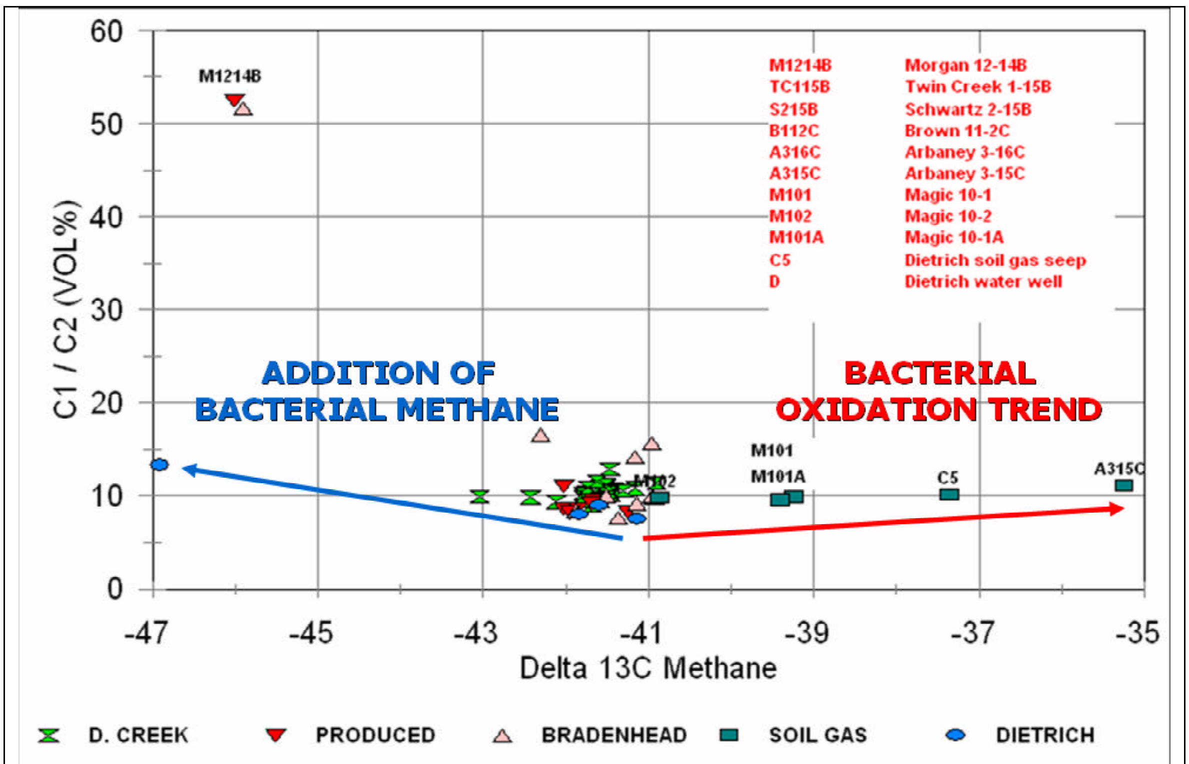

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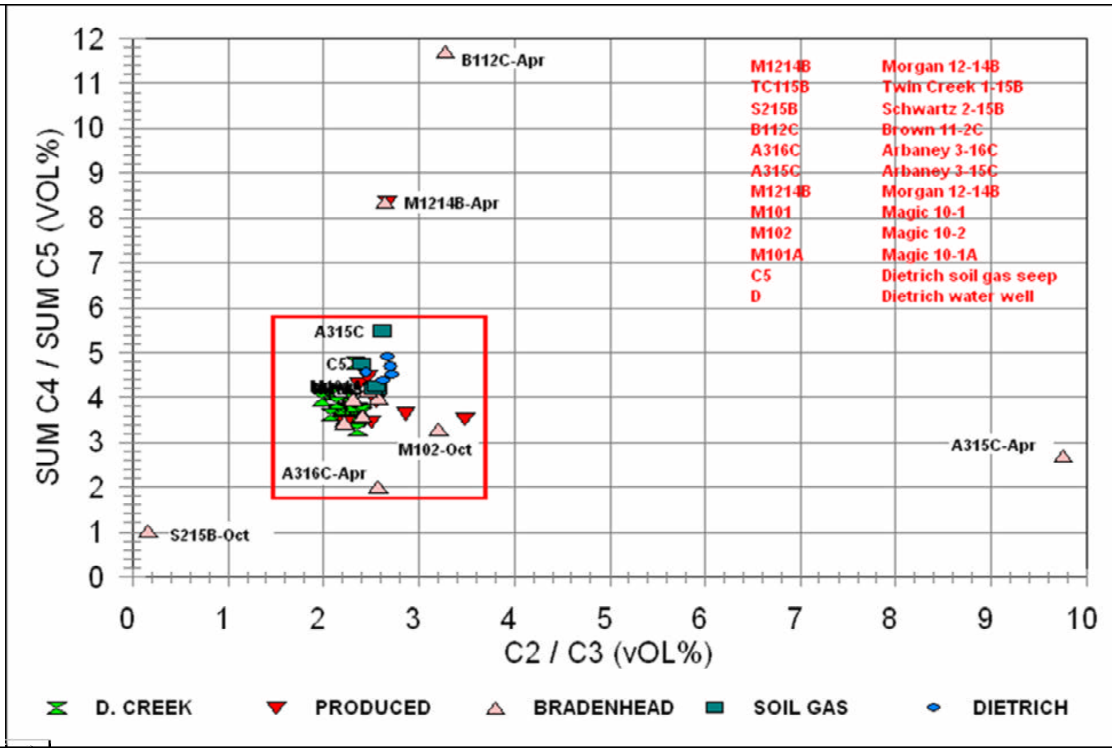

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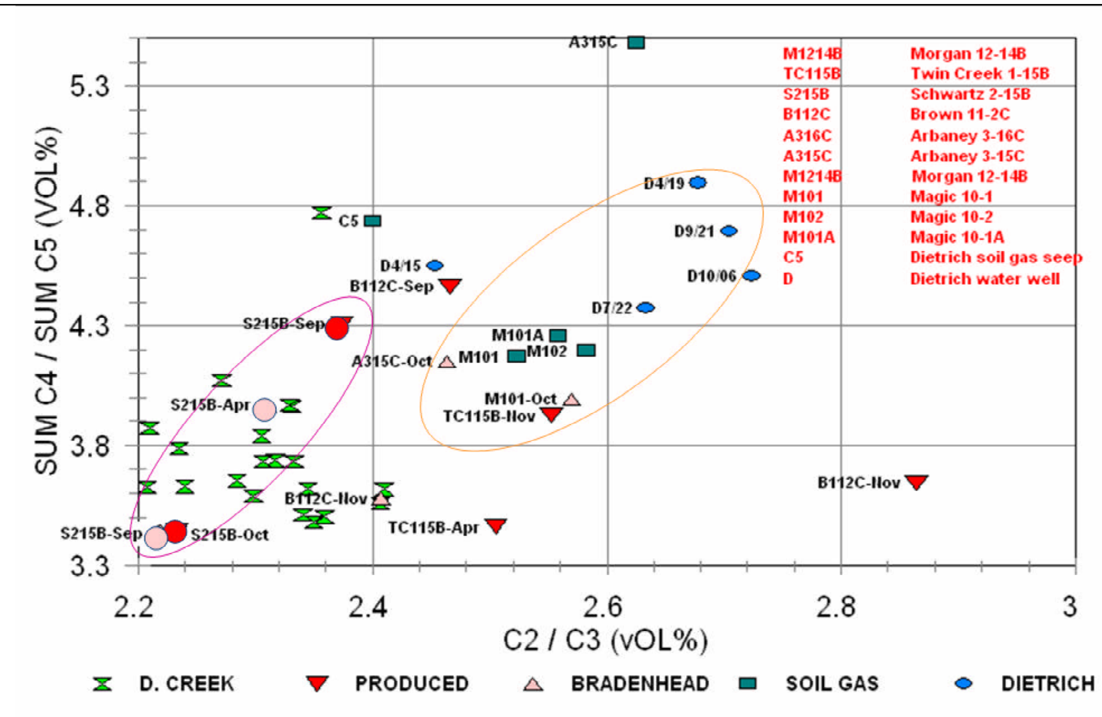

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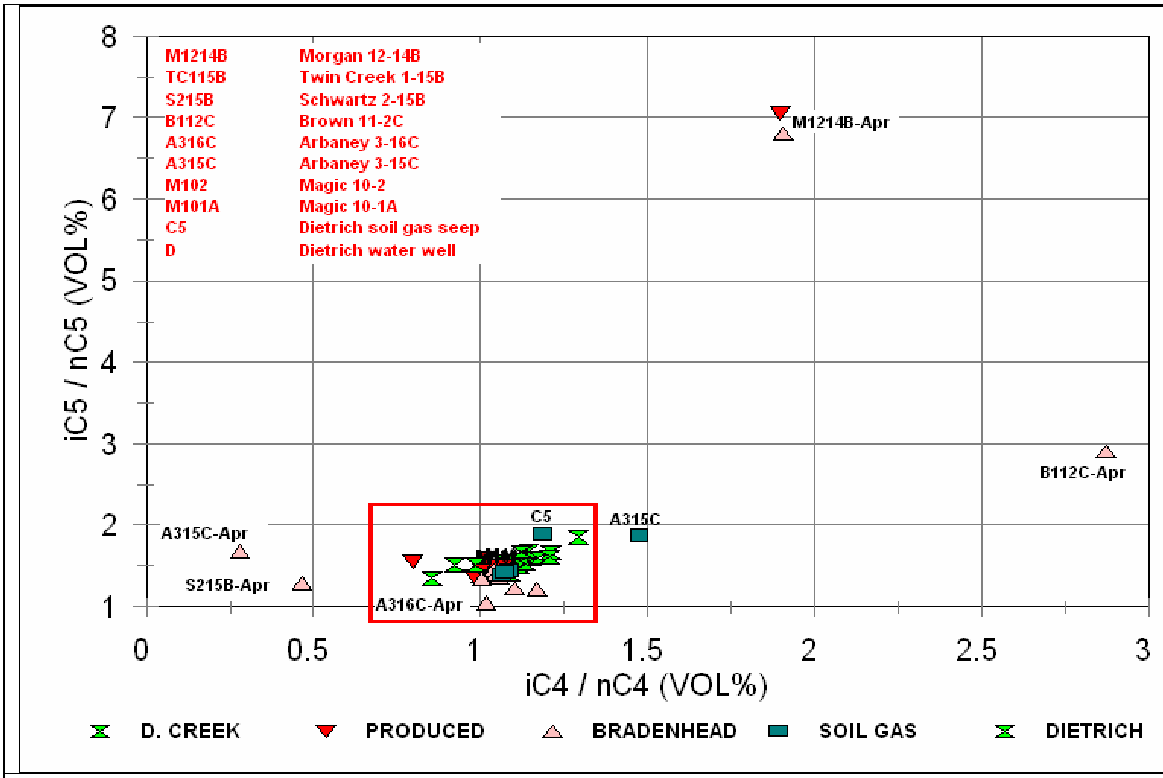

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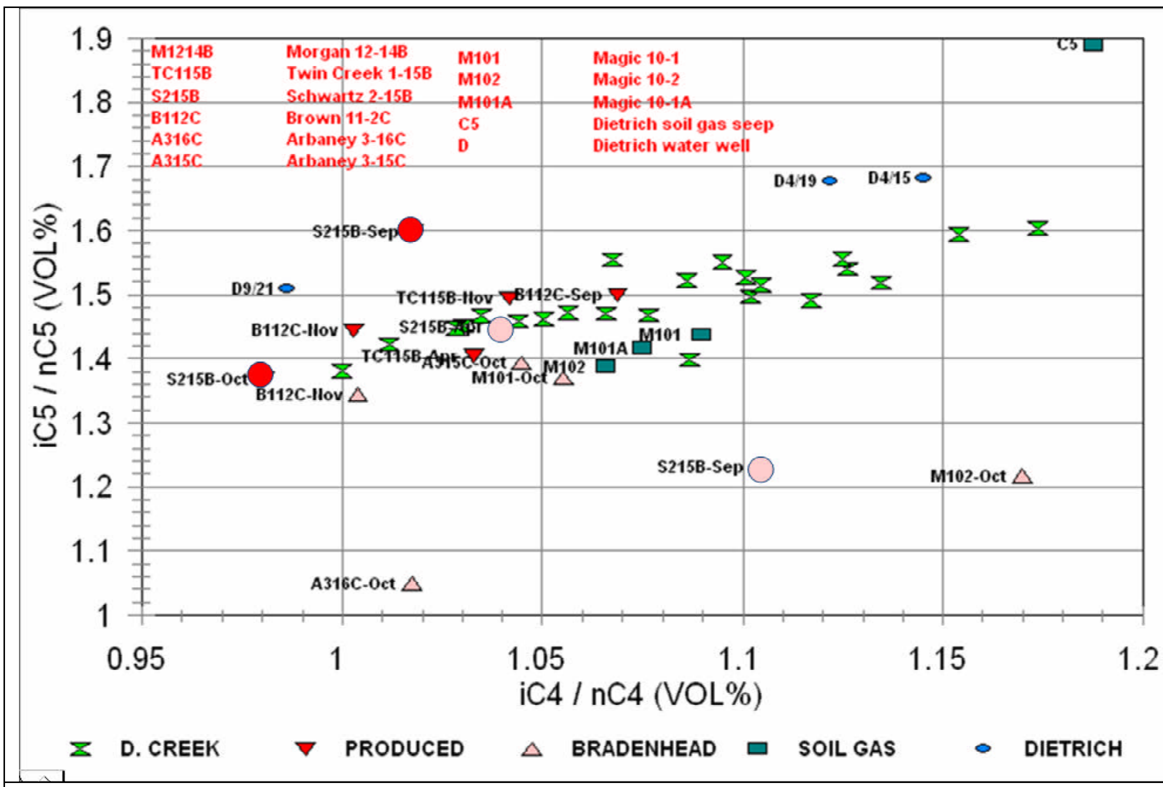

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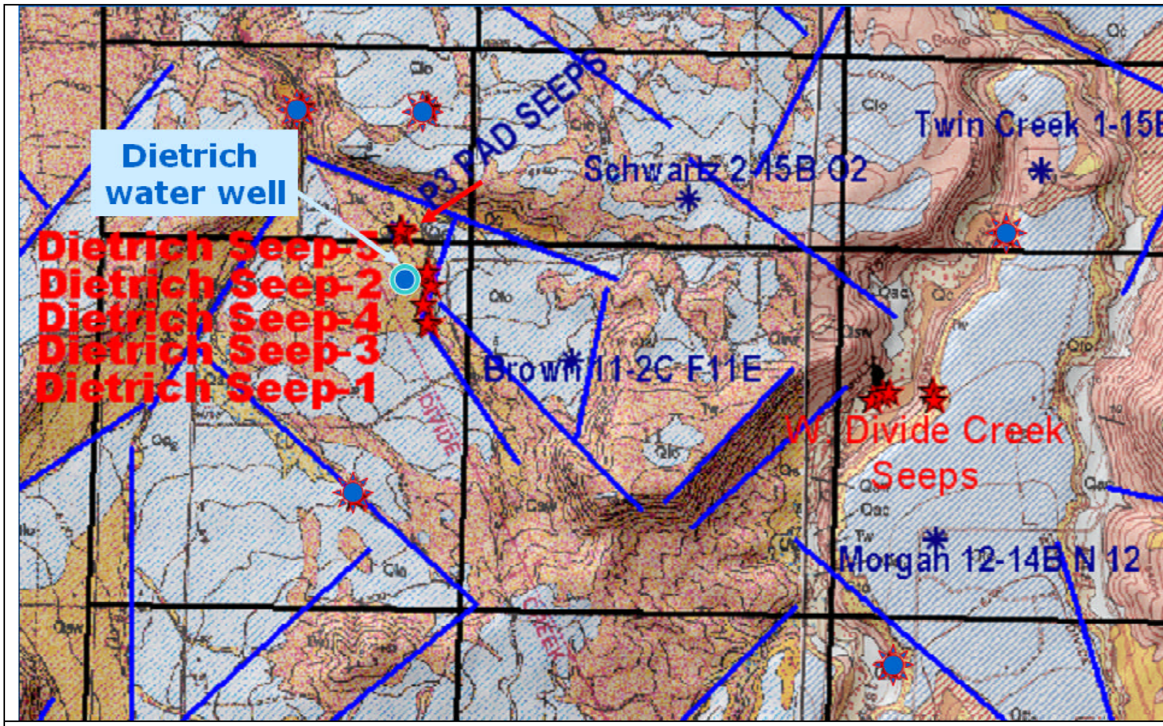

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9. LIST OF APPENDICES

Appendix A.	COGCC conditional letter of approval to conduct survey
Appendix B.	Final proposal describing scope of work
Appendix C.	Public announcement announcing intent to survey properties
Appendix D.	Letter request for signatures providing permission to access private property
Appendix E.	Release and waiver of liability and assumption of risk
Appendix F.	Sampling protocols
Appendix G.	Property access data
Appendix H.	Summary of special features addressed in this survey

Appendix I.	Photo index and thumbnails.
Appendix J.	ESN soil sample and soil gas sample analysis
Appendix K.	Isotech results of thermogenic gas analyses from soil probe and bradenhead samples.
Appendix L.	Results of extended gas analyses from Schwartz 2-15B wellhead and bradenhead samples.
Appendix M.	List of files available on the CD ROM accompanying this report.

APPENDIX A

COGCC CONDITIONAL LETTER OF APPROVAL TO CONDUCT SURVEY

VIA EMAIL AND SURFACE MAIL

September 7, 2004

Mr. Chris Williams
EnCana Oil & Gas (USA)
950 17th Street
Suite 2600
Denver, CO 80202

RE: FORM 27 – SITE INVESTIGATION REMEDIATION WORKPLAN #1815
Phase II
Gas Seep Survey and Gas Characterization
West Divide Creek and Adjacent Areas

Dear Chris:

Colorado Oil and Gas Conservation Commission (COGCC) staff have reviewed the ***Gas Seep Survey and Gas Characterization Work Plan Summary (Divide Creek Area – EnCana Oil and Gas (USA) Inc.)*** submitted by Environmental Services Network (ESN) on behalf of EnCana Oil & Gas (USA) Inc. (EnCana). We appreciate the thoroughness of the Phase II Gas Seep Survey and Gas Characterization workplan and it is approved, with the following conditions:

Survey All Sampled Locations

All sampled locations must be surveyed either with a GPS or by a licensed surveyor. These data must be provided electronically to the COGCC staff.

