



June 24, 2005

Ms. Margaret Ash, P.G.  
Colorado Oil and Gas Conservation Commission  
1120 Lincoln Street, Suite 801  
Denver, Colorado 80203

RE: Methane Seep Survey Summary Letter  
Mondragon and Saint Residences  
Trinidad, Colorado

Dear Ms. Ash:

LT Environmental, Inc. (LTE) is pleased to provide the Colorado Oil and Gas Conservation Commission (COGCC) with this letter summarizing the results of a recent methane seep survey conducted on the Mondragon property including a tract of land located north of Colorado State Highway 12 and a tract located south of Colorado State Highway 12 which contains the Mondragon and Saint residential structures. The field activities were conducted on June 6 and June 7, 2005.

### **Executive Summary**

On June 6 and 7, 2005, LTE personnel were onsite to conduct a methane seep survey of the Mondragon property. LTE collected subsurface measurements of methane concentration at approximately 150 locations. Using a global positioning system (GPS), LTE mapped each measurement location and mapped the extent of stressed and dead vegetation on the property.

Methane was detected on the property in many locations both north and south of the highway. Methane concentrations ranged from 2,000 parts per million (ppm) to 990,000 ppm (99%). LTE noted areas of dead and stressed vegetation and detected methane at elevated concentrations within nearly all of the mapped stressed/dead vegetation areas. Visible methane seeps were noted in standing water on the property and along the nearby Purgatoire River. Elevated concentrations of methane were also noted around the outside of each of the residential structures on site.

A methane detection system has been installed within two of the residential structures on site and within one of the garages. The system provides a warning when methane vapors accumulate near explosive levels. Currently, LTE is installing a methane mitigation system within two of the residential structures on site to reduce the potential for the accumulation of methane gas in the basement/crawlspace of the two structures.

*LT Environmental, Inc.*

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## **Background**

In February 2004, Joseph Mondragon contacted the COGCC with a complaint concerning methane gas seep activity on his property. In particular, Mr. Mondragon was concerned about the potential for methane gas seeps on his property to accumulate in the basement/crawlspace of the residential structures and create an explosive hazard. LTE was tasked by the COGCC, as part of an emergency response action, to inspect the residential structures and surrounding land on the Mondragon Property and to evaluate the potential for explosive hazards within the structures on site. Results of the initial inspection detected methane in the shallow subsurface soil around each of the structures, at the water wells for each house, and within each of the residences.

In November 2004, LTE installed methane detection systems in both the Mondragon and Saint residences in an effort to warn occupants of potentially explosive vapors present in the crawlspace and or basement areas or within the main living areas. If a warning alarm occurred, the occupant could open the doors and windows to allow the vapors to dissipate.

During the period from November 2004 through May 2005, the methane detection systems have detected more frequent occurrences of elevated methane concentrations within the crawlspace/basement of both residences, despite attempts to ventilate the buildings. Currently, LTE is designing a methane mitigation system to actively vent the crawlspace/basements of both residential structures to prevent the accumulation of explosive vapors. The mitigation system will bring fresh outside air into the basement and exhaust inside air to the outdoors via fans actuated by the detection system. The mitigation system installation is scheduled for the week of June 27, 2005.

As an added safety precaution, the COGCC requested a methane survey of the Mondragon property, particularly the area in close proximity to the residences but also the fields located south of the residences and portions of the Mondragon property located on the north side of Colorado State Highway 12. The results of the survey are discussed below.

## **Property Description**

The property covers an area of approximately 60 acres and holds two residential structures, various garages and sheds, and a mobile home unit. The residential structures include the house at 28100 Highway 12 where Mr. Mondragon resides (Mondragon House), and an adjacent house used by his daughter Ms. Laura Saint (Saint House). Both residences are addressed as 28100 Highway 12. A site location map is included as Figure 1. A map illustrating the property layout is included as Figure 2.

The portion of property located north of Colorado State Highway 12 is an upland area with steep hills and pine forest. No structural improvements were noted north of the highway. The parcel of land south of the highway lies in the alluvial valley of the Purgatoire River. The



residential units, associated garages, and mobile home unit are located approximately 100 feet south of the highway.

Each house is constructed with a basement/crawlspace. The basement is partially paved with concrete and houses the furnace and water heater. The remaining portion of the crawlspace area is a dirt sub floor with low overhead clearance.

Each house is serviced by a city water supply. However, each house was formerly served by two separate water wells still located near each structure. Plumbing from the wells to the structures has been removed. The depth to groundwater in each well is less than five feet below ground surface (bgs) and visible methane seeps can be seen in each water well.

An agricultural field covering approximately seven acres and used to grow hay is located south of the residences. The area to the east and southeast of the residences is heavily vegetated and contains large trees, shrubs, and grasses. The vegetation in the area southeast of residences and along the river is very lush and dense. Some areas of the property were not accessible due to dense vegetation and/or flooding near the river.

The southern property boundary is defined by the Purgatoire River which flows from the southwest to the northeast. The area appears to be heavily irrigated and surface soils appeared to be very moist or nearing saturation at the time of the visit. Previous trenching near the Saint house noted very shallow groundwater (less than two feet bgs) within the trench.

### **Methane Survey Results**

Methane gas was detected in the subsurface soil at several locations across the property. Approximately 70 points were measured for the concentration of methane gas in the shallow subsurface soil north of the highway. In the area north of Colorado State Highway 12, LTE detected methane at concentrations ranging from 2,000 ppm to 99%. The highest concentrations of methane detected appeared to be located in the lower elevation areas along a northwest-southeast trending valley opposite Adobe Ranch Road (Figure 3A) as compared to the upland areas west of the valley. Areas of stressed and/or dead vegetation were also located along this valley and were associated with elevated concentrations of seeping methane gas. Photographs of the site are included in Attachment 1.

