August 1, 2005

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

RE: June 3, 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 third methane seep survey conducted at the Bondad Gas Seep Site (Site) located in Bondad, Colorado during the week of June 10, 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 Nick Spatter Bryce Farm #1 (NSBF #1) production well (Figure 1). The results of the initial soil gas survey are presented in the *Methane Seep Survey Report* (March 2005). On April 19, 2005 LTE performed second methane seep survey of the Site. A letter summarizing the results from the second survey was provided to the COGCC on June 3, 2005. All reports are available on the COGCC website at www.oil-gas.state.co.us.

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 June 10, 2005, LTE was on site to conduct a third methane gas seep survey of the Site. The scope of the survey was similar to the survey conducted at the Site during April 2005. During the most recent 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 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 93 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 also collected methane measurements around the exterior of the three houses located to the east of the former Yoakum residence and near the water wells associated with each of the three houses.

Stressed or dead vegetation observations were also collected using the Trimble GeoXT® GPS. The data collected consisted of stressed juniper and cottonwood trees, dead pine and dead cottonwood trees, and an area of stressed vegetation. Figure 1 shows the stressed or dead vegetation observations.

Soil Gas Survey Results

On June 10, 2005, LTE personnel advanced a total of 139 subsurface probes across the project area. Results of this survey indicated that elevated methane gas was detected in an elliptically-shaped area centered over the NSBF#1 well and covering approximately 14 acres. Detected methane concentrations in the elliptically-shaped seep area ranged from 1,500 parts per million (ppm) (0.15% methane) to 810,000 ppm (81% methane).

Outside of the elliptically-shaped seep area, methane was also detected at one location near the Cain 31-2 coal bed methane (CBM) production well at a concentration of 500 ppm (0.05% methane). Methane was detected near the Budhue water well at a concentration of 880,000 ppm (88% methane). Methane was not detected in the subsurface around the outside of the other two water wells which are associated with the Bennett and Grant Properties; however the groundwater with each of the water wells contain elevated concentrations of methane. Figure 1 shows all methane concentrations recorded during the June 2005 methane seep survey. Field data from the June 2005 mapping event are presented in Attachment 1.

Methane Seep Survey Comparison

The number of soil gas measurements collected during the April 2005 methane seep survey and the June 2005 methane seep survey were consistent at 136 and 139 points, respectively. The grid created for the April 2005 methane seep survey allowed LTE to conduct field activities more efficiently and systematically.

The results of the June 2005 soil gas survey varied slightly as compared to the results of the April 2005 soil gas survey. Unlike the April 2005 survey, methane was not detected in the flood plain of the Animas River near the natural springs. Methane was detected near the Cain 31-2 CBM production well and the subsurface methane concentration was lower than during the April monitoring event. The majority of methane continued to be detected in an elliptically-shaped seep area centered over the NSBF#1 well.

In general, the concentrations of methane recorded during the June 2005 soil gas survey were slightly lower than the concentrations recorded during the April 2005 survey. The lower concentrations are most likely due to a drop in the groundwater level. The lower groundwater level results in a larger volume of unsaturated material through which the methane diffuses and becomes more diluted with air. The variance in concentrations observed between the two measurements is more likely related to water level fluctuations than to a decreasing trend in gas seepage.

CONCLUSIONS AND RECOMMENDATIONS

The extent of seep activity has remained relatively unchanged since the initial sampling event. Seep activity appears to be associated with the NSBF#1 well based on the current concentrations and extent of impact. Soil gas survey measurement protocols appear to have an effect on the reported concentration. LTE recommends the downhole measurement of gas concentrations over surface measurements, whenever possible.

Based on the results of the most recent methane seep survey and the natural spring survey, it appears that an area of trapped methane gas is present beneath the sandstone layer. It is likely that the sandstone unit is acting as a vertical confining layer, forcing the methane gas to migrate horizontally towards the valley of the Animas River and northward (updip) to create the elliptically-shaped seepage plume.