Phase II Gas Seep Survey and Gas Characterization Results

After the Phase II Gas Seep Survey and Gas Characterization is complete the interpretations and reports listed in the workplan must be submitted to COGCC staff and to Garfield County. A hard copy and an electronic copy of all reports must be provided. This includes the final Power Point presentation, digital photos, maps, analytical results, and any other documentation. All location data/coordinates must be referenced to the North American Datum of 1927 (NAD 27 Conus).

Reporting Suspected Occurrences During the Investigation

If during this investigation the field team encounters conditions that indicate or analytical results from samples indicate gas seep(s), gas in water well(s), dead or stressed vegetation, or other feature(s) is (are) a result of impacts from oil and gas activities, then those occurrences must be reported immediately to the COGCC staff.

The final presentation and report must include a detailed map that shows the locations of all places monitored for this investigation, including but not limited to sampled water wells, sampled oil and gas wells, surface water sample locations, ground water monitoring wells, biological testing and sampling locations.

<u>Additional Analyses</u>
If samples, including those of produced gas, meet the minimum methane concentration required for isotope analysis and if those samples meet the minimum ethane concentration required for isotope analysis, then you must analyze for stable isotope ratios of carbon ($d^{13}C$) and hydrogen (dD) for ethane.

<u>Typographical Errors and Clarification</u>
There appear to be a couple of typographical errors and places in the workplan where some clarification is required. Please have your contractor make the following corrections to the workplan and resubmit it. ESN may proceed with the field work before this is done, but the revised workplan must be submitted to the COGCC staff by September 17, 2004.

1. Gas Seep Detection (3) …*eastern extension of Tar Gulch (14 km).* East Divide Creek was not mentioned, but it was highlighted on the map that was provided. I believe what they intended to say was **"Along the southern extension of West Divide Creek, East Divide Creek, and the eastern extension of Tar Gulch.**

2. <u>Scheduling</u> …*to begin the investigation in the vicinity of the* ***East*** **(should be West)** *Divide Creek Seeps.*

3. Figure 1 (map) label pointing to the seep area reads ***East*** **(should be West) Divide Creek Seeps**.

4. Figure 1 also shows the locations of 6 previously identified natural seeps for gas and water sampling and 1 artesian well. Include an explanation of how these features were identified (information from landowners, reconnaissance survey, published literature, etc) in the revised workplan?

If you have any questions or would like to discuss this matter further, then please call me at 303-894-2100 ex 111 or email me at debbie.baldwin@state.co.us.

Sincerely,

Dorothy E. Baldwin, Environmental Supervisor

cc: B. Macke, COGCC –Director
M. Bell, COGCC - Operations Manager
R. Chesson, COGCC – EPS
J. Adkins, COGCC – Field Engineer
C. Harmon, AG
G. Naugle, WQCD
S. Klarich, WQCD
D. Bliezner, EnCana
A. Gorody, UGC, Inc.
K. Kaal, Cordilleran

APPENDIX B

FINAL PROPOSAL DESCRIBING THE SCOPE OF WORK

GAS SEEP SURVEY AND GAS CHARACTERIZATION WORK PLAN SUMMARY (DIVIDE CREEK AREA – ENCANA OIL AND GAS (USA) INC.)

This work plan summary describes the components of a gas seep survey and gas characterization from selected areas in the Divide Creek Area of Garfield County, Colorado (Figure 1).

Field Program

Gas Seep Detection

Portable Flame/Photo Ionization detectors (FID/PID) will be used to detect and map gas seeps along 140 km in the following areas (Figure 1):

(1) A 4-km^2 area around the Divide Creek seeps will be mapped in detail. Approximately 40, northeast-oriented, 1 km-long lines spaced 100 m apart for initial surveying, will be traversed in the purple hatched area (40 km).

(2) All lineaments and faults will be traversed within the 25-km^2 area outlined in red (86 km).

(3) Along the southern extension of West Divide Creek, East Divide Creek and the eastern extension of Tar Gulch (14 km).

The FID/PID will be calibrated daily with methane and iso-butylene standards respectively. The sample pump in the instrument continually draws ambient air from the ground surface through the FID/PID, and measurements are essentially instantaneous. Air samples can therefore be sampled and analyzed at short intervals along traverses. Once a seep is encountered, its lateral extent will be mapped out with the FID/PID and GPS. Seeps will be flagged for subsequent gas and/or water sampling, and their location will be recorded as UTM NAD27 coordinates. The seep areas will be photographed and all relevant observations made in the field will be documented and made available in electronic format.

Gas/Water Sampling

Soil gas samples will be collected at the source of seeps identified previously with a portable truck-mounted Infrared Spectrometer (Figure 1), and also from new seeps discovered with the portable FID/PID in this survey. Samples will be collected from 3-5' depths where possible with steel probes driven in by slide hammer. This probe system utilizes a "post-run-tubing" system where a clean 1/4" poly tube is used to line the steel tubing and collect the soil gas sample. Soil gas samples will be withdrawn with peristaltic pump or syringe and transferred into appropriate soil gas containers. A sample of the gas will be injected into the field FID/PID to obtain an estimate of total gas concentration.

Gas bubbles from newly and previously discovered seeps at springs or creeks would be captured in 250ml to 1-liter glass bottles with septum caps. Water samples will be collected in both 250 ml glass bottles with septum caps for the dissolved gas analysis and 250ml poly bottles for anion and cation analysis. Samples will be preserved as appropriate for each analysis.

Analysis

Gas and/or water samples collected from previous and newly discovered seeps will be analyzed for analytes listed in Table 1. Gas samples will be screened for trace levels of C1-C8 hydrocarbons at ESN's laboratory. Samples that meet minimum methane and ethane concentrations required for isotope analysis will be forwarded to Istotech Laboratories for the carbon and deuterium isotopic analysis of methane and ethane (Table 1). Water samples will be analyzed for dissolved C1-C8 hydrocarbon gases, major and trace anions and cations (Table 1).

The gas from previously identified and newly discovered seeps will be analyzed for C1-C8 hydrocarbons and fixed gases, and methane will be separated for carbon and deuterium analysis (Figure 1; Table 1). The water samples will be analyzed for the components listed in Table 1.

Interpretation and Reporting

The results will be compiled and plotted by ESN and Universal Geoscience Consulting. The data will be interpreted and presented to EnCana by Dr. Gorody. The interpretation will include:

1) Comparison of geochemical and remote sensing data to determine if seeps correspond to interpreted lineaments and faults.

2) Interpret hydrocarbon, isotopic and water compositional data to determine the source of seeps.

The following deliverables will be presented to EnCana within after the infill survey and gas characterization is complete.

1) A brief report in Power Point format showing graphic results of the survey.

2) Digital photos and transcribed field notes containing relevant field observations.

3) Shape files of maps showing areas traversed, location and magnitude of seeps, prevailing wind direction when discovered and any other available geologic, production or environmental information that may be relevant.

4) Results of the gas characterization and spring/creek water analyses.

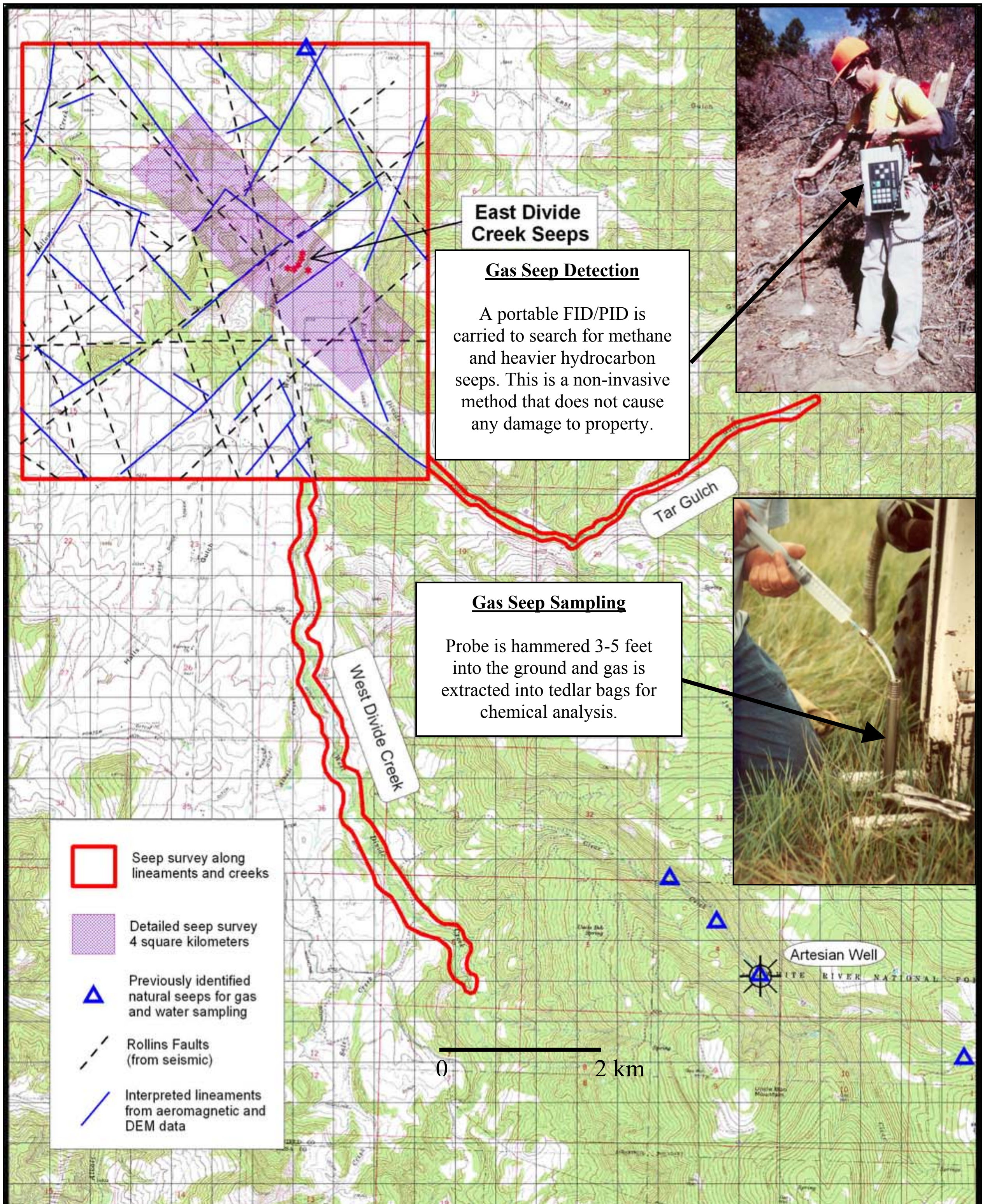

Figure 1. Areas outlined in red will be checked for gas seeps on foot using a portable gas detector. Motorized vehicles will not be used on private property. Gas seeps found will be sampled as indicated for further analysis

ESN Rocky Mountain
ENVIRONMENTAL SERVICES NETWORK
130 Capital Drive, Suite C
Golden, CO 80401-5654

Table 1. Summary of field, analytical and interpretation components of the survey

Field Program	Units
Design and Landowner Notification	10 Days
Labor: (2 Geologists) - gas detection and sampling	30 Days
Laboratory	Units
N_2, O_2, CO_2, Ar, H_2, He, CH_4, C_2H_6, C_3H_{10}, iC_4H_{10}, nC_4H_{10}, iC_5H_{12}, nC_5H_{12}, and C_6+, $d^{13}C$ and dD of CH_4 and C_2H_6 (**Free Gas**)	18 samples
N_2, O_2, CO_2, Ar, H_2, He, CH_4, C_2H_6, C_3H_{10}, iC_4H_{10}, nC_4H_{10}, iC_5H_{12}, nC_5H_{12}, and C_6+, $d^{13}C$ and dD of CH_4 and C_2H_6 (**Produced gas from DCU3 and DCU9**)	2 samples
Dissolved C1-C6 hydrocarbons, NO_2, NO_3, SO_4, PO_4, Br, F, Cl, HCO_3^-, CO_3^{2-}, Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Sr, Sn, Ti, Tl, V, Zn, pH, Conductivity, TDS, Total Alkalinity (**Water**)	8 samples
Data Compilation, Interpretation and Mapping	Units
Data compilation and mapping	4 Days
Interpretation and presentation (Dr. Gorody)	4 Days

APPENDIX C

PUBLIC ANNOUNCEMENT OF INTENT TO SURVEY PROPERTIES

GAS SEEP SURVEY AND GAS CHARACTERIZATION DESCRIPTION
(DIVIDE CREEK AREA – ENCANA OIL AND GAS (USA) INC.)

ESN Rocky Mountain of Golden, Colorado is planning to conduct a gas seep survey beginning the week of September 13th on behalf of EnCana Oil & Gas (USA) Inc. in areas outlined in red on Figure 1. A portable gas detector will be used to detect and map gas seeps (Figure 1). Once a gas seep has been identified, it will be staked for further detailed sampling to determine the source of the gas. The sampling procedure involves hammering a steel probe 3 to 5 feet into the ground by hand to withdraw a gas sample for chemical analysis (Figure 1). Motorized vehicles **will not** be used on private property for either the gas seep detection or sampling procedures.

The purple-hatched area shown in Figure 1 will be surveyed in detail by collecting gas readings along lines spaced 300 feet apart. In addition, the solid blue and black dashed lines in the red box will be traversed to look for gas seeps. The creeks outside the red box (i.e. West Divide and Tar Gulch) will also be walked to check for gas seeps.

The gas detection procedure is rapid in that a 1-mile long line can be walked in about 3 hours. If gas sampling is necessary at detected seeps, this procedure normally takes less than 1 hour. Any gates that have to be opened for progression of the survey will be closed immediately after passage through the gate. Both the gas detection and sampling procedures are environmentally friendly, and they will cause no damage to private property.

The project manager for the field operation is David Seneshen, and he can be contacted at:

Office: 303-278-1911
Cell: 303-249-2814

An ESN field geologist will contact landowners 1 day prior to gaining access to private property.

David Seneshen, Ph.D. P.Geol.
Senior Geochemist

130 Capital Drive, Suite C
Golden, Colorado 80401-5654
Web Site: www.ESN-RM.com

ESN Rocky Mountain
E-Mail: ESN@ESN-RM.com

PH: 303.278.1911
FAX: 303.278.0104

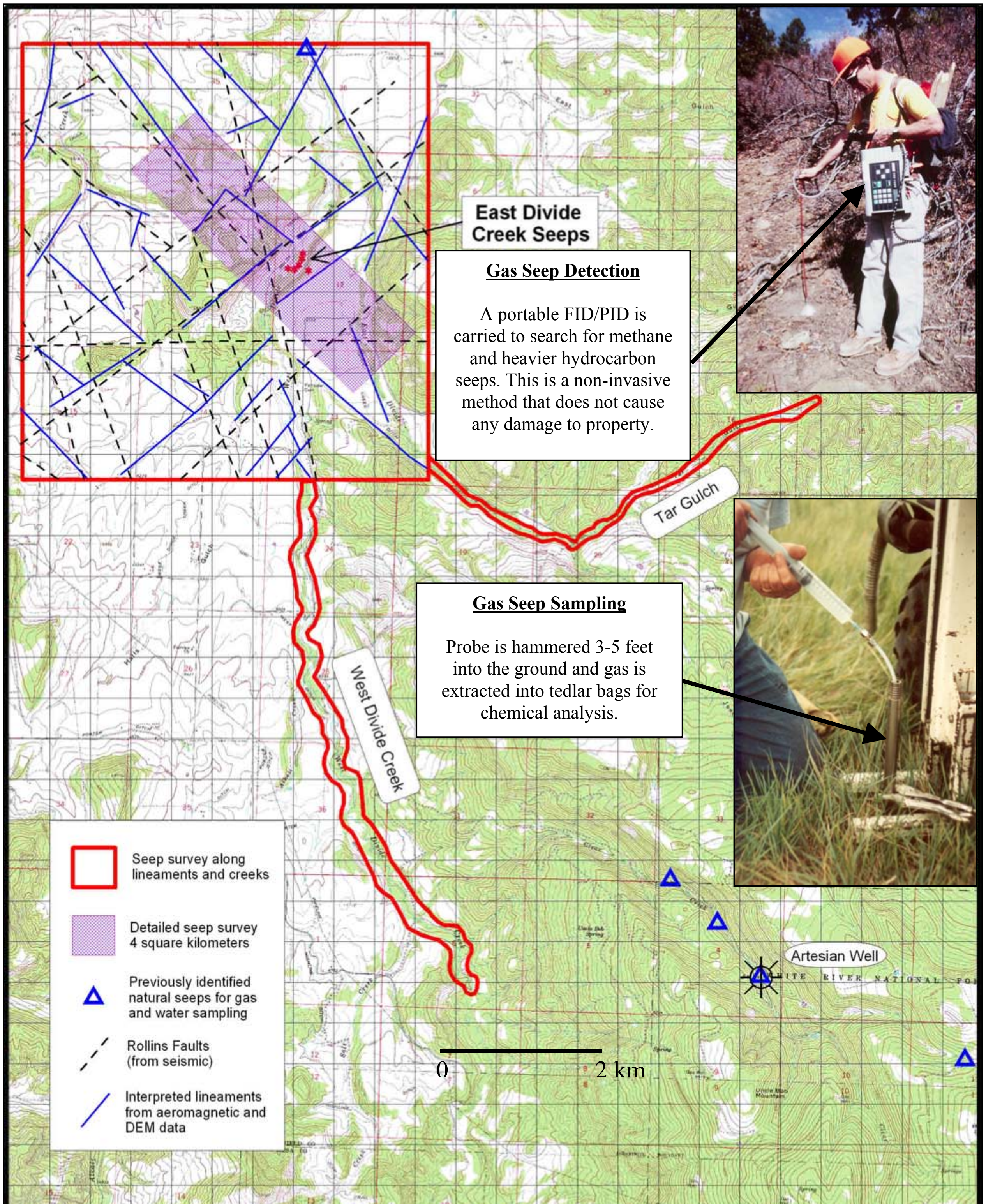

Figure 1. Areas outlined in red will be checked for gas seeps on foot using a portable gas detector. Motorized vehicles will not be used on private property. Gas seeps found will be sampled as indicated for further analysis

ESN Rocky Mountain
ENVIRONMENTAL SERVICES NETWORK
130 Capital Drive, Suite C
Golden, CO 80401-5654

APPENDIX D

LETTER REQUEST FOR SIGNATURES PROVIDING PERMISSION TO ACCESS PRIVATE PROPERTY

September 2, 2004

TO: Divide Creek Area Landowners

EnCana Oil & Gas (USA) Inc. has contracted Environmental Services Network (ESN) to conduct a surface gas seep survey as described at the Colorado Oil & Gas Conservation Commission (COGCC) hearing in Glenwood Springs on August 16-17. The survey area covers approximately 9 square miles surrounding the original gas seep found in Divide Creek. The survey will involve personnel walking along the ground surface with a gas detection instrument, followed by collection of gas samples where appropriate. Additional information regarding the gas survey activities, area of investigation, and contact information for ESN is enclosed.