LTE collected a gas sample from the area north of the highway for analysis of gas composition and isotopic analysis. The sample was collected at a location where the highest concentration of methane was measured (99% methane). This area is located approximately 400 feet northwest of the intersection of Colorado State Highway 12 and Adobe Ranch Road (Figure 3A). The sample was submitted to Isotech Laboratory in Champaign, Illinois for analysis of gas composition and carbon and hydrogen isotope ratios of methane. Results of the laboratory analysis will be submitted under separate cover upon receipt.



An area of stressed/dead pine trees was also mapped in a smaller valley feature located approximately 400 feet southwest of the more active methane seep valley but also located north of the highway. However, methane was not detected at the base of these stressed/dead pine trees. The stressed/dead trees may be a result of pine beetle infestation and/or drought. Figure 3A illustrates the results of the June 2005 methane survey of portions of the Mondragon property located north of Colorado State Highway 12.

In the area south of the highway, LTE collected subsurface methane concentration measurements at approximately 90 locations. Detected methane concentrations ranged from 3,000 ppm to 870,000 ppm (87%). Of the approximately 40 subsurface methane measurements collected in close proximity to the residential structures, only five locations detected methane at concentrations ranging from 10,000 ppm (1%) to 370,000 ppm (37%). The frequency and magnitude of detectable methane in close proximity to the residences is lower than observed during the February 2004 preliminary survey.

LTE noted relatively large areas of stressed/dead vegetation located in the field south of the residences. Approximately two acres of stressed/dead vegetation were mapped during this field event. Elevated concentrations of methane in the shallow subsurface were noted at nearly all of the stressed/dead vegetation areas mapped on the property.

LTE noted visible methane seeps within the Purgatoire River in two locations and in standing water approximately 150 feet southeast of the Mondragon garage. Figure 3B illustrates the results of the methane survey of the Mondragon property located south of the highway. Table 1 summarizes the field data collected during the methane survey.

### **Field Procedures**

The field procedures utilized during this methane survey are similar to those developed over the past nine years for monitoring methane seeps from geologic outcrops in the San Juan Basin. The procedure includes the collection of subsurface gas concentration measurements, mapping areas of stressed and dead vegetation, visible seeps in surface water, and other pertinent geographic features.

To collect subsurface soil gas measurements, LTE utilizes a slide hammer and three foot long steel rod to advance a hole into the ground to a depth of approximately three feet bgs. The rod is removed from the borehole and a four foot long 0.25-inch diameter polyethylene tubing is inserted into the hole. The bottom six inches of the tubing is perforated to allow gas from the subsurface to enter the tubing. The surface soil around the tubing is compacted to prevent short-circuit of downhole air flow.

Once the tubing is in place, LTE attaches a MSA<sup>®</sup> Gasport<sup>®</sup> four-gas meter to the tubing. The Gasport<sup>®</sup> is equipped with a pump which pulls a vacuum on the tubing and into the meter to



measure the concentration of methane, carbon monoxide, oxygen, and hydrogen sulfide in the air.

While gas measurements are being recorded, LTE uses a Trimble® GPS to mark the physical location of the sample measurement. Gas concentration measurements are recorded in the GPS database associated with each position. The tubing is removed from the ground once the measurement is recorded.

Vegetation is mapped based on field observations. Stressed vegetation is classified as vegetation that contains both green leaves or needles and brown or yellowish leaves or needles. The stressed vegetation is a subjective observation made based on comparisons of the stressed vegetation to nearby or surrounding lush vegetation. Dead vegetation is classified as vegetation with no green leaves or needles. The vegetation is mapped with the GPS as areas, such as a grass field with large dead areas, or as points, such as a single dead tree or stressed bush.

As areas of vegetation are mapped, subsurface measurements of methane gas are also collected in and around the vegetation to determine if methane is present. Typically, areas of vegetation impacted by methane result in complete mortality of the vegetation from grasses and low lying forbs to mature trees. Areas of stressed vegetation with associated methane in the subsurface typically indicate recent impacts from methane seepage.

Visible methane seeps are mapped in areas containing surface water. Typically, LTE will walk along the banks of a river, pond, or standing water pool and attempt to observe free methane gas seeping from the ground through the surface water in the form of bubbles. If observed, LTE uses the Gasport® and tubing fitted with a funnel at the end to capture seeping gas bubbles above the water surface. The funnel allows for an increased radius of capture. The meter can then determine if the seeping gas contains methane. Once noted, LTE marks the location of the visible seep with the GPS.

All of the data collected by the GPS is geographically corrected to a base station. The data is then plotted on an aerial photograph for evaluation.

### **Conclusions and Recommendations**

It is apparent that methane gas seeps are occurring on the Mondragon property. Methane gas was detected in the shallow subsurface soil surrounding each of the residences on site; in the fields south of the residences; and along a prominent valley on property owned by Mr. Mondragon located north of Colorado State Highway 12.

Areas of stressed/dead vegetation were noted both north and south of the highway with the largest areas located on the southern portion of the property in close proximity to the Purgatoire River.



As previously determined, there is a potential for explosive vapors to accumulate in the basement/crawlspace areas of the structures located on the property. LTE is currently installing a mitigation system to address this potential accumulation of explosive vapors.

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.

A handwritten signature in black ink, appearing to read "John D. Peterson". The signature is stylized with a large, sweeping flourish at the end.

