# Memorandum

To: Well File

From: Mark Weems, P.E.
Regional Engineer - SW Colorado

Date: 03/07/2013

Subject: Well Review and Assessment

**COMPASS EXPLORATION, INC.**
**BONDAD #3-1**
**SENE 1 32N 10W**
**05-067-05191**

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The purpose for generating a review of this well is due to BP preparing to plug one of their wells and the landowner expressing a concern because of the history of natural gas contaminating shallow aquifers in the area.

Note: A final PA well schematic is attached to this report

**1963**

This well was drilled and completed by Compass Exploration, Inc. on October 26, 1963. It was drilled to a total depth of 2414' with the likely target pay being the Pictured Cliffs sandstone of Fruitland formation. Surface casing was set at 255' (KB) and cemented back to surface. Production casing was set at 2191' (KB) and cemented with 107 sacks with a calculated top of cement being at 1490' (1.18 cu ft/sk; 50% excess; 15.6 ppg; 6.5" bit). The top of the Fruitland was reported at 2205'. The pay zone was open hole 2414'-2191'. The well was deemed uneconomical and plugged on October 29, 1963. The plugging report states that cement plugs were set at 2414'-2150' (30 sx), 2000'-1800' (25 sx) and 10 sx at the surface. No casing was reported being cut and pulled.

**1989**

Results of water well testing and investigations in the area along with the development of coal bed methane deemed this well a possible suspect to leaking gas and contaminating shallow fresh water aquifers. At this time the COGCC did not have its Plugging Reclamation Abandonment Well (PRAW) program in place. Offset operators agreed to pay for the cost of re-entry and plugging and included Amoco, McKenzie Methane, and Ladd Petroleum. A design and plan was put together to perform this work.

Prior to preparing the PA procedure, the well cellar was dug down to a depth of 4 feet. Perhaps it was the construction of the 4 ½" casing PA marker that made the contractor believe that a portions of the production casing had been cut and pulled. A good cement

sheath was found around the surface casing. The cellar was flooded with water and gas was observed bubbling up from inside the surface casing.

Cutting off both the surface casing and PA marker confirmed the 4 1/2" casing had been cut and retrieved. The surface plug was drilled out using a 7 7/8" bit and formation cuttings were found in the returns once drilling commenced beneath the surface casing shoe confirming that the original bit was a nominal s inches in diameter. Drilling continued until hitting the top of the 4 ½" casing stub at 802'. Pulled the drill string and run in with a 3 1/2" cutrite mill having a 45 degree angle cut. Work mill into the 4 ½" casing stub and fall free 5' and tag the top of the casing stub with the change over sub on the drill string. Decide to plug from 807' after considering expenditures to date, remaining funds available, and belief that plugging will be successful from this depth.

Cement plugs were set at depths as measure from the Kelly bushing (KB) as follows:

60 sx at 807' and tagged top of plug at 684'

Run temperature survey from 674' to surface as a means to find any possible gas flow. A GR log was run with the temperature survey at no additional cost. Mud level found to settle at 48'. No gas flows seen.

Spot 45 sx w/ 2% CaCl2 from 570'- 480' and calculate top of the cement plug using a 9" diameter wellbore

Spot 55 sx w/ 2% CaCl2 at 305' and tagged top of plug at 132'

Pressure test surface casing and discover a hole in it

Fill surface casing with 45 sx w/ 2% CaCl2 and pressure up to 1500 psig with no leak off

Cut off surface casing four feet below grade and well on top plate and backfill the well cellar

**2007**

As result of the explosion and complete destruction of a home with a very badly burned victim due to a plugged and abandoned well leaking gas, the COGCC hired L.T. Environmental, Inc. to perform soil gas surveys on approximately wells plugged by the COGCC's PRAW program in southwest Colorado. This well was included in that survey. This well is located on the same well pad and in close proximity to four (4) other active wells which are depicted below:

| | | | |
|---|---|---|---|
| Red Willow Production Co. | Red Willow Production Co. | BP America Production Co. | Red Willow Production Co. |
| S. Ute Bonds FC 32-10 #1-1 | S. Ute 32-10 #1-2 (MV) | Bonds GU #1E (Dk) | S. Ute FC 32-10 #1-4 |
| NENE 1 32N 10W | NENE 1 32N 10W | NENE 1 32N 10W | NENE 1 32N 10W |
| 067-06926 | 067-05189 | 067-06327 | 067-09622 |

Conclusions of the Survey

LTE advanced a total of 35 subsurface probes across the project area. Results of this survey indicate that methane was detected at three locations in relatively low concentrations running from 1000 ppm to 7500 ppm. There was not enough gas to capture at the probes to conduct an isotopic analysis. There is not enough evidence to specifically cite this well or any of the other wells as to being the source of gas found in the soil. For future work, LTE recommended conducting another more focused survey at this well site, conducting interior and exterior gas surveys at adjacent residences and structures sample and analyze adjacent water wells, to review Braden head tests on the offset gas wells, and to obtain isotopic gas analyses on all samples taken. A full report on this field work is on file at the COGCC.