We are requesting your permission to access your property to complete the survey. To give us your permission, please sign one copy of this letter and return it in the postage paid envelope provided. If we do not receive your response by September 9, you will be contacted by ESN personnel, first by phone, and then in person the day of the survey, to sign a copy of this letter. If we receive your response prior to September 9, you will still be contacted by an ESN field geologist prior to initiating work activities on your property. ESN will begin contacting landowners the week of September 6 as the work is scheduled to take place from September 13 through October 1. If additional significant gas seeps are identified, affected landowners will be notified. If you have any questions or concerns about the work activities, please contact David Seneshen with ESN at (303) 278-1911.

Sincerely,

John Fontana
Vice President, ESN Rocky Mountain

Chris Williams
EHS Advisor, Encana Oil & Gas USA

I hereby give permission for access to the property indicated below for purposes of conducting the gas seep survey and collecting samples as described in this letter.

______________________________ Landowner Name (Printed)	______________________________ Landowner Address
______________________________ Landowner Signature	______________________________ Telephone Number
______________________________ Date	______________________________ Best Time to Contact

APPENDIX E

RELEASE AND WAIVER OF LIABILITY AND ASSUMPTION OF RISK

ESN
ROCKY MOUNTAIN

Environmental
Services Network

<u>RELEASE AND WAIVER OF LIABILITY AND ASSUMPTION OF RISK</u>

In consideration of ___________________________________ ("Owner") allowing Environmental Services Network Rocky Mountain ("ESN") access to Owner's property located at

___________________________________, ______________, Colorado (the "Property") for the purpose of conducting a surface gas seep survey, ESN agrees to accept and assume all risks for losses, costs, and damages incurred by any ESN employee or agent as a result of ESN's presence on the Property.

ESN hereby waives, release and discharges Owner from all liability, claims, demands, losses, or damages for death, personal injury or property damages asserted by an ESN employee or agent as a result of ESN's presence on the Property.

September 15, 2004

Environmental Services Network Rocky Mountain

By: ______________________________

Name: John Fontana
Title: Vice President

130 Capital Drive, Suite C
Golden, Colorado 80401-5654
Web Site: www.ESN-RM.com

ESN Rocky Mountain
E-Mail: ESN@ESN-RM.com

PH: 303.278.1911
FAX: 303.278.0104

APPENDIX F

SAMPLING PROTOCOLS

APPENDIX G

PROPERTY ACCESS DATA

NAME	ACCESS	Sec	Twnshp	Range	PARCEL	Special Request
Allmon, Warren & Julie	Verbal	10	7	92		
Anderson, Makee & Nancy	Verbal	10	7	92		
Arbany, Rick & Shirley	Verbal	3	7	92		
Arlinski, Daniel & Lee Ann	Verbal	10	7	92		
Aspen Resource Management	Written	10	7	92		
Baker, John & Sharon	Written	15	7	92		
Balcomb, Mark & Lisa	Verbal					
Bell, Orlyn & Carol	Written	34	6	92	427	
Bell, Orlyn & Carol	Written	34	6	92	348	Y
BLM	Not required	25	6	92	954	
Boulton, John & Alice	Verbal	34	6	92	415	
Brachen, Lisa /Eicher, Bob and Shorty	Verbal	11	7	92		Y
Brynildson, Scott & Linda	Written	34	6	92	391	
Buerger, Jim & Pam	Verbal					
Robert Buerger Trust - Wilma K Burger	Written					
Baumgardner, Harold & Kay	Verbal	25	6	92	410	
Burnett, Dixie	Written					Y
Butterfly, Oni	Verbal	35	6	92	172	
Canyon Gas Resources, Inc.	Written	25	7	92	142	
Cherokee Mtn Estates	Written	10	7	92		
Chipperfield Estates	Verbal	34	6	92		
Currie, Donald Lee	Verbal	34	6	92	3	Y
Currie, Donald Lee	Verbal	34	6	92	1	
Currie, Donald Lee	Verbal	34	6	92	2	
Dahlin, Russell L.	Verbal	35	6	92	451	
Daley, Frank	Written					
Dardynski, Beth Ann	Written	34	6	92	400	
Dexter, Bryan "Doc"	Verbal	23	7	92		
EnCana Oil and gas	Written	11	7	92		
Dodd, Ronald & Shirley	Written	36	7	92	56	
Donelson, Karen & Dean	Verbal	34	6	92	263	
Duncan, Kathy & Jess Graber	Written					
Engelhardt, Debra K.	Written	34	6	92	404	
Esgar, Dwight & Shermette	Written					
Eubanks, Jim	Written					
Fait, Jim & Donna	Verbal	11	7	92		
Flaherty, Martin	Verbal					Y
Fulton, Donald	Written	30	7	91	94	
Fulton, Donald	Written	31	7	91	96	
Gagne, Gary/Jacobsen, Nancy	Verbal	0	0	0		Y
Gardiner, Robert & Amy	Written	34	6	92	402	
Garfield Cty Sch Dist RE2	Verbal	25	7	92	37	
George, Karin	Verbal	24	7	92	225	
Griffin, Bill	Verbal	11	7	92		Y
Guthrie, Janette	Written	34	6	92	407	
Hall, Gary R. & Phyllis E.	Verbal	35	6	92	238	
Harding, Steve & Kathy	Verbal					
Hill, Gary & Karen	Verbal	16	7	92		
Hoffmeister, Harold & Deanna	Written	34	6	92	1	
Hoffmeister, Harold & Deanna	Verbal	34	6	92	2	
Hoffmeister, Kris & Jerry	Written	34	6	92	5	
Howard, Virgil & Dorothy	Verbal	34	6	92	213	
Howell	Verbal					Y
Hughes, Teran & Cinnamon	Written	25	6	92	482	
JD Rifle Properties	Written					
Juniper Group LLC	Written	2	7	92		Y
Kaufman, William & Janette	Verbal	25	6	92	267	
Kaufman, William & Janette	Verbal	25	6	92	247	
Kaufman, William & Janette	Verbal	25	6	92	249	
Kaufman, William & Janette	Verbal	25	6	92	248	

Kaufman, William & Janette	Verbal	25	6	92	250	
Kaufman, William & Janette	Verbal	25	6	92	449	
Kaufman, William & Janette	Verbal	30	6	91	123	
Kozak, Robert & Maria	Verbal	15	7	92		
Landrum, Emmie	Written	34	6	92	336	Y
Langegger, Pepi	Verbal	1	7	92		Y
Last Dance LLC, Lloyd, Tom	Verbal	34	6	92	416	Y
Leo Ray Light Trust	Verbal	13	7	92	20	
Louthan, Donald & Mary	Verbal	34	6	92		
MacMaster, Kirsty	No Response	35	6	92	463	
Maynard, Ronald & Margie	Verbal	34	6	92	401	
McCray, Lynn (McCray Ranch)	Written	0	0	0		Y
Mease, Rocky & Terri	Verbal	34	6	92	612	
Miller Land & Cattle Co.	Written	36	6	92	245	
Miller, Marty	Written	36	6	92		
Miller, Ruth	Written	35	6	92		
Morgan, Dick & Kay	Written	12	7	92		Y
Morris Ranch	Verbal	15	7	92		
Morris, Gary & Catherine	Verbal	16	7	92		
Mortensen, Margaret & Duane	Written	25	7	92	104	
Nesbitt, James E.	Verbal	25	6	92	570	
Okagawa, Jean	Written					Y
O'Neill, Kerry & Kim	Verbal					
Patterson, Robert & Rosemary	Written	25	7	92	148	
Don Place	Written					
Prather, Jake & Amber	Verbal					
Protz, Kelly R. & Karen	Verbal	35	6	92	315	
Rippy, Dow & Katharine	Verbal	24	7	92	105	
Rippy, Dow & Katharine	Verbal	24	7	92	226	
Rogers, Lisa & Specht, Ronald	Written	19	7	91	3	
Rogers, Michael	Verbal	19	7	91	92	
Rohan, Danny & Dana	Verbal					
Schickling, Tom & Rebecca	Verbal	34	6	92	406	
Schirer, Michelle & Daniel	Written	35	6	92	531	
Schoonmaker, Raymond & Judy	Written	0	0	0		
Scott, Duane & Annie	Verbal	36	6	92	142	
Seidlitz, Bob & Judy	Verbal					
Shaner, Greg	Written					
EnCana Oil & Gas (former Dietrich and Sherow	Not required	11	7	92		Y
Smith, Harold Jr. & Linda	Verbal	35	6	92	530	
Smith, William & Patricia	Verbal	35	6	92	532	
Snyder, James	Verbal	6	8	91	1	
Spaulding, Michael & Kenda	Verbal	13	7	92	190	
Spinden, Leon & Alretta	Written	0	0	0		
Staufer, Hermann	Verbal	12	7	92		Y
Stone, Barbara	Written	34	6	92		
Schwartz, Henry & Linda	Verbal	2	7	92		
Thompson, Steve & Patty	Written	11	7	92		Y
Tompid Revocable Trust (Wellie)	Written	20	7	91	13	
Tomlinson, Wellie D.	Written					
Union Divide Creek Cemetery	Not required					
Utesch, Robert & Peggy	Written	34	6	92	613	
Vallario, Lou & Sandi	Written					
Vanordstrand, Mary	Verbal					
Weller, Douglas & Judy	Written	34	6	92	4	
West, Arlen & Edith	Written	34	6	92	333	Y
Wheeler, Robert	Verbal	6	8	91	29	
Whittington	Written					Y
Williams, Richard & Kaethe	Written	35	6	92	314	Y
Wing, Layne & Jeanne (Gallagher Agri-Service,	Written	15	7	92		

APPENDIX H

SUMMARY OF SPECIAL FEATURES ADDRESSED IN THIS SURVEY

MAP ID	Date	Category	GPS ID	Field Tech	GPS file	Dip	Azimuth	Easting UTM	Northing UTM	Longitude	Latitude	FID ppm	PID ppm	Elev (Ft)	Description
Staufer Res		Residence	STAUFER	CG	9-24-B			274342	4370371	-107.622643	39.455237			6143	Staufer Home
Morgan bubbles	9/23/04	Vegetation	MORG FLAG	DR	9-23-A			275296	4370106	-107.611477	39.453101	0	0	6260	Requested by Mr. Morgan where he saw bubbles when pasture was wet. He had marked location with flag. No gas detected, bubbles may have been air displaced by water during flooding.
Langegger Pond 1	9/23/04	Pond	SEEP A1	DR	9-23-A			274696	4371284	-107.618841	39.463548	6	0	6088	Marks pond.
Langegger Pond 1	9/23/04	Gas Detected	SEEP A1	DR	9-23-A			274696	4371284	-107.618841	39.463548	6	0	6088	Weak gas seep next to Pond on Langegger, edge of dirt road, above creek valley. Previously marked by Cordilleran as seep area.
Langegger Divide Ck	9/24/04	Gas Detected	B1	CG	9-24-B			274434	4371249	-107.621871	39.463164	56	0	5987	In treed area S of main seep (not marked by Cordilleran) Extent approx. 10'. Possibly just outside of Cordilleran mapped seep area.
Langegger Spring	9/24/04	Spring	B2	CG	9-24-B			274473	4371266	-107.621424	39.463327	2600	2.3	5979	Marks spring.
Langegger Spring	9/24/04	Gas Detected	B2	CG	9-24-B			274473	4371266	-107.621424	39.463327	2600	2.3	5979	Swampy spring area at Divide creek seep. In seep area marked by Cordilleran
Morgan Veg 2	9/24/04	Vegetation	B3 GRASS	DR	9-24-B			274915	4370214	-107.615937	39.453973	0	0	6255	Stressed irrigated grass area on Morgan. See photos
Staufer Veg 1	9/24/04	Vegetation	(rec. in notes only)	DR	NA			274582	4370586	-107.619929	39.457235	0	0		Stressed irrigated grass area on Staufer approx. 100'x100'. See photos
Staufer Veg 2	9/24/04	Vegetation	(rec. in notes only)	DR	NA			274430	4370960	-107.621820	39.460562	0	0		Stressed grass area on Staufer. Strip E to W, larger at W end. See photos
Langegger Pond 1B	9/27/04	Pond	POND INLET	DR	9-27-A			274704	4371247	-107.618735	39.463217	70	3	6093	Marks pond inlet. See photos
Langegger Pond 1B	9/27/04	Gas Detected	POND INLET	DR	9-27-A			274704	4371247	-107.618735	39.463217	70	3	6093	Pond Inlet 70 ppm S side inlet, 7ppm @ n side inlet, 24ppm north side pond. PID readings 0-3ppm? (Could not get gas readings when later revisiting site). See photos
BLM Outcrop	9/28/04	Outcrop		DR	NA	16	210	275803	4370912	-107.605861	39.460488	0	0		Sandstone outcrop. See photos at D35-12
BLM Berm	9/28/04	Pond	CHADS BERM	DR	9-28-A			276553	4370660	-107.597068	39.458415	0	0	6873	Dried pond and berm on BLM land. See photos
BLM Berm	9/30/04	View Point	CHADS BERM					276553	4370660	-107.597068	39.458415	0	0		View looking west of Langegger and Morgan irrigated pastures. See photos
Lengegger Pond 2	9/29/04	Gas Detected	PL N POND	CG	9-29-B			275012	4371972	-107.615403	39.469823	250	0	6046	Lengger northern pond. FID maxed 250ppm & dropped to 30ppm at south end pond, 18ppm at east end. Sheen on water near edges (possible bacterial slime). May be biogenic gas from pond.
Lengegger Pond 2	9/29/04	Pond	PL N POND	CG	9-29-B			275012	4371972	-107.615403	39.469823	250	0	6046	Lengger northern pond. FID maxed 250ppm & dropped to 30ppm at south end pond, 18ppm at east end. Sheen on water near edges (possible bacterial slime). May be biogenic gas from pond.
P3 Magic 10-1	9/29/04	Gas Detected	MAG10-1	JF	9-29-C			272382	4371971	-107.645945	39.469123	3900	1	5994	Pad P3. Highest value about 3' SE of wellhead. Drops rapidly away from well. See photos
P3 Arbany 3-16C	9/29/04	Gas Detected	(rec. in notes only)	JF	NA			272381	4371977	-107.645959	39.469177	160	2		Pad P3. Highest value about 1-3' from wellhead. Drops rapidly away from well. See photos
P3 Magic 10-1A	9/29/04	Gas Detected	(rec. in notes only)	JF	NA			272380	4371983	-107.645973	39.469230	7800	4		Pad P3. Highest value about 1-3' from wellhead. Drops rapidly away from well. See photos
P3 Magic 10-2	9/29/04	Gas Detected	MAGIC10-2	JF	9-29-C			272379	4371991	-107.645987	39.469302	>50000	>160	5991	Pad P3. Highest value about 1-3' from wellhead. Killed flame on FID and saturated PID. Gas intensity drops rapidly away from well. See photos.
P3 Arbany 3-15C	9/29/04	Gas Detected	ALB3-15C	JF	9-29-C			272378	4371998	-107.646001	39.469365	21000	2	6032	Pad P3. Highest value about 1-3' from wellhead. Gurgling sound under gravel around wellhead. Gas intensity drops rapidly away from well. See photos
Pad P-3	9/29/04	View						272398	4371958	-107.645755	39.469010				View of 5 wellheads on Pad P-3, Magic and Arbany wells; see photo.
P3 Arbany 3-15C	10/4/04	Soil Probe		JF				272378	4371998	-107.646001	39.469365	220000	40		Attempted soil gas probe at 6', too tight/wet, Collect in ed soil gas from probe at 3' depth. Dilute in syringe and inject into FID/PID. Collect in Cali-Bond-5 gas bag - Lab ID: SG@Arbany 3-25C
P3 Magic 10-2	10/4/04	Soil Probe		JF				272379	4371991	-107.645987	39.469302	>100%	800		3' soil gas probe. Dilute in syringe and inject into FID/PID. Collect in Cali-Bond-5 gas bag - Lab ID: SG@MAGIC 10-2
P3 Magic 10-1A	10/4/04	Soil Probe		JF				272380	4371983	-107.645973	39.469230	>100%	50		3' soil gas probe. Dilute in syringe and inject into FID/PID. Collect in Cali-Bond-5 gas bag - Lab ID: SG@MAGIC 10-1A
P3 Arbany 3-16C	10/4/04	Soil Probe		JF				272381	4371977	-107.645959	39.469177	11	0		3' soil gas probe. Not enough gas, no sample collected.
P3 Magic 10-1	10/4/04	Soil Probe		JF				272382	4371971	-107.645945	39.469123	220000	40		3' soil gas probe. Dilute in syringe and inject into FID/PID. Collect in Cali-Bond-5 gas bag - Lab ID: SG@MAGIC 10-1
Sherowski Veg 1	9/30/04	Vegetation	C2	JF	9-30-C			272715	4372077	-107.642114	39.470165	0	0	6083	Stressed Junipers (3 trees); grass underlying trees is OK; see photo.