John D. Peterson, P.G.  
Project Manager

Attachments (3)

**TABLE**



TABLE 1

**SUBSURFACE METHANE DATA  
MONDRAGON PROPERTY  
TRINIDAD, COLORADO**

Subsurface CH <sub>4</sub> Conc. (ppm)	Subsurface O <sub>2</sub> Conc. (%)	Subsurface H <sub>2</sub> S Conc. (ppm)	Subsurface CO Conc. (ppm)	Sample Date	Feature Name	Elevation (m)	Northing	Easting	Point ID
<b>North of Colorado State Highway 12</b>									
0.0	21	0	0	6/6/2005	SubGas	1923.050	4109534.288	531875.569	2
0.0	20	0	0	6/6/2005	SubGas	1922.605	4109557.435	531849.119	3
0.0	20	0	0	6/6/2005	SubGas	1922.186	4109568.738	531840.884	4
10,000.0	20	0	0	6/6/2005	SubGas	1927.705	4109565.301	531822.011	6
0.0	21	0	0	6/6/2005	SubGas	1930.190	4109530.071	531849.141	7
0.0	21	0	0	6/6/2005	SubGas	1929.832	4109492.682	531866.228	8
480,000.0	11	0	0	6/6/2005	SubGas	1929.327	4109443.211	531882.622	9
0.0	21	0	0	6/6/2005	SubGas	1929.099	4109407.254	531914.052	10
900,000.0	0	0	0	6/6/2005	SubGas	1935.337	4109551.133	531800.987	14
50,000.0	19	0	0	6/6/2005	SubGas	1936.264	4109530.495	531790.214	16
250,000.0	19	0	0	6/6/2005	SubGas	1929.585	4109486.112	531832.001	18
37,000.0	21	0	0	6/6/2005	SubGas	1944.234	4109569.064	531764.907	19
0.0	21	0	0	6/6/2005	SubGas	1946.866	4109461.043	531793.259	20
3,000.0	20	0	0	6/6/2005	SubGas	1947.982	4109408.358	531828.583	21
0.0	20	0	0	6/6/2005	SubGas	1944.181	4109360.437	531824.797	22
0.0	21	0	0	6/6/2005	SubGas	1941.617	4109299.256	531822.843	23
0.0	21	0	0	6/6/2005	SubGas	1927.546	4109260.343	531827.751	24
0.0	21	0	0	6/6/2005	SubGas	1923.464	4109242.696	531849.665	27
0.0	20	0	0	6/6/2005	SubGas	1933.344	4109236.583	531792.225	28
0.0	20	0	0	6/6/2005	SubGas	1929.167	4109268.161	531788.984	29
0.0	20	0	0	6/6/2005	SubGas	1935.322	4109300.083	531788.575	31
0.0	20	0	0	6/6/2005	SubGas	1950.709	4109343.212	531792.721	32
0.0	21	0	0	6/6/2005	SubGas	1949.521	4109323.740	531788.438	36
0.0	21	0	0	6/6/2005	SubGas	1952.524	4109389.859	531793.906	37
0.0	21	0	0	6/6/2005	SubGas	1949.109	4109430.130	531794.413	38
5,000.0	21	0	0	6/6/2005	SubGas	1949.223	4109534.727	531749.580	40
0.0	20	0	0	6/6/2005	SubGas	1950.124	4109500.209	531746.217	41
0.0	21	0	0	6/6/2005	SubGas	1946.213	4109471.954	531763.687	42
0.0	21	0	0	6/6/2005	SubGas	1952.803	4109420.949	531763.759	43
0.0	21	0	0	6/6/2005	SubGas	1959.664	4109385.029	531757.935	44
0.0	21	0	0	6/6/2005	SubGas	1958.730	4109352.039	531766.291	45
0.0	21	0	0	6/6/2005	SubGas	1950.326	4109320.331	531766.982	48
0.0	21	0	0	6/6/2005	SubGas	1933.452	4109292.638	531766.138	49
0.0	21	0	0	6/6/2005	SubGas	1938.381	4109260.146	531764.748	50
0.0	21	0	0	6/6/2005	SubGas	1948.209	4109228.846	531754.253	52
0.0	21	0	0	6/6/2005	SubGas	1953.786	4109174.561	531762.389	53
0.0	21	0	0	6/6/2005	SubGas	1946.537	4109137.372	531761.613	54
0.0	21	0	0	6/6/2005	SubGas	1935.643	4109093.760	531760.359	55
0.0	21	0	0	6/6/2005	SubGas	1926.510	4109065.566	531762.063	56
0.0	21	0	0	6/6/2005	SubGas	1924.355	4109025.400	531728.054	57
0.0	21	0	0	6/6/2005	SubGas	1940.083	4109079.685	531733.274	58
0.0	21	0	0	6/6/2005	SubGas	1959.703	4109144.733	531732.153	59
0.0	21	0	0	6/6/2005	SubGas	1956.868	4109201.841	531729.216	60
0.0	21	0	0	6/6/2005	SubGas	1944.881	4109274.291	531717.820	61
0.0	21	0	0	6/6/2005	SubGas	1951.037	4109339.597	531732.535	62
0.0	21	0	0	6/6/2005	SubGas	1958.874	4109422.212	531723.802	63
0.0	21	0	0	6/6/2005	SubGas	1949.732	4109476.317	531735.633	64
0.0	21	0	0	6/6/2005	SubGas	1952.596	4109526.151	531722.434	65
2,000.0	21	0	0	6/6/2005	SubGas	1951.418	4109564.542	531714.639	66
70,000.0	19	0	0	6/6/2005	SubGas	1952.522	4109547.153	531683.910	68
0.0	21	0	0	6/6/2005	SubGas	1954.322	4109525.123	531676.680	69
90,000.0	21	0	0	6/6/2005	SubGas	1936.002	4109497.368	531803.038	70
0.0	20	0	0	6/7/2005	SubGas	1929.405	4109475.372	531857.029	193
270,000.0	18	0	0	6/7/2005	SubGas	1932.288	4109449.047	531859.877	194
990,000.0	0	0	0	6/7/2005	SubGas	1935.363	4109414.640	531868.902	195
530,000.0	7	0	0	6/7/2005	SubGas	1928.951	4109359.116	531882.806	196
200,000.0	17	0	0	6/7/2005	SubGas	1929.319	4109318.113	531892.157	198
30,000.0	19	0	0	6/7/2005	SubGas	1924.225	4109267.105	531890.569	199
170,000.0	19	0	0	6/7/2005	SubGas	1915.775	4109219.583	531892.453	200
0.0	20	0	0	6/7/2005	SubGas	1916.597	4109276.994	531926.028	202
0.0	20	0	0	6/7/2005	SubGas	1920.063	4109352.172	531925.146	203
13,000.0	18	0	0	6/7/2005	SubGas	1919.584	4109425.623	531945.956	204
0.0	20	0	0	6/7/2005	SubGas	1924.413	4109474.969	531933.813	205
0.0	20	0	0	6/7/2005	SubGas	1921.983	4109498.765	531890.710	206



