December 16, 2005

Ms. Debbie Baldwin
Colorado Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, Colorado 80203

RE: December 2, 2005 Methane Seep Survey
Bondad, Colorado

Dear Ms. Baldwin:

LT Environmental, Inc. (LTE) is pleased to provide the Colorado Oil and Gas Conservation Commission (COGCC) with this letter summarizing the results of the fifth methane seep survey conducted at the Bondad Gas Seep Site (Site) located in Bondad, Colorado on December 2, 2005.

BACKGROUND

At the request of the COGCC, LTE was tasked to conduct an initial methane gas seep survey on the Site in February 2005. The initial methane seep survey was performed in response to an explosion of a residence located at 4034 US Highway 550 (Yoakum Residence). During the period from February 21 through February 24, 2005, LTE conducted soil gas survey activities in the project area extending approximately 3,000 feet in all directions from the Bryce 1-X production well (Figure 1). The results of the initial soil gas survey are presented in the *Methane Seep Survey Report* (March 2005). Additional soil gas surveys were performed on April 19, 2005, June 10, 2005, and November 1, 2005. All project reports are available on the COGCC website at www.oil-gas.state.co.us.

Recent activity at the site has included continued operation and maintenance (O&M) of the methane detection systems located at the Weston well house, Fire Station, Wilson residence, Budhue residence, and Grant residence. LTE also conducted oversight during excavation and inspection of the Bryce 1-X abandoned well and sandstone bedrock surface, results of which were reported under separate cover. The December 2, 2005 survey was the first survey performed following the recent inspection and opening of the Bryce 1-X well.

SITE DESCRIPTION

The Site is located in Bondad, Colorado, approximately 20 miles south of Durango, Colorado (Figure 1). The Site is located approximately 0.25 miles north of the confluence of the Animas River to the west and the Florida River to the east. The Site consists of several tracts of land covering more than 100 acres. The project area land use consists of residential

properties, a fire station, US Highway 550, the Animas River, and the Florida River. The majority of land is privately owned. Figure 1 displays the Site layout.

METHANE GAS SEEP SURVEY

Methodology

On December 2, 2005, LTE was on site to conduct a fifth methane gas seep survey of the Site. The scope of the survey was similar to the previous surveys conducted at the Site. During the soil gas survey, tubing was lowered into each borehole and gas measurements were collected directly from the shallow surface soil approximately three feet below ground surface (bgs). LTE measured the concentration of methane, oxygen, hydrogen sulfide, and carbon monoxide at each sampling location.

LTE created a sampling grid to cover the mapping area systematically and to provide a means to delineate the extent of the gas seepage. The grid consisted of approximately 140 squares, each measuring approximately 10,000 square feet in area. LTE collected a soil gas measurement at the corners of each square in the grid. Each sample location was recorded using a Trimble GeoXT® global positioning system (GPS). When methane was detected along the edges of the grid, additional measurements were collected outside of the grid to better define the extent of the seep area.

LTE measured methane concentration in the soil around the exterior of the five houses (Weston, Grant, Budhue, Wilson, and Williams) located in the area, near the water wells associated with each of the five houses, and along the valley floor of both the Animas and Florida rivers.

Soil Gas Survey Results

On December 2, 2005, LTE personnel advanced a total of 189 subsurface probes across the project area. Results of this survey indicated that elevated methane gas was detected in an elliptically-shaped area around the Bryce 1-X well and covering approximately 6 acres. The distribution of the methane gas extends approximately 600 feet north of the well, 200 feet south of the well, and 150 feet both east and west of the well. Detected methane concentrations in the elliptically-shaped seep area ranged from 500 parts per million (ppm) (0.05% methane) to 82% methane.

Methane was detected near the Budhue water well at a concentration of 80% methane. Methane was detected at a concentration 500 ppm approximately 10 feet west of the Budhue residence and five feet south of the Wilson residence. Methane was not detected around the Weston, Grant, or Williams residences nor the water wells associated with these structures.

Methane was detected in an isolated area along the abandoned pipeline on the east side of US Highway 550 approximately 300 feet north of the primary seep area. The methane

concentration reported at this sampling point was 500 ppm. Prior to this event, methane has not been detected in this area. The reason for this isolated gas seep is not clear at this time.