MAP ID	Date	Category	GPS ID	Field Tech	GPS file	Dip	Azimuth	Easting UTM	Northing UTM	Longitude	Latitude	FID ppm	PID ppm	Elev (Ft)	Description
Sherowski Veg 2	9/30/04	Vegetation	C3	JF	9-30-C			272615	4372092	-107.643281	39.470274	0	0	6066	Stressed Junipers (3 trees); grass under trees is OK.
Sherowski Veg 3	9/30/04	Vegetation	C4	JF	9-30-C			272606	4372091	-107.643385	39.470262	0	0	6059	Barren soil area with no vegetation growing near area of stressed Juniper trees; large ant hill;no gas detected; see photos
P3 Magic 10-1	10/4/04	Bradenhead		JF				272382	4371971	-107.645945	39.469123				Bradenhead gas sample. flowed 1 minute, collected sample. Shut-in pressure = 230 psi. Most of the gas flow comes from this well when flaring.
P3 Arbany 3-16C	10/4/04	Bradenhead		JF				272381	4371977	-107.645959	39.469177				Braden head gas sample, very weak flow. Flowed 5 minutes, collected sample. Shut-in pressure = 180 psi. Pressure did not return after gas vented from bradenhead.
P3 Magic 10-1A	10/4/04	Bradenhead		JF				272380	4371983	-107.645973	39.469230				Attempted Bradenhead gas sample. no flow. no sample collected.
P3 Magic 10-2	10/4/04	Bradenhead		JF				272379	4371991	-107.645987	39.469302				Bradenhead gas sample. very weak flow. Flowed 5 minutes - used squeeze bulb, collected sample. Shut-in pressure = 30 psi. Pressure did not return after gas vented from bradenhead.
P3 Arbany 3-15C	10/4/04	Bradenhead		JF				272378	4371998	-107.646001	39.469365				Bradenhead gas sample, strong flow. Flowed 1 minute, collected sample. Shut-in pressure 300 psi. Pressure did not return after gas vented from bradenhead.
Langegger MW P-3	9/28/04	Gas Detected	MWP-3	DR	9-28-A			274510	4371280	-107.620999	39.463463	NA	NA	5943	Southwest of Seep & 2MW, P-3, P-4 &mw-4, photos of seep area.
Sherowski Veg 1	9/30/04	Vegetation	C2	JF	9-30-C			272715	4372077	-107.642114	39.470165	0	0	6083	Stressed Junipers (3 trees) . See photos
Sherowski Veg 2	9/30/04	Vegetation	C3	JF	9-30-C			272615	4372092	-107.643281	39.470274	0	0	6066	Stressed Junipers (3 trees). grass under trees OK.. See photos
Sherowski Veg 3	9/30/04	Vegetation	C4	JF	9-30-C			272606	4372091	-107.643385	39.470262	0	0	6059	Barren soil area with no vegetation growing. See photos
Dietrich Seep-1	10/1/04	Gas Detected	DETRK SEEP	DR	10-1-A			272501	4371571	-107.644427	39.465554	175	2	6039	Flagged seep in dry creek bed - hottest point. Salt crust on soils nearby. See photos
Dietrich Seep-2	10/1/04	Gas Detected	DETRK SEEP 001	DR	10-1-A			272508	4371750	-107.644407	39.467167	6.5	0	6035	Flagged seep. Weak point north of stronger seep. Salt crust on soils nearby. See photos
Dietrich Seep-3	10/1/04	Gas Detected	DETRK SEEP 002	DR	10-1-A			272494	4371585	-107.644513	39.465678	37	0		Flagged seep, salt crust on soils nearby. See photos
Dietrich Seep-4	10/1/04	Gas Detected	DS4	DR				272473	4371665	-107.644784	39.466393	4.5	0		West of creek bed.
Dietrich Seep-5	10/1/04	Gas Detected	DS5	DR				272489	4371806	-107.644647	39.467666	14	0		Flagged seep well north of hot spot. May have drift from well pad
Dietrich Soil Gas	10/4/04	Soil Probe	C5 SEEP	JF	10-4-C			272502	4371572	-107.644416	39.465563	>1000000	8	6068	Attempted soil gas probe from 6' - too wet. Collect soil gas at 18" depth. Dilute in syringe and inject into FID/PID. Collect Cali-Bond-5 gas bag - Lab ID = C5-SEEP. See photos
Eicher View	10/5/04	View		JF				274048	4371902	-107.626575	39.468941	0	0		View across Eicher-Thompson-Griffin properties. see photo
W Divide Ck View		View		JF				274387	4371462	-107.622489	39.465069	0	0		View from Thompson, Grid point D20-07, overlooking W Divide Creek. See photos.
Eicher Veg 1	10/5/04	Vegetation	C-6	JF	10-5-C			274092	4371769	-107.626019	39.467755	0	0	6233	Cluster of dead trees, appear to follow strike of N30E. See photos.
Eicher Veg 2	10/5/04	Vegetation	C7	JF	10-5-C			274105	4371809	-107.625881	39.468119	0	0	6215	Dead pine next to road/driveway. See photos.
Eicher Veg 3	10/5/04	Vegetation	C8	JF	10-5-C			274178	4371888	-107.625060	39.468849	0	0	6217	Large dead pinyon, many beetle and woodpecker holes. See photos.
Whittington Veg	10/5/04	Vegetation	C10	JF	10-5-C			273434	4371604	-107.633604	39.466097	0	0	6255	View of dead pines, See photos
Griffin Veg 1	10/5/04	Vegetation		JF				273862	4371594	-107.628630	39.466119	0	0		Stress pasture grass, view looking NE from Griffin across Eicher . See photos
Eicher Veg 4	10/5/04	Vegetation		JF				274071	4371869	-107.626296	39.468650	0	0		Stress pasture grass, view looking SW from Eicher across Griffin towards Thompson. See photos
Griffin Veg 2	10/5/04	Vegetation	C11	JF	10-5-C			273548	4371852	-107.632364	39.468359	0	0	6188	Water well house & dead pine trees, excavation, trees appear beetle and woodpecker attacked. See photos.
Thompson Cabin	10/5/04	Residence	CABIN	JF	10-5-C			274140	4371558	-107.625390	39.465868	0	0	6243	Checked around residence with FID
Eicher Residence	10/5/04	Residence	EICHER	JF	10-5-C			274172	4371766	-107.625089	39.467749	0	0	6207	Stressed vegetation near house & dead pine to north of property. See photos
Griffin Residence	10/5/04	Residence	GRIFFEN	JF	10-5-C			273762	4371770	-107.629851	39.467677	0	0	6274	Checked w/ FID around house.
Whittington View	10/5/04	View						273301	4371697	-107.635180	39.466899	0	0		View of Valley looking SW-NW from mesa on west end of Whittington (Eubanks). See photos.
Outcrop 1	10/5/04	Outcrop	SS OUTCP1	JF	10-5-C	10	0	274308	4371768	-107.623510	39.467803	0	0	6155	Sandstone outcrop. 10 deg to N. abundant joint pattern is N40E w/ less common joints perpendicular to those.
Last Dance D12-2	10/6/04	Infrastructure	LAST D12-2	DR	10-6-A			273048	4372535	-107.638403	39.474375	0	0	6095	No gas seeps on well pad
Thompson Residence	10/6/04	Residence	Thompson	DR	10-6-A			273788	4371303	-107.629391	39.463481	0	0		Checked w/ FID around house. pictures of dead trees SW of house. See photos
Juniper LLC-Veg 1	10/6/04	Vegetation		CG	10-6-B			274207	4371900	-107.624728	39.468964	0	0		Stressed pine with beetle damage. see photo.
Langegger Veg 1	10/6/04	Vegetation	B-1	CG	10-6-B			274730	4372480	-107.618850	39.474322	0	0	6042	Dieing tree, see photo
Juniper LLC-Veg 2	10/6/04	Vegetation	B-2	CG	10-6-B			273968	4372216	-107.627610	39.471746	0	0	6161	Stressed tree, no gas detected. see photo
Thompson Veg 1	10/6/04	Vegetation	C12	JF	10-6-C			273742	4371252	-107.629908	39.463009	0	0	6461	(2) lg mature pine tree kills, beetle & woodpecker holes & missing bark on lower trunk. See photos.

MAP ID	Date	Category	GPS ID	Field Tech	GPS file	Dip	Azimuth	Easting UTM	Northing UTM	Longitude	Latitude	FID ppm	PID ppm	Elev (Ft)	Description
BLM View 1		View						273881	4371174	-107.628267	39.462344	0	0		View point looking SW to S. See photos.
Thompson Veg 2	10/6/04	Vegetation	C13	JF	10-6-C			273749	4371102	-107.629776	39.461661	0	0	6492	Single mature pine kill. See photos.
BLM View 2	10/6/04	View		JF				273233	4370781	-107.635658	39.458636	0	0		View from mesa on BLM land, south of Thompson, overlooking McRay Ranch, Schoonmaker, Staufer. SE-SW view. See photos.
BLM Veg 1	10/6/04	Vegetation	C14	JF	10-6-C			273222	4370927	-107.635836	39.459947	0	0	6518	Recent pine kill & numerous dead or stressed shrubs in small ravine/canyon. other vegetation OK. no gas detected
BLM Veg 2	10/6/04	Vegetation	C15	JF	10-6-C			273264	4370969	-107.635362	39.460336	0	0	6506	Recently stressed juniper and 2 small pines, numerous dead weathered trees dead several years. other vegetation OK. east edge of ravine
Thompson Veg 3	10/6/04	Vegetation	C16	JF	10-6-C			273548	4371304	-107.632178	39.463427	0	0	6428	Cluster of 6 mature pines showing recent kill, needles still brown on trees, lots of beetle holes and 2 active woodpeckers going at them. Underlying vegetation OK. See Photo.
Thompson Veg 4	10/6/04	Vegetation		DR				273772	4371322	-107.629583	39.463647	0	0		Dying pine trees along road/driveway going up to Thompson residence. See photos.
Outcrop 2	10/6/04	Outcrop	D20-03									0	0		Grid D20-03. Sandstone outcrop dipping 10 deg N30E
Outcrop 3	10/6/04	Outcrop	SSOUTCP2	JF	10-6-C	10	30	273196	4370902	-107.636129	39.459715	0	0	6523	Sandstone outcrop dipping 10 deg N20W. major jointing N40W
Last Dance 12-2	10/7/04	Infrastructure	LAST DANCE	CG	10-7-B			273051	4372532	-107.638367	39.474349	0	0	6084	Last Dance 12-2 gas well, no gas leaks detected.
Calpine Last Dance 9-3 Tank Vapors	10/7/04	Infrastructure	C17	JF	10-7-C			272680	4372964	-107.642823	39.478140	800	7	5987	Strong condensate odor. lid open on waste(?) tank. airborne gas: FID max = 800ppm, PID max = 7ppm.. See photos.
Calpine Last Dance 10-3	10/7/04	Infrastructure	CAL LD10-3	JF	10-7-C			271979	4372927	-107.650952	39.477621	5	4	5991	Weak airborne gas hits around wellhead: FID = 5ppm, PID = 4ppm
Calpine Last Dance 9-3	10/7/04	Infrastructure	CAL LD9-3	JF	10-7-C			272649	4372967	-107.643184	39.478159	2	2	5988	Weak airborne gas hits around pit: FID = 1-2ppm, PID = 1-2ppm. No gas detected around well head or process equipment. See photos.
Chandler Residence	10/7/04	Residence	CHANDLER	JF	10-7-C			272154	4372467	-107.648762	39.473527	0	0	6097	Last Dance Property. Norm Chandler identified several locations for testing on Last Dance Ranch - Tom Lloyd property. Checked faucet outside Chandler home, no gas when cracking it open.
Last Dance Faucet	10/7/04	Water System	LLOYD WELL2	JF	10-7-C			272272	4372339	-107.647348	39.472406	0	0	6122	Faucet fed by Last Dance Well 1 according to Chandler. No gas detected when opening faucet.
Tom Lloyd Residence	10/7/04	Residence	LLOYD	JF	10-7-C			272510	4372516	-107.644645	39.474062	0	0	6089	Checked around home and abandoned well head.
Tom Lloyd Faucet	10/7/04	Water System	LLOYD	JF	10-7-C			272491	4372518	-107.644866	39.474075	300	0	6089	Outside faucet at Tom Lloyd's home fed by Last Dance Well 1 ; FID = 300ppm spike (not continuous) from opened water faucet. No gas detected on grounds or surrounding area.
Last Dance Well 1	10/7/04	Water System	TLLO WELL	JF	10-7-C			271937	4372529	-107.651304	39.474028	2700	0	5956	Active water well on Lloyd property; Well house with tank and pump, fan system. FID = 2700 ppm in water tank headspace. No gas detected around sealed well head or surrounding area.
Tom Lloyd Faucet	10/7/04	Gas Detected	LLOYD	JF	10-7-C			272491	4372518	-107.644866	39.474075	300	0	6089	Outside faucet at Tom Lloyd's home fed by Last Dance Well 1 ; FID = 300ppm spike (not continuous) from opened water faucet. No gas detected on grounds or surrounding area.
Last Dance Well 1	10/7/04	Gas Detected	TLLO WELL	JF	10-7-C			271937	4372529	-107.651304	39.474028	2700	0	5956	Active water well on Lloyd property; Well house with tank and pump, fan system. FID = 2700 ppm in water tank headspace. No gas detected around sealed well head or surrounding area.
Last Dance Well 2	10/7/04	Water System	WELL2A	JF	10-7-C			272206	4372387	-107.648131	39.472821	0	0	6102	Additional water well on Lloyd property, not in typically in use according to Chanlder. No gas detected around well head. Well sealed, not opened.
Last Dance Spring	10/7/04	Spring	SPG	JF	10-7-C			272140	4372804	-107.649040	39.476557	0	0	6010	Intermittent spring on Last Dance Ranch, next to pond, no gas detected
Staufer Pond	10/7/04	Pond	POND	JF	10-7-C			274409	4370174	-107.621798	39.453481	0	0	6093	Pond next to intermittent spring on Last Dance. See photos.
Staufer Spring 1	10/7/04	Spring	SPG					274511	4370082	-107.620583	39.452680	20	0	6116	Marks spring.
Staufer Spring 1	10/7/04	Gas Detected	SPG2	JF	10-7-C			274511	4370082	-107.620583	39.452680	20	0	6116	Spring collection well box next to hunting cabin. Gas hits of 2-20 ppm in short burst reading above flowing water areas when disturbed, cannot be reproduced. Numerous and continuous springs along east side of creek valley w/in 50' of creek and 3-5' above creek level. See photos
Staufer Spring 2	10/8/04	Spring	SPG		10-8-C			274121	4370468	-107.625242	39.456052			6010	Dry muddy spring area at base of N. facing slope
Staufer Spring 3	10/7/04	Spring	SPG3	JF	10-7-C			274470	4369999	-107.621031	39.451922	0	0	6100	Wet spring are on east slope of Divide Ck valley, abnt boulders. see photo.
Staufer Residence	10/7/04	Residence	Staufer	JF	10-7-C			274389	4370318	-107.622079	39.454772	0	0		Surveyed area around home. No gas detected.
Thompson View	10/8/04	View						274386	4371464	-107.622501	39.465087				View across Multa Trina Ditch and W. Divide Creek. See photos.
Staufer Veg 3	10/8/04	Vegetation	C18	JF	10-8-C			273909	4370487	-107.627710	39.456167	0	0	6119	Stressed pines missing bark, sappy, beetle borings. No gas detected. See photos