**TABLE 1**  
**SUBSURFACE METHANE DATA**  
**MONDRAGON PROPERTY**  
**TRINIDAD, COLORADO**

Subsurface CH <sub>4</sub> Conc. (ppm)	Subsurface O <sub>2</sub> Conc. (%)	Subsurface H <sub>2</sub> S Conc. (ppm)	Subsurface CO Conc. (ppm)	Sample Date	Feature Name	Elevation (m)	Northing	Easting	Point ID
<b>South of Colorado State Highway 12</b>									
26000.0	20	0	0	6/7/2005	SubGas	1916.706	4109042.729	531830.640	72
0.0	20	0	0	6/7/2005	SubGas	1916.576	4109051.206	531826.505	73
0.0	20	0	0	6/7/2005	SubGas	1917.100	4109043.141	531816.150	74
0.0	20	0	0	6/7/2005	SubGas	1916.746	4109026.063	531816.191	75
0.0	20	0	0	6/7/2005	SubGas	1915.526	4109024.513	531843.879	76
0.0	20	0	0	6/7/2005	SubGas	1916.679	4108989.590	531842.324	77
0.0	21	0	0	6/7/2005	SubGas	1915.624	4108959.667	531857.953	78
0.0	21	0	0	6/7/2005	SubGas	1917.355	4108929.805	531829.181	79
5000.0	20	0	0	6/7/2005	SubGas	1917.221	4108900.018	531820.957	80
70000.0	20	0	0	6/7/2005	SubGas	1917.023	4108893.664	531796.357	82
0.0	20	0	0	6/7/2005	SubGas	1917.134	4108868.885	531819.280	83
0.0	20	0	0	6/7/2005	SubGas	1916.902	4108836.651	531820.191	84
0.0	20	0	0	6/7/2005	SubGas	1917.818	4108804.452	531817.867	85
0.0	21	0	0	6/7/2005	SubGas	1918.066	4109018.192	531799.081	86
34000.0	19	0	0	6/7/2005	SubGas	1917.809	4109010.165	531806.273	89
110000.0	19	0	0	6/7/2005	SubGas	1916.196	4109014.990	531813.360	90
0.0	21	0	0	6/7/2005	SubGas	1916.231	4108989.037	531820.835	91
0.0	21	0	0	6/7/2005	SubGas	1917.759	4108958.430	531820.450	92
0.0	21	0	0	6/7/2005	SubGas	1919.349	4108928.461	531790.591	93
0.0	21	0	0	6/7/2005	SubGas	1919.331	4108899.494	531757.220	94
0.0	21	0	0	6/7/2005	SubGas	1918.769	4108867.509	531762.301	95
0.0	21	0	0	6/7/2005	SubGas	1920.653	4108869.065	531748.633	97
0.0	20	0	0	6/7/2005	SubGas	1918.974	4108837.119	531762.956	98
0.0	21	0	0	6/7/2005	SubGas	1918.363	4108807.679	531761.079	99
8000.0	21	0	0	6/7/2005	SubGas	1917.768	4108812.064	531783.231	101
8000.0	21	0	0	6/7/2005	SubGas	1917.829	4108778.642	531780.718	103
0.0	21	0	0	6/7/2005	SubGas	1918.321	4108780.946	531749.244	104
10000.0	21	0	0	6/7/2005	SubGas	1918.291	4108753.788	531763.327	105
5000.0	21	0	0	6/7/2005	SubGas	1917.274	4108692.608	531771.226	108
3000.0	21	0	0	6/7/2005	SubGas	1917.889	4108714.538	531762.712	109
9000.0	21	0	0	6/7/2005	SubGas	1916.145	4108699.858	531795.286	110
70000.0	21	0	0	6/7/2005	SubGas	1918.822	4108669.358	531739.010	111
70000.0	20	0	0	6/7/2005	SubGas	1918.499	4108642.966	531732.856	112
0.0	20	0	0	6/7/2005	SubGas	1918.273	4108636.731	531747.355	113
190000.0	18	0	0	6/7/2005	SubGas	1916.573	4108626.679	531767.278	114
0.0	18	0	0	6/7/2005	SubGas	1916.855	4108657.334	531786.114	115
0.0	21	0	0	6/7/2005	SubGas	1917.492	4108665.909	531766.749	116
0.0	21	0	0	6/7/2005	SubGas	1918.991	4108717.559	531728.756	117
0.0	21	0	0	6/7/2005	SubGas	1918.737	4108763.026	531731.815	118
0.0	21	0	0	6/7/2005	SubGas	1919.012	4108788.709	531730.676	119
5000.0	21	0	0	6/7/2005	SubGas	1917.258	4108741.844	531798.798	120
0.0	21	0	0	6/7/2005	SubGas	1917.068	4108741.339	531776.100	121
0.0	21	0	0	6/7/2005	SubGas	1916.209	4108745.765	531821.766	122
0.0	18	0	0	6/7/2005	SubGas	1916.718	4108783.827	531822.069	123
0.0	19	0	0	6/7/2005	SubGas	1916.576	4108806.416	531846.925	124
0.0	20	0	0	6/7/2005	SubGas	1916.408	4108838.421	531850.912	125
360000.0	18	0	0	6/7/2005	SubGas	1925.391	4108967.173	531773.190	126
0.0	21	0	0	6/7/2005	SubGas	1920.259	4108957.007	531771.180	127
0.0	21	0	0	6/7/2005	SubGas	1918.189	4108945.791	531773.235	128
0.0	21	0	0	6/7/2005	SubGas	1918.583	4108946.869	531785.367	130
0.0	19	0	0	6/7/2005	SubGas	1917.878	4108962.645	531792.099	131
0.0	20	0	0	6/7/2005	SubGas	1918.148	4108982.051	531794.298	132
0.0	20	0	0	6/7/2005	SubGas	1918.273	4109002.779	531791.359	133
0.0	20	0	0	6/7/2005	SubGas	1919.750	4108988.770	531764.512	134
0.0	20	0	0	6/7/2005	SubGas	1918.008	4108956.095	531755.011	135
0.0	20	0	0	6/7/2005	SubGas	1919.411	4108947.758	531740.576	136
0.0	20	0	0	6/7/2005	SubGas	1920.575	4108975.009	531734.654	137
0.0	20	0	0	6/7/2005	SubGas	1918.860	4108926.207	531732.098	138
0.0	20	0	0	6/7/2005	SubGas	1919.416	4108895.426	531731.413	139
0.0	20	0	0	6/7/2005	SubGas	1919.705	4108850.897	531730.787	140
0.0	20	0	0	6/7/2005	SubGas	1919.057	4108819.077	531731.324	141
0.0	20	0	0	6/7/2005	SubGas	1918.188	4108842.655	531790.320	142
0.0	20	0	0	6/7/2005	SubGas	1918.018	4108872.174	531788.689	143
0.0	20	0	0	6/7/2005	SubGas	1918.477	4108930.930	531760.964	144

