



COMPLIANCE / ENGINEERING / REMEDIATION

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RECEIVED

JAN 10 2008

COGCC

January 4, 2008

Mr. Steven R. Lindblom  
Colorado Oil and Gas Conservation Commission  
1120 Lincoln Street, Suite 801  
Denver, Colorado 80203

RE: Additional ERF Gas Seep Investigation Report  
Bondad #3-1 (API# 05-067-05191)  
La Plata County, Colorado

Dear Mr. Lindblom:

LT Environmental, Inc. (LTE) has been retained by the Colorado Oil and Gas Conservation Commission (COGCC) to conduct additional gas seep investigation activities in the vicinity of the Bondad #3-1 abandoned production well and nearby house in La Plata County, Colorado (Figure 1). LTE understands that this work is being conducted in response to methane gas seepage identified during the Environmental Response Fund (ERF) well investigation performed in April 2007. The following is a summary of the additional assessment activities conducted at the site.

## PURPOSE

The purposes of this investigation are to confirm the presence of methane seepage at the Bondad #3-1, delineate the lateral extent of methane seepage at the ground surface, and to assess the threat of methane seepage to impact nearby structures and water wells.

## BACKGROUND

The ERF program has funded the plugging and abandonment (P&A) of over 200 orphan oil and gas production wells in Colorado. Only limited documentation regarding the completion and/or the P&A of these wells is available. In 2005, methane seepage from the Bryce 1-X orphan well in Bondad, Colorado created increased awareness of the potential hazardous conditions associated with the integrity of the P&A of orphan wells.

In April 2007, LTE was retained by the COGCC to conduct gas seep surveys at 30 orphan wells in the southwest region of Colorado. Results of the initial ERF well investigations in April 2007 were submitted to the COGCC in a report dated June 2007. The initial investigation indicated methane seepage around the Bondad #3-1.



## RESULTS

### Landowner Identification

LTE used information provided on the La Plata County Assessor's website to determine the landowner of the nearest residence and water well to Bondad #3-1. An access request letter with a return card was sent to the landowner. LTE did not receive an access card to conduct an interior/exterior house and water well survey by the nearest landowner to the Bondad #3-1 prior to field activities commencing. LTE spoke with one resident, Mr. Lesky, living south of the Bondad #3-1. Mr. Lesky granted access to conduct a survey of the interior and exterior portions of his house. The Lesky residence is visible on Figure 2.

### Soil Gas Survey

LTE conducted a soil gas survey around the areas of methane detections identified during the April 2007 ERF investigation on November 13, 2007. These areas included: the area located approximately 120 feet northeast of the Southern Ute Bonds FC 32-10 #1-1, the area located approximately 80 feet east of the Southern Ute Bonds FC 32-10 #1-1, and the area located just north of the COGCC marked Bonds Gas Unit #1E. LTE also conducted an interior/exterior gas survey around the Lesky residence. No survey was performed at the pole barns and other structures located approximately 400 feet south-southeast of the well pad as access was not granted.

Prior to initiating the field work, LTE contacted the Utility Notification Center of Colorado (UNCC) to identify any buried facilities in the survey area. The soil gas probes were advanced to approximately 3 feet below ground surface (bgs) using a slide hammer to bore a 0.5-inch diameter hole into the surface soil. Polyethylene tubing (0.25-inch diameter), with the bottom 6 inches perforated, was inserted into each borehole to collect subsurface gas measurements. After subsurface concentration measurements were collected, the polyethylene tubing was removed from the ground and the borehole was backfilled with native soil. The four gases measured in each soil gas probe included oxygen, methane, carbon monoxide, and hydrogen sulfide.

Each soil gas probe location and pertinent site features were recorded using a Trimble GeoXT<sup>®</sup> GPS, which measures and records geographic position in accordance with COGCC Rule 215. At each subsurface sample point, LTE recorded the geographic position by logging a minimum of 20 GPS positions. The GPS data were downloaded and differentially corrected using publicly available base station data to achieve sub-meter accuracy.

A total of 21 soil gas probes were advanced within a 50-foot radius around the Bonds Gas Unit 1E production well (Photo 1). Methane was not detected in any of the 21 soil gas probes. In contrast, methane was detected in this area in April 2007.





A total of 44 soil gas probes were advanced east and north of the Southern Ute Bonds FC 32-10 1-1 production well. The methane points were in the vicinity of a feeding trough for cattle. Cattle were not present during the November 2007 event; however manure was present in a stockpile with soil near the feeding troughs (Photo 2). Methane was detected in five of the 44 soil gas probes at concentrations ranging from 12,000 parts per million (ppm) to 50,000 ppm.

Mr. Lesky granted access to conduct a survey of his house (Photo 3). An interior survey was conducted, which included measuring ambient gas concentrations on the first floor and basement. Methane was not detected inside of the house. Four soil gas probes were advanced around each side of the house. Methane was not detected at any of the soil gas probes. Mr. Lesky stated that he did not have a water well and as a result, a survey was not conducted around a water well at the residence.

### **Gas Sampling**

LTE collected a subsurface gas sample in the area of the highest methane concentration to determine the origin of the gas (biogenic or thermogenic). The samples were collected using a hand pump to transfer gas from the subsurface soils exhibiting methane seeps into a mylar sample bag. All gas samples were packaged per the Federal Department of Transportation (DOT) regulations with a completed COC form and submitted to Isotech Laboratories, Inc. (Isotech) in Champaign, Illinois. Gas samples were submitted for the following parameters:

- ***Fixed Gas Chromatography:*** Hydrogen (H<sub>2</sub>), Argon (Ar), Nitrogen (N<sub>2</sub>), Oxygen (O<sub>2</sub>), Carbon Dioxide (CO<sub>2</sub>), and Hydrogen Sulfide (H<sub>2</sub>S);
- ***Hydrocarbon Gas Chromatography:*** Methane, Ethane, Propane, i-Butane, n-Butane, i-Pentane, and Hexane+; and
- ***Stable Isotopic Analysis:*** Carbon and Hydrogen isotopes of Methane, Carbon isotopes of CO<sub>2</sub>, and Carbon isotopes of Ethane and Propane.

