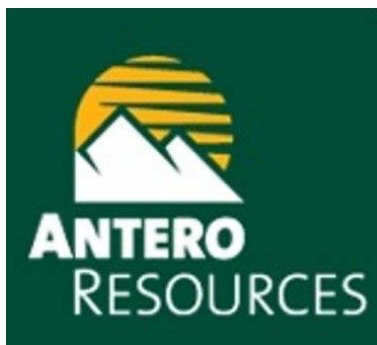


Spill # 1942191

**Soil Sampling and Analytical Results Summary  
McPherson A Well Pad Incident**

**February 24, 2009**

**Prepared for**



**Antero Resources Piceance Corporation**

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**Soil Sampling and Analytical Summary**  
**Antero Resources**  
**McPherson A Pad Incident**

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## **1.0 Introduction**

### **1.1 Project Background**

Antero Resources Piceance Corporation (Antero) experienced a loss of well control which resulted in a blowout on the McPherson A well pad at approximately 12:10 pm on November 25, 2008. The well flowed uncontrolled from approximately 12:10 on November 25, 2008 until 15:40 November 27, 2008. During this time period an undetermined amount of natural gas and fluids, in the form of frac water, produced water, and possibly some condensate, was released from the well into the air. Due to the pressures involved, the released fluids migrated through the air in the form of a fine mist which potentially could have drifted from the well pad onto surrounding properties.

Antero retained the services of HRL Compliance Solutions, Inc. (HCSI) to conduct an initial site investigation and to assess any potential effects, if any; the released fluids may have had on the surrounding properties. HCSI initially visited the site on December 1, 2008. During the site visit no adverse affects of the blowout were visually evident on areas immediately adjacent to the well pad. In direct consultation with Antero environmental staff it was decided that soil samples would be collected on the north, south, east, and west sides of the well pad approximately 50 feet from the toe of the fill slopes of the pad. In addition, it was decided that soil samples would be collected from the well pad itself after the residual kill muds and fluids had been remediated and removed from the pad. The soil samples were submitted and analyzed for the constituents established in Table 910-1 of the revised Colorado Oil and Gas Conservation Commission (COGCC) rules for oil and gas operations.

### **1.2 Project Scope and Objectives**

The objective of this investigation was to identify and sample potentially affected properties within a half mile radius of the McPherson A well pad for both surface soil and surface water contamination. Meteorological data from the Rifle Municipal Airport was utilized to construct a wind rose diagram covering the periods from November 24, 2008 to November 29, 2008. The data indicates that the prominent wind direction during the entire period was from the south-southwest and from the west. Based on this data it would appear that the properties with the greatest potential for impacts from this incident would be those to the northeast of the McPherson A well pad. However, in order to provide further due diligence on behalf of Antero, HCSI and Antero environmental staff concluded that samples would be collected from all the potentially affected properties surrounding the McPherson A well pad. In addition HCSI and Antero environmental staff conferred with Bob Chesson, the COGCC Environmental Protection Specialist for this area of Colorado on 1/19/2009 in regards to our proposed sampling strategy. We explained that for both practical and economic purposes we would like to sample for TVPH, TEPH on all of the properties and SAR, EC, and pH from one selected property

on the north, south, east and west sides of the McPherson A well pad. It was explained to Mr. Chesson that our main objective was to determine if any adjacent property owners land had been affected by the release. If analytical results indicated results that were potentially the result of the release then all of the properties would be sampled for the entire Table 910-1 in the revised COGCC rules and regulations. He agreed and stated our rationale was appropriate for what we were trying to determine.

During sample collection, HCSI worked in direct consultation with Antero Land staff representative David Strickland to contact potentially affected landowners and inform them sampling of their properties was being conducted as previously authorized.

## **2.0 Site Investigation Activities**

### **2.1 Surface Soil Sampling**

Initial surface soil samples were collected on December 2, 2008 on the north, south, east and west sides of the McPherson A well pad 50-feet from the toe of the fill slope of the pad. A composite sample was collected from each of the four sides and analyzed for the constituents established in Table 910-1 of the revised COGCC rules for oil and gas operations. HCSI visited the pad again on December 4, 2009 and collected a composite sample from the well pad after remediation had been completed and any potentially impacted soil removed. The results of these sampling events are included as Table 1. Initial Soil Sampling McPherson A well pad.

