



January 28, 2009

Certified Mail Return Receipt Requested # 7008 1140 0000 3926 4669

Mr. Vince Coleman
10307 Dahlberg Road
Franktown, CO 80116-8204

RE: Complaint 200201188
Continued Monitoring – Groundwater Chemistry
NESW 10 29S, 67W Huerfano County, Colorado

Dear Vince:

The COGCC collected water samples from your domestic well as part of continued monitoring of methane gas venting from your water well and elevated dissolved methane in the water produced from your well. Water samples were collected for general organic and inorganic water quality testing as well as for analysis of dissolved methane and volatile organic compounds. A summary of the results of the chemical analyses is presented below. The analytical results are also compared to published water quality standards and to results of prior testing of water from your well.

FIELD TESTING

Peter Gintautas of the COGCC visited your property on December 29, 2008. You showed him how to divert water from your indoor treatment system to an outdoor spigot. The pump downhole powered on at 09:25. Water pumped from the well started to arrive at the cistern at 09:30. After 20 minutes of flow, I collected samples from the pipe entering the cistern. We collected samples from an indoor tap (after the treatment system and untreated samples from the pipe as it enters your indoor cistern at 09:07. The samples for general chemical analyses, dissolved methane and volatile organic compounds were then shipped to ALS Paragon in Fort Collins, CO and received on December 30, 2008.

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. 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 analytical reports from ALS Paragon 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 not detected in the sample collected from your water well.

- **Arsenic (As):** The CDPHE human health standard for arsenic is 0.05 mg/l. Arsenic is a highly poisonous metal.

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

- **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.

- **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.

- **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.

- **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.

- **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.

- **Molybdenum (Mo):** The CDPHE human health standard for molybdenum in groundwater is 0.035mg/l.

Molybdenum was detected in the sample collected from your water well at a concentration of 0.0051mg/l which is below the CDPHE human health standard.

- **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.

- **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.

- **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.

- **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.

- **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.

- **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 8.7mg/l which is above 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.

- **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.

- **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.

- **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 at a concentration of 25mg/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 not detected in the sample collected from your water well.

- **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 not detected in the sample collected from your water well.

- **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 at a concentration of 36mg/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 with a value of 8.6 which is outside the CDPHE drinking water and agricultural standards.

- **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 at a concentration of 280mg/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.

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 at a concentration of 100mg/l which is above the recommended level.

- **Boron (B)**:

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

- **Calcium (Ca)**:

The calcium concentration in the sample collected from your well was 2.8mg/l.

- **Magnesium (Mg):**

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

- **Potassium (K):**

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

- **Bicarbonate (HCO₃):**

Bicarbonate alkalinity was measured in the sample collected from your well at a concentration of 150mg/l.

- **Bromide (Br):**

The bromide concentration in the sample collected from your well was 0.33mg/l.

METHANE GAS ANALYSIS

Methane was detected in the sample collected from your well at a concentration of 28mg/l. The concentration of methane in the water produced from the well is above the threshold level of 1.1mg/l that could allow methane to accumulate in confined unventilated spaces and potentially be explosive. All samples from your well that I have a record of indicate the concentration of dissolved methane in water produced by your domestic well exceeds the 1.1mg/l threshold discussed above. The table below lists dates of sampling with associated reported concentrations of dissolved methane in water from your well. You have a vented indoor cistern that serves as a passive treatment system to reduce methane dissolved in water pumped from your domestic well and then on to your home. You also have an indoor treatment system that is vented to the outdoors. The dissolved methane concentration is water sampled from your tap which is after the cistern and the treatment system was 7.4mg/l. The vented cistern treatment system appears to be lowering the dissolved methane concentration by a factor of approximately 4 times. However the dissolved methane concentration after treatment is still greater than the threshold concentration mentioned above of 1.1mg/l that could allow for methane to buildup in enclosed spaces and potentially be explosive. You have flammable gas detectors inside your home to alert you if methane were to build up to levels well below the lower explosive limit of approximately 5% methane in air.

Date Sampled	06/20/2007	12/15/2007	3/01/2008	12/29/2008
Methane (mg/l)	10	5.9	5.1	28

VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS

Toluene was detected in water samples collected from your well in late 2007 and 2008. The concentration of toluene in water from your well has decreased by a factor of 40 since it was first analyzed and detected in water from your domestic well. Table 3 in Attachment 4 lists dates of sampling with reported concentrations of toluene from each sampling event. No volatile organic compounds other than toluene were detected in the most recent samples collected by the COGCC.

Toluene could be present in the well due to several possible causes. For example all three can be present in products used to cement PVC or other plastic piping. Benzene and toluene are typically present in crude and refined petroleum products but not in coal bed methane gas. However when refined or crude petroleum products are present as contaminants in water, there are typically numerous other organic

compounds present that were not detected in samples from your well. The presence of benzene and toluene without other organic compounds typically present in crude or refined petroleum along with the solvent acetone indicates to me the likely source is from a product used in drilling or completing your well and not from diesel fuel or from coal bed methane.

