COMPLIANCE / ENGINEERING / REMEDIATION

LT Environmental Inc.

4600 W. 60th Avenue
Arvada, Colorado 80003
T 303.433.9788 / F 303.433.1432

January 9, 2006

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

RE: December 13, 2006 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 eleventh methane seep survey conducted at the Bondad Gas Seep Site (Site) located in Bondad, Colorado on December 13, 2006. This is the third survey since drilling and re-completion activities were conducted at the Bryce 1-X (API #05-067-09087) well between late July 2006 and early August 2006.

The field work recently completed also included a limited surface inspection of the Nick Spatter #1 (API #05-067-05217) well, which was plugged and abandoned in May 1998 and located northeast of the main seep area.

BACKGROUND

At the request of the COGCC, LTE conducted an initial methane gas seep survey of the Site in response to an explosion of a residence located at 4034 US Highway 550 (the former Yoakum Residence). 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, November 1, 2005, December 2, 2005, January 30, 2006, April 6, 2006, June 28, 2006, August 28, 2006, and September 21, 2006. All project reports are available on the COGCC website at www.oil-gas.state.co.us.

LTE conducted a geophysical survey of the seep area in April 2005 which identified several areas suspected of containing buried structures with the potential to act as conduits for methane gas. Exploratory excavation activities were conducted in these suspect areas in August 2005 and the abandoned Bryce 1-X (API #05-067-09087) well was uncovered in the main gas seep area. In November, 2005, LTE provided oversight during the excavation, inspection, and initial remediation of the Bryce 1-X (API #05-067-09087) well and sandstone bedrock surface. Reports summarizing the geophysical survey, exploratory excavation activities, and the Bryce 1-X (API #05-067-09087) well remediation activities are also available on the COGCC website.

Recent activity at the site has included continued operation and maintenance (O&M) of the methane detection systems located at the fire station, the Weston well house, and the Weston, Wilson, Buddhue, and Bandy (former Grant) residences. LTE also conducted a limited surface inspection of

the Nick Spatter #1 (API #05-067-05217) well location to confirm its location and to determine whether methane gas is seeping to the ground surface near this 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 and the Florida River. The Site consists of several tracts of land covering more than 100 acres. The surrounding land use consists of several residential properties, agricultural properties, a fire station, US Highway 550, the Animas River, to the west, and the Florida River, to the east. The majority of land in the area is privately owned.

METHANE GAS SEEP SURVEY

Methodology

On December 13, 2006, LTE was on site to conduct the eleventh 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, carbon monoxide, hydrogen sulfide, and oxygen 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. 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 define the extent of the seep area more completely.

LTE measured the methane concentration in the soil around the exterior of the fire station and four houses in the mapping area, near the water wells associated with each of the structures, and along the valley floor of both the Animas and Florida Rivers.

Soil Gas Survey Results

LTE personnel advanced a total of 127 subsurface probes across the project area. Results of this survey indicate that elevated methane gas was detected in an area around the Bryce 1-X (API #05-067-09087) well covering approximately 2.2 acres. The distribution of the methane gas in this area extended approximately 360 feet north of, 40 feet south of, 120 feet west of, and 80 feet east of the Bryce 1-X (API #05-067-09087) well. Detected methane concentrations in the seep area ranged from 500 parts per million (ppm) (0.05%) to 23,000 ppm (2.3%)

Methane was detected near the Buddhue water well at a concentration of 35,500 ppm (3.55%). Methane was not detected around the Weston, Bandy, or Wilson residences or near the water wells associated with these structures. Methane was not detected in the vicinity of the Cain 31-2 (API #05-067-08114) coal bed methane (CBM) gas well during this December 2006 survey.

Methane was not detected along the floodplains of either the Animas River or the Florida River during the September 2006 methane seep survey.

Figure 1 shows all methane concentrations recorded during the December 2006 methane seep survey.