Figure 1 shows all methane concentrations recorded during the December 2005 methane seep survey.

Methane Seep Survey Comparison

With the exception of the February 2005 survey event which included the collection of 372 subsurface gas measurements, the number of subsurface measurements collected during the April 2005, June 2005, November 2005, and December 2005 remained relatively consistent ranging from 134 to 189 points. The grid created for the April 2005 methane seep survey and used during the past four survey events allowed LTE to conduct field activities more efficiently and systematically.

LTE prepared a map illustrating the extent of methane seepage identified during the February 2005, April 2005, June 2005, November 2005, and December 2005 survey events (Figure 2). Comparison of the data indicates that the primary seep area (elliptically shaped area around the Bryce 1-X abandoned well) has decreased in both magnitude and extent during the most recent December 2005 survey. In addition, gas previously detected near the Cain 31-2 well was not detected during the December 2005 survey event. The magnitude and extent of the gas seep around the Wilson and Budhue residences has also decreased as compared to previous survey events.

CONCLUSIONS AND RECOMMENDATIONS

The results of the December 1, 2005, survey indicate that the extent of activity in the primary seep area has decreased in both magnitude and extent since the November 2005 survey. Also during the December 1, 2005, survey, gas seepage was not detected in the vicinity of the Cain 31-2 CBM well, where it had been detected in November, and a decline in seep activity was detected around the Budhue and Wilson residences, relative to what was found in November. Seep activity appears to be associated with the Bryce 1-X abandoned well. Since the work performed on the Bryce 1-X during December 2 through December 4, 2005, the Bryce 1-X is venting gas to the atmosphere and it appears that the well is acting as the preferential pathway for methane gas migration. The preferential flow through the Bryce 1-X well may be decreasing the lateral migration of methane gas beneath the sandstone layer, thereby reducing the extent of the surface gas seep and the concentration of the methane gas detected at the surface. In addition, in the beginning of November, 2005, the Cain 31-2 was returned to full production after well maintenance activities conducted during October were completed. Production from the Cain 31-2 may be capturing some of the gas that would otherwise be flowing up the Bryce 1-X and, therefore, it may be influencing the extent of the gas seep also.

Gas seeps were not detected in the vicinity of the springs identified along the Animas River valley nor along the alluvial floodplain of both the Animas River and Florida River valleys.

LTE recommends continued monitoring of the methane seep at the Site as a safety precaution for the people living in the area. Continued monitoring of the gas seep should occur prior to the initiation of any extensive mitigation measure on the Bryce 1-X well. It is possible that the recent venting of the Bryce 1-X alone may be sufficient to reduce the extent of the gas trapped beneath the sandstone layer without active extraction of subsurface gas. Additional monitoring of the gas seep will be able to assess the effectiveness of passive venting of the methane gas.

The grid mapping system will continue to be used during future seep surveys in an effort to remain consistent with the previous monitoring events. The next soil gas survey event is scheduled for January 30, 2006. LTE also recommends continued operation and maintenance (O&M) of the existing methane detection systems in the four houses and the fire station located within the project area. The monthly O&M will continue to be conducted by Standby Safety of Cortez, Colorado.

LTE appreciates the opportunity to provide environmental services to the COGCC. If you have any questions regarding this report or would like additional information, please contact us at (303) 433-9788.