In the most recent sampling, none of the volatile organic compounds detected in water from your well were detected in the two water wells closest to your property (Hopke and Angely). These water wells were sampled two to three weeks earlier in December, 2008 than your well was sampled. Both of those wells had been sampled and analyzed twice previously since November, 2007 for volatile organic compounds. None of the six compounds listed in Table 3 and detected in water from your well were detected in the two closest neighboring water wells during prior sampling in at the Hopke well in three sampling and analysis events (November 2007, March 2008 and December 2008 or in the Angely well in three recent sampling and analysis events (December 2007, March 2008 and December 2008).

Toluene was detected in samples collected from the recently drilled and installed monitoring well on lot 55 near your property. The samples were collected shortly after completion of drilling. The chemistry of the water indicated that even though the monitoring well was pumped for many hours before sampling that grout, mud and other products used in drilling may have been still present and impacting the results. Toluene was detected in one of two samples collected during a November, 2007 test of the Rohr 09-04 and the Rohr 04-14 coal bed methane wells. The concentration of toluene detected in the Rohr 09-04 was more than 100 times less than the concentration of toluene detected in water from your well in November 2007. Toluene was not detected in the sample collected from the Rohr 04-14 by either lab that analyzed duplicate samples collected in October, 2007. Other CBM wells in your vicinity have not been active since July, 2007 so samples for comparison cannot be collected at this time.

CONCLUSIONS

Table 1 in Attachment 1 compares the results of the most recent sampling and analysis event to the groundwater standards promulgated by the Water Quality Control Commission of the Colorado Department of Public Health and the Environment. All parameters tested are below the groundwater standards. No standard exists for dissolved methane in groundwater or drinking water.

Table 2 in Attachment 3 compares general analytical results from samples collected since 2007 from your domestic water well. The analytical results shown in Table 2 do not indicate any significant changes in overall water chemistry since the June 2007 sampling event.

At this time, there is no evidence that the toluene present in your well is a result of activities of Petroglyph. The highest concentration of toluene detected in water or CBM wells near your well has been in water from your well. Pollutants, such as toluene, will disperse away from a point source in groundwater. That toluene concentrations are higher in your well water than in samples collected from neighboring wells tends to indicate the source of the toluene is closer to your well than to the other wells. The decreasing toluene concentrations in water from your well over time are consistent with a limited source of toluene within the well itself. As we have discussed, I think that the information we have shows that the most likely source of the toluene in your water is a product used in your well.

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 . We appreciate your continued cooperation with the staff of the COGCC in granting continued access to sample and investigate the occurrence of methane in the Poison Canyon aquifer.

Sincerely,
Colorado Oil and Gas Conservation Commission

Peter Gintautas
Environmental Protection Specialist

Attachments: Attachment 1 - Table 1 - Analytical Summary
 Attachment 2 - ALS Paragon Reports
 Attachment 3 - Table 2 - Summary of 2007-2008 Analytical Results
 Attachment 4 - Table 3 – VOC Analytical Summary

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
 Tom Melland, Petroglyph w/o attachments

TABLE 1
ANALYTICAL SUMMARY
Complaint 200201188
Coleman Water Well

Parameter	Water Sample		CDPHE Standards		
	Sample Date				
	29-Dec-08				
	Result	Unit	Domestic	Agriculture	Units
Antimony	ND	mg/l	0.006	NS	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
Boron	ND	mg/l	NS	0.75	mg/l
Cadmium	ND	mg/l	0.005	0.01	mg/l
Calcium	2.8	mg/l	NS	NS	
Chromium	ND	mg/l	0.1	0.1	mg/l
Cobalt	ND	mg/l	NS	0.05	mg/l
Copper	ND	mg/l	1	0.2	mg/l
Iron	ND	mg/l	0.3	5	mg/l
Lead	ND	mg/l	0.05	0.1	mg/l
Lithium	ND	mg/l	NS	NS	
Magnesium	ND	mg/l	NS	NS	
Manganese	ND	mg/l	0.05	0.2	mg/l
Molybdenum	0.0051	mg/l	0.035	NS	mg/l
Nickel	ND	mg/l	0.1	0.2	mg/l
Potassium	ND	mg/l	NS	NS	
Selenium	ND	mg/l	0.05	0.02	mg/l
Silver	ND	mg/l	0.05	NS	mg/l
Sodium	100	mg/l	NS	NS	
Strontium	0.069	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	25	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	8.7	mg/l	4.0	NS	mg/l
Total Dissolved Solids	280	mg/l	400	*1500	mg/l
pH	8.6	No units	6.5 - 8.5	6.5 - 8.5	No units
Sulfate	36	mg/l	250	NS	mg/l
Bromide	0.33	mg/l	NS	NS	
Total Alkalinity	160	mg/l	NS	NS	
Bicarbonate	150	mg/l	NS	NS	
Carbonate	ND	mg/l	NS	NS	
Conductivity	481	umhos/cm	NS	NS	
methane	28	mg/l	NS	NS	
Total Organic Carbon	1.3	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 complied 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 2007 to 2008
Complaint 200201188
Coleman Water Well