## 2008

The following excerpts were taken from an LTE soil gas survey submitted Jan 4, 2008

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.

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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.

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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.

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.

COGCC Engineering Conclusions:

Any residual shallow gases that may have escaped from the Bondad 3-1 prior to its re-plugging in 1989 could still be present even now. To determine if it is thermogenic or biogenic, more soil gas than the amount collected to date must be gathered up in order to be able to perform an isotopic gas analysis and compare it with those from the Braden heads in the offset gas wells. Also, shallow water aquifer samples must confirm that gas is present and confirmed thermogenic before stronger remedial measures are to be taken on the gas wells.

Bondad 3-1
There was not enough gas available to conduct an isotopic gas analysis taken from the probe points near this well to determine whether it is of biogenic or thermogenic in origin. LTE suspects it to be biogenic based on the nearness to a cattle feeding trough.

BP-Bonds GU #1E
Methane was not detected near this well which is in contrast to the prior survey done in 2007. Braden head pressures run 0-35 psig and bleed down in seconds. An isotopic analysis of the Braden head gas would be useful when compared to a soil gas sample.

RWPC- S. Ute FC 32-10 #1-1
The report does not state whether or not there was enough gas to perform an isotopic analysis on samples collected from the probe points near this well. A phone call to LTE may clear this question up and if not, another soil survey would be appropriate to determine the gas origins. Braden head pressures run 10-25 psig and bleed down in a few seconds. An isotopic analysis of the Braden head gas would be useful when compared to a soil gas sample.

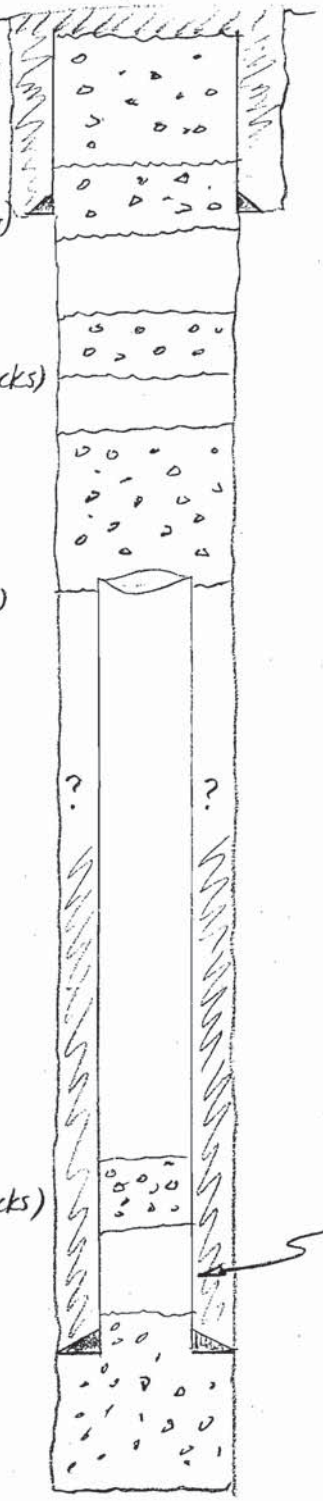
RWPC- S. Ute 32-10 #1-2 (MV)
Gas was not detected in the soil near this well during the 2007 survey. Braden head pressures run 10-35 psig and bleed down in 20 seconds. An isotopic analysis of the Braden head gas would be useful when compared to a soil gas sample.

RWPC- S. Ute FC 32-10 #1-4

This well was drilled after any soil gas surveys were conducted. Braden head pressure was zero in 2012. No further work required.

# Compass Bondad 3-1 Well Sketch

Tested @ 1500psi @ surface, 11/13/89, no blow off, no sign of gas




Plug 6, 1989
0-143' (50 sacks)

Plug 5, 1989
143'-305' (50 sacks)

Plug 4, 1989
480-570' (40 sacks)

Plug 3, 1989
684-802' (60 sacks)

Plug # 2, 1963
1800-2000 (25 sacks)

Bottom hole plug 2150-TD (30 sacks) 1963

8 5/8-32# set @ 255' KB w/ 150 sacks

Csg top @ 802' during replugging operation (1364' or 45 jts left in hole)

TOC unknown, but should be at least 1500' KB

4 1/2"-10.5 & 9.5 set @ 2191' KB w/ 107 sacks

TD 2414' KB

JMS 12/22/89