Methane Seep Survey Comparison

Fewer gas measurements were collected during the December 2006 survey than during previous surveys. The decrease in the number of gas measurements collected is the result of a smaller seep area requiring fewer measurements to define the areal extent of seepage.

LTE prepared a map illustrating the historical areal extent of methane seepage identified during the previous gas survey events (Figure 2). Comparison of the December 2006 data indicates that the areal extent of the primary seep area (around the abandoned Bryce 1-X (API #05-067-09087) well) is slightly smaller than the extent observed during the September 2006 survey. During the June 2006 survey, the primary seep area extended over an area of approximately 5.7 acres. During the August 2006 and September 2006 surveys, the primary seep area extended over an area of approximately 2.7 acres and 2.4 acres, respectively. During the December 2006 survey, the primary seep area extended over an area of approximately 2.2 acres. This is the smallest areal extent of methane seepage observed at the site since monitoring began in February 2005.

The average methane concentration detected within the primary seep area during December 2006 survey is the lowest average concentration detected since monitoring began in February 2005. The table below presents the number of points reporting detectable concentrations of methane and the average methane concentrations within the primary seep area during each of the soil gas survey events.

Table 1. Average Methane Concentrations

Survey Date	Number of Survey Points	Average Subsurface Methane (%)
Feb-05	112	23
Apr-05	45	33
Jun-05	37	21
Nov-05	45	32
Dec-05	25	21
Jan-06	31	10
Apr-06	32	29
Jun-06	23	25
Aug-06	13	2
Sep-06	13	3
Dec-06	10	0.63

The methane concentration detected near the Buddhue water well was 23% during the September 2006 survey. During the December 2006 survey, the methane concentration near the Buddhue water well was 3.55%. This is the lowest concentration detected near the Buddhue water well since monitoring began in February 2006.

NICK SPATTER #1 (API #05-067-05217) WELLHEAD INSPECTION

The purpose of this inspection was to identify the exact location of the former Nick Spatter #1 (API #05-067-05217) well and to determine whether it was affecting methane seepage at the site. The surface marker had been cut off below grade by Petrogulf Corporation (with approval from the COGCC) to improve site access to the nearby Cain 31-2 (API # 05-067-08114) CBM well, so there was no longer a visible indication of the location of the former well.

As described in the *September 2006 Methane Seep Survey* report, LTE marked two possible locations of the Nick Spatter #1 (API No. 05-067-05217) wellhead using a metal detector and marked the locations using survey flagging and GPS. On December 13, 2006, LTE used a back-hoe to remove the soil in the vicinity of the two locations. Scrap metal was observed in one location within the fence of the Cain 31-2 (API # 05-067-08114) well. The Nick Spatter #1 (API No. 05-067-05217) wellhead was located in the second excavation at a depth of approximately 3 feet bgs between the fence for the Cain 31-2 (API # 05-067-08114) well and the associated meter house. The GPS data and geographic coordinates of the Nick Spatter #1 (API No. 05-067-05217) well are as follows:

Latitude*	Longitude*	Max PDOP	GPS Date	GPS Time	No. of Unfiltered Positions
37.055145692	-107.872344071	4.2	12/13/2006	10:02:45am	49

*North American Datum 1983 (NAD83)

LTE attempted to photograph the well surface casing during the excavation; however, there was not enough light to obtain usable photographs.

During excavation activities, LTE inadvertently knocked the steel well marker plate that had been tack-welded to the surface casing following abandonment. With the plate removed, LTE could observe the concrete seal within the surface casing and within the 2-inch diameter steel surface marker pipe. Standing water was observed at the top of the surface casing and within the steel surface marker pipe. Gas bubbles were observed within the surface marker pipe and LTE measured a methane concentration of 5%. Bubbles were not observed in the standing water between the surface marker pipe and the surface casing. Methane was not detected in the gravel soil surrounding the surface casing. A diagram illustrating the surface observation has been included as an attachment. Once the Nick Spatter #1 (API No. 05-067-05217) well was located, GPS data and geographic coordinates obtained, and gas survey measurements made, it was re-buried, and the ground surface was recontoured.

