



October 2, 2008

Certified Mail Return Receipt Requested # 7007 1490 0001 8186 1016

Mr. and Mrs. Tom and Anne Parise
16700 Nighthawk Ridge
Weston, CO 81091-9560

RE: Complaint 200192455
Baseline Water Well Analysis
Well Permit 191638
SWNE 26 32S, 68W Las Animas County, Colorado

Dear Mr. and Mrs. Parise:

In response to your request for a continued baseline water quality testing of your water well, the Colorado Oil and Gas Conservation Commission (COGCC) conducted a field visit to your property on July 16, 2008. The well head was screened for the presence of methane during the visit. Methane was not detected at the well head on July 16, 2008. Samples were collected on July 16, 2008 for general water quality parameters including dissolved methane analysis. These samples for analysis of inorganic parameters and dissolved methane analysis were received by Paragon Analytics (PA) in Fort Collins, Colorado on July 17, 2008. This letter summarizes the results of the chemical analyses and compares the laboratory data to published water quality standards.

FIELD TESTING

I visited your property on July 16, 2008 and you and I met at your well and we screened at the casing of your well for methane with no methane detected on this day. You assisted me during sample collection. We pumped water from an outdoor spigot located near your well for 25 minutes. I then collected samples for general inorganic water quality, dissolved methane. I did not observe bubbles in the water as it was pumped. The water was relatively clear with some gray-white particulates present. I did not notice any odor of hydrogen sulfide (rotten eggs) from the water. A 1 liter aliquot of water was filtered at the lab and the sediment present on the filter was analyzed for metals content.

COMPARISON OF INORGANIC ANALYTICAL RESULTS TO CDPHE INORGANIC STANDARDS

The Water Quality Control Commission (WQCC) of the Colorado Department of Public Health and Environment (CDPHE) has established "Domestic Use-Quality" human health standards and drinking water standards. Analytical data for the samples from your water well was compared to these standards. This information is summarized in Table 1 which is located in Attachment 1 and discussed in narrative form below. The records available to the COGCC show that samples were collected on four prior occasions in the last two years and a comparison of results is shown in Table 2 in Attachment 1. Please keep in mind that these "Domestic Use-Quality Standards" were established for **municipal public** drinking water supplies and often people use and consume ground water from private wells that exceed these standards. The laboratory data reports from Paragon Analytics are included as Attachment 2.

- **Antimony (Sb):** The CDPHE human health standard for antimony is 0.006mg/l. Antimony is a contaminate metal.

Antimony was detected in the sample collected from your water well at a concentration of 0.00087mg/l which is below the CDPHE human health standard.
- **Arsenic (As):** The CDPHE human health standard for arsenic is 0.01 mg/l. Arsenic is a highly poisonous metal.

Arsenic was not detected in the sample collected from your water well (2008).
- **Barium (Ba):** The CDPHE human health standard for barium is 2.0 mg/l. Barium is a contaminate metal.

Barium was not detected in the sample collected from your water well (2008).
- **Beryllium (Be):** The CDPHE human health standard for beryllium is 0.004mg/l. Beryllium is a contaminate metal.

Beryllium was not detected in the sample collected from your water well (2008).
- **Cadmium (Cd):** The CDPHE human health standard for cadmium is 0.005 mg/l. Cadmium is a contaminate metal.

Cadmium was not detected in the sample collected from your water well (2008).
- **Chromium (Cr):** The CDPHE human health standard for chromium is 0.1 mg/l. Chromium is a contaminate metal.

Chromium was not detected in the sample collected from your water well (2008).
- **Lead (Pb):** The CDPHE human health standard for lead is 0.05 mg/l. Prolonged exposure to this metal can result in serious health effects.

Lead was not detected in the sample collected from your water well (2008).
- **Nickel (Ni):** The CDPHE human health standard for nickel is 0.1mg/l. Nickel is a contaminate metal.

Nickel was not detected in the sample collected from your water well (2008).
- **Selenium (Se):** The CDPHE human health standard for selenium is 0.05 mg/l. Selenium is a contaminate metal.

Selenium was not detected in the sample collected from your water well (2008).
- **Silver (Ag):** The CDPHE human health standard for silver is 0.05 mg/l. Excess amounts of silver may cause a permanent gray discoloration of the skin.