Surface soil sampling from the potentially affected property owners was conducted on January 13 and 14, 2009. The Composite samples were collected as close to the original proposed locations and as shown in Figure 1 of the previously submitted Sampling and Analysis Plan. The actual composite sample locations are depicted in Figure 1. Composite soil sample locations within a ½ mile radius of the McPherson A well pad. Analytical results from this sampling event are attached as Table 2. Soil sampling analytical results. Adjacent property owners within a ½ mile radius of the McPherson A well pad.

Sample material from both sampling events was placed directly into laboratory specified sample containers and labeled in accordance with the COGCC revised Table 910-1 analytes. Samples were submitted to Evergreen Analytical Laboratory (EAL) with proper Chain of Custody (COC) protocol.

### **2.2 Surface Water Sampling**

Surface Water was not collected as part of this investigation due to the fact none was present in the two irrigation ditches at the time of the January sampling event.

## **2.3 Surveying**

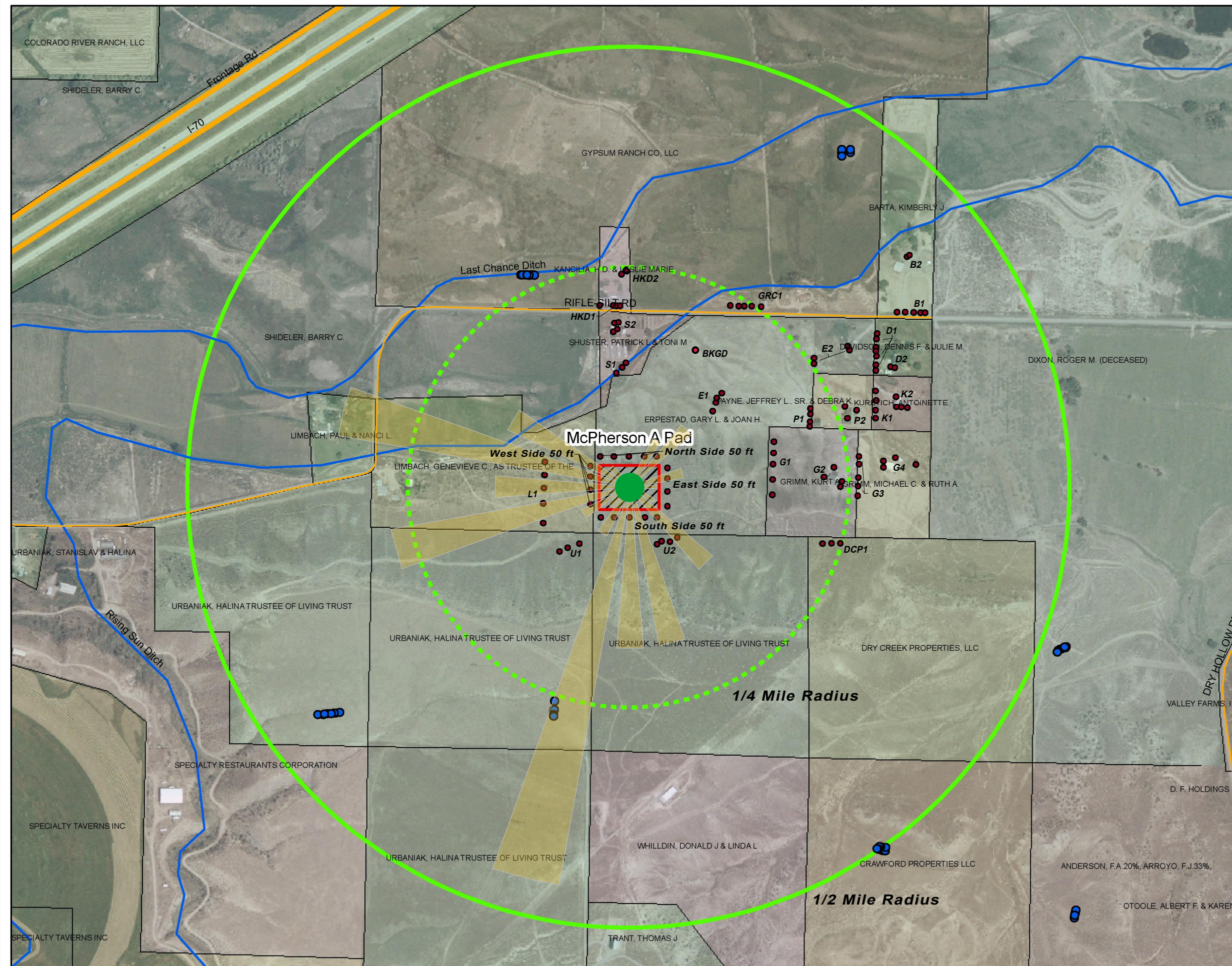
Each sampling location was surveyed with a hand held Trimble GPS unit that meets specification required by the COGCC, specifically in accordance with COGCC Rule 215.