Conceptually, it appears that gas is migrating vertically using the NSBF#1 as the primary conduit. Varying permeability and well plugging efficiency allows for horizontal migration of seeping gas. The sandstone layer may also be acting as a trap of seeping methane gas. The increased radius of surface methane seepage is believed to be a result of trapped gas beneath the sandstone layer and the underlying weathered shale layers.

Other potential conduits such as the Cain 31-2; the water wells located at nearby residences; and at the fire station also appear to act as conduits for the vertical migration of methane gas along multiple horizons. However, the gas migrating in the water wells appears to be derived from deeper impacted groundwater horizons as a result of the NSBF#1 seeping gas into a subsurface aquifer rather than the near-surface methane seep.

LTE recommends continued monitoring of the methane seep at the Site on a quarterly basis as a safety precaution for the people living in the area. The grid mapping system will continue to be used during future seep surveys in an effort to remain consistent and systematic in the field techniques. The next seep survey is proposed for September 2005.

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.

Currently, LTE is scheduled to conduct excavation activities in the seep area as a result of the findings from the geophysical survey. The excavation activities will assist in determining the presence or absence of subsurface conduits affecting the seepage of methane gas other than the NSBF#1 well.

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.

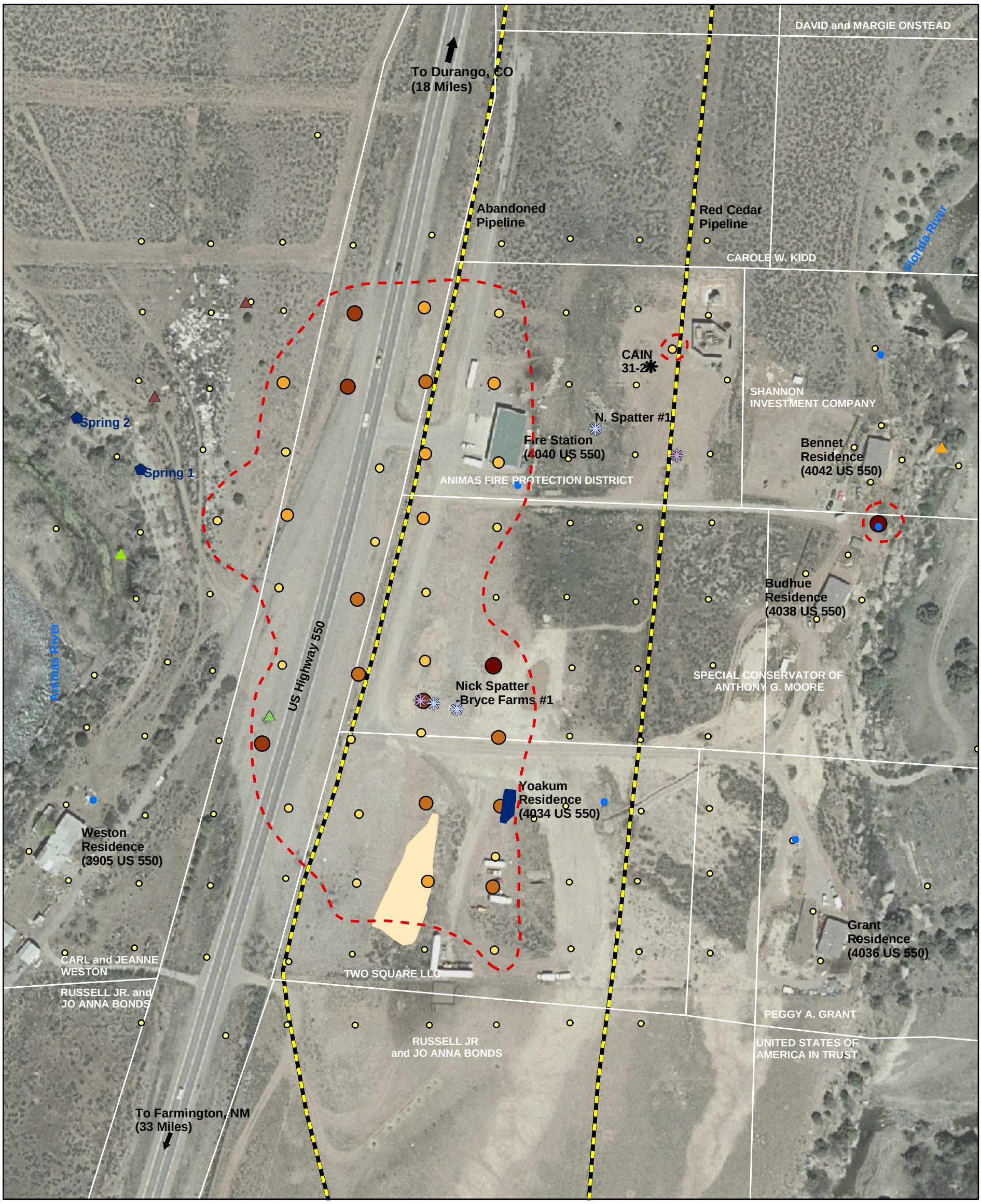
Sincerely,

LT ENVIRONMENTAL, INC.

John D. Peterson, P.G.
Project Manager

Attachments (1)

FIGURE



LEGEND

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

Trees
- Stressed Juniper
- Stressed Cottonwood
- Dead Pine
- Dead Cottonwood

Vegetation
- Stressed Vegetation

Extent of Methane Seepage April 19, 2005

Landowner and Property Boundaries Labeled in White

Subsurface Methane Gas
- 0 ppm
- 1 ppm - 5%
- 5% - 15%
- 15% - 25%
- 25% - 50%
- 50% - 75%
- 75% - 100%