Silver was not detected in the sample collected from your water well (2008).
- **Thallium (Tl):** The CDPHE human health standard for thallium is 0.002 mg/l. Thallium is a contaminate metal.

Thallium was not detected in the sample collected from your water well (2008).

- **Uranium (U)**: The CDPHE human health standard for thallium is 0.03 mg/l. Uranium can be present due to erosion of natural deposits of this element.

Uranium was not detected in the sample collected from your water well (2008).

- **Fluoride (F)**: The CDPHE human health standard for fluoride is 4.0 mg/l. Where fluoride concentrations are in the range of 0.7 mg/l to 1.2 mg/l health benefits such as reduced dental decay have been observed. Consumption of fluoride at concentrations of greater than 2.0 mg/l can result in mottling of teeth. Consumption of fluoride at concentrations greater than 4.0 mg/l can increase the risk of skeletal fluorosis or other adverse health effects. Fluoride occurs naturally in the ground water in many areas in Colorado at concentrations that exceed the drinking water standard.

Fluoride was detected in the sample collected from your water well at a concentration of 1.2mg/l (2008) which is below the CDPHE human health standard.

- **Nitrate (NO₃)**: The CDPHE human health standard for nitrate is 10.0 mg/l. Nitrate can cause cyanosis in infants; a household water supply should not contain nitrate concentration in excess of 10 mg/l.

Nitrate was not detected in the sample collected from your water well in 2008.

- **Nitrite (NO₂)**: The CDPHE human health standard for nitrite is 1.0 mg/l. Nitrite concentrations exceeding 1.0 mg/l should not be used for feeding infants.

Nitrite was not detected in the sample collected from your water well in 2008.

- **Copper (Cu)**: The CDPHE secondary drinking water standard for copper is 1 mg/l.

Copper was not detected in the sample collected from your water well in 2008.

- **Chloride (Cl)**: The CDPHE secondary drinking water standard for chloride is 250mg/l. Chloride concentrations in excess of 250 mg/l usually produce a noticeable taste in drinking water.

Chloride was detected in the sample collected from your water well (2008) at a concentration of 10mg/l which is below the CDPHE drinking water standard.

- **Iron (Fe)**: The CDPHE secondary drinking water standard for iron is 0.3mg/l. Small amounts of iron are common in ground water. Iron produces a brownish-red color in laundered clothing, can leave reddish stains on fixtures, and impart a metallic taste to beverages and food made with it. After a period of time iron deposits can build up in pressure tanks, water heaters, and pipelines, reducing the effective flow rate and efficiency of the water supply.

Iron was detected in the sample collected from your water well at a concentration of 0.35mg/l which is above the CDPHE human health standard.

- **Manganese (Mn)**: The CDPHE secondary drinking water standard for manganese is 0.05mg/l. Manganese produces a brownish color in laundered clothing, may stain fixtures and affect the taste of coffee or tea.

Manganese was detected in the sample collected from your water well in 2008 at a concentration of 0.022mg/l which is below the CDPHE drinking water standard.

- **Sulfate (SO₄)**: The CDPHE sulfate secondary standard for human drinking water is 250mg/l. Although CDPHE does not have an agricultural standard for sulfate, other agencies recommend a concentration below 1,500 mg/l for livestock watering. Waters containing high concentrations of sulfate, typically caused by the leaching of natural deposits of magnesium sulfate (Epsom salts) or sodium sulfate (Glauber's salt), may be undesirable because of their laxative effects.

Sulfate was detected in the sample collected from your water well in 2008 at a concentration of 88mg/l which is below the CDPHE drinking water standard.

- **pH**: pH is the measure of the hydrogen ion concentration in water. The pH of water in its natural state is generally from 5.5 to 9.0. The CDPHE standard for domestic and agricultural water is a range of 6.5 to 8.5. Seven (7) represents neutrality, while values less than 7 indicate increasing acidity and values greater than 7 indicate increasing alkalinity.

pH was measured in the water sample from your well (2008) with a value of 8.33 which is within the CDPHE drinking water and agricultural standard.