## **3.0 Analytical Summary**

Review of the analytical data suggests that there were no impacts to the area surrounding the well pad, the pad itself, or the surrounding properties within ½ mile of the McPherson A well pad. Total Volatile Petroleum Hydrocarbon (TVPH) results were all non-detect which would most likely rule out any BTEX impacts from the release. We do see small concentrations in the Total Extractable Petroleum Hydrocarbon (TEPH) samples, however none that exceed the revised COGCC Table 910-1 guidelines. Therefore it is the opinion of HCSI that none of these small concentrations would pose a risk to any of the adjacent property owners. HCSI opines that these concentrations may be representative of the general air quality in the area due to some oil and gas activity, traffic, and wood burning. Therefore, HCSI would recommend that No Further Action is necessary in regards to this release. HCSI, on behalf of Antero, requests that the site investigation for the McPherson A well pad incident be considered closed, and further respectfully requests a letter declaring a status of “No Further Action” from the COGCC in this regard.

**Figure 1. Composite soil sample locations within a ½ mile radius of the McPherson A well pad.**

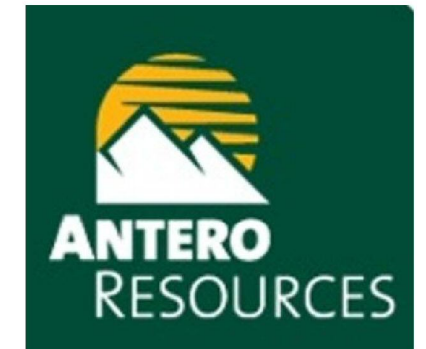




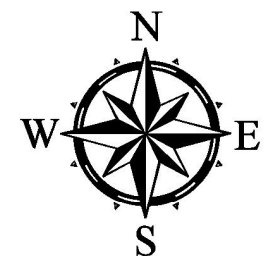
McPherson\_A\_Wellpad\_Soil\_Sampling\_02/23/09\_18:18

Figure 1. Composite soil sample locations within a 1/2 mile radius of the McPherson A well pad

## McPherson A Pad Soil Sample Locations



- Gas Wells
- Composite Sample Locations
- County Roads
- Irrigation Ditch





**Table 1. Initial soil sampling results McPherson A well pad.**



Table 1 - Initial Soil Sampling McPherson A Well Pad

Sample ID	Date	Benzene (mg/Kg)	Toluene (mg/Kg)	Ethylbenzene (mg/Kg)	Total Xylene's	Acenaphthene (mg/Kg)	Anthracene (mg/Kg)	Benzo(A)anthracence (mg/Kg)	Benzo(B)flu oranthene (mg/Kg)	Benzo(K)flu oranthene (mg/Kg)	Benzo(A)pyrene (mg/Kg)
North Side 50ft.	12/2/2008	U	U	U	U	U	U	U	U	U	U
South Side 50ft.	12/2/2008	U	U	U	U	U	U	U	U	U	U
East Side 50ft.	12/2/2008	U	U	U	U	U	U	U	U	U	U
West Side 50ft.	12/2/2008	U	U	U	U	U	U	U	U	U	U
Background	12/3/2008										
Well Pad	12/4/2008	U	U	U	U	U	U	U	U	U	U
COGCC Stds		0.17 mg/Kg	85 mg/Kg	100 mg/Kg	175 mg/Kg	1,000 mg/Kg	1,000 mg/Kg	0.22 mg/Kg	0.22 mg/Kg	2.2 mg/Kg	0.022 mg/Kg

Less Than COGCC Standards

Exceeds COGCC Standards

Notes:

- 1.) mg/Kg = milligram per kilogram = ppm = parts per million
- 2.) U = Analyte not detected

Table 1 - Initial Soil Sampling McPherson A Well Pad Contd.