**TABLE 1**  
**SUBSURFACE METHANE DATA**  
**MONDRAGON PROPERTY**  
**TRINIDAD, COLORADO**

Subsurface CH <sub>4</sub> Conc. (ppm)	Subsurface O <sub>2</sub> Conc. (%)	Subsurface H <sub>2</sub> S Conc. (ppm)	Subsurface CO Conc. (ppm)	Sample Date	Feature Name	Elevation (m)	Northing	Easting	Point ID
<b>South of Colorado State Highway 12 (continued)</b>									
0.0	20	0	0	6/7/2005	SubGas	1913.753	4108936.917	531862.724	146
10000.0	20	0	0	6/7/2005	SubGas	1914.575	4108967.575	531880.323	151
20000.0	20	0	0	6/7/2005	SubGas	1915.047	4108956.254	531909.753	152
0.0	20	0	0	6/7/2005	SubGas	1914.404	4108975.856	531897.293	153
0.0	20	0	0	6/7/2005	SubGas	1915.024	4108992.897	531880.136	154
0.0	20	0	0	6/7/2005	SubGas	1914.006	4108992.416	531913.465	157
0.0	20	0	0	6/7/2005	SubGas	1914.166	4109002.009	531929.219	158
0.0	20	0	0	6/7/2005	SubGas	1914.410	4108952.903	531920.877	161
0.0	20	0	0	6/7/2005	SubGas	1913.818	4109022.173	531914.017	162
0.0	20	0	0	6/7/2005	SubGas	1913.649	4109022.718	531879.448	163
0.0	20	0	0	6/7/2005	SubGas	1915.853	4109033.335	531847.210	164
0.0	20	0	0	6/7/2005	SubGas	1916.302	4109015.092	531826.632	165
0.0	20	0	0	6/7/2005	SubGas	1918.822	4109033.635	531833.172	166
0.0	20	0	0	6/7/2005	SubGas	1914.849	4109052.741	531855.167	167
0.0	19	0	0	6/7/2005	SubGas	1915.859	4109082.405	531851.855	168
0.0	20	0	0	6/7/2005	SubGas	1917.318	4108535.122	531730.879	169
0.0	20	0	0	6/7/2005	SubGas	1914.580	4108813.189	531877.861	171
0.0	20	0	0	6/7/2005	SubGas	1915.476	4108861.811	531880.054	173
0.0	20	0	0	6/7/2005	SubGas	1914.714	4108872.386	531921.524	174
64000.0	0	0	0	6/7/2005	SubGas	1914.564	4108895.731	531954.187	176
15000.0	18	0	0	6/7/2005	SubGas	1915.077	4108920.252	531951.785	178
16000.0	17	0	0	6/7/2005	SubGas	1912.492	4108944.144	531988.614	180
0.0	20	0	0	6/7/2005	SubGas	1913.553	4108966.810	532004.852	181
87000.0	0	0	0	6/7/2005	SubGas	1913.229	4108937.881	532008.892	182
0.0	20	0	0	6/7/2005	SubGas	1914.979	4108840.120	531978.677	186
0.0	20	0	0	6/7/2005	SubGas	1913.655	4108862.747	531952.565	187
0.0	20	0	0	6/7/2005	SubGas	1914.266	4108836.111	531926.657	188
18000.0	16	0	0	6/7/2005	SubGas	1916.816	4108798.997	531920.234	190
0.0	20	0	0	6/7/2005	SubGas	1917.595	4108902.369	531834.829	192
9000.0	18	0	0	6/7/2005	SubGas	1913.564	4109284.379	531968.462	208
66000.0	3	0	0	6/7/2005	SubGas	1912.199	4109275.414	531966.542	210
0.0	20	0	0	6/7/2005	SubGas	1910.426	4109311.372	532029.099	211
0.0	20	0	0	6/7/2005	SubGas	1912.016	4109317.358	532043.094	212