CONCLUSIONS AND RECOMMENDATIONS

The results of the December 2006 survey indicate that the areal extent of methane seepage is slightly smaller than detected during the September 2006 survey. More notably, the average methane concentration detected within the seep area has decrease by more than an order of magnitude. The decrease is most likely the result of reentering, plugging, and abandoning the Bryce 1-X (API #05-067-09087) well in July - August 2006. Seepage continues around the fire station and the Buddhue water well, but not in the vicinity of the other residences within the mapping area.

The primary methane seep appears to have been caused by gas migrating from the Fruitland Formation up the well bore of the Bryce 1-X (API #05-067-09087) well. The gas moved vertically upward along the well bore and then migrated laterally into permeable layers and aquifers of the Nacimiento Formation where well casing was absent and/or structurally compromised. It appears that the plugging of the Bryce 1-X (API #05-067-09087) has reduced the gas seepage at the ground surface. LTE recommends continued monitoring of the methane seep at the Site as a safety precaution for the residents in the area and to monitor the effectiveness of the plugging activities.

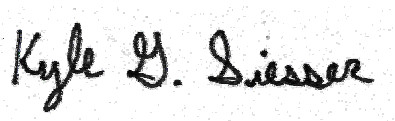
The next soil gas survey event is scheduled for March 2007. The monthly O&M of the methane detection systems in the residences and fire station will continue to be conducted by Standby Safety of Cortez, Colorado.

LTE was able to identify the exact location of the Nick Spatter #1 (API #05-067-05217) well by excavation of the surface soil. Gas was observed seeping at the top in the surface marker pipe, but not at the top of the surface casing. Methane was not detected in the native gravel deposits around the well. To prevent this gas from accumulating in the soil, LTE recommends that the Nick Spatter #1 (API #05-067-05217) well be exposed again, that an additional piece of casing be added to the existing surface casing so that it extends above the ground surface, and that the gas be allowed to vent. Future soil gas monitoring in this area will determine whether this well has been acting as a conduit for methane seepage.

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.