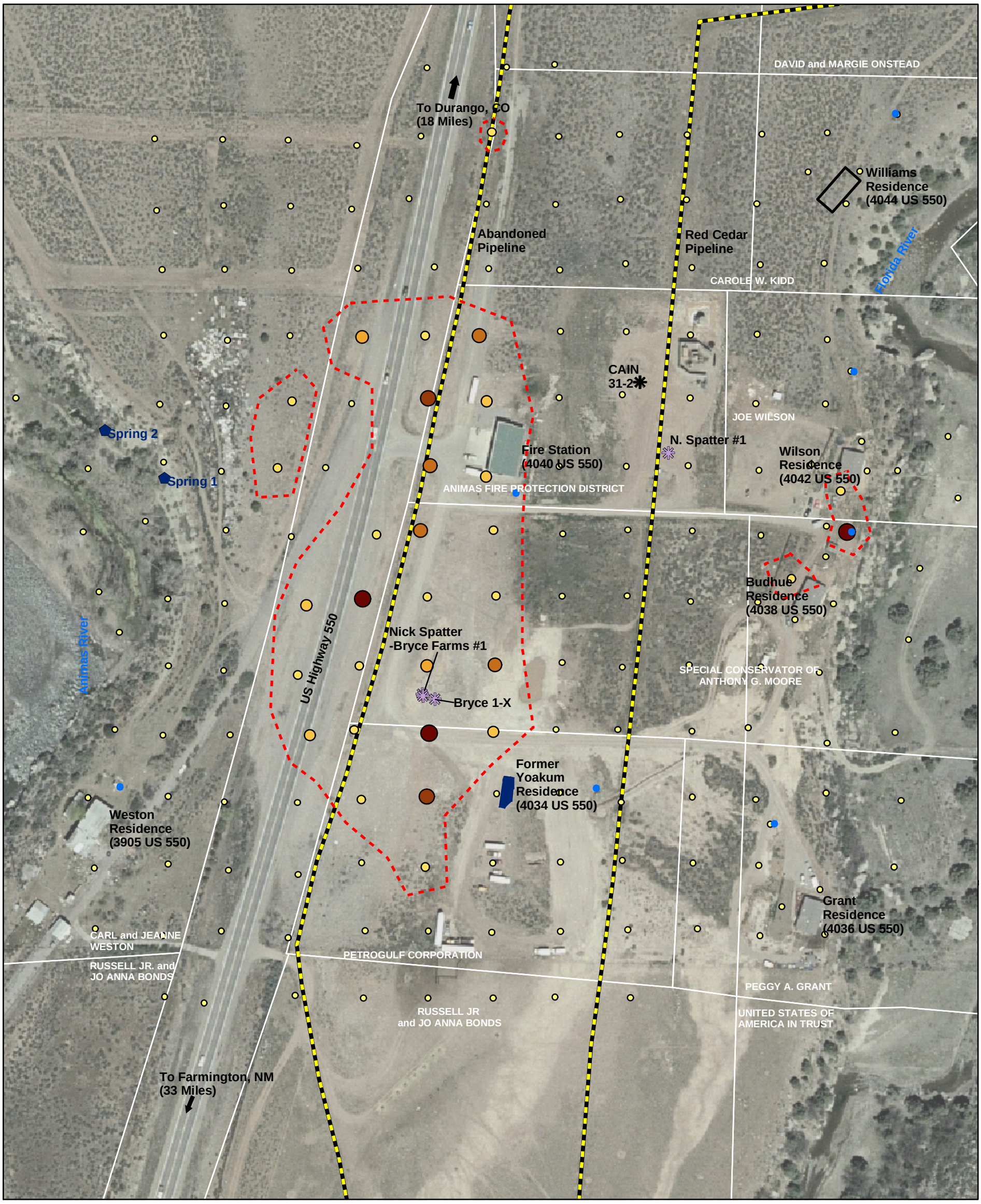
Sincerely,

LT ENVIRONMENTAL, INC.

John D. Peterson, P.G.
Project Manager

Attachments

FIGURES



LEGEND

- Water Supply Well
- Springs
- Yoakum Residence
- Gas Well
- Former Oil and Gas Well