Results of the laboratory analysis indicated that methane was detected in the Bondad #3-1 sample at a concentration of 0.0163 percent. Due to an insufficient concentration of methane detected by the laboratory, the isotopic analysis of the sample described above could not be conducted. Based on the location of the sample collected, the origin of the methane seeping would appear to be biogenic. Thermogenic gas is defined as gas derived from heat and pressure exerted on organic matter as opposed to biogenic gas which is derived from biological activity. The laboratory analytical report is included in Attachment 1.



## CONCLUSION

Methane seepage has been confirmed at the Bondad #3-1. The location of the methane seepage is near a cattle feeding trough on the northeastern portion of the well pad, not in the vicinity of the Bondad #3-1. The methane seepage does not appear to be impacting the Lesky residence as no methane was detected inside or outside of the house.

LTE appreciates the opportunity to provide environmental services to the COGCC. If you have any questions, please contact me at (303) 433-9788.

Sincerely,

LT ENVIRONMENTAL, INC.

A handwritten signature in black ink, appearing to read 'Daniel R. Moir', enclosed within a large, hand-drawn oval.

Daniel R. Moir, G.I.T.  
Staff Geologist

A handwritten signature in black ink, appearing to read 'Kyle G. Siesser', followed by a small 'for' and a flourish.

Kyle G. Siesser  
Project Geologist

**PHOTOS**





Photo 1: Methane seep area during April 2007 ERF investigation around Bonds Gas Unit 1E (right), view northeast.



Photo 2: Methane seep area near manure/soil stockpile east of Southern Ute Bonds FC 32-10 1-1 (right), view southwest



Photo 3: Exterior of Mr. Lesky's house, view south.

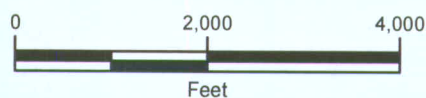
## FIGURES







Map Source:  
 USDA, Natural Resources Conservation Service  
 National Cartography & Geospatial Center, 1999-Present



#### LEGEND

○ SITE LOCATION

FIGURE 1  
 SITE LOCATION MAP  
 BONDAD #3-1  
 API #05-067-05191  
 LA PLATA COUNTY, COLORADO  
 COLORADO OIL AND GAS CONSERVATION COMMISSION







Map Source: USDA, National Agriculture Imagery Program Mosaic, 2005

## LEGEND

### SUBSURFACE METHANE MEASUREMENTS

- |                   |                          |
|-------------------|--------------------------|
| ○ 0 ppm           | ⊕ GAS SAMPLE LOCATION    |
| ● 1 ppm - 500 ppm | ⊖ DRY AND ABANDONED WELL |
| ● 501 ppm - 5%    | ● PRODUCTION WELL        |
| ● 6% - 15%        | □ NO ACCESS              |
| ● 16% - 25%       |                          |
| ● 26% - 50%       |                          |
| ● 51% - 75%       |                          |
| ● 76% - 100%      |                          |

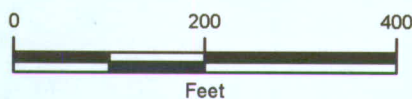


FIGURE 2  
SITE MAP  
BONDAD #3-1  
API #05-067-05191

LA PLATA COUNTY, COLORADO  
COLORADO OIL AND GAS CONSERVATION COMMISSION



GAS SAMPLE COLLECTED ON 11/13/07  
SOIL GAS SURVEY PERFORMED ON 11/13/07

**ATTACHMENT 1**  
**ANALYTICAL LABORATORY REPORT**







# ISOTECH®

Web Page [www.isotechlabs.com](http://www.isotechlabs.com) Email [mail@isotechlabs.com](mailto:mail@isotechlabs.com)

Isotech Laboratories, Inc. 1308 Parkland Court, Champaign IL 61821-1826 Telephone (217) 398-3490 Fax (217) 398-3493

Lab #: 127711 Job #: 9104  
Sample Name/Number: Bondad #3-1  
Company: LT Environmental  
Date Sampled: 11/13/2007  
Container: Cali-5-Bond Bag  
Field/Site Name: OGCC0705.02  
Location: SW Colorado  
Formation/Depth:  
Sampling Point:  
Date Received: 11/21/2007 Date Reported: 12/19/2007

Component	Chemical		Delta 13C per mil	Delta D per mil	Delta 15N per mil
	Chemical mol. %	Air Free vol. %			
Carbon Monoxide -----	nd	nd			
Hydrogen Sulfide -----	nd	nd			
Helium -----	nd	nd			
Hydrogen -----	nd	nd			
Argon -----	0.95	9.45			
Oxygen -----	21.03				
Nitrogen -----	77.90	nd			
Carbon Dioxide -----	0.10	78.06			
Methane -----	0.016	12.49			
Ethane -----	nd	nd			
Ethylene -----	nd	nd			
Propane -----	nd	nd			
Iso-butane -----	nd	nd			
N-butane -----	nd	nd			
Iso-pentane -----	nd	nd			
N-pentane -----	nd	nd			
Hexanes + -----	nd	nd			

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

Specific gravity, calculated: 1.001

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