Natural Spring location

Yoakum Residence

Utilities
- Buried Gas Pipeline

N

0 280

Feet

1 INCH = 140 FEET

FIGURE 1
SUBSURFACE METHANE MEASUREMENTS
JUNE10, 2005
BONDAD GAS SEEP
BONDAD, CO

COLORADO OIL AND GAS CONSERVATION COMMISSION

OGCC050101 06/05

ATTACHMENT 1

METHANE SURVEY SEEP DATA

Attachment 1
June 2005
Methane Seep Survey Data

Point ID	Date	Northing	Easting	Elevation	Subsurface CH_4 (ppm)	Subsurface O_2 (%)	Subsurface H_2S (ppm)	Subsurface CO (ppm)
1	6/10/2005	1149537.624	2307796.990	6036.440	0.0	20	0	0
2	6/10/2005	1149649.951	2307796.810	6039.081	0.0	20	0	0
3	6/10/2005	1149741.312	2307795.568	6041.701	0.0	20	0	0
4	6/10/2005	1149842.778	2307793.998	6043.469	0.0	20	0	0
5	6/10/2005	1149942.603	2307801.105	6043.579	0.0	21	0	0
6	6/10/2005	1150035.661	2307794.345	6045.267	0.0	21	0	0
7	6/10/2005	1150143.546	2307799.556	6041.724	0.0	20	0	0
8	6/10/2005	1150239.861	2307796.975	6045.198	0.0	20	0	0
9	6/10/2005	1150344.431	2307821.194	6045.507	0.0	20	0	0
10	6/10/2005	1150435.299	2307794.471	6047.204	0.0	21	0	0
11	6/10/2005	1150540.507	2307792.574	6047.364	0.0	21	0	0
12	6/10/2005	1150541.153	2307697.695	6049.336	0.0	21	0	0
13	6/10/2005	1150443.893	2307695.313	6047.166	0.0	21	0	0
14	6/10/2005	1150336.998	2307693.111	6047.226	0.0	21	0	0
15	6/10/2005	1150387.422	2307744.179	6048.863	500.0	21	0	0
16	6/10/2005	1150239.322	2307691.858	6050.719	0.0	21	0	0
17	6/10/2005	1150136.644	2307697.629	6048.640	0.0	20	0	0
18	6/10/2005	1150032.354	2307692.575	6048.200	0.0	21	0	0
19	6/10/2005	1149937.995	2307694.809	6046.168	0.0	21	0	0
20	6/10/2005	1149838.081	2307698.743	6041.871	0.0	21	0	0
21	6/10/2005	1149737.541	2307700.123	6040.514	0.0	21	0	0
22	6/10/2005	1149639.173	2307694.569	6037.926	0.0	21	0	0
23	6/10/2005	1149539.689	2307696.595	6040.410	0.0	21	0	0
24	6/10/2005	1149543.907	2307600.887	6041.145	0.0	21	0	0
25	6/10/2005	1149637.720	2307598.789	6045.584	0.0	20	0	0
26	6/10/2005	1149744.522	2307594.072	6044.382	0.0	20	0	0
27	6/10/2005	1149727.456	2307549.075	6045.261	0.0	20	0	0
28	6/10/2005	1149843.079	2307599.207	6043.490	0.0	20	0	0
29	6/10/2005	1149939.346	2307602.510	6046.068	0.0	20	0	0
30	6/10/2005	1150038.873	2307595.417	6044.902	0.0	20	0	0
31	6/10/2005	1150143.114	2307600.177	6045.692	0.0	20	0	0
32	6/10/2005	1150233.630	2307597.434	6049.765	0.0	20	0	0
33	6/10/2005	1150338.097	2307598.342	6052.349	0.0	21	0	0
34	6/10/2005	1150438.871	2307594.405	6053.622	0.0	21	0	0
35	6/10/2005	1150542.955	2307600.339	6056.755	0.0	21	0	0