- **Total Dissolved Solids (TDS)**: CDPHE's TDS standard for human drinking water is 500 milligrams per liter (mg/l). Although CDPHE does not have an agricultural standard for TDS, other agencies recommend concentrations below 1500 mg/l for irrigation, and below 5,000 mg/l for most livestock watering. TDS occurs naturally in the ground water in many areas of Colorado at concentrations that exceed the drinking water standard.

TDS was measured in the water sample collected from your well in 2008 at a concentration of 340mg/l which is below the drinking water standard.

- **Zinc (Zn)**: CDPHE's Zn standard for human drinking water is 5 milligrams per liter (mg/l) and the agricultural standard is 2mg/l.

Zinc was not detected in the sample collected from your water well in 2008.

The following parameters were also measured as part of the laboratory analysis although there are no CDPHE standards.

- **Sodium (Na)**: People on salt restricted diets should be aware of the sodium concentration in the water they drink. A concentration of less than 20 mg/l is recommended by some for people on salt restricted diets or for people suffering from hypertension or heart disease. Sodium occurs naturally in the ground water in many areas of Colorado at concentrations that exceed this health advisory level.

Sodium was detected in the water sample from your well (2008) at a concentration of 94mg/l which is above the recommended level.

- **Boron (B)**:

Boron was not detected in the sample collected from your water well in 2008.

- **Calcium (Ca)**:

The calcium concentration in the sample collected from your well in 2008 was 14mg/l.

- **Magnesium (Mg):**

Magnesium was not detected in the sample collected from your well in 2008.

- **Potassium (K):**

The potassium concentration in the sample collected from your well in 2008 was 1.1mg/l.

- **Molybdenum (Mo):**

Molybdenum was detected in the water sample from your well at 0.0012mg/l in 2008.

- **Bicarbonate (HCO₃):**

Bicarbonate alkalinity was measured in the sample collected from your well in 2008 at a concentration of 170mg/l.

- **Bromide (Br):**

Bromide was not detected in the sample collected from your water well in 2008.

