STATE OF COLORADO
OIL & GAS
CONSERVATION COMMISSION

January 28, 2009

Certified Mail Return Receipt Requested # 7008 1140 0000 3926 4782

Mr. Don Derowitsch
9288 Arizona Avenue
Lakewood, CO 80232-5175

RE: Complaint 200199691
Continued Monitoring – Groundwater Chemistry
SESE 2 29S, 67W Huerfano County, Colorado

Dear Don:

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

Christa Whitmore of Whetstone Associates and Peter Gintautas of the COGCC visited your property on December 8, 2008. We started water flowing from an outdoor spigot at 10:06 at approximately 4.5 gallons per minute. Samples were collected at 10:43 after water temperature, conductivity and pH had been stable for several minutes. 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 9, 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 not detected in the sample collected from your water well.

- **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 4.3mg/l which is above the CDPHE human health standard.

- **Nitrate (NO_3):** 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 (NO_2):** 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 39mg/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 (SO_4):** 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 79mg/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 8.53 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 440mg/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 150mg/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 3.2mg/l.

- **Magnesium (Mg):**

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

- **Potassium (K):**

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

- **Bicarbonate (HCO_3):**

  Bicarbonate alkalinity was measured in the sample collected from your well at a concentration of 200mg/l.

- **Bromide (Br):**

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

METHANE GAS ANALYSIS

Methane was detected in the sample collected from your well at a concentration of 3.4mg/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 outdoor 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 a Venturi effect treatment system in your cistern that is vented to the outdoors that was installed after the September, 2007 sampling. The Venturi treatment system appears to reduce the concentration of dissolved methane by a factor of approximately 5-fold. 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	09/18/2007 untreated	01/12/2008 treated	3/01/2008 treated	12/8/2008 treated
Methane (mg/l)	21.2	4.83	4.0	3.4

VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS

There were 70 volatile organic compounds included in the target list for the analysis of the samples collected in December 2008. There were 58 compounds included in the target list for the samples collected in November 2007 by Petroglyph. No volatile organic compounds were detected in samples collected from your domestic well by Petroglyph or the COGCC. The samples were collected after the Venturi treatment system was installed which could influence the results of the testing.

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 with the exception of pH and fluoride. The results for fluoride concentration and the pH measurement are consistent with those from the 2007 sampling event. 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 September 2007 sampling event.

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

Digitally signed by Peter Gintautas
DN: cn=Peter Gintautas, o=Colorado Oil and Gas Conservation Commission, ou, email=peter.gintautas@state.co.us, c=US
Date: 2009.01.27 16:42:25 -07'00'

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

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 200199691
Derowitsch Water Well

Parameter	Water Sample		CDPHE Standards		
	Sample Date				
	08-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
Berylium	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	3.2	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	ND	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	150	mg/l	NS	NS	
Strontium	0.11	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	39	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	4.3	mg/l	4.0	NS	mg/l
Total Dissolved Solids	440	mg/l	400	*1500	mg/l
pH	8.53	No units	6.5 - 8.5	6.5 - 8.5	No units
Sulfate	79	mg/l	250	NS	mg/l
Bromide	ND	mg/l	NS	NS	
Total Alkalinity	210	mg/l	NS	NS	
Bicarbonate	200	mg/l	NS	NS	
Carbonate	ND	mg/l	NS	NS	
Conductivity	760	umhos/cm	NS	NS	
methane	3.4	mg/l	NS	NS	
Total Organic Carbon	1.5	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).
µmhos/cm	micromhos per centimeter
NA	Not analyzed.
ND	Not detected.
NS	No Standard.
******	Health Advisory.
	Human health standard.
	Secondardy standard.

TABLE 2
ANALYTICAL SUMMARY 2007 to 2008
Complaint 200199691
Derowitsch Water Well

Parameter	Water Sample				CDPHE Standards		
	Sample Date	Sample Date	Sample Date				
	18-Sep-07	12-Nov-07	08-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	ND(<0.1)	0.0597	ND(<0.1)	mg/l	2.0	NS	mg/l
Berylium	NA	ND	ND	mg/l	0.004	0.1	mg/l
Boron	ND	ND	ND	mg/l	NS	0.75	mg/l
Cadmium	ND	ND	ND	mg/l	0.005	0.01	mg/l
Calcium	6	NA	3.2	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	0.15	0.519	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	0.012	0.0131	ND(<0.01)	mg/l	0.05	0.2	mg/l
Molybdenum	ND	ND	ND	mg/l	0.035	NS	mg/l
Nickel	NA	ND	ND	mg/l	0.1	0.2	mg/l
Potassium	1.1	NA	1.1	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	150	195	150	mg/l	NS	NS	
Strontium	NA	0.129	0.11	mg/l	NS	NS	
Thallium	ND	ND	ND	mg/l	0.002	NS	mg/l
Uranium	NA	NA	ND	mg/l	0.03	NS	mg/l
Zinc	NA	0.0102	ND(<0.02)	mg/l	5	2	mg/l
Chloride	39	NA	39	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	4.3	NA	4.3	mg/l	4.0	NS	mg/l
Total Dissolved Solids	530	NA	440	mg/l	400	*1500	mg/l
pH	8.36	NA	8.53	No units	6.5 - 8.5	6.5 - 8.5	No units
Sulfate	110	NA	79	mg/l	250	NS	mg/l
Bromide	0.7	NA	ND(<0.2)	mg/l	NS	NS	
Total Alkalinity	190	NA	210	mg/l	NS	NS	
Bicarbonate	190	NA	200	mg/l	NS	NS	
Carbonate	ND	NA	ND	mg/l	NS	NS	
Conductivity	746	NA	760	umhos/cm	NS	NS	
methane	21.2	NA	3.4	mg/l	NS	NS	
Total Organic Carbon	NA	NA	1.5	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 Groundwate
Agriculture	* Standards for agriculture complied from CDPHE and other of sources.
mg/l	milligrams per liter (ppm or parts per million).
µmhos/cm	micromhos per centimeter
NA	Not analyzed.
ND	Not detected.
NS	No Standard.
****	Health Advisory.
	Human health standard.
	Secondardy standard.