MAP ID	Date	Category	GPS ID	Field Tech	GPS file	Dip	Azimuth	Easting UTM	Northing UTM	Longitude	Latitude	FID ppm	PID ppm	Elev (Ft)	Description
Calpine Miller 5-36	10/8/04	Infrastructure	MILLR5-36	JF	10-8-C			274535	4373765	-107.621549	39.485838	0	0	5946	Leaky valves on well head. airborne gas >5% on FID (flameout). see photo
Calpine Miller 4-36	10/8/04	Infrastructure	MILR4-36	JF	10-8-C			274535	4373771	-107.621551	39.485892	0	0	5941	Leaky valves on well head. airborne gas >5% on FID (flameout). see photo
Outcrop 4	10/8/04	Outcrop	OUTCP	JF	10-8-C	15	310	273783	4370593	-107.629209	39.457088	0	0	6167	Sandstone outcrop on BLM land near Staufer
Pipeline	10/8/04	Infrastructure	PIPLINCNR	JF	10-8-C			274671	4373748	-107.619963	39.485720	0	0	5817	Pipeline above ground valving. no gas detected. see photo
Miller Spring 1	10/8/04	Spring	SPG 4	JF	10-8-C			274296	4373110	-107.624103	39.479879	0	0	5931	Siring in creek drainage, cattails, marshy, occ salt crust along edges where dry. No gas detected.
Staufer Spring 4	10/8/04	Spring	SPG5	JF	10-8-C			273880	4370101	-107.627916	39.452685	0	0	6098	Intermittent spring next to small tributary to W Divide Ck. Heavy salt crust on dried mud areas. See photos
Miller Spring 2	10/8/04	Spring	SPG6	JF	10-8-C			274423	4373208	-107.622662	39.480795	0	0	5899	Convergence of two drainages, large wet marshy spring area in creek bottom, abnt salt crust . See photos The entire drainage walked contained similar almost continuous springs of a similar nature all the way down to Divide Creek. See photos.
SA-150	10/8/04	Pond	SA-150	JF	10-8-C			274654	4373958	-107.620232	39.487606	0	0		1.3 ppm seep detected with truck-mounted IR survey investigated on foot. Checked for seeps at registered waypoint (not near creek) and walked to creek in attempt to locate seep. Could not find seep.
Okagawa Pond West	10/12/04	Pond	O-POND-W	JL	10-12-A			270252	4372778	-107.670958	39.475821	0	0	5953	Pond on Okagawa property west of survey area
Schoonmaker pond	10/11/04	Pond	B-4	CG	10-11-B			272180	4370819	-107.647898	39.458700	122	0	6134	Marks Pond
Schoonmaker pond	10/11/04	Gas Detected	B-4	CG	10-11-B			272180	4370819	-107.647898	39.458700	122	0	6134	Seep by a pond, possibly biogenic gas. Revisited site on 10/26/04, now wet from rain, green grassy area, trampled by livestock. no gas detected. Original gas show presumed to be from biogenic methane. See photos.
Encana 146 well 1	10/12/04	Infrastructure	146-W-1	CG	10-12-B			271223	4372498	-107.659585	39.473559	0	0	6028	No gas detection on around well head
Encana 146 well 2	10/12/04	Infrastructure	146-W-2	CG	10-12-B			271229	4372503	-107.659517	39.473606	9	0	6029	Airborne gas hit from well head - FID = 9 ppm
Encana 146 well 3	10/12/04	Infrastructure	146-W-3	CG	10-12-B			271231	4372507	-107.659495	39.473642	50	0	6024	Airborne gas from well head - FID = 50ppm
Encana 146 well 4	10/12/04	Infrastructure	146-W-4	CG	10-12-B			271236	4372511	-107.659439	39.473680	0	0	6030	Variable airborne gas from well heads (Values not recorded)
KLT-W-1	10/12/04	Infrastructure	KLT GAS 24	CG				276567	4370436	-107.596830	39.456402	0	0	6934	Gas well. no gas detection on around well head. not producing?
BLM View 3	10/12/04	View		CG				275733	4371148	-107.606753	39.462594	0	0		View of Miller Ranch and surround properties. see photo.
Burnett Well	10/13/04	Water System	BURNETTWEL	JL	10-13-A			271207	4369918	-107.658887	39.450332	0	0	6143	Water well shown by Dixie Burnett. no gas detected.
Morris Pond Dry	10/14/04	Pond	DRY POND	CG	10-13-B			271631	4370165	-107.654049	39.452668	0	0	6208	3 Ponds near each other on Morris lot, one dry, no gas detected
Okagawa Pond 1	10/13/04	Pond	O-POND	CG	10-13-B			271325	4372840	-107.658518	39.476665	0	0	5961	Pond shown by Okagawa, on Kerley lot
Okagawa Pond 2	10/14/04	Pond	O-POND2	CG	10-13-B			270225	4373245	-107.671433	39.480017	0	0	5891	Okagawa pond
Morris Pond 1	10/13/04	Pond	POND	CG	10-13-B			271565	4370174	-107.654818	39.452731	0	0	6198	3 Ponds near each other on Morris lot, one dry, no gas detected
Morris Pond 2	10/13/04	Pond	POND2	CG	10-13-B			271696	4370160	-107.653292	39.452640	0	0	6221	3 Ponds near each other on Morris lot, one dry, no gas detected
Morris Pond 3	10/13/04	Pond	POND3	CG	10-13-B			271897	4370361	-107.651027	39.454503	0	0	6222	Ponds on east central part of Morris lot. no gas detected
Dardynski Veg	10/14/04	Vegetation		CG				271836	4373146	-107.652688	39.479555	0	0		Spring in creek bed on Dardynski property. few dead trees surrounded by lush undergrowth. See photos
McRay Creek	10/14/04	Vegetation		CG				273729	4370045	-107.629650	39.452141	0	0		View of creek along lineament on McRay. one dead tree with live undergrowth.
Currie Pond	10/14/04	Pond	CURRIEPOND	JL	10-14-A			272018	4373244	-107.650608	39.480485	0	0	5923	Pond on Currie Lot
Howell Pond	10/14/04	Pond	HOWELLPOND	JL	10-14-A			271669	4368941	-107.653189	39.441661	0	0	6256	Pond on Howell lot
Encanna Pad #130	10/15/04	Infrastructure	W-130	JL	10-15-A			275209	4373996	-107.613798	39.488094	170	0	5915	Scott 2-36. Gas leak appear to be coming from valve leaks. Up to 170ppm FID on south side of well.
Gibson Gulch Well 4-31,	10/19/04	Infrastructure	G-GLCH4-31	JL	10-19-A			276149	4374117	-107.602919	39.489428	>5%	0	5923	Gibson Gulch 4-31. Leaky well head valves, flamed out FID.
Gibson Gulch Well 13-30	10/20/04	Infrastructure		JL				276149	4374117	-107.602919	39.489428	5	0		up to 5ppm on FID detected around valves
Gibson Gulch Well 12-30	10/21/04	Infrastructure		JL				276149	4374117	-107.602919	39.489428	0	0		No leaks detected
Flaherty Spring	10/21/04	Spring	2	CG	10-21-B			274761	4369351	-107.617434	39.446165	0	0	6318	Flaherty's spring and pond. See photos.
Williams Pond	10/21/04	Pond	DRY-POND	CG	10-21-B			273192	4374080	-107.637256	39.488320	0	0	5879	Pond on Williams lot
Flaherty Pond	10/21/04	Pond	F-POND	CG	10-21-B			274678	4369464	-107.618436	39.447160	0	0	6217	Pond on Flaherty, also checked around home.
Flaherty Res	10/21/04	Residence		CG				274652	4369373	-107.618707	39.446335	0	0		Checked around Flaherty house.
West Pond	10/21/04	Pond	POND 4	CG	10-21-B			272430	4374141	-107.646128	39.488668	0	0	5799	Pond with good clear water, lots of vegetation, no bubbles.
Langegger Pond 2	10/26/04	Pond		JL								0	0		Revisit to Langegger N Pond to investigate gas seeps. Could not get any gas indications to reproduce, only occasional minor spikes on FID around disturbed vegetation.
Aspen RM 10-6C (10E)	10/26/04	Infrastructure	ARM-10E	JL	10-26-A			271522	4371211	-107.655672	39.462054	>5%	NR	6065	Pad 10E. Aspen Resource Management 10-6C. Leaky valves on combustor(?) & well head. max out FID. See photos
Buerger 15-1D (A15)	10/26/04	Infrastructure	B15-1D-A15	JL	10-26-A			272559	4369958	-107.643204	39.451050	>5%	NR	6331	Pad A15. Buerger 15-1D Well. Leaky valves on well head. max out FID. See photos
Brown 11-2C F11E	10/26/04	Infrastructure	F11E	JL	10-26-A			273134	4371414	-107.637023	39.464308		NR	6108	Pad F11E. Leaky valves on well head

MAP ID	Date	Category	GPS ID	Field Tech	GPS file	Dip	Azimuth	Easting UTM	Northing UTM	Longitude	Latitude	FID ppm	PID ppm	Elev (Ft)	Description
Pad L-34 Magnall Wells	10/26/04	Infrastructure	L-34	JL	10-26-A			271306	4373540	-107.658979	39.482960	>5%	NR	5871	Pad L-34. Magnall gas wells 34-5, 34-6, 34-11, 34-12. Well heads leaking from valves - max out FID. See photos.
Morgan 12-14B N12	10/26/04	Infrastructure	M12-14BN12	JL	10-26-A			274713	4370643	-107.618427	39.457782	>5%	NR	6174	Well head leaking from valves, max out FID
Aspen Soil Sample	10/26/04	Soil Sample	SALT-001	JL	10-26-A			271837	4371162	-107.651998	39.461697	0	0	6066	Salt crust sample collected on Aspen Resource lot.
Dietrich Soil Sample	10/26/04	Soil Sample	SALT-02	JL	10-26-A			272506	4371604	-107.644380	39.465852	0	0	6028	Salt crust sample collected on Dietrich lot approx. 100' north of main seep in creek bed. now wet and flowing from rain. See photos
Thompson Soil Gas	10/26/04	Soil Probe	SG-001	JL	10-26-A			273852	4371562	-107.628736	39.465829	4	?	6257	5' deep soil gas sample. New tubing or tooling appears to be contaminated with heavy hydrocarbons. FID jumps up and drops back to 4ppm. Collect soil gas in CaliBond-5 bag. Background methane levels (2-3 ppm) found in bag samples with pentane as contaminant gas.
Griffin Soil Gas	10/26/04	Soil Probe	SG-002	JL	10-26-A			273904	4371666	-107.628167	39.466779	4	?	6233	5' deep soil gas sample. New tubing or tooling appears to be contaminated with heavy hydrocarbons. FID jumps up and drops back to 4ppm & PID to 42ppm. Collect soil gas in CaliBond-5 bag. Background methane levels (2-3 ppm) found in bag samples with pentane as contaminant gas.
Eicher Soil Gas	10/26/04	Soil Probe	SG-003	JL	10-26-A			273962	4371724	-107.627513	39.467316	4	?	6226	5' deep soil gas sample. New tubing or tooling appears to be contaminated with heavy hydrocarbons. FID jumps up and drops back to 5ppm & PID to 41ppm. Collect soil gas in CaliBond-5 bag. Background methane levels (2-3 ppm) found in bag samples with pentane as contaminant gas.
Encana Twin Creek 1-15B 01E	10/26/04	Infrastructure	TC1-15B01E	JL	10-26-A			275157	4372257	-107.613815	39.472427	5%	NR	6102	Leaky valves on well head flamed out FID

APPENDIX I

PHOTO INDEX AND THUMBNAILS

MAP ID	Date	PHOTO_ID	DESCRIPTION; Key words: property, subject
Morgan Veg 2	9/24/04	092404_P9240012.JPG	Morgan; Stressed pasture grass - approx. 30' x 30'; possibly uneven irrigation
Morgan Veg 2	9/24/04	092404_P9240015.JPG	Morgan; Stressed pasture grass - approx. 30' x 30'; possibly uneven irrigation
Staufer Veg 1	9/24/04	092404_P9240017.JPG	Staufer; Stressed pasture grass - approx. 100' x 100'; possibly uneven irrigation
Staufer Veg 1	9/24/04	092404_P9240019.JPG	Staufer; Stressed pasture grass - approx. 100' x 100'; possibly uneven irrigation
Staufer Veg 2	9/24/04	092404_P9240021.JPG	Staufer; Stressed pasture grass - Strip oriented E-W, larger at W end - possibly uneven irrigation
Staufer Veg 2	9/24/04	092404_P9240022.JPG	Staufer; Stressed pasture grass - Strip oriented E-W, larger at W end - possibly uneven irrigation
Staufer Veg 2	9/24/04	092404_P9240024.JPG	Staufer; Stressed pasture grass - Strip oriented E-W, larger at W end - possibly uneven irrigation
Staufer Veg 2	9/24/04	092404_P9240025.JPG	Staufer; Stressed pasture grass - Strip oriented E-W, larger at W end - possibly uneven irrigation
Langegger Pond 1B	9/27/04	092704_P9270002.JPG	Langegger (southern) pond
Langegger Pond 1B	9/27/04	092704_P9270003.JPG	Langegger (southern) pond, lush spring like area above pond
Langegger Pond 1B	9/27/04	092704_P9270005.JPG	Langegger (southern) pond, inlet area
Langegger MW P-3	9/28/04	092804_P9280008.JPG	Main seep area
Langegger MW P-3	9/28/04	092804_P9280009.JPG	Main Seep area
Langegger MW P-3	9/28/04	092804_P9280010.JPG	SW Seep and two monitoring wells
Langegger MW P-3	9/28/04	092804_P9280011.JPG	Monitoring Well P-3
BLM Berm	9/28/04	092804_P9280012.JPG	View of berm & dried pond on BLM land
BLM Berm	9/28/04	092804_P9280014.JPG	View looking west from BLM land to Langegger and Morgan irrigated pastures.
BLM Berm	9/28/04	092804_P9280015.JPG	View looking west from BLM land to Langegger and Morgan irrigated pastures.
Pad P-3	9/29/04	092404_PICT2469.JPG	Pad P-3 well heads
P3 Magic 10-2	9/29/04	092404_PICT2470.JPG	Magic 10-2 wellhead
Sheroski Veg 1	9/30/04	092404_PICT2472.JPG	Stressed Junipers (3 trees); underlying vegetation (grass) appears OK.
Sheroski Veg 3	9/30/04	092404_PICT2474.JPG	Barren soil area near some dead trees, no gas detected
Dietrich Seep-1	10/4/04	100104_PA010016.JPG	Measuring soil surface gas at Dietrich seep in creek bed bottom
Dietrich Seep-3	10/4/04	100404_PA040002.JPG	Salt crusted barren soils in Dietrich seep area, N-NW of main seep, gas not detected in most of the salt crust and barren areas. .
Dietrich Seep-3	10/4/04	100404_PA040003.JPG	Flag marks seep area in densely vegetated area in dry creek bed.
Dietrich Seep-1	10/4/04	100404_PA040004.JPG	Salt crusted soils in Dietrich seep area; View looking N-NW

Dietrich Soil Gas	10/4/04	100404_PA040006.JPG	Driving soil gas probe in seep.
Dietrich Soil Gas	10/4/04	100404_PA040007.JPG	Pulling soil gas sample from soil gas probe.
Dietrich Seep-1	10/4/04	100404_PA040008.JPG	Salt crusted barren soil areas near Dietrich seep.
Dietrich Seep-1	10/4/04	100404_PA040009.JPG	View of salt crusted barren soils, dead tree (weathered, no bark), looking SW from main seep area.
Dietrich Soil Gas	10/4/04	100404_PA040010.JPG	Collecting soil gas sample from soil gas probe in Cali-Bond-5 gas bag.
Dietrich Soil Gas	10/4/04	100404_PA040012.JPG	Pulling soil gas sample from soil gas probe & injecting into FID/PID.
Dietrich Seep-1	10/4/04	100404_PA040014.JPG	Salt crusted soil above lower part of creek bed, looking S-SW of main seep
Dietrich Seep-1	10/4/04	100404_PA040015.JPG	Flag marks gas seep area in vegetated area in dry creek bed.
P3 Magic 10-2 Soil Gas	10/4/04	100404_PA040016.JPG	Injecting soil gas into FID/PID at Pad P-3
Griffin Veg 1	10/5/04	100504_PICT2476.JPG	Griffin property looking NE toward Eicher; stressed pasture grass, N30-40E trend (residents said that areas turned brown in summer, now greened up after abundant rain)
Griffin Veg 1	10/5/04	100504_PICT2477.JPG	Zoomed Photo: Griffin property looking NE toward Eicher; stressed pasture grass, N30-40E trend (residents said that areas turned brown in summer, now greened up after abundant rain)
Eicher View	10/5/04	100504_PA050001.JPG	View across Eicher-Thompson-Griffin properties observing stressed pasture grasses
Eicher View	10/5/04	100504_PA050002.JPG	Zoomed view across Eicher-Thompson-Griffin properties observing stressed pasture grasses
W Divide Creek View	10/5/04	100504_PA050003.JPG	View from Thompson property overlooking W. Divide Creek, looking N
W Divide Creek View	10/5/04	100504_PA050004.JPG	View from Thompson property overlooking W. Divide Creek, looking NE
W Divide Creek View	10/5/04	100504_PA050005.JPG	View from Thompson property overlooking W. Divide Creek, looking NSE
W Divide Creek View	10/5/04	100504_PA050006.JPG	View from Thompson property overlooking W. Divide Creek, looking N,
W Divide Creek View	10/5/04	100504_PA050007.JPG	View from Thompson property overlooking W. Divide Creek, looking N,
W Divide Creek View	10/5/04	100504_PA050008.JPG	View from Thompson property overlooking W. Divide Creek, looking N,
Eicher Residence	10/5/04	100504_PA050010.JPG	Eicher Residence (teepee and play area) Stressed trees in yard
Eicher Residence	10/5/04	100504_PA050011.JPG	Eicher Residence (teepee and play area) Stressed trees in yard
Eicher Residence	10/5/04	100504_PA050012.JPG	Eicher Residence (teepee and play area) Stressed trees in yard
Eicher Veg 1	10/5/04	100504_PA050015.JPG	Cluster of dead & stressed Junipers & Pines next to road on Eicher property
Eicher Veg 2	10/5/04	100504_PA050016.JPG	Cluster of dead & stressed Junipers & Pines next to road on Eicher property
Eicher Veg 3	10/5/04	100504_PA050017.JPG	Large (mature) dead Pinyons with many bug and Woodpecker holes
Eicher Veg 3	10/5/04	100504_PA050018.JPG	Large (mature) dead Pinyons with many bug and Woodpecker holes
Griffin Veg	10/5/04	100504_PICT2476.JPG	Griffin property looking NE toward Eicher; stressed pasture grass, N30-40E trend (residents said that areas turned brown in summer, now greened up after abundant rain)

Griffin Veg	10/5/04	100504_PICT2477.JPG	Griffin property looking NE toward Eicher; stressed pasture grass, N30-40E trend (residents said that areas turned brown in summer, now greened up after abundant rain)
Eicher Veg 4	10/5/04	100504_PICT2478.JPG	Eicher property looking SW across Griffin towards Thompson; stressed pasture grass, N30-40E strike (residents said that areas turned brown in summer, now greened up after abundant rain)
Whittington Veg	10/5/04	100504_PICT2479.JPG	3 recent pine kills (still have brown needles); underlying vegetation looks OK.
Whittington Veg	10/5/04	100504_PICT2480.JPG	View NE, pine kills, underlying vegetation looks OK.
Whittington View	10/5/04	100504_PICT2481.JPG	View SW overlooking valley; Whittington (Eubanks), Gagne, Sheroski
Whittington View	10/5/04	100504_PICT2482.JPG	View W overlooking valley; Whittington (Eubanks), Sheroski
Whittington View	10/5/04	100504_PICT2483.JPG	View NW overlooking valley; Whittington (Eubanks), Sheroski, Last Dance Ranch
Griffin Veg 2	10/5/04	100504_PICT2484.JPG	Recent dead pines near well house and small excavation, beetle & woodpecker damage.
Griffin Veg 2	10/5/04	100504_PICT2486.JPG	Recent dead pines near well house and small excavation; close up of beetle damage.
Thompson Veg 4	10/6/04	100604_PA060001.JPG	Dying pine trees along road/driveway going up to Thompson residence, closest to home.
Thompson Veg 4	10/6/04	100604_PA060002.JPG	Dying pine trees along road/driveway going up to Thompson residence, view of house.
Thompson Veg 4	10/6/04	100604_PA060003.JPG	Dying pine trees along road/driveway going up to Thompson residence, farther down road.
Thompson Veg 1	10/6/04	100604_PICT2487.JPG	(2) lg mature pine tree kills, beetle & woodpecker holes & missing bark on lower trunk.
Thompson Veg 1	10/6/04	100604_PICT2488.JPG	Pine tree kills along Thompson's road.
BLM View 1	10/6/04	100604_PICT2489.JPG	View over W Divide Creek, looking W
BLM View 1	10/6/04	100604_PICT2490.JPG	View over W Divide Creek, looking W - zoomed
BLM View 1	10/6/04	100604_PICT2491.JPG	View over W Divide Creek, looking SW
BLM View 1	10/6/04	100604_PICT2492.JPG	View over W Divide Creek, looking SW & down into valley
BLM View 1	10/6/04	100604_PICT2493.JPG	View over W Divide Creek, looking S
Thompson Veg 2	10/6/04	100604_PICT2494.JPG	Larger single mature pine kill, underlying vegetation OK.
BLM View 2	10/6/04	100604_PICT2495.JPG	View from mesa on BLM land looking SE
BLM View 2	10/6/04	100604_PICT2496.JPG	View from mesa on BLM land looking S
BLM View 2	10/6/04	100604_PICT2497.JPG	View from mesa on BLM land looking SW
BLM View 2	10/6/04	100604_PICT2498.JPG	View from mesa on BLM land looking W
Thompson Veg 3	10/6/04	100604_PICT2499.JPG	Recent pine kill, underlying vegetation OK.
Dietrich Seep-1	10/4/04	100704_PA040001.JPG	Photo checking the main Dietrich seep with FID/PID.