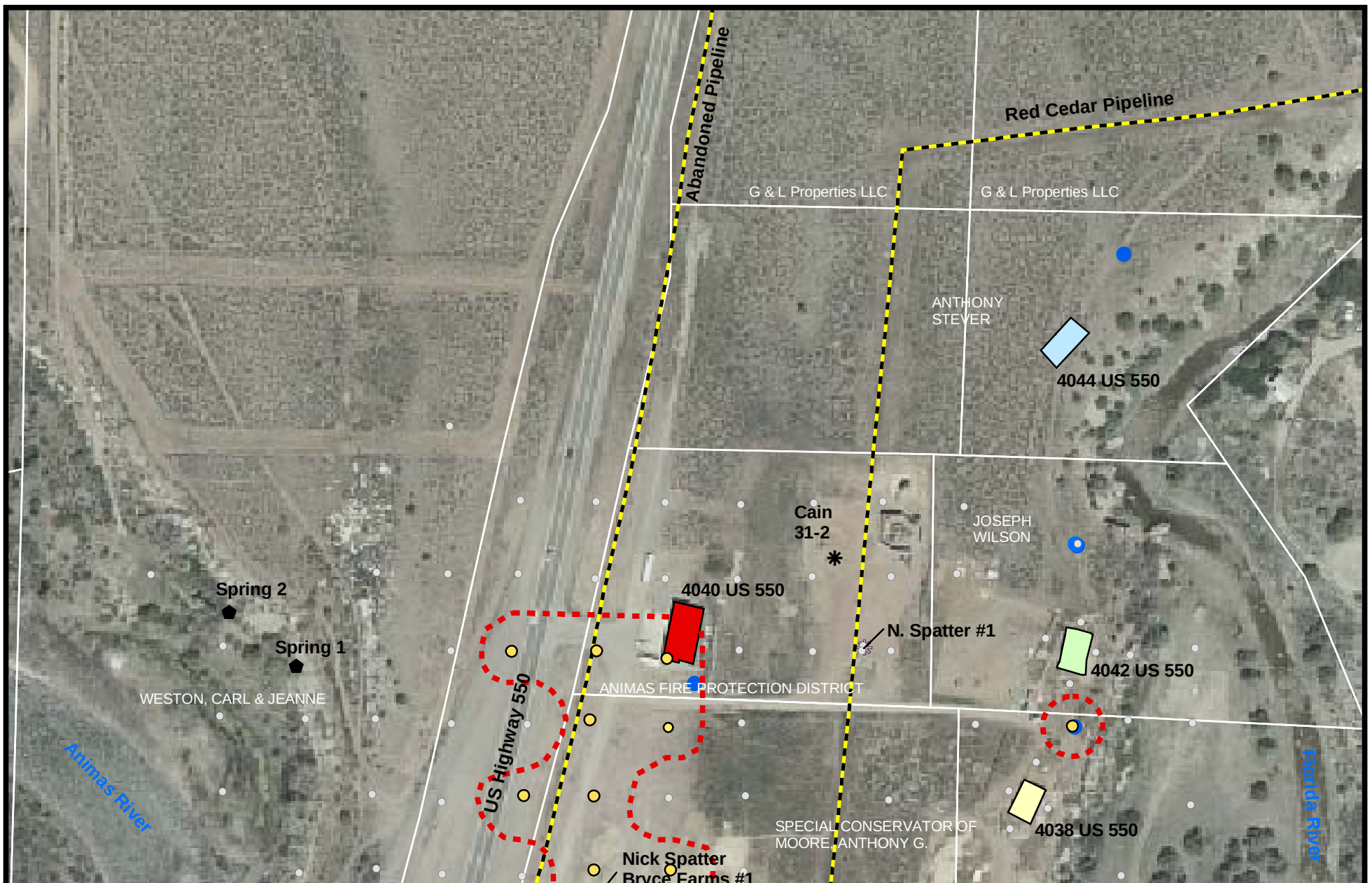


Kyle G. Siesser
Staff Geologist

John D. Peterson, P.G.
Project Manager

Attachments

FIGURES



LEGEND

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

Extent of Methane Seepage

- December 2006

Utilities

- Buried Gas Pipeline

Structures

- Williams Residence
- Fire Station
- Wilson Residence
- Buddhue Residence
- Bandy (former Grant) Residence
- Former Yoakum Residence
- Weston Residence