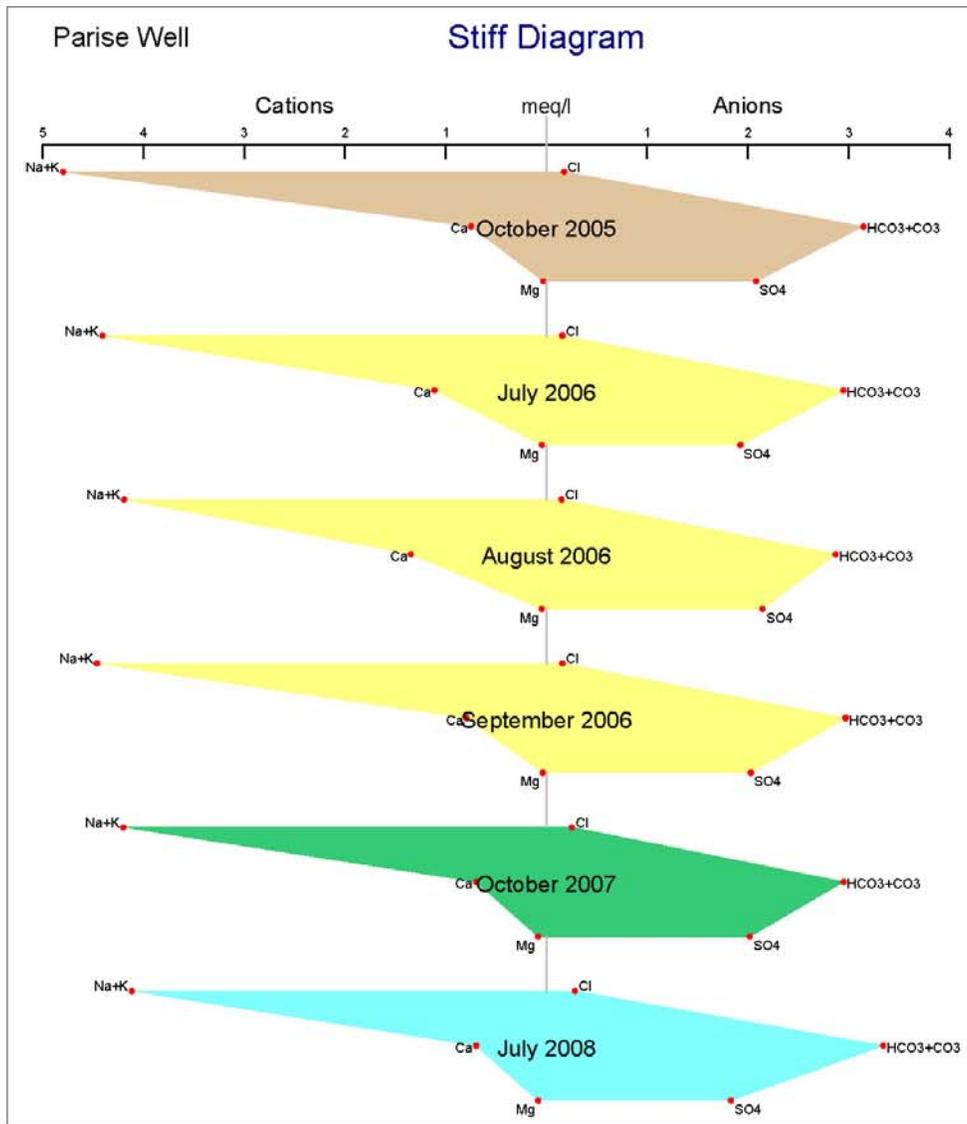
METHANE GAS ANALYSIS

Methane was detected in the sample collected from your well in 2008 at a concentration of 0.23mg/l. The concentration of methane in the water produced from the well and entering your house is below the threshold level of 1.1mg/l that could allow methane to accumulate in confined unventilated spaces and potentially be explosive.

CONCLUSIONS

As noted in the narrative discussion and summarized in Table 1, the overall quality of water produced from your well is good. Methane concentrations measured in your water are at levels that should not pose an explosion hazard if water is brought directly into your home or other confined space. Table 1 illustrates that one parameter tested (iron) is over the CDPHE drinking water standards. In at least one previous test manganese was over the secondary standard and manganese is present below the secondary standard in 2008. The presence of dissolved manganese and iron in your well water may be due to the presence of iron related bacteria in the well. The conditions that the bacteria create and maintain can enhance the solubilization of iron and manganese oxides that coat sand grains in your aquifer.

The Stiff diagram graphs below illustrate the major ion composition of the water in your well during six sampling events since 2005. Stiff diagrams are a means of visualizing the major ion chemistry of water. The plots below show that the water from you well is dominantly sodium-sulfate-bicarbonate water. The plots also illustrate that the major ion chemistry of water produced from your domestic well has not changed over the last three years. Produced water from coal bed methane (CBM) wells typically have several times higher concentrations of total dissolved solids than your well water contains. CBM produced water in the Raton Basin is characteristically of a sodium-bicarbonate nature (with lesser chloride).



If your well had been impacted by CBM produced water I would expect the concentrations of sodium, bicarbonate and possibly chloride to have increased in water from your well. The concentrations of these three ions have remained constant within the constraints of the analytical precision and accuracy of approximately $\pm 10\%$.

There were low concentrations of suspended particulates in the water from your well when we sampled the well. The lab reported a concentration of 3.3mg/l. After filtration, the lab digested the sediment and performed analysis for metals in the particulates. The results of that analysis are included in Attachment 2. The metals analysis of the suspended sediments tends to indicate the particles are aquifer material and perhaps some iron oxides. The particles contain aluminum, calcium, magnesium potassium and sodium at percent levels. Typically these elements are all present in silicate mineral particles. There are also low percent levels of iron and manganese which can come from aquifer minerals but are more likely from iron oxide particles. The iron oxide particles may be a by-product of bacterial colonies present in your well. I have arranged for Whetstone Associates to attempt to filter a larger sample of the particulates than was obtained in July, 2008. Once that sample is collected, I will arrange to have a mineralogical analysis of the particles performed (if enough particulate material can be obtained).

At present there is no data that would indicate the water quality in your domestic well has been impacted by nearby CBM drilling and operations. If you have any questions or would like to discuss these matters further, please contact me at 719-846-3091 or by email at peter.gintautas@state.co.us.