Calpine Last Dance 9-3 Tank Vapors	10/7/04	100704_PICT2500.JPG	Calpine Last Dance 9-3; tank with open hatch.
Calpine Last Dance 9-3	10/7/04	100704_PICT2501.JPG	Calpine Last Dance 9-3; gas processing unit
Calpine Last Dance 9-3	10/7/04	100704_PICT2502.JPG	Calpine Last Dance 9-3; well head
Thompson View	10/8/04	100804_PA080005.JPG	View across Multa Trina Ditch and W. Divide Creek looking E over main seep area
Thompson View	10/8/04	100804_PA080006.JPG	View across Multa Trina Ditch and W. Divide Creek looking N
Thompson View	10/8/04	100804_PA080007.JPG	View across Multa Trina Ditch and W. Divide Creek looking SE over main seep area
Thompson View	10/8/04	100804_PA080008.JPG	View across Multa Trina Ditch and W. Divide Creek looking S
Staufer Spring 4	10/8/04	100804_PICT2504.JPG	Dried spring next to small tributary of W Divide Ck; Patches of salt crust with no vegetation where salt crust is abundant; view looking SW
Staufer Spring 4	10/8/04	100804_PICT2505.JPG	Close-up of heavy salt crust & dried mud in spring area .
Staufer Veg 1	10/8/04	100804_PICT2506.JPG	Stressed pines on hillside in small valley bark, sappy, beetle borings;
Calpine Miller 5-36	10/8/04	100804_PICT2510.JPG	Calpine gas wells; Miller 5-36 & Miller 4-36
Calpine Miller 5-36	10/8/04	100804_PICT2511.JPG	Calpine gas wells; Miller 5-36
Calpine Miller 4-36	10/8/04	100804_PICT2512.JPG	Calpine gas wells; Miller 5-36
Miller Spring 1	10/8/04	100804_PICT2513.JPG	Wet spring & marshy area in creek drainage, cattails, occ salt crust areas along edges where dry
Miller Spring 2	10/8/04	100804_PICT2514.JPG	Looking upstream. Convergence of two drainages, large wet marshy spring area in creek bottom, abundant salt crust areas where vegetation does not grow; see photos The entire drainage walked contained similar almost continuous springs of a similar nature all the way down to Divide Creek
Pipeline	10/8/04	100804_PICT2515.JPG	Pipeline above ground valving.
BLM View 3	10/12/04	101204_PA120005.JPG	View of Miller Ranch and surround properties
Dardynski Veg	10/14/04	101404_PA140006.JPG	Spring in creek bed on Dardynski property;
Dardynski Veg	10/14/04	101404_PA140007.JPG	Spring in creek bed on Dardynski property; a few dead trees, undergrowth OK
Dardynski Veg	10/14/04	101404_PA140008.JPG	Spring in creek bed on Dardynski property; few dead trees surrounded by dense vegetation
McRay Creek	10/14/04	101404_PA140009.JPG	McRay, view one dead tree along creek and mapped lineament.
Staufer Spring 1	10/6/04	101904_0105520-R1-038-17A.JPG	Staufer Spring and collection well; near old hunting cabin; will be used to feed new home.
Staufer Pond	10/6/04	101904_0105520-R1-040-18A.JPG	View of Staufer main pond, looking NW.
Staufer Spring 3	10/6/04	101904_0105520-R1-042-19A.JPG	Spring along E side of valley, boulders & lush grassy with water seeping up over large area >100' wide.
Juniper LLC-Veg 1	10/6/04	101904_0105520-R1-046-21A.JPG	Large dead pinyon; close-up of trunk with beetle and woodpecker holes

Juniper LLC-Veg 1	10/6/04	101904_0105520-R1-048-22A.JPG	Large dead pinyon, underlying vegetation OK.
Langegger Veg 1	10/6/04	101904_0105520-R1-050-23A.JPG	Large dead pine with brown needles still on; underlying vegetation OK; view looking E.
Juniper LLC-Veg 2	10/6/04	101904_0105520-R1-054-25A.JPG	Large stressed pine; underlying vegetation OK; view looking SW.
Flaherty Spring	10/21/04	102104_PA210001.JPG	Source of Flaherty spring
Flaherty Spring	10/21/04	102104_PA210002.JPG	Stream from Flaherty spring
Lengegger Pond 2	10/26/04	102604_PA260003.JPG	Pond & Spring on Langegger; no bubbles, spring flowing;
Lengegger Pond 2	10/26/04	102604_PA260004.JPG	Pond on Langegger; area trampled by Elk.
Pad A15 Buerger 15-1D	10/26/04	102604_PA260005.JPG	Pad A15, Buerger 15-1D Well; gas process equipment
Pad A15 Buerger 15-1D	10/26/04	102604_PA260006.JPG	Pad A15, Buerger 15-1D Well; gas process equipment
Pad A15 Buerger 15-1D	10/26/04	102604_PA260007.JPG	Pad A15, Buerger 15-1D Well; gas process equipment
Pad A15 Buerger 15-1D	10/26/04	102604_PA260008.JPG	Pad A15, Buerger 15-1D Well; well head
Pad A15 Buerger 15-1D	10/26/04	102604_PA260009.JPG	Pad A15, Buerger 15-1D Well; well head
Pad A15 Buerger 15-1D	10/26/04	102604_PA260010.JPG	Pad A15, Buerger 15-1D Well; well head
Aspen RM 10-6C (10E)	10/26/04	102604_PA260011.JPG	Pad 10E; Aspen Resource Management 10-6C Well; wellhead
Aspen RM 10-6C (10E)	10/26/04	102604_PA260012.JPG	Pad 10E; Aspen Resource Management 10-6C Well; wellhead
Aspen RM 10-6C (10E)	10/26/04	102604_PA260013.JPG	Pad 10E; Aspen Resource Management 10-6C Well; combustor?
Aspen Soil	10/26/04	102604_PA260014.JPG	Close-up of salt crust & dried mud in spring area.
Aspen Soil	10/26/04	102604_PA260015.JPG	Salt crust & dried mud in spring area.
Skoonmaker pond	10/26/04	102604_PA260016.JPG	Area near where gas was detected; rainy day; trampled by livestock.
Skoonmaker pond	10/26/04	102604_PA260017.JPG	Area near where gas was detected; rainy day; trampled by livestock.
Pad L-34 Magnall Wells	10/26/04	102604_PA260018.JPG	Pad L-34; various infrastructure
Pad L-34 Magnall Wells	10/26/04	102604_PA260019.JPG	Pad L-34; various infrastructure
Pad L-34 Magnall Wells	10/26/04	102604_PA260020.JPG	Pad L-34; various infrastructure
Pad L-34 Magnall Wells	10/26/04	102604_PA260021.JPG	Pad L-34; Magnall 34-5, 34-6, 34-11, 34-12 well heads
Dietrich Seep-1	10/26/04	102604_PA260024.JPG	Return to Dietrich Seep during rain - main seep area with flags marking site.
Dietrich Seep-1	10/26/04	102604_PA260025.JPG	Return to Dietrich Seep during rain - water flowing over sandstone outcrop next to seep.
Dietrich Soil Sample	10/26/04	102604_PA260027.JPG	Return to Dietrich Seep during rain - sample of salt crust on soil surface collected.
Thompson Soil Gas	10/26/04	102604_PA260028.JPG	Area where Thompson Soil Gas sample was collected; setting up soil gas probe.
Griffin Soil Gas	10/26/04	102604_PA260029.JPG	Area where Griffin Soil Gas sample was collected; inserting soil gas probe.
Griffin Soil Gas	10/26/04	102604_PA260030.JPG	Area where Griffin Soil Gas sample was collected; soil gas probe in ground
Eicher Soil Gas	10/26/04	102604_PA260031.JPG	Area where Eicher Soil Gas sample was collected; soil gas probe in ground.

Eicher Soil Gas	10/26/04	102604_PA260032.JPG	Area where Eicher Soil Gas sample was collected; close-up of soil gas probe.
Eicher Soil Gas	10/26/04	102604_PA260033.JPG	Area where Eicher Soil Gas sample was collected; soil gas probe in ground.


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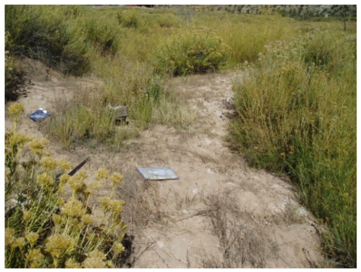
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100704_Stuafer Spring Well.jpg


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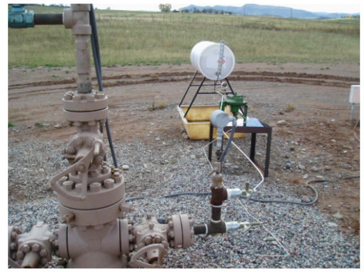
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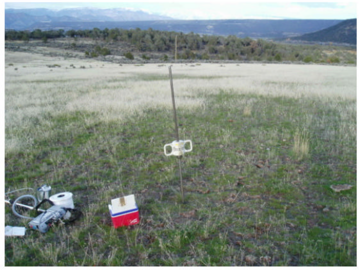

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APPENDIX J

ESN SOIL SAMPLE AND SOIL PROBE GAS SAMPLE ANALYSIS

November 17, 2004

John Fontana
ESN – Rocky Mountain
130 Capital Drive
Suite C
Golden, CO 80401

Re: ESN-RM (Encana) Salt Samples
ESN Project #: 40237.101860

Dear John:

Enclosed is the data package for the analytical project carried out at our laboratory in Golden, Colorado. There were a total of 2 soil samples and 3 soil gas samples submitted for the determination of the following analysis]:

- Soil Gas Method 8015M
- Leachable Metals by Method 6010B
- Leachable Anions by Method 9056M
- Leachable Alkalinity by Method SM2320B

Results for method blanks, laboratory control samples and duplicates are included in the report. Acceptance limits for surrogate recoveries are also included in the data report.

The accompanying project narrative discusses:

- sample receipt and holding times,
- methods and equipment used to determine analyte concentrations,
- calculations to determine final results.

Any problems or unusual circumstances related to this project are discussed in the narrative.

I have included a copy of an ion balance spreadsheet used to calculate alkalinity for comparison of results. If you should have any questions, please give me a call.

Sincerely,

Dave Roberts

Dave Roberts

ESN ENVIRONMENTAL
ROCKY MOUNTAIN SERVICES NETWORK

Lab Number	**101860**	**Logged In By**	Richard Clinkscales
Client	ESN-RM	**Date Rcvd**	10/28/04 9:19
Project	40237 ENCANA / Silt, CO	**Report Due**	11/5/2004

101860-0001 Salt S-001 10/26/04

6010B, Metals, Total, Selected in Soil
9056M, Anions, Water

101860-0002 Salt S-002 10/26/04

6010B, Metals, Total, Selected in Soil
9056M, Anions, Water

101860-0003 SG-001 10/26/04

Light Hydrocarbons in vapor

101860-0004 SG-002 10/26/04

Light Hydrocarbons in vapor

101860-0005 SG-003 10/26/04

Light Hydrocarbons in vapor

PROJECT NARRATIVE REPORT

ESN Project Number: 40237
Date: November 17, 2004

ESN Client: ESN Rocky Mountain
Client Contact: John V. Fontana

ESN LIMS ID:	**Client Sample ID:**
101860-0001	Salt S-001
101860-0002	Salt S-002
101860-0003	SG-001
101860-0004	SG-002
101860-0005	SG-003

Sample Receipt:
The samples for this project were received on 10/28/04 from the ESN Rocky Mountain Field Services Division and were accompanied by a chain-of-custody form. The samples and their containers appeared to be in good condition and the chain of custody form was complete and accurate.

Holding Times:
All samples were prepared and analyzed within the method required holding times. .

Methodology:
The determinations were carried out using modified SW-846 Methods or appropriate Methods as noted below:

ANALYSIS	METHOD	EXTRACTION	CLEAN-UP	INSTRUMENT INTRODUCTION	DETECTOR
Alkalinity	SM2320B	None	None	Burette	Titration
Anions	9056	9056	None	Sample Loop	Conductivity
Light Hydrocarbons	NLAG110	None	None	Injection	FID
Metals (excluding Hg)	6010B-M	3010A – Water 3050B – Soil	None	Pump/Nebulizer	ICP

Calibrations / Calculations:
The laboratory instruments are calibrated using method appropriate standards. On each additional project day the calibration is verified with a mid-level Continuing Calibration Verification (CCV). Calculations are carried out by the data system to compute the actual concentration of the analyte in the original sample. Results are reported on an as received basis.

ANALYSIS OF PURGEABLE OR DIRECTLY INJECTIBLE ANALYTES			
Method	**Calibration Curve**	**Sample Volume/Mass**	**Calculation / Reporting Units**
Light Hydro-carbons – NLAG110	5-point	5cc	The GC is calibrated in ppb molar volume. The Ideal Gas Law is then used to convert the molar volume detected into a mass of analyte. Dividing the mass of analyte by the sample mass gives a final concentration in ppb (w/w).

GENERAL LABORATORY ANALYSES			
Method	**Calibration Curve**	**Sample Volume/Mass**	**Calculation / Reporting Units**
Alkalinity – SM2320B	n/a	100mL	Samples are titrated with a solution; units are mg/L.
Anions – 9056	5-point	50µL	Dividing nanograms of analyte by microliters of sample is equivalent to mg/L.
Metals (excluding Hg) – 6010B-M	3-point	50mL – water 1.0g – solids	Results are calculated using the Instrument Print-out multiplied by a Standard Prep Factor (water/soil) and Dilution Factor; results are reported in mg/L or mg/Kg.

Initial Calibration Verification (ICV):
A Second Source Calibration Standard is analyzed after each calibration run (ICAL) to verify the accuracy of the original calibration standards. All calculated ICV recoveries were within QC limits.

Blanks:
A blank is used after each calibration run (ICAL), continuing calibration verification (CCV), and after samples determined to have high concentrations of analytes to verify system cleanliness.

Method Blanks (MBLK):
A method blank is used with each analytical batch to demonstrate the absence of contamination from analytical reagents, glassware, preparation process, and analytical instrumentation.

Surrogates:
Surrogates are added to each sample (as appropriate by method) and are monitored to determine the efficacy of the analyte recovery from the sample matrix. Instrument operation can also be tracked by surrogate recoveries. All calculated surrogate recoveries were within QC limits.

Laboratory Duplicates (DUP):
Duplicate analyses are run on samples in order to verify instrument precision. The analyst randomly selects a sample for duplication where sample volume is sufficient. Relative Percent Difference (RPD) between the original sample and the duplicate sample is calculated and reported.

Laboratory Control Sample (LCS):
A sample representing laboratory reagents and containers is spiked (LCS) with a Second Source Calibration Standard to demonstrate the laboratory's ability to extract/purge and accurately quantitate the analytes of interest from a clean sample matrix. All calculated LCS recoveries were within QC limits.

Analysis Comments: Analysis for inorganic constituents were performed on a deionized water leachate. The initial testing for metals and anions was on a solution derived from 5g of sample to 50mL of deionized water. Alkalinity was requested after reviewing the anion and metals data and was performed on a separate solution derived from 10g of sample to 100mL of deionized water.

David B Rohrkoff
Senior Chemist

11-17-04
Date

ESN Rocky Mountain
130 Capital Drive, Suite C
Golden, CO 80401

Final Data

(303) 278-1911
FAX: (303) 278-0104
email: Lab@ESN-RM.com

CLIENT: ENCANA

CLIENT PROJECT NO.: NA
ESN PROJECT NO.: 40237
LIMS NO.: 101860
PROJECT NAME: SILT

C_1-C_6 Hydrocarbons by FID Gas Chromatography

GAS CONCENTRATIONS BY VOLUME (Parts-per-Million by Volume)

ESN ID	Client ID	Sample Date	Receive Date	Analysis Date	Data Notes*	Dilution 1 : x	Methane	Ethane	Ethene	Propane	Propene	iButane	nButane	Butene	iPentane	nPentane	Pentene	iHexane	nHexane
METHOD BLANK	NA	NA	NA	10/28/04		1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101860-003	SG-001	10/26/04	10/28/04	10/28/04		1	1.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00
101860-004	SG-002	10/26/04	10/28/04	10/28/04		1	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.06	0.00
101860-005	SG-003	10/26/04	10/28/04	10/28/04		1	1.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.05	0.00
101860-005	SG-003 DUP	10/26/04	10/28/04	10/28/04		1	2.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.03	0.00
DETECTION LIMITS:							0.51	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

***ABBREVIATIONS**

TB = Trip Blank
MB = Method Blank
TB = Trip Blank
FD = Field Duplicate
LD = Laboratory Duplicate
LS = Laboratory Spike
D = Dilution

DATA FLAGS

j = an estimated concentration outside the calibration range of the method
b = analyte also appeared in the associated method blank for this sample

ESN Rocky Mountain
130 Capital Drive, Suite C
Golden, CO 80401

Metals Analysis by ICP
Final Data

(303) 278-1911 / FAX: (303) 278-0104
E-Mail: Lab@ESN-RM.com

CLIENT: ESN-RM (Encana)
CLIENT'S REPRESENTATIVE: John Fontana
CLIENT'S PROJECT NUMBER: NA
SITE: Silt, Silt, Colorado

ESN PROJECT NUMBER: 40237
CONTROL NUMBER: 101860
CHEMIST: D Roberts
ESN LAB NAME: "F"

Selected ICP Metals / RCRA 8 ICP Metals by SW-846 Method 6010B Mod.

Sample Collection Date	10/26/04			10/26/04			10/26/04					
Sample Received Date	10/26/04			10/26/04			10/26/04					
Analysis Date	11/03/04			11/03/04			11/03/04					
Analysis Time	9:56 AM			10:00 AM			10:04 AM					
Client Sample ID	Salt S-001			Salt S-001			Salt S-002					
LIMS ID	101860-0001			101860-0001			101860-0002					
Lab Code	Parent Sample			Laboratory Duplicate								
Matrix	Soil			Soil			Soil					
Digest / Leach Method	DI Leachate			DI Leachate			DI Leachate					
Sample Aliquot Reporting Units Dilution Factor	5 gram mg/kg 1.0	*	PQL	5 gram mg/kg 1.0	*	% RPD	5 gram mg/kg 1.0	*	PQL			
Calcium	227.6		5.0	225.8		0.8	203.8		5.0			
Magnesium	16.7		5.0	17.2		3.2	51.7		5.0			
Potassium	131.0		50.0	139.6		6.4	130.0		50.0			
Sodium	32010.0		50.0	31900.0		0.3	32560.0		50.0			

** = Data Qualifier: see Project Narrative for Explanations*
PQL = Practical Quantitation Limit
NA = Not Analyzed / ND = Not Detected at Specified Reporting Limit
Samples Reported on an "As Received" Basis

ESN Rocky Mountain
130 Capital Drive, Suite C
Golden, CO 80401-5654

(303) 278-1911 / FAX: (303) 278-0104
E-Mail: Lab@ESN-RM.com

Anions
Final Data

CLIENT: Encana
CLIENT'S REPRESENTATIVE: John Fontana - ESN
CLIENT'S PROJECT NUMBER: NA
SITE: Silt, Silt, Colorado

ESN PROJECT NUMBER: 40237
CONTROL NUMBER: 101860
CHEMIST: D Roberts
ESN LAB NAME: "F"

Selected Anions by SW-846 Method 9056A Mod.