36	6/10/2005	1150536.188	2307503.571	6058.097	0.0	21	0	0
37	6/10/2005	1150438.207	2307499.959	6059.829	2000.0	20	0	0
38	6/10/2005	1150339.496	2307493.360	6056.114	240000.0	14	0	0
39	6/10/2005	1150228.406	2307499.087	6058.637	120000.0	17	0	0
40	6/10/2005	1150136.936	2307497.640	6055.703	1500.0	20	0	0
41	6/10/2005	1150038.281	2307495.922	6051.084	0.0	21	0	0
42	6/10/2005	1149942.410	2307492.270	6047.694	810000.0	5	0	0
43	6/10/2005	1149841.161	2307499.256	6044.890	350000.0	15	0	0
44	6/10/2005	1149744.776	2307501.922	6045.380	370000.0	14	0	0
45	6/10/2005	1149673.582	2307495.241	6046.097	50000.0	19	0	0
46	6/10/2005	1149631.226	2307491.472	6042.895	490000.0	7	0	0
47	6/10/2005	1149542.208	2307493.852	6043.505	17000.0	6	0	0
49	6/10/2005	1149543.098	2307395.295	6043.931	0.0	21	0	0
50	6/10/2005	1149638.580	2307399.646	6044.060	210000.0	12	0	0
51	6/10/2005	1149748.779	2307397.705	6047.592	380000.0	13	0	0
52	6/10/2005	1149847.697	2307390.718	6049.838	25000.0	19	0	0
53	6/10/2005	1149892.477	2307393.651	6051.565	620000.0	8	0	0
54	6/10/2005	1149949.108	2307395.965	6052.599	80000.0	19	0	0
55	6/10/2005	1150045.240	2307397.654	6051.737	40500.0	18	0	0
56	6/10/2005	1150149.508	2307393.682	6053.306	200000.0	17	0	0
57	6/10/2005	1150240.446	2307396.792	6051.802	230000.0	16	0	0
58	6/10/2005	1150341.699	2307396.938	6055.115	380000.0	15	0	0
59	6/10/2005	1150445.806	2307395.360	6053.801	220000.0	16	0	0
60	6/10/2005	1150548.175	2307405.266	6056.020	0.0	20	0	0
61	6/10/2005	1150533.787	2307294.884	6060.884	0.0	19	0	0
62	6/10/2005	1150438.024	2307297.011	6057.701	620000.0	7	0	0
63	6/10/2005	1150334.894	2307287.312	6057.564	600000.0	7	0	0
64	6/10/2005	1150220.547	2307331.941	6056.933	23000.0	19	0	0
65	6/10/2005	1150116.604	2307325.740	6055.945	36000.0	20	0	0
66	6/10/2005	1150035.494	2307301.075	6054.403	270000.0	14	0	0
67	6/10/2005	1149930.419	2307302.355	6054.363	320000.0	14	0	0
68	6/10/2005	1149838.408	2307291.963	6051.619	50000.0	20	0	0
69	6/10/2005	1149733.537	2307302.990	6045.061	19500.0	19	0	0
70	6/10/2005	1149636.141	2307299.861	6045.190	50000.0	18	0	0
71	6/10/2005	1149536.306	2307293.922	6047.282	0.0	21	0	0
72	6/10/2005	1149526.345	2307204.372	6041.352	0.0	21	0	0
73	6/10/2005	1149643.066	2307200.026	6042.332	0.0	21	0	0
74	6/10/2005	1149741.866	2307204.359	6044.570	36500.0	18	0	0
76	6/10/2005	1149832.795	2307166.859	6047.754	590000.0	7	0	0
77	6/10/2005	1149942.897	2307195.206	6047.812	25500.0	18	0	0
78	6/10/2005	1150052.019	2307190.479	6052.986	33500.0	17	0	0