Sincerely,
Colorado Oil and Gas Conservation Commission

Peter Gintautas
Environmental Protection Specialist

Attachments: Attachment 1 - Table 1 - Analytical Summary 2008
Attachment 2 - Paragon Analytics Data Report
Attachment 3 - Table 2 - Analytical Summary 2005-2008

cc: David Neslin, Acting COGCC Director w/o attachments
Debbie Baldwin, COGCC Environmental Protection Manager w/o attachments
Margaret Ash, COGCC Environmental Protection Supervisor w/o attachments

**TABLE 1
ANALYTICAL SUMMARY
Complaint 200192455
Parise Water Well**

Parameter	Sample Date		CDPHE Standards		
	16-Jul-08		Domestic	Agriculture	Units
	Result	Unit			
Antimony	0.00087	mg/l	0.006	NS	mg/l
Boron	ND	mg/l	NS	0.75	mg/l
Copper	ND	mg/l	1	0.2	mg/l
Arsenic	ND	mg/l	0.01	0.1	mg/l
Barium	ND	mg/l	2.0	NS	mg/l
Beryllium	ND	mg/l	0.004	0.1	mg/l
Cadmium	ND	mg/l	0.005	0.01	mg/l
Calcium	14	mg/l	NS	NS	
Chromium	ND	mg/l	0.1	0.1	mg/l
Iron	0.35	mg/l	0.3	5	mg/l
Lead	ND	mg/l	0.05	0.1	mg/l
Lithium	0.02	mg/l	NS	NS	
Magnesium	ND	mg/l	NS	NS	
Manganese	0.022	mg/l	0.05	0.2	mg/l
Molybdenum	0.0012	mg/l	0.035	NS	mg/l
Nickel	ND	mg/l	0.1	0.2	mg/l
Potassium	1.1	mg/l	NS	NS	
Selenium	ND	mg/l	0.05	0.02	mg/l
Silver	ND	mg/l	0.05	NS	mg/l
Sodium	94	mg/l	NS	NS	
Strontium	0.3	mg/l	NS	NS	
Thallium	ND	mg/l	0.002	NS	mg/l
Uranium	ND	mg/l	0.03	NS	mg/l
Zinc	ND	mg/l	5	2	mg/l
Chloride	10	mg/l	250	NS	mg/l
Nitrite	ND	mg/l	1.0	10	mg/l
Nitrate	ND	mg/l	10.0	100	mg/l
Total Nitrite/Nitrate	ND	mg/l	10.0	100	mg/l
Fluoride	1.2	mg/l	4.0	NS	mg/l
Total Dissolved Solids	340	mg/l	400	*1500	mg/l
pH	8.33	No units	6.5 - 8.5	6.5 - 8.5	No units
Sulfate	88	mg/l	250	NS	mg/l
Bromide	ND	mg/l	NS	NS	
Total Alkalinity	170	mg/l	NS	NS	
Bicarbonate	170	mg/l	NS	NS	
Carbonate	ND	mg/l	NS	NS	
Conductivity	515	umhos/cm	NS	NS	
methane	0.23	mg/l	NS	NS	
Total Organic Carbon	2.7	mg/l	NS	NS	

Notes

CDPHE Colorado Department of Public Health and the Environment.
Domestic Water Quality Control Commission 5 CCR 1002-41, Regulation No. 41 - The Basic Standards For Groundwater.
Agriculture * Standards for agriculture compiled from CDPHE and other of sources.
mg/l milligrams per liter (ppm or parts per million).
umhos/cm micromhos per centimeter
NA Not analyzed.
ND Not detected.
NS No Standard.
****** Health Advisory.
Human health standard.
Secondary standard.