SAMPLE COLLECTION DATE	10/26/04			10/26/04			10/26/04		
SAMPLE RECEIVED DATE	10/26/04			10/26/04			10/26/04		
ANALYSIS DATE	11/03/04			11/03/04			11/03/04		
ANALYSIS TIME	11:42 AM			12:04 PM			12:26 PM		
CLIENT SAMPLE ID.	Salt S-001			Salt S-001			Salt S-002		
LIMS ID	101860-0001			101860-0001			101860-0002		
LAB CODE (D, MS, MSD)				Duplicate					
Matrix	Soil			Soil			Soil		
Total, Dissolved, Leachate	Leachate Extraction			Leachate Extraction			Leachate Extraction		
SAMPLE AMOUNT	5 gram			5 gram			5 gram		
REPORTING UNITS	mg/kg		PQL	mg/kg		% RPD	mg/kg		PQL
DILUTION FACTOR	100.0	*		100.0	*		100.0	*	
Fluoride	ND		1000	ND		NC	ND		1000
Chloride	ND		1000	ND		NC	ND		1000
Nitrite	ND		1000	ND		NC	ND		1000
Bromide	ND		1000	ND		NC	ND		1000
Nitrate	ND		1000	ND		NC	ND		1000
Phosphate	ND		2000	ND		NC	ND		2000
Sulfate	67729		2000	68198		0.7%	71783		2000
Alkalinity	550		50				600		50

** = Data Qualifier: see Project Narrative for Explanations*
PQL = Practical Quantitation Limit

NA = Not Analyzed / ND = Not Detected at Specified Reporting Limit
Samples Reported on an "As Received" Basis

APPENDIX K

ISOTECH RESULTS OF THERMOGENIC GAS ANALYSES FROM SOIL PROBE AND BRADENHEAD SAMPLES

Isotech Gas Data
Job 5477

Isotech Lab No.	Sample Name	Location	Sampling Type	GC date	He %	H_2 %	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+ %	MS date	$d^{13}C_1$ per mil	dDC_1 per mil	$d^{13}C_2$ per mil	$d^{13}C_3$ per mil	Specific Gravity	BTU	Comments
74038	Magic 10-1 bradenhead	Encana PAD P-3	Bradenhead	10/6/04	0.009	0.003	0.005	0.025	0.0080	0.60	0	85.4	8.6	0	3.35	0.76	0.72	0.215	0.157	0.122	10/7/04	-40.95	-196	-28.33	-25.8	0.663	1174	230
74039	Arbany 3-16C bradenhead	Encana PAD P-3	Bradenhead	10/6/04	0.01	0.006	0.023	0.417	0.0050	2.42	0	82.8	8.4	0	3.25	0.76	0.74	0.383	0.365	0.479	10/8/04	-40.94	-193	-28.30	-25.7	0.686	1173	18
74040	Magic 10-2 bradenhead	Encana PAD P-3	Bradenhead	10/6/04	0.013	0.015	0.084	0.143	0	6.53	0	84.9	5.4	0	1.69	0.38	0.32	0.117	0.096	0.247	10/8/04	-40.96	-196	-27.83	-25.3	0.645	1044	30 psi
74041	Arbany 3-15C bradenhead	Encana PAD P-3	Bradenhead	10/6/04	0.005	0.003	0	0.02	0	0.39	0	84.6	9.1	0	3.71	0.84	0.8	0.230	0.165	0.124	10/9/04	-41.15	-195	-28.37	-25.8	0.670	1190	300 psi - st
74042	C5-SEEP	Dietrich Soil Gas	soil gas	10/7/04	0.0040	0	0.474	1.95	5.51	43.9	0	41.5	4.1	0	1.70	0.41	0.34	0.103	0.055	0.037	10/9/04	-37.35	-196	-27.44	-25.1	0.854	568	
74043	SG @ Arbany 3-15C	Encana PAD 3	soil gas	10/7/04	0.002	0.003	0.647	0.103	3.08	63	0	29.10	2.6	0	0.99	0.24	0.16	0.047	0.025	0.016	10/9/04	-35.24	-177	-26.59	-24.3	0.880	383	
74044	SG @ Magic 10-2	Encana PAD 3	soil gas	10/7/04	0.009	0.004	0.006	0.04	0.062	0.67	0	85.2	8.7	0	3.38	0.760	0.71	0.204	0.147	0.102	10/9/04	-40.86	-198	-28.33	-25.8	0.663	1172	
74045	SG @ Magic 10-1A	Encana PAD 3	soil gas	10/7/04	0.006	0.002	0.069	0.047	0.58	6.98	0	79	8.3	0	3.24	0.730	0.68	0.194	0.137	0.091	10/11/04	-39.40	-195	-27.92	-25.6	0.690	1094	
74046	SG @ Magic 10-1	Encana PAD 3	soil gas	10/7/04	0.006	0.0010	0.324	0.290	1.86	30.1	0	57.8	5.9	0	2.33	0.55	0.5	0.148	0.103	0.086	10/11/04	-39.24	-189	-27.81	-25.4	0.774	798	

Chemical analysis based on standards accurate to within 2%

APPENDIX L

RESULTS OF EXTENDED GAS ANALYSES FROM SCHWARTZ 2-15B WELLHEAD AND BRADENHEAD SAMPLES

EMPACT ANALYTICAL SYSTEMS, INC
365 S. MAIN STREET
BRIGHTON, CO 80601
(303) 637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

PROJECT NO. :	**0410098**	ANALYSIS NO. :	**01**
COMPANY NAME :	**CORDILLERAN**	ANALYSIS DATE:	OCTOBER 29, 2004
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 25, 2004
PRODUCER :		TO:	
LEASE NO. :		CYLINDER NO. :	TEDLAR BAG
NAME/DESCRIP :	SAMPLE ID 102504-02BH 1110		
FIELD DATA			
SAMPLED BY:		AMBIENT TEMP.:	
SAMPLE PRES. :		GRAVITY :	
SAMPLE TEMP. :			
COMMENTS :			

COMPONENT	MOLE %	MASS %	GPM@ 14.65	GPM@ 14.73
HELIUM	0.0000	0.0000	---	---
HYDROGEN	2.0212	0.1463	---	---
OXYGEN/ARGON	2.4238	2.7849	---	---
NITROGEN	94.8832	95.4402	---	---
CO2	0.0522	0.0825	---	---
METHANE	0.0056	0.0043	---	---
ETHANE	0.0031	0.0033	0.0008	0.0008
PROPANE	0.0328	0.0519	0.0090	0.0090
I-BUTANE	0.0670	0.1398	0.0218	0.0220
N-BUTANE	0.1397	0.2921	0.0439	0.0441
I-PENTANE	0.1143	0.2960	0.0416	0.0418
N-PENTANE	0.0972	0.2518	0.0350	0.0352
HEXANES PLUS	0.1599	0.5069	0.0650	0.0650
TOTALS	100.0000	100.0000	0.2171	0.2179

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0021	0.0060
ETHYLBENZENE	0.0001	0.0002
TOLUENE	0.0015	0.0050
XYLENES	0.0003	0.0009
TOTAL BTEX	0.0040	0.0121

(CALC: GPA STD 2145-94 & TP-17 @14.696 & 60 F)

BTU @	**14.65**	**14.73**
GROSS DRY REAL :	30.33	30.50
GROSS WET REAL :	29.80	29.97
RELATIVE DENSITY (AIR=1):		0.9614
COMPRESSIBILITY FACTOR :		0.99968

**DHA (DETAILED HYDROCARBON ANALYSIS/NJ 1993) ; ASTM D6730*

THIS DATA HAS BEEN ACQUIRED THROUGH APPLICATION OF CURRENT STATE-OF-THE-ART ANALYTICAL TECHNIQUES. THE USE OF THIS INFORMATION IS THE RESPONSIBLITY OF THE USER. EMPACT ANALYTICAL SYSTEMS, ASSUMES NO RESPONSIBLITY FOR ACCURACY OF THE REPORTED INFORMATION NOR ANY CONSEQUECES OF IT'S APPLICATION.

EMPACT ANALYTICAL SYSTEMS, INC

365 S. MAIN STREET
BRIGHTON, CO 80601
(303) 637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

PROJECT NO. : **0410098** ANALYSIS NO. : **01**
COMPANY NAME : **CORDILLERAN** ANALYSIS DATE: OCTOBER 29, 2004

COMPONENT	PIANO #	MOLE %	MASS %	GPM@ 14.65	GPM@ 14.73
HELIUM		0.0000	0.0000	---	---
HYDROGEN		2.0212	0.1463	---	---
OXYGEN/ARGON		2.4238	2.7849	---	---
NITROGEN		94.8832	95.4402	---	---
CO2		0.0522	0.0825	---	---
METHANE	P1	0.0056	0.0043	---	---
ETHANE	P2	0.0031	0.0033	0.0008	0.0008
PROPANE	P3	0.0328	0.0519	0.0090	0.0090
I-BUTANE	I4	0.0670	0.1398	0.0218	0.0220
N-BUTANE	P4	0.1385	0.2891	0.0435	0.0437
2,2 DIMETHYLPROPANE	I5	0.0012	0.0030	0.0004	0.0004
I-PENTANE	I5	0.1143	0.2960	0.0416	0.0418
N-PENTANE	P5	0.0972	0.2518	0.0350	0.0352
2,2 DIMETHYLBUTANE	I6	0.0030	0.0093	0.0012	0.0012
METHANOL	X1	0.0014	0.0016	0.0002	0.0002
CYCLOPENTANE	N5	0.0045	0.0113	0.0013	0.0013
2,3 DIMETHYLBUTANE	I6	0.0068	0.0211	0.0028	0.0028
2 METHYLPENTANE	I6	0.0317	0.0982	0.0131	0.0131
3 METHYLPENTANE	I6	0.0157	0.0487	0.0064	0.0064
N-HEXANE	P6	0.0345	0.1067	0.0142	0.0142
2,2-DIMETHYLPENTANE	I7	0.0007	0.0025	0.0003	0.0003
METHYLCYCLOPENTANE	N6	0.0113	0.0340	0.0040	0.0040
2,4 DIMETHYLPENTANE	I7	0.0013	0.0047	0.0006	0.0006
2,2,3 TRIMETHYLBUTANE	I7	0.0002	0.0007	0.0001	0.0001
BENZENE	A6	0.0021	0.0060	0.0006	0.0006
3,3 DIMETHYLPENTANE	I7	0.0003	0.0010	0.0001	0.0001
CYCLOHEXANE	O6	0.0093	0.0280	0.0032	0.0032
2 METHYLHEXANE	I7	0.0040	0.0142	0.0019	0.0019
2,3 DIMETHYLPENTANE	I7	0.0013	0.0046	0.0006	0.0006
1,1 DIMETHYLCYCLOPENTANE	N7	0.0008	0.0027	0.0003	0.0003
3 METHYLHEXANE	I7	0.0033	0.0120	0.0015	0.0015
1,C 3 DIMETHYLCYCLOPENTANE	N7	0.0012	0.0041	0.0005	0.0005
1,T 3 DIMETHYLCYCLOPENTANE	N7	0.0010	0.0035	0.0004	0.0004
3 ETHYLPENTANE	I7	0.0002	0.0007	0.0001	0.0001
1,T 2 DIMETHYLCYCLOPENTANE	N7	0.0015	0.0053	0.0006	0.0006
2,2,4-TRIMETHYLPENTANE	I8	0.0001	0.0002	0.0000	0.0000
N-HEPTANE	P7	0.0063	0.0227	0.0029	0.0029
1,C 2 DIMETHYLCYCLOPENTANE	N7	0.0001	0.0005	0.0000	0.0000
METHYLCYCLOHEXANE	N7	0.0089	0.0312	0.0036	0.0036
2,2-DIMETHYLHEXANE	I8	0.0003	0.0014	0.0002	0.0002
ETHYLCYCLOPENTANE	N7	0.0003	0.0010	0.0001	0.0001
2,5-DIMETHYLHEXANE	I8	0.0002	0.0008	0.0001	0.0001
2,4-DIMETHYLHEXANE	I8	0.0002	0.0008	0.0001	0.0001
1C,2T,4-TRIMETHYLCYCLOPENTANE	N8	0.0002	0.0008	0.0001	0.0001
3,3-DIMETHYLHEXANE	I8	0.0001	0.0003	0.0001	0.0001
2,3,4-TRIMETHYLPENTANE	I8	0.0001	0.0006	0.0000	0.0000
TOLUENE	A7	0.0015	0.0050	0.0005	0.0005
2,3-DIMETHYLHEXANE	I8	0.0001	0.0006	0.0001	0.0001
2-METHYL-3-ETHYLPENTANE	I8	0.0001	0.0002	0.0001	0.0001
2-METHYLHEPTANE	I8	0.0007	0.0027	0.0004	0.0004

4-METHYLHEPTANE	I8	0.0002	0.0007	0.0001	0.0001
3-METHYL-3-ETHYLPENTANE	I8	0.0000	0.0001	0.0000	0.0000
3,4-DIMETHYLHEXANE	I8	0.0000	0.0001	0.0000	0.0000
1C,2C,4-TRIMETHYLCYCLOPENTANE	N8	0.0000	0.0001	0.0000	0.0000
1C,3-DIMETHYLCYCLOHEXANE	N8	0.0000	0.0001	0.0000	0.0000
3-METHYLHEPTANE	I8	0.0003	0.0010	0.0002	0.0002
1C,2T,3-TRIMETHYLCYCLOPENTANE	N8	0.0008	0.0030	0.0004	0.0004
3-ETHYLHEXANE	I8	0.0001	0.0003	0.0001	0.0001
1T,4-DIMETHYLCYCLOHEXANE	N8	0.0003	0.0011	0.0001	0.0001
1,1-DIMETHYLCYCLOHEXANE	N8	0.0001	0.0003	0.0000	0.0000
3C-ETHYLMETHYLCYCLOPENTANE	N8	0.0001	0.0002	0.0000	0.0000
3T-ETHYLMETHYLCYCLOPENTANE	N8	0.0000	0.0001	0.0000	0.0000
2T-ETHYLMETHYLCYCLOPENTANE	N8	0.0001	0.0002	0.0000	0.0000
2,2,4-TRIMETHYLHEXANE	I9	0.0002	0.0008	0.0001	0.0001
N-OCTANE	P8	0.0009	0.0039	0.0005	0.0005
1C,2-DIMETHYLCYCLOHEXANE	N8	0.0000	0.0001	0.0000	0.0000
2,3,5-TRIMETHYLHEXANE	I9	0.0001	0.0002	0.0001	0.0001
2,2-DIMETHYLHEPTANE	I9	0.0001	0.0002	0.0001	0.0001
1,1,4-TRIMETHYLCYCLOHEXANE	N9	0.0001	0.0006	0.0001	0.0001
2,4-DIMETHYLHEPTANE	I9	0.0001	0.0007	0.0001	0.0001
2,5-DIMETHYLHEPTANE	I9	0.0001	0.0003	0.0001	0.0001
ETHYLBENZENE	A8	0.0001	0.0002	0.0000	0.0000
1C,2T,4T-TRIMETHYLCYCLOHEXANE	N9	0.0001	0.0002	0.0001	0.0001
1,3-DIMETHYLBENZENE (M-XYLENE)	A8	0.0002	0.0006	0.0001	0.0001
1,4-DIMETHYLBENZENE (P-XYLENE)	A8	0.0001	0.0003	0.0000	0.0000
2,3-DIMETHYLHEPTANE	I9	0.0001	0.0002	0.0001	0.0001
4-ETHYLHEPTANE	I9	0.0001	0.0003	0.0001	0.0001
4-METHYLOCTANE	I9	0.0001	0.0003	0.0001	0.0001
N-NONANE	P9	0.0001	0.0007	0.0001	0.0001
UNKNOWN NONANES	U9	0.0001	0.0003	0.0001	0.0001
TOTALS		100.0000	100.0000	0.2171	0.2179

EMPACT ANALYTICAL SYSTEMS, INC
365 SOUTH MAIN STREET
BRIGHTON, CO 80601
(303) 637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

PROJECT NO. :	**0410098**	ANALYSIS NO. :	**02**
COMPANY NAME :	**CORDILLERAN**	ANALYSIS DATE:	OCTOBER 29, 2004
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 25, 2004
PRODUCER :		TO:	
LEASE NO. :		CYLINDER NO. :	TEDLAR BAG
NAME/DESCRIP :	SAMPLE ID 102504-02 WH 1120		
FIELD DATA			
SAMPLED BY:			AMBIENT TEMI
SAMPLE PRES. :	SAMPLE TEMI		GRAVITY :
COMMENTS :			

COMPONENT	MOLE %	MASS %	GPM@ 14.696	GPM@ 14.73
HELIUM	0.031	0.006	---	---
HYDROGEN	0.000	0.000	---	---
OXYGEN/ARGON	0.279	0.435	---	---
NITROGEN	1.779	2.429	---	---
CO2	0.000	0.000	---	---
METHANE	80.572	63.010	---	---
ETHANE	9.709	14.234	2.5907	2.5967
PROPANE	4.412	9.485	1.2129	1.2157
I-BUTANE	1.001	2.836	0.3267	0.3275
N-BUTANE	1.049	2.971	0.3300	0.3308
I-PENTANE	0.368	1.296	0.1342	0.1345
N-PENTANE	0.262	0.923	0.0947	0.0949
HEXANES PLUS	0.538	2.375	0.2177	0.2179
TOTALS	100.000	100.000	4.9069	4.9180

BTEX COMPONENTS	MOLE%	WT%	
BENZENE	0.008	0.031	**LOW**
ETHYLBENZENE	0.000	0.001	
TOLUENE	0.006	0.028	**HIGH**
XYLENES	0.001	0.005	
TOTAL BTEX	0.015	0.065	

BTU @	14.696		14.73
NET DRY REAL :	1104.74	/scf	1107.29
NET WET REAL :	1085.48	/scf	1088.04
GROSS DRY REAL :	1218.57	/scf	1221.39
GROSS WET REAL :	1197.34	/scf	1200.16
NET DRY REAL :	20378	/lb	20425
GROSS DRY REAL :	22479	/lb	22531
RELATIVE DENSITY (AIR=1):			0.71
COMPRESSIBILITY FACTOR :			0.99686

(CALC: GPA STD 2145 & TP-17 @14.696 & 60 F)
**DHA (DETAILED HYDROCARBON ANALYSIS/NJ 1993)*
; ASTM D6730

THIS DATA HAS BEEN ACQUIRED THROUGH APPLICATION OF CURRENT STATE-OF-THE-ART ANALYTICAL TECHNIQUES. THE USE OF THIS INFORMATION IS THE RESPONSIBLITY OF THE USER. EMPACT ANALYTICAL SYSTEMS, ASSUMES NO RESPONSIBLITY FOR ACCURACY OF THE REPORTED INFORMATION NOR ANY CONSEQUENCES OF IT'S APPLICATION.