Sample ID	Date	Chrysene (mg/Kg)	Dibenzo(A,H)a nthracence (mg/Kg)	Fluoranthene (mg/Kg)	Fluorene (mg/Kg)	Indeno(1,2,3,C,D) pyrene (mg/Kg)	Napthalene (mg/Kg)	Pyrene (mg/Kg)	TVPH- Gasoline (mg/Kg)	TEPH-Diesel Fuel (mg/Kg)
North Side 50ft.	12/2/2008	U	U	U	U	U	U	U	U	U
South Side 50ft.	12/2/2008	U	U	U	U	U	U	U	U	U
East Side 50 ft.	12/2/2008	U	U	U	U	U	U	U	U	25
West Side 50ft.	12/2/2008	U	U	U	U	U	U	U	U	30
Background	12/3/2008									
Well Pad	12/4/2008	U	U	U	U	U	U	U	U	34
COGCC Standards		22 mg/Kg	0.022 mg/Kg	1,000 mg/Kg	1,000 mg/Kg	0.22 mg/Kg	23 mg/Kg	1,000 mg/Kg	500 mg/Kg	500 mg/Kg

Less Than COGCC Standards

Exceeds COGCC Standards

Notes:

- 1.) mg/Kg = milligram per kilogram = ppm = parts per million
- 2.) U = Analyte not detected

Table 1 - Initial Soil Sampling McPherson A Well Pad Contd.

Sample ID	Date	Calcium* (mg/L)	Magnesium* (mg/L)	Sodium* (mg/L)	Arsenic (mg/Kg)	Barium (mg/Kg)	Boron (mg/Kg)	Cadium (mg/Kg)	Chromium (III) (mg/Kg)	Chromium (VI) (mg/Kg)	Copper (mg/Kg)
North Side 50ft.	12/2/2008	78	19	62	U	130	0.35	U	7.7	U	9.2
South Side 50ft.	12/2/2008	30	6.4	23	U	150	1	U	8.9	U	11
East Side 50 ft.	12/2/2008	96	24	97	U	71	0.27	U	5.8	U	6.9
West Side 50ft.	12/2/2008	81	9.7	120	4.4	130	0.22	U	7.8	U	9.2
Background	12/3/2008	77	22	140							
Well Pad	12/4/2008	100	28	370	U	310	0.061	U	5.4	U	5.3
COGCC Standards		*Designations were not made for parameters that do not have COGCC Stds			0.39 mg/Kg	15,000 mg/Kg	2 mg/L	70 mg/Kg	120,000 mg/Kg	23 mg/Kg	3,100 mg/Kg

Less Than COGCC Standards

Exceeds COGCC Standards

Notes:

- 1.) mg/Kg = milligram per kilogram = ppm = parts per million
- 2.) U = Analyte not detected

Table 1 - Initial Soil Sampling McPherson A Well Pad Contd.

Sample ID	Date	Lead (mg/Kg)	Mercury (mg/Kg)	Nickel (mg/Kg)	Selenium (mg/Kg)	Silver (mg/Kg)	Zinc (mg/Kg)	EC (mmhos/cm)	pH	SAR
North Side 50ft.	12/2/2008	8.8	0.025	9.7	U	U	U	831	8.92	1.6
South Side 50ft.	12/2/2008	10	0.03	12	U	U	46	326	9.35	0.1
East Side 50 ft.	12/2/2008	6.1	U	7	U	U	31	1180	9.16	2.3
West Side 50ft.	12/2/2008	9.1	0.027	9.7	U	U	41	962	9.34	0.1
Background	12/3/2008							1210	9.23	0.1
Well Pad	12/4/2008	U	U	6	U	U	21	2150	9.37	8.4
COGCC Standards		400 mg/Kg	23 mg/Kg	1,600 mg/Kg	390 mg/Kg	390 mg/Kg	23,000 mg/Kg	<4mmhos/cm or 2X background levels	6-9	<12