Attachment 1
June 2005
Methane Seep Survey Data

Point ID	Date	Northing	Easting	Elevation	Subsurface CH_4 (ppm)	Subsurface O_2 (%)	Subsurface H_2S (ppm)	Subsurface CO (ppm)
79	6/10/2005	1150154.114	2307202.527	6054.728	190000.0	14	0	0
80	6/10/2005	1149733.447	2307098.883	6036.882	0.0	21	0	0
81	6/10/2005	1149633.021	2307093.803	6038.023	0.0	21	0	0
82	6/10/2005	1149532.230	2307088.899	6042.453	0.0	21	0	0
83	6/10/2005	1149421.877	2307115.282	6032.296	0.0	21	0	0
84	6/10/2005	1149436.756	2307201.765	6039.223	0.0	21	0	0
85	6/10/2005	1149436.319	2307297.757	6049.608	0.0	21	0	0
86	6/10/2005	1149436.488	2307402.077	6042.452	0.0	17	0	0
87	6/10/2005	1149436.842	2307496.418	6040.950	0.0		0	0
88	6/10/2005	1149439.895	2307599.909	6039.343	0.0	21	0	0
89	6/10/2005	1149439.039	2307699.562	6040.514	0.0	21	0	0
90	6/10/2005	1149527.256	2307952.058	6040.614	0.0	21	0	0
91	6/10/2005	1149557.966	2308006.917	6038.213	0.0	21	0	0
92	6/10/2005	1149596.857	2307941.611	6038.484	0.0	21	0	0
93	6/10/2005	1149696.261	2307912.821	6042.616	0.0	21	0	0
95	6/10/2005	1150007.894	2307946.570	6041.378	0.0	21	0	0
96	6/10/2005	1150072.024	2307931.173	6042.296	0.0	21	0	0
97	6/10/2005	1150098.309	2307991.162	6039.671	0.0	21	0	0
98	6/10/2005	1150034.615	2308010.314	6038.516	0.0	21	0	0
100	6/10/2005	1150141.830	2308033.325	6037.816	880000.0	2	0	0
101	6/10/2005	1150200.286	2308022.558	6040.128	0.0	20	0	0
102	6/10/2005	1150249.471	2307999.458	6048.176	0.0	21	0	0
103	6/10/2005	1150280.190	2308037.586	6042.363	0.0	21	0	0
104	6/10/2005	1150231.896	2308066.473	6043.577	0.0	20	0	0
106	6/10/2005	1150388.460	2308028.660	6043.521	0.0	21	0	0
107	6/10/2005	1150265.914	2308239.328	6010.899	0.0	21	0	0
109	6/10/2005	1150223.505	2308146.473	6009.586	0.0	21	0	0
112	6/10/2005	1149991.560	2308222.140	6012.851	0.0	21	0	0
113	6/10/2005	1149825.518	2308173.025	6004.551	0.0	21	0	0
115	6/10/2005	1149632.167	2308102.711	6000.434	0.0	20	0	0
116	6/10/2005	1149935.021	2307097.180	6050.966	0.0	21	0	0