**Notes:**

CH<sub>4</sub> = Methane

O<sub>2</sub> = Oxygen

H<sub>2</sub>S = Hydrogen Sulfide

CO = Carbon Monoxide

Conc. = concentration

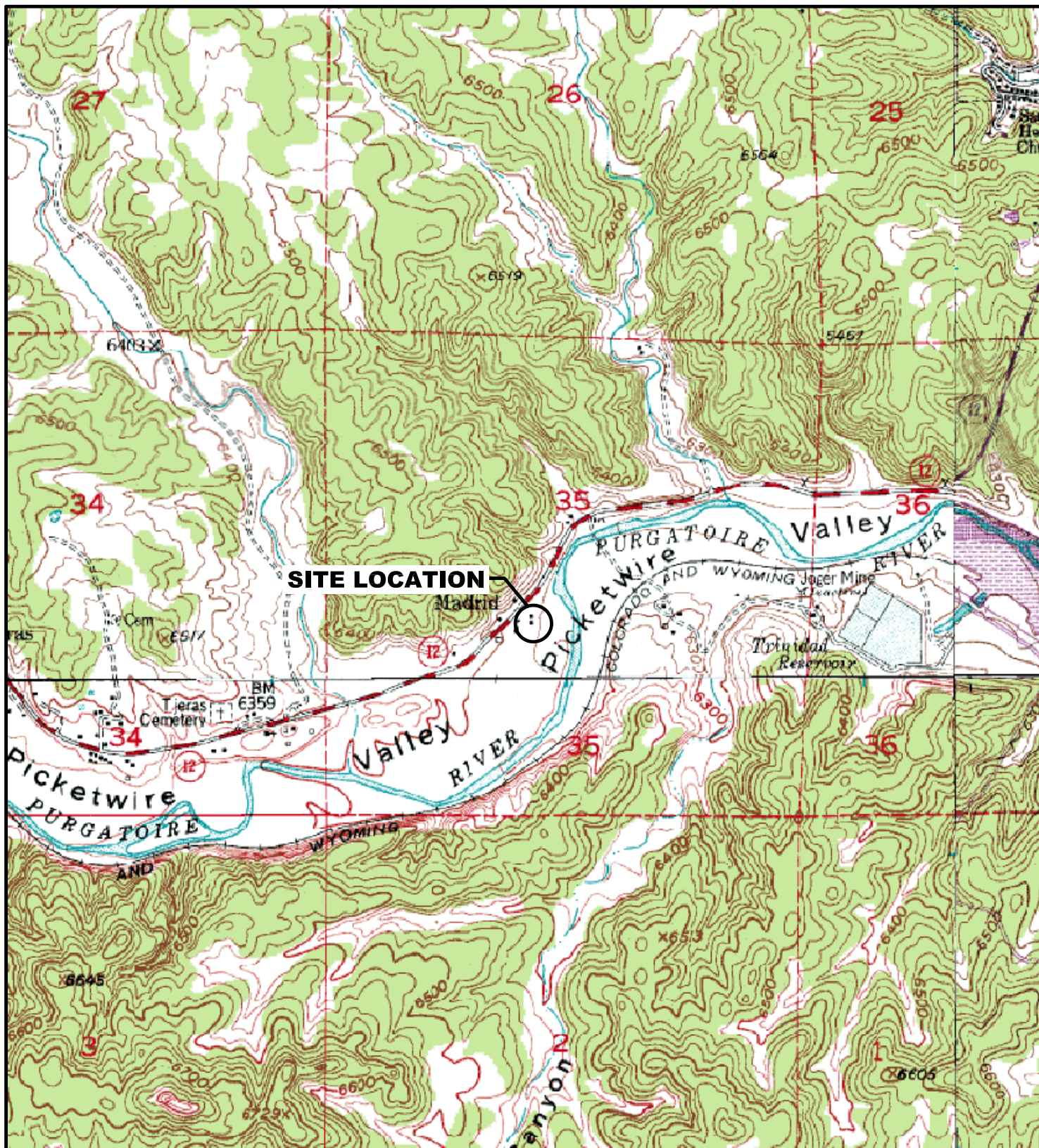
ppm = parts per million

m = meters

Coordinates based on UTM Datum NAD83

## FIGURES

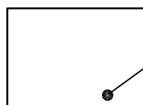




# LEGEND



**SITE LOCATION**  
T33S, R65W, SEC.35



COLORADO

SITE LOCATION

SOURCE: TOPOZONE.COM  
USGS 7.5' QUADRANGLE  
MADRID, CO 1951  
(NAD27)