**TABLE 2
ANALYTICAL SUMMARY
COMPLAINT #200192455
PARISE WATER WELL**

Parameter	Water Well Sample									CDPHE Standards		
	Sample Date	Sample Date		Sample Date		Sample Date	Sample Date	Sample Date				
	18-Oct-05	31-Jul-06	07/31/2006 Duplicate	04-Aug-06	08/04/2006 Duplicate	07-Sep-06	09-Oct-07	16-Jul-08		Domestic	Agriculture	Units
	Result	Result	Result	Result	Result	Result	Result	Result	Unit			
Boron	ND	ND	ND	ND	NA	ND	ND	ND	mg/l	NS	0.75	mg/l
Copper	ND	ND	ND	ND	ND	NA	ND	ND	mg/l	1	0.2	mg/l
Arsenic	ND	ND	ND	ND	ND	NA	ND	ND	mg/l	0.01	0.1	mg/l
Barium	0.078	0.066	0.1	0.084	0.088	NA	ND	ND	mg/l	2.0	NS	mg/l
Cadmium	NA	ND	NA	ND	NA	ND	ND	ND	mg/l	0.005	0.01	mg/l
Calcium	15	22.3	NA	27	22	15.9	14	14	mg/l	NS	NS	
Chromium	NA	ND	NA	0.011	ND	NA	ND	ND	mg/l	0.1	0.1	mg/l
Iron	ND	ND	ND	NA	NA	0.081	ND	0.35	mg/l	0.3	5	mg/l
Lead	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	0.1	mg/l
Magnesium	0.4	0.55	0.48	0.58	0.48	0.43	ND	ND	mg/l	NS	NS	
Manganese	0.015	0.023	0.044	0.06	0.04	0.018	0.016	0.022	mg/l	0.05	0.2	mg/l
Potassium	0.56	ND	0.6	0.68	0.61	ND	1	1.1	mg/l	NS	NS	
Selenium	NA	ND	NA	ND	ND	NA	ND	ND	mg/l	0.05	0.02	mg/l
Silver	NA	ND	NA	NA	NA	NA	ND	ND	mg/l	0.05	NS	mg/l
Sodium	110	101	95	96	99	102	96	94	mg/l	NS	NS	
Chloride	6.2	5.6	NA	5.3	5.5	5.6	9	10	mg/l	250	NS	mg/l
Nitrite	NA	NA	NA	ND	ND	NA	ND	ND	mg/l	1.0	10	mg/l
Nitrate	ND	ND	NA	ND	ND	ND	ND	ND	mg/l	10.0	100	mg/l
Total Nitrite/Nitrate	NA	NA	NA	ND	ND	NA	ND	ND	mg/l	10.0	100	mg/l
Fluoride	1.1	0.94	NA	0.82	0.89	1	1.2	1.2	mg/l	4.0	2	mg/l
Total Dissolved Solids	340	350	NA	347	338	337	330	340	mg/l	400	*1500	mg/l
pH	7.58	7.6	NA	7.63	8.05	7.8	8.13	8.33	No units	6.5 - 8.5	6.5 - 8.5	No units
Sulfate	100	92.4	NA	103	95.3	97.4	97	88	mg/l	250		mg/l
Sulfide	4.2	0.18	NA	ND	ND	ND	NA	NA	mg/l	NS		
Bromide	NA	ND	NA	0.1	0.09	NA	ND	ND	mg/l	NS		
Total Alkalinity	160	150	NA	146	146	151	150	170	mg/l	NS		
Bicarbonate	160	150	NA	146	146	151	150	170	mg/l	NS		
Carbonate	1	ND	NA	ND	ND	ND	ND	ND	mg/l	NS		
Conductivity	NA	NA	NA	493	484	NA	537	515	umhos/cm	NS		
methane	NA	0.65	NA	0.12	0.14	0.051	0.168	0.23	mg/l	NS		

**TABLE 2
ANALYTICAL SUMMARY
COMPLAINT #200192455
PARISE WATER WELL**

Notes

CDPHE	Colorado Department of Public Health and the Environment.
Domestic	Standards for Domestic Water Supply, Human Health and Drinking Water Standards.
Agriculture	* Standards for agriculture complied from CDPHE and other of sources.
mg/l	Milligrams per liter (equals parts per million).
CDPHE Standards	Water Quality Control Commission 5 CCR 1002-41, Regulation No. 41 - The Basic Standards For Groundwater.
µmhos/cm	micromhos per centimeer
NA	Not analyzed.
ND	Not detected.
NS	No Standard.
**	Health Advisory.
	Human health standard.
	Secondary standard.