EMPACT ANALYTICAL SYSTEMS, INC

365 SOUTH MAIN STREET
BRIGHTON, CO 80601
(303) 637-0150

E & P /GlyCalc Information

PROJECT NO. :	**0410098**	ANALYSIS NO. :	**02**
COMPANY NAME :	**CORDILLERAN**	ANALYSIS DATE:	OCTOBER 29, 2004
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 25, 2004
PRODUCER :		TO:	
LEASE NO. :		CYLINDER NO. :	TEDLAR BAG
NAME/DESCRIP :	SAMPLE ID 102504-02 WH 1120		
FIELD DATA			
SAMPLED BY:		AMBIENT TEMP.:	
SAMPLE PRES. :		GRAVITY :	
		SAMPLE TEMP. :	
COMMENTS :			

Componenet	Mole %	Wt %
Helium	0.031	0.006
Methanol	0.002	0.003
Nitrogen	1.779	2.429
Methane	80.572	63.010
Ethane	9.709	14.234
Propane	4.412	9.485
Isobutane	1.001	2.836
n-Butane	1.049	2.971
Isopentane	0.368	1.296
n-Pentane	0.262	0.923
Cyclopentane	0.011	0.039
n-Hexane	0.112	0.471
Cyclohexane	0.039	0.160
Other Hexanes	0.202	0.844
Heptanes	0.097	0.466
Methycyclohexane	0.039	0.189
Benzene	0.008	0.031
Toluene	0.006	0.028
Ethylbenzene	0.000	0.001
Xylenes	0.001	0.005
C8+ Heavies	0.021	0.138
Subtotal	99.721	99.565
Oxygen	0.279	0.435
Total	100.000	100.000

EMPACT ANALYTICAL SYSTEMS, INC

365 SOUTH MAIN STREET
BRIGHTON, CO 80601
(303) 637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

PROJECT NO. : **0410098** ANALYSIS NO. : **02**
COMPANY NAME : **CORDILLERAN** ANALYSIS DATE: OCTOBER 29, 2004

COMPONENT	PIANO #	MOLE %	MASS %	GPM 14.696	GPM 14.73
HELIUM		0.031	0.006	---	---
HYDROGEN		0.000	0.000	---	---
OXYGEN/ARGON		0.279	0.435	---	---
NITROGEN		1.779	2.429	---	---
CO2		0.000	0.000	---	---
METHANE	P1	80.572	63.010	---	---
ETHANE	P2	9.709	14.234	2.5907	2.5967
PROPANE	P3	4.412	9.485	1.2129	1.2157
I-BUTANE	I4	1.001	2.836	0.3267	0.3275
N-BUTANE	P4	1.049	2.971	0.3300	0.3308
2,2 DIMETHYLPROPANE	I5	0.007	0.025	0.0024	0.0024
I-PENTANE	I5	0.361	1.271	0.1318	0.1321
N-PENTANE	P5	0.262	0.923	0.0947	0.0949
2,2 DIMETHYLBUTANE	I6	0.008	0.034	0.0033	0.0033
METHANOL	X1	0.002	0.003	0.0003	0.0003
CYCLOPENTANE	N5	0.011	0.039	0.0032	0.0032
2,3 DIMETHYLBUTANE	I6	0.019	0.081	0.0078	0.0078
2 METHYLPENTANE	I6	0.089	0.375	0.0368	0.0369
3 METHYLPENTANE	I6	0.046	0.191	0.0187	0.0187
N-HEXANE	P6	0.112	0.471	0.0459	0.0460
2,2-DIMETHYLPENTANE	I7	0.002	0.012	0.0009	0.0009
METHYLCYCLOPENTANE	N6	0.040	0.163	0.0141	0.0141
2,4 DIMETHYLPENTANE	I7	0.005	0.023	0.0023	0.0023
2,2,3 TRIMETHYLBUTANE	I7	0.001	0.004	0.0005	0.0005
BENZENE	A6	0.008	0.031	0.0022	0.0022
3,3 DIMETHYLPENTANE	I7	0.001	0.006	0.0005	0.0005
CYCLOHEXANE	O6	0.039	0.160	0.0132	0.0132
2 METHYLHEXANE	I7	0.016	0.079	0.0074	0.0074
2,3 DIMETHYLPENTANE	I7	0.006	0.027	0.0027	0.0027
1,1 DIMETHYLCYCLOPENTANE	N7	0.003	0.014	0.0012	0.0012
3 METHYLHEXANE	I7	0.014	0.067	0.0064	0.0064
1,C 3 DIMETHYLCYCLOPENTANE	N7	0.005	0.023	0.0021	0.0021
1,T 3 DIMETHYLCYCLOPENTANE	N7	0.004	0.020	0.0016	0.0016
3 ETHYLPENTANE	I7	0.001	0.004	0.0005	0.0005
1,T 2 DIMETHYLCYCLOPENTANE	N7	0.007	0.031	0.0029	0.0029
N-HEPTANE	P7	0.028	0.137	0.0129	0.0129
1,C 2 DIMETHYLCYCLOPENTANE	N7	0.001	0.005	0.0004	0.0004
METHYLCYCLOHEXANE	N7	0.039	0.189	0.0156	0.0156
ETHYLCYCLOPENTANE	N7	0.001	0.006	0.0004	0.0004
2,5-DIMETHYLHEXANE	I8	0.001	0.005	0.0005	0.0005
2,4-DIMETHYLHEXANE	I8	0.001	0.004	0.0005	0.0005
1C,2T,4-TRIMETHYLCYCLOPENTANE	N8	0.001	0.005	0.0005	0.0005
3,3-DIMETHYLHEXANE	I8	0.000	0.002	0.0000	0.0000
2,3,4-TRIMETHYLPENTANE	I8	0.001	0.003	0.0005	0.0005
TOLUENE	A7	0.006	0.028	0.0020	0.0020
2,3-DIMETHYLHEXANE	I8	0.001	0.004	0.0005	0.0005
2-METHYL-3-ETHYLPENTANE	I8	0.000	0.001	0.0000	0.0000
2-METHYLHEPTANE	I8	0.003	0.016	0.0015	0.0015
4-METHYLHEPTANE	I8	0.001	0.004	0.0005	0.0005
3-METHYL-3-ETHYLPENTANE	I8	0.000	0.001	0.0000	0.0000

3,4-DIMETHYLHEXANE	I8	0.000	0.001	0.0000	0.0000
3-METHYLHEPTANE	I8	0.001	0.008	0.0005	0.0005
1C,2T,3-TRIMETHYLCYCLOPENTANE	N8	0.003	0.016	0.0014	0.0014
3-ETHYLHEXANE	I8	0.000	0.002	0.0000	0.0000
1T,4-DIMETHYLCYCLOHEXANE	N8	0.001	0.007	0.0005	0.0005
1,1-DIMETHYLCYCLOHEXANE	N8	0.000	0.002	0.0000	0.0000
3C-ETHYLMETHYLCYCLOPENTANE	N8	0.000	0.001	0.0000	0.0000
3T-ETHYLMETHYLCYCLOPENTANE	N8	0.000	0.001	0.0000	0.0000
2T-ETHYLMETHYLCYCLOPENTANE	N8	0.000	0.001	0.0000	0.0000
1,1-METHYLETHYLCYCLOPENTANE	N8	0.000	0.001	0.0000	0.0000
2,2,4-TRIMETHYLHEXANE	I9	0.001	0.005	0.0006	0.0006
UNKNOWN-HEPTANE	P7	0.002	0.008	0.0009	0.0009
N-OCTANE	P8	0.004	0.023	0.0020	0.0020
1C,2-DIMETHYLCYCLOHEXANE	N8	0.000	0.001	0.0000	0.0000
2,3,5-TRIMETHYLHEXANE	I9	0.000	0.001	0.0000	0.0000
1,1,4-TRIMETHYLCYCLOHEXANE	N9	0.001	0.004	0.0005	0.0005
2,4-DIMETHYLHEPTANE	I9	0.001	0.004	0.0006	0.0006
2,2-DIMETHYLHEPTANE	I9	0.000	0.001	0.0000	0.0000
ETHYLCYCLOHEXANE	N9	0.000	0.001	0.0000	0.0000
N-PROPYLCYCLOPENTANE	N8	0.000	0.001	0.0000	0.0000
2,5-DIMETHYLHEPTANE	I9	0.000	0.001	0.0000	0.0000
3,3-DIMETHYLHEPTANE	I9	0.000	0.001	0.0000	0.0000
ETHYLBENZENE	A8	0.000	0.001	0.0000	0.0000
1C,2T,4T-TRIMETHYLCYCLOHEXANE	N9	0.000	0.001	0.0000	0.0000
1,3-DIMETHYLBENZENE (M-XYLENE)	A8	0.001	0.003	0.0004	0.0004
1,4-DIMETHYLBENZENE (P-XYLENE)	A8	0.000	0.001	0.0000	0.0000
2,3-DIMETHYLHEPTANE	I9	0.000	0.001	0.0000	0.0000
4-METHYLOCTANE	I9	0.000	0.002	0.0000	0.0000
3-METHYLOCTANE	I9	0.000	0.001	0.0000	0.0000
1,2-DIMETHYLBENZENE (O-XYLENE)	A8	0.000	0.001	0.0000	0.0000
UNKNOWN OCTANES	U8	0.000	0.001	0.0000	0.0000
N-NONANE	P9	0.000	0.003	0.0000	0.0000
UNKNOWN NONANES	U9	0.000	0.001	0.0000	0.0000
TOTALS		100.000	100.000	4.9069	4.9180

APPENDIX M

CONTENTS OF CD ROM

Directory of D:\Divide Creek Area FID Survey Project

D:\Divide Creek Area FID Survey Project\ESN Survey Photos
D:\Divide Creek Area FID Survey Project\Georeferenced TIFF maps
D:\Divide Creek Area FID Survey Project\Interpreted Data
D:\Divide Creek Area FID Survey Project\Location Data
D:\Divide Creek Area FID Survey Project\Spreadsheets
D:\Divide Creek Area FID Survey Project\SSURGO Soil Map Data
D:\Divide Creek Area FID Survey Project\Survey Data
D:\Divide Creek Area FID Survey Project\Water Sample Data Base 122004

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D:\Divide Creek Area FID Survey Project\ESN Survey Photos
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100704_Stuafer Spring Well.jpg	569 KB	11/11/2004 08:03:20 PM	a
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102604_PA260014.JPG	418 KB	11/11/2004 08:04:00 PM	a
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Total 142 file(s); Size: 56704528 Byte(s)

D:\Divide Creek Area FID Survey Project\Georeferenced TIFF maps
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NAD27_1_100000Topo.tif	32418 KB	6/8/2004 12:43:56 PM	a
NAD27_1_24000Topo.tif	95231 KB	6/8/2004 12:39:10 PM	a
NE_Hunter_Mesa_InfraRed_Ikonos2.tif	83826 KB	5/26/2004 11:40:52 AM	a
Orthophoto_39107d51.tif	47269 KB	8/3/2004 08:02:20 AM	a
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Total 6 file(s); Size: 368135357 Byte(s)

D:\Divide Creek Area FID Survey Project\Interpreted Data
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linears - drainage.dbf	1 KB	12/1/2004 11:32:30 PM	a
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linears - infrared.dbf	1 KB	12/1/2004 11:03:40 PM	a
linears - infrared.shp	4 KB	12/1/2004 11:03:40 PM	a
linears - infrared.shx	1 KB	12/1/2004 11:03:40 PM	a

Total 15 file(s); Size: 18340 Byte(s)

D:\Divide Creek Area FID Survey Project\Location Data
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Colorado Rivers Nad27.prj	1 KB	6/22/2004 07:59:36 AM	a
Colorado Rivers Nad27.sbn	1 KB	6/22/2004 07:59:36 AM	a
Colorado Rivers Nad27.sbx	1 KB	6/22/2004 07:59:36 AM	a
Colorado Rivers Nad27.shp	634 KB	6/22/2004 07:59:36 AM	a
Colorado Rivers Nad27.shx	423 KB	6/22/2004 07:59:36 AM	a
cordilleran sample locations.dbf	21 KB	12/21/2004 09:16:16 AM	a
cordilleran sample locations.sbn	5 KB	12/21/2004 09:16:16 AM	a
cordilleran sample locations.sbx	1 KB	12/21/2004 09:16:16 AM	a
cordilleran sample locations.shp	2 KB	12/21/2004 09:16:16 AM	a
cordilleran sample locations.shx	1 KB	12/21/2004 09:16:16 AM	a
Cordilleran Soil Probe Location...	4 KB	6/10/2004 09:40:24 AM	a
Cordilleran Water Sample Locati...	21 KB	12/21/2004 08:38:38 AM	a
DC Seep Offset Production Well ...	1 KB	6/10/2004 07:17:28 AM	a
Divde Creek Seep Locations.dbf	1 KB	6/5/2004 04:45:04 PM	a
Divide Creek 50ppm Contour.DBF	1 KB	8/5/2004 10:21:34 AM	a
Divide Creek 50ppm Contour.shp	4 KB	8/5/2004 10:21:34 AM	a
Divide Creek 50ppm Contour.shp.gsr	1 KB	8/5/2004 10:21:34 AM	a
Divide Creek 50ppm Contour.SHX	1 KB	8/5/2004 10:21:34 AM	a
Divide Creek 50ppm ContourPoly....	1 KB	8/5/2004 10:21:34 AM	a
Divide Creek Area Water Well Lo...	2 KB	10/15/2004 03:17:34 PM	a
E Piceance Basin Wells.dbf	278 KB	6/21/2004 01:00:12 PM	a
FID Special Features Tracks _ A...	1 KB	12/4/2004 12:58:46 PM	a
FID Special Features Tracks _ A...	9 KB	12/4/2004 01:32:40 PM	a

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FID Special Features Tracks _ A...     160 KB    12/4/2004 01:32:40 PM      a
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fid track survey.shx                   210 KB   12/19/2004 10:54:28 AM      a
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Garfield_waterwells.shx                 56 KB     7/8/2003 01:04:28 PM      a
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grid points for fid traverses.sbx        1 KB   12/21/2004 09:23:08 AM      a
grid points for fid traverses.shp       26 KB   12/21/2004 09:23:08 AM      a
grid points for fid traverses.shx        7 KB   12/21/2004 09:23:08 AM      a
Grid points for fid traverses_(...      61 KB    12/1/2004 05:54:00 PM      a
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sections covered.shx                     1 KB    12/4/2004 03:46:16 PM      a
sections surveyed.dbf                    1 KB   12/21/2004 09:11:14 AM      a
sections surveyed.sbn                    1 KB   12/21/2004 09:11:14 AM      a
sections surveyed.sbx                    1 KB   12/21/2004 09:11:14 AM      a
sections surveyed.shp                    1 KB   12/21/2004 09:11:14 AM      a
sections surveyed.shx                    1 KB   12/21/2004 09:11:14 AM      a
Special Feature_Gas Detected.DBF        12 KB   12/17/2004 05:06:48 PM      a
Special Feature_Infrastructure.DBF      14 KB   12/19/2004 04:34:50 PM      a
Special Feature_Outcrop.DBF              3 KB    12/4/2004 01:38:12 PM      a
Special Feature_Pond.DBF                11 KB   12/19/2004 04:34:54 PM      a
Special Feature_Residence.DBF            3 KB    12/4/2004 01:33:50 PM      a
Special Feature_Soil Gas.DBF             5 KB    12/4/2004 01:39:50 PM      a
Special Feature_Soil Sample.DBF          1 KB    12/4/2004 01:40:26 PM      a
Special Feature_Spring.DBF               3 KB    12/4/2004 01:34:26 PM      a
Special Feature_Vegetation.DBF          17 KB    12/4/2004 01:38:58 PM      a
Special Feature_View.DBF                 5 KB    12/4/2004 01:36:48 PM      a
Special Feature_Water Well.DBF           3 KB    12/4/2004 01:37:46 PM      a
Special Features Tracks _ All.INF        1 KB    12/4/2004 12:41:26 PM      a

Total 65 file(s);  Size: 132308528 Byte(s)
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D:\Divide Creek Area FID Survey Project\Spreadsheets

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Survey and Laboratory Data.xls        5589 KB   12/20/2004 02:59:30 PM      a

Total 1 file(s);  Size: 5723648 Byte(s)
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D:\Divide Creek Area FID Survey Project\SSURGO Soil Map Data

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soilmu_a_co683NAD27.sbx	4 KB	6/22/2004 07:32:12 AM	a
soilmu_a_co683NAD27.shp	9957 KB	6/22/2004 07:32:12 AM	a
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Total 6 file(s); Size: 10849335 Byte(s)

D:\Divide Creek Area FID Survey Project\Survey Data

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IR Survey Gas Seeps Detected.dbf	1 KB	12/3/2004 11:26:24 AM	a
IR Truck Survey Line.DBF	13 KB	7/7/2004 12:05:38 PM	a
IR Truck Survey Line.PRJ	1 KB	7/7/2004 12:52:00 PM	a
IR Truck Survey Line.shp	3344 KB	7/7/2004 12:52:00 PM	a
IR Truck Survey Line.shx	1 KB	7/7/2004 12:52:00 PM	a
IR Truck Survey Results.dbf	21 KB	12/17/2004 01:56:10 PM	a
IR Truck Survey Results.FAM	1 KB	12/16/2004 06:11:14 PM	a
IR Truck Survey Results.TVf	3 KB	12/16/2004 06:11:14 PM	a
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section lines.dbf	1 KB	12/1/2004 10:22:32 PM	a
section lines.shx	1 KB	12/1/2004 10:22:02 PM	a
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D:\Divide Creek Area FID Survey Project\Water Sample Data Base 122004

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Total 1 file(s); Size: 1163264 Byte(s)

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Total 8 folder(s); 250 file(s)

Total files size: 565 MB; 565216 KB; 578781192 Bytes

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