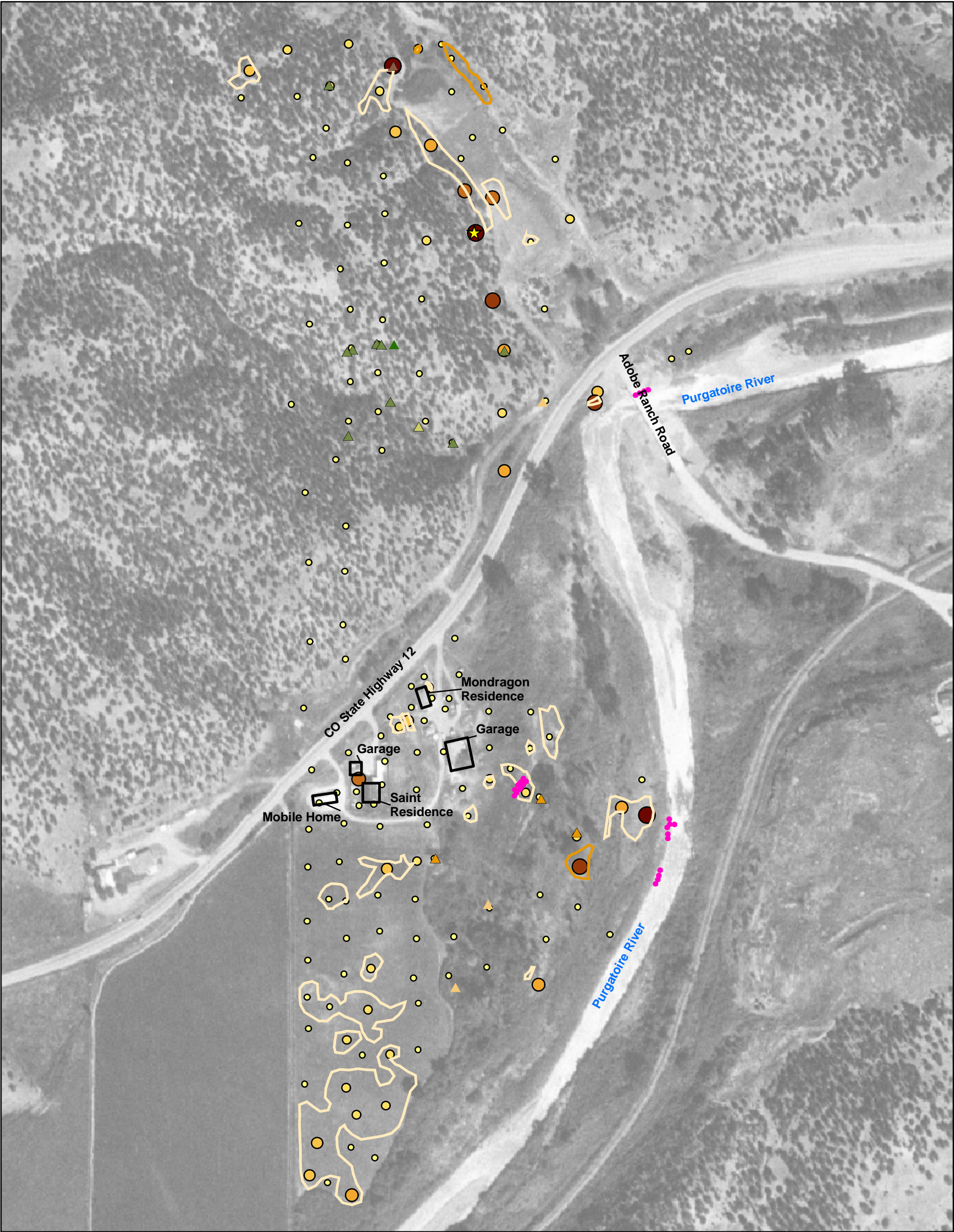
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FIGURE 1  
SITE LOCATION MAP  
MONDRAGON PROPERTY  
LAS ANIMAS COUNTY, COLORADO  
COLORADO OIL & GAS CONSERVATION COMMISSION



OGCC0402\_SL 8/04

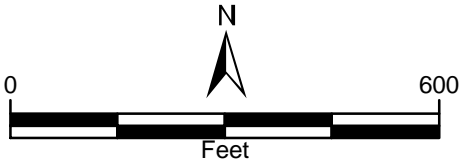




**LEGEND**

- Methane Seeps
- Gas Sample Location
- Trees
  - Stressed Pine
  - Stressed Cottonwood
  - Dead Scrub Oak
  - Dead Pine
  - Dead Juniper
  - Dead Cottonwood
- Vegetation
  - Stressed Vegetation
  - Dead Vegetation