Subsurface Methane Measurements

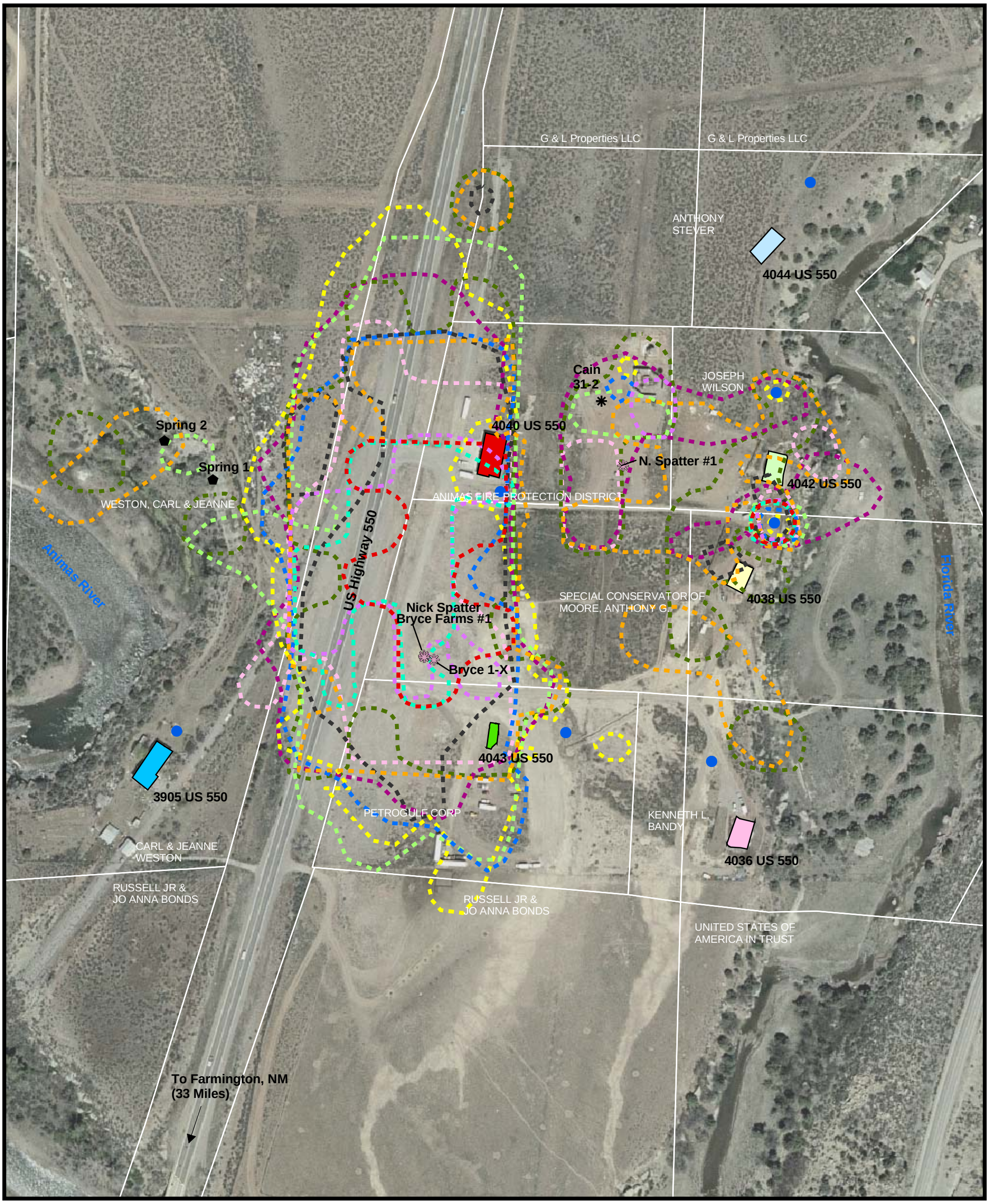
- 0 ppm
- 500 ppm - 5%
- 6% - 15%
- 16% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%

0 350 Feet

N

Landowner and Property Boundaries Labeled in White

FIGURE 1
SUBSURFACE METHANE MEASUREMENTS
DECEMBER 2006
BONDAD GAS SEEP
BONDAD, CO
COLORADO OIL AND GAS CONSERVATION COMMISSION



Legend

Extent of Methane Seepage	Structures	
December 2006	Williams Residence	Water Supply Wells
September 2006	Fire Station	Springs
August 2006	Wilson Residence	Gas Well
June 2006	Buddhue Residence	Former Oil and Gas Well
April 2006	Bandy (former Grant) Residence	
January 2006	Former Yoakum Residence	
December 2005	Weston Residence	
November 2005		
June 2005		
April 2005		
February 2005		

Landowner and Property Boundaries Labeled in White

N

0 350

Feet

FIGURE 2
HISTORICAL SUBSURFACE METHANE MEASUREMENTS
FEBRUARY 2005 - DECEMBER 2006
BONDAD GAS SEEP
BONDAD, CO
COLORADO OIL AND GAS CONSERVATION COMMISSION

NICK SPATTER #1 (API #05-067-05217) DIAGRAM

Nick Spatter #1