Less Than COGCC Standards

Exceeds COGCC Standards

Notes:

- 1.) mg/Kg = milligram per kilogram = ppm = parts per million
- 2.) U = Analyte not detected



**Table 2. Soil sampling analytical results.**  
**Adjacent property owners within a ½ mile of the McPherson A well pad.**

Table 2. Soil Sampling analytical results. Adjacent property owners within a 1/2 mile of McPhearson A well pad.

Sample I.D.	Property Owner	Sample Location	Type	Date	TVPH-Gasoline (mg/Kg)	TEPH-Diesel Fuel (mg/Kg)	Calcium* (mg/L)	Magnesium* (mg/L)	Sodium* (mg/L)	SAR
B1	Kimberly Barta	Southwest Property Corner	Soil	1/13/2009	U	22				
B2	Kimberly Barta	Structure Drip Line (Roof)	Soil	1/13/2009	U	65				
D1	Dennis F. & Julie M. Davidson	Western Property Boundary	Soil	1/13/2009	U	65				
D2	Dennis F. & Julie M. Davidson	Structure Drip Line (Roof)	Soil	1/13/2009	U	U				
P1	Jeffery L., SR.. & Debra K. Payne	Western Property Boundary	Soil	1/14/2009	U	46				
P2	Jeffery L., SR.. & Debra K. Payne	Structure Drip Line (Roof)	Soil	1/14/2009	U	32				
K1	Antoinette Kuretich	Western Property Boundary	Soil	1/13/2009	U	17				
K2	Antoinette Kuretich	Structure Drip Line (Roof)	Soil	1/13/2009	U	23				
G1	Kurt & Tammara Grimm	Western Property Boundary	Soil	1/14/2009	U	17	180	42	120	2.1
G2	Kurt & Tammara Grimm	Structure Drip Line (Roof)	Soil	1/14/2009	U	18				
G3	Michael C. & Ruth A. Grimm	Western Property Boundary	Soil	1/13/2009	U	23				
G4	Michael C. & Ruth A. Grimm	Structure Drip Line (Roof)	Soil	1/13/2009	U	30				
DCP1	Dry Creek Properties, LLC	Northwest Property Corner	Soil	1/14/2009	U	41				
U1	Halina Urbank Trustee of Living Trust	Northern Property Boundary	Soil	1/14/2009	U	33	170	21	43	0.83
U2	Halina Urbank Trustee of Living Trust	Northern Property Boundary	Soil	1/14/2009	U	37				
L1	Genevieve C. Limbach As Trustee of The	Northeast Property Corner	Soil	1/14/2009	U	35	120	16	53	1.2
S1	Patrick L. & Toni M. Shuster	Southern Property Boundary	Soil	1/13/2009	U	18	720	130	710	6.4
S2	Patrick L. & Toni M. Shuster	Structure Drip Line (Roof)	Soil	1/13/2009	U	32				
HDK1	H.D. & Leslie Marie Kanciua	Southern Portion of Property	Soil	1/13/2009	U	78				
HDK2	H.D. & Leslie Marie Kanciua	Structure Drip Line (Roof)	Soil	1/13/2009	U	36				
GRC1	Gypsum Ranch Co., LLC	Southern Property Boundary	Soil	1/13/2009	U	34				
E1	Gary L. & Joan N. Eppestad	Central Portion of Property	Soil	1/13/2009	U	30				
E2	Gary L. & Joan N. Eppestad	Structure Drip Line (Roof)	Soil	1/13/2009	U	26				
COGCC Standards					500 mg/Kg	500 mg/Kg	*Designations were not made for parameters that do not have COGCC Stds			<12

Less Than COGCC Standards

Exceeds COGCC Standards

Notes:

1.) mg/Kg = milligram per kilogram = ppm = parts per million

2.) U = Analyte not detected