117	6/10/2005	1149836.573	2307106.271	6042.368	0.0	21	0	0
118	6/10/2005	1149842.982	2307002.255	6036.332	0.0	21	0	0
119	6/10/2005	1149731.803	2307002.512	6045.337	0.0	21	0	0
120	6/10/2005	1149635.771	2306993.409	6041.175	0.0	21	0	0
121	6/10/2005	1149545.110	2306987.392	6042.300	0.0	21	0	0
122	6/10/2005	1149439.731	2306996.965	6041.593	0.0	21	0	0
123	6/10/2005	1149538.319	2306889.271	6037.113	0.0	21	0	0
124	6/10/2005	1149640.007	2306894.701	6040.818	0.0	21	0	0
125	6/10/2005	1149746.760	2306891.286	6041.509	0.0	21	0	0
126	6/10/2005	1149681.188	2306839.177	6040.214	0.0	21	0	0
127	6/10/2005	1149855.339	2306920.469	6041.823	0.0	21	0	0
128	6/10/2005	1149947.371	2307033.873	6045.680	0.0	21	0	0
129	6/10/2005	1150043.262	2307093.719	6049.317	0.0	20	0	0
130	6/10/2005	1150146.262	2307103.829	6050.903	7000.0	13	0	0
131	6/10/2005	1150242.964	2307200.101	6056.732	2500.0	20	0	0
132	6/10/2005	1150340.393	2307196.739	6058.603	180000.0	16	0	0
133	6/10/2005	1150441.731	2307197.370	6058.759	0.0	20	0	0
134	6/10/2005	1150538.067	2307195.785	6058.199	0.0	21	0	0
135	6/10/2005	1150688.745	2307244.954	6059.372	0.0	21	0	0
136	6/10/2005	1150536.266	2307094.516	6046.579	0.0	21	0	0
137	6/10/2005	1150539.136	2306997.128	6048.873	0.0	21	0	0
138	6/10/2005	1150440.063	2306998.550	6048.790	0.0	21	0	0
139	6/10/2005	1150438.761	2307095.315	6046.964	0.0	21	0	0
141	6/10/2005	1150454.578	2307151.333	6054.383	0.0	21	0	0
142	6/10/2005	1150332.247	2307093.093	6045.134	0.0	21	0	0
143	6/10/2005	1150246.145	2307083.616	6045.648	0.0	21	0	0
144	6/10/2005	1150343.294	2306993.085	6042.951	0.0	21	0	0
146	6/10/2005	1150236.124	2306962.802	6007.351	0.0	19	0	0
147	6/10/2005	1150130.032	2306995.609	6005.806	0.0	17	0	0
149	6/10/2005	1150036.640	2306989.809	6003.035	0.0	19	0	0
150	6/10/2005	1150135.217	2306877.296	5998.919	0.0	14	0	0
151	6/10/2005	1149928.932	2306931.106	5999.716	0.0	21	0	0

Notes: CH_4 - methane
O_2 - oxygen
H_2S - hydrogen sulfide
CO - carbon monoxide