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



**FIGURE 2**  
**MONDRAGON SAINT**  
**DETAILED SEEP MAPPING**  
**JUNE 2005**

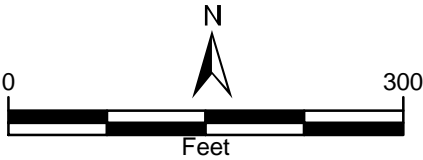




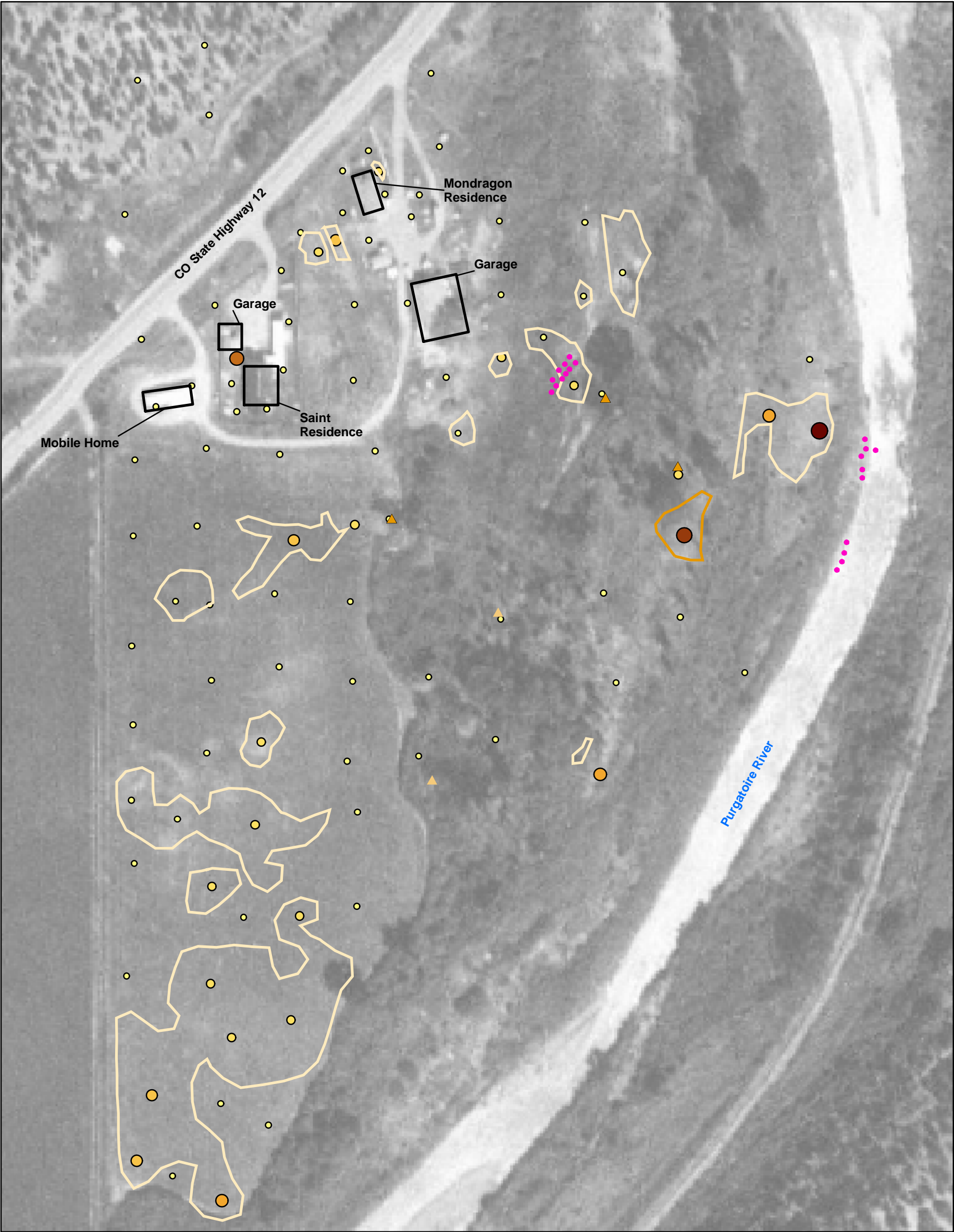


**LEGEND**

- |                   |                     |   |            |
|-------------------|---------------------|---|------------|
| ●                 | Methane Seeps       | ● | 0 ppm      |
| ★                 | Gas Sample Location | ● | 1 ppm - 5% |
| <b>Trees</b>      |                     |   |            |
| ▲                 | Stressed Pine       | ● | 5% - 15%   |
| ▲                 | Stressed Cottonwood | ● | 5% - 25%   |
| ▲                 | Dead Scrub Oak      | ● | 25% - 50%  |
| ▲                 | Dead Pine           | ● | 50% - 75%  |
| ▲                 | Dead Juniper        | ● | 75% - 100% |
| ▲                 | Dead Cottonwood     |   |            |
| <b>Vegetation</b> |                     |   |            |
| □                 | Stressed Vegetation |   |            |
| □                 | Dead Vegetation     |   |            |

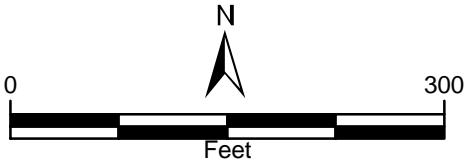


**FIGURE 3A  
MONDRAGON SAINT  
DETAILED SEEP MAPPING  
JUNE 2005**



**LEGEND**

- |                   |                     |   |            |
|-------------------|---------------------|---|------------|
| ●                 | Methane Seeps       | ● | 0 ppm      |
| ★                 | Gas Sample Location | ● | 1 ppm - 5% |
| <b>Trees</b>      |                     |   |            |
| ▲                 | Stressed Pine       | ● | 5% - 15%   |
| ▲                 | Stressed Cottonwood | ● | 5% - 25%   |
| ▲                 | Dead Scrub Oak      | ● | 25% - 50%  |
| ▲                 | Dead Pine           | ● | 50%- 75%   |
| ▲                 | Dead Juniper        | ● | 75% - 100% |
| ▲                 | Dead Cottonwood     |   |            |
| <b>Vegetation</b> |                     |   |            |
| □                 | Stressed Vegetation |   |            |
| □                 | Dead Vegetation     |   |            |



**FIGURE 3B  
MONDRAGON SAINT  
DETAILED SEEP MAPPING  
JUNE 2005**



## ATTACHMENT 1







Photograph 1: Mondragon property south of highway, Saint residence in foreground, view south.



Photograph 2: Stressed/dead vegetation along alluvial valley north of highway, view east.





Photograph 3: Stressed/dead vegetation southeast of Mondragon residence, view southeast.



Photograph 4: Dead pine trees located north of highway, no methane detected, view north.