Parameter	Water Sample				CDPHE Standards		
	Sample Date	Sample Date	Sample Date				
	20-Jun-07	11-Nov-07	29-Dec-08				
	Result	Result	Result	Unit	Domestic	Agriculture	Units
Antimony	NA	ND	ND	mg/l	0.006	NS	mg/l
Arsenic	ND	ND	ND	mg/l	0.01	0.1	mg/l
Barium	0.0469	0.0592	ND(<0.1)	mg/l	2.0	NS	mg/l
Beryllium	NA	ND	ND	mg/l	0.004	0.1	mg/l
Boron	0.0569	ND(<0.2)	ND(<0.1)	mg/l	NS	0.75	mg/l
Cadmium	ND	ND	ND	mg/l	0.005	0.01	mg/l
Calcium	4.2	NA	2.8	mg/l	NS	NS	
Chromium	ND	ND	ND	mg/l	0.1	0.1	mg/l
Cobalt	NA	NA	ND	mg/l	NS	0.05	mg/l
Copper	ND	ND	ND	mg/l	1	0.2	mg/l
Iron	ND(<0.07)	0.922	ND(<0.1)	mg/l	0.3	5	mg/l
Lead	ND	ND	ND	mg/l	0.05	0.1	mg/l
Lithium	NA	NA	ND	mg/l	NS	NS	
Magnesium	ND	NA	ND	mg/l	NS	NS	
Manganese	0.0143	0.0213	ND(<0.01)	mg/l	0.05	0.2	mg/l
Molybdenum	NA	0.00668	0.0051	mg/l	0.035	NS	mg/l
Nickel	NA	ND	ND	mg/l	0.1	0.2	mg/l
Potassium	0.4	NA	ND(<1)	mg/l	NS	NS	
Selenium	ND	ND	ND	mg/l	0.05	0.02	mg/l
Silver	ND	ND	ND	mg/l	0.05	NS	mg/l
Sodium	113	132	100	mg/l	NS	NS	
Strontium	NA	0.0863	0.069	mg/l	NS	NS	
Thallium	NA	ND	ND	mg/l	0.002	NS	mg/l
Uranium	NA	NA	ND	mg/l	0.03	NS	mg/l
Zinc	NA	0.012	ND	mg/l	5	2	mg/l
Chloride	27.4	NA	25	mg/l	250	NS	mg/l
Nitrite	ND	NA	ND	mg/l	1.0	10	mg/l
Nitrate	ND	NA	ND	mg/l	10.0	100	mg/l
Total Nitrite/Nitrate	ND	NA	ND	mg/l	10.0	100	mg/l
Fluoride	9.88	NA	8.7	mg/l	4.0	NS	mg/l
Total Dissolved Solids	297	NA	280	mg/l	400	*1500	mg/l
pH	8.52	NA	8.6	No units	6.5 - 8.5	6.5 - 8.5	No units
Sulfate	32.7	NA	36	mg/l	250	NS	mg/l
Bromide	0.343	NA	0.33	mg/l	NS	NS	
Total Alkalinity	153	NA	160	mg/l	NS	NS	
Bicarbonate	150	NA	150	mg/l	NS	NS	
Carbonate	ND	NA	ND	mg/l	NS	NS	
Conductivity	451	NA	481	umhos/cm	NS	NS	
methane	10	NA	28	mg/l	NS	NS	
Total Organic Carbon	NA	NA	1.3	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 complied 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.
	Secondarily standard.

TABLE 3
ANALYTICAL SUMMARY
Complaint 200201188
Coleman Water Well

Parameter	Water Well Samples						CDPHE Standards		
	Sample Date	Sample Date	Sample Date	Sample Date	Sample Date				
	10-Nov-07	15-Dec-07	30-Jan-08	26-Mar-08	29-Dec-08				
	Result	Result	Result	Result	Result	Unit	Drinking Water	Groundwater	Unit
chloromethane	ND (<0.5)	ND (<4.0)	0.270	ND (<1.0)	ND (<1.0)	µg/l	NS	NS	µg/l
acetone	NA	48	20	9.5	ND(<10)	µg/l	NS	NS	µg/l
chloroform	0.83	ND (<2.0)	1.4	1.1	ND (<1.0)	µg/l	80	3.5	µg/l
benzene	ND (<0.5)	ND (<2.0)	0.24	0.24	ND (<1.0)	µg/l	5.0	5	µg/l
dibromomethane	ND (<0.5)	ND (<2.0)	0.25	ND (<1.0)	ND (<1.0)	µg/l	NS	NS	µg/l
toluene	139	86	62	63	4.3	µg/l	1000	560	µg/l

Notes

CDPHE
Domestic
µg/l

CDPHE Standards

NA

ND (<4.0)

NS

Colorado Department of Public Health and the Environment
Standards for Domestic Water Supply, Human Health and Drinking Water Standards
micrograms per liter (equals parts per billion or ppb)
Water Quality Control Commission 5 CCR 1002-41, Regulation No. 41 - The Basic
Standards For Groundwater
not analyzed
not detected (less than 4.0µg/l)
no standard