Utilities

- Buried Gas Pipeline

Extent of Methane Seepage

- December 2005

Landowner and Property Boundaries Labeled in White

Subsurface Methane Measurements

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

N

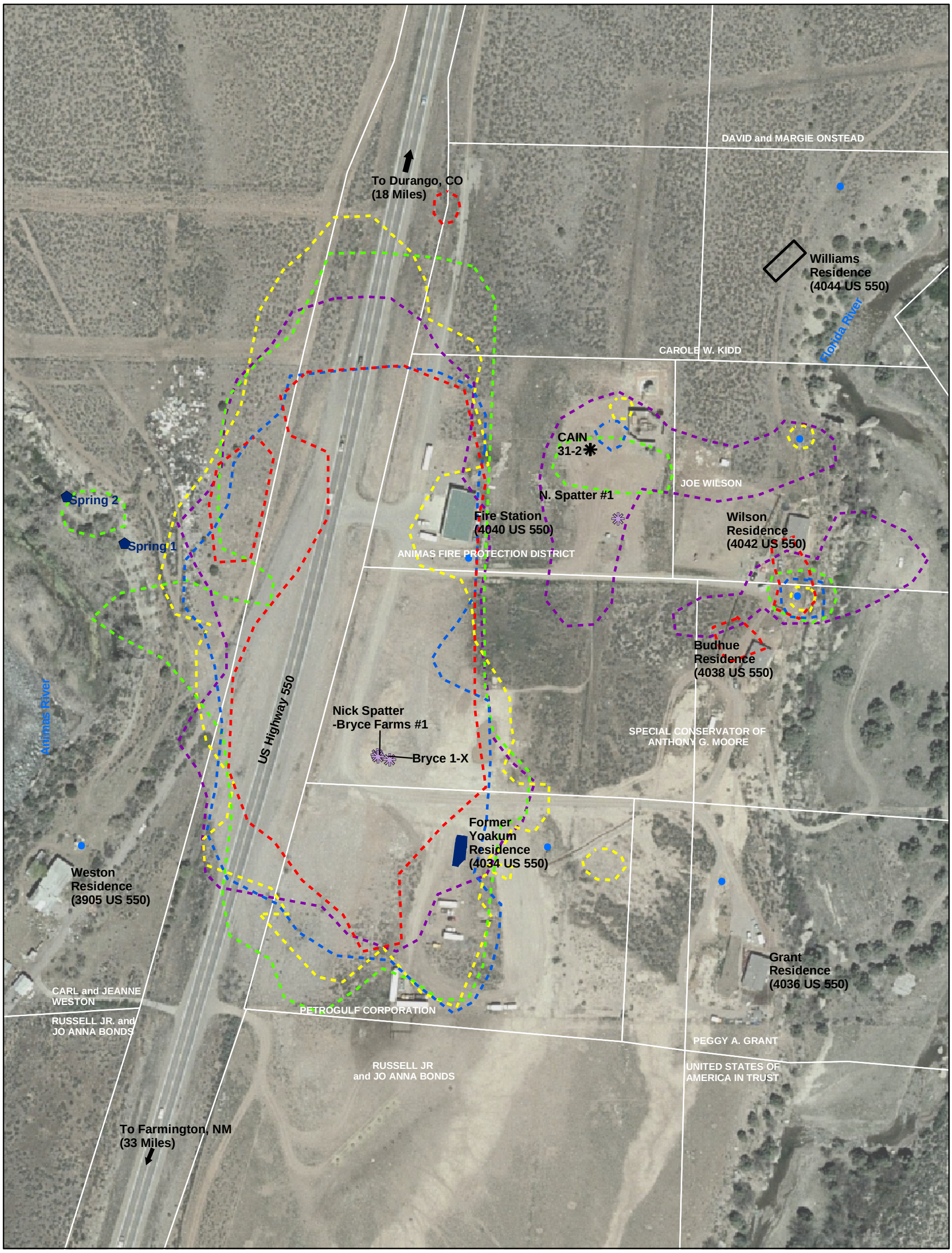
0 300

Feet

1 INCH = 150 FEET

FIGURE 1
SUBSURFACE METHANE MEASUREMENTS
DECEMBER 2005
BONDAD GAS SEEP
BONDAD, CO

COLORADO OIL AND GAS CONSERVATION COMMISSION



LEGEND

- Water Supply Well
- Springs
- Yoakum Residence
- Gas Well
- Former Oil and Gas Well

Methane Seepage

- Feburary 2005
- April 2005
- June 2005
- November 2005
- December 2005

Landowner and Property Boundaries Labeled in White

N

0 300

Feet

1 INCH = 150 FEET

FIGURE 2
HISTORICAL SUBSURFACE METHANE MEASUREMENTS FEBURARY - DECEMBER 2005
BONDAD GAS SEEP
BONDAD, CO

COLORADO OIL AND GAS CONSERVATION COMMISSION