



September 26, 2008

Certified Mail Return Receipt Requested # 7007 1490 0001 8186 0996

Ms. Marcia Dasko
15301 Logging Canyon Road
Weston, CO 81091-9558

RE: Complaint 200190667
Water Well Analysis
Well Permit 191184
SENW 35 32S, 68W Las Animas County, Colorado

Dear Ms. Dasko:

In response to your concerns regarding possible impacts to water quality from coal bed methane (CBM) operations in the area near your home, the Colorado Oil and Gas Conservation Commission (COGCC) conducted a field visit to your property on June 10, 2008. Water samples were collected for general organic and inorganic water quality testing as well as for analysis of dissolved methane tests. 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. The Niagara 23-35R coal bed methane (CBM) well had been drilled and completed in the weeks prior to the June 10, 2008 sampling event.

FIELD TESTING

I visited your property on June 10, 2008 and you and I walked to your domestic water well so that I could determine if methane was venting from your water well. I determined that there was no methane venting from the casing of your water well before the pump was started. We started water flowing from your outdoor hydrant at approximately 7.5 gallons per minute at 09:56. We collected samples from your well using the hydrant installed near the well casing after pumping the well for 24 minutes. The water temperature had been stable at 52°F for eleven minutes at the time of sampling. The samples were shipped to TestAmerica Laboratories in Arvada, CO and received on June 11, 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 results were delivered to you previously. Table 1 also includes results from testing you had conducted in 2005 on water from your well as well as data from samples collected in February 2008 prior to drilling and completion of the Niagara 23-35R. The analytical reports from TestAmerica 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 detected in the sample collected from your water well at a concentration of 0.074mg/l which is below the CDPHE human health standard.

- **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.

- **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 1.1mg/l 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.

- **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 7.4mg/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 66mg/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 8.1 which is within 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 270mg/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 water sample collected from your 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 88mg/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 12mg/l.

- **Magnesium (Mg):**

The magnesium concentration in the sample collected from your well was 1mg/l.

- **Potassium (K):**

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

- **Molybdenum (Mo):**

Molybdenum 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):**

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

METHANE GAS ANALYSIS

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

VOLATILE ORGANIC COMPOUND ANALYSIS

A target list of sixty-six volatile organic compounds (VOC) was utilized during analysis of water from your well. None of the 66 target compounds were detected in water samples from your well. Three tentatively identified compounds were detected in the water samples from your well. The lab identified all three as unknown. All three are relatively long chain hydrocarbons. The three volatile TIC's may be artifacts of the analytical process as all were present in the method blank analyzed with the samples from your well.

SEMI-VOLATILE ORGANIC COMPOUND ANALYSIS

A target list of sixty-three semi-volatile organic compounds (SVOC) was utilized during analysis of water from your well. None of the 63 target compounds were detected in water samples from your well. Two tentatively identified compounds were detected in the water samples from your well. The analyst tentatively identified both TIC's as unknown. Both TIC's are possibly artifacts of the sampling and analysis process as the same peaks at similar retention times were present in another sample collected on the same day. Both semi-volatile TIC's were also present in the method blank prepared and analyzed along with the sample from your domestic well. The presence in the method blank indicates the TIC's are artifacts of the analytical process.

CONCLUSIONS

The inorganic chemistry of water from your well is not similar to coal bed methane (CBM) produced water and does not appear to have been impacted by CBM operations in the vicinity of your home. CBM produced water is typically much higher in sodium content than your well water is. CBM produced water typically has much greater levels of total dissolved solids than water from your well.

Table 1 shows a comparison of results from a sample collected from your well in 2005 by a private consultant to the results of two sampling and analysis events in 2008. The overall chemistry of the water from your well has not changed. The water is predominantly of a sodium-bicarbonate character. Most parameters that were analyzed on all three occasions have similar concentrations with several lower in 2008 than in 2005. However, the pH of water from your well was 7.7 when sampled in 2005 and the pH was 8.04 when measured at the laboratory in 2008. Total dissolved solids (TDS) were slightly lower in 2008 than in 2005. TDS is a good indicator of overall inorganic water quality. None of the more than 140 organic target analytes was detected in water from your well. No analyte measured exceeds the groundwater standards of the state of Colorado. Higher pH may be an artifact of shock chlorinating your water well. Bacterial colonies and their metabolic processes in a well are capable of maintaining a pH close to 7 as that is their preferred growth habitat. Calcium concentrations have decreased since 2005. The decrease in calcium concentration in the water is likely due to the increase in pH with subsequent precipitation of calcium carbonate minerals.

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
Attachment 2 - TestAmerica Analytical Data

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 200190667
Dasko Water Well**

Parameter	Water Well Sample				CDPHE Standards		
	Sample Date	Sample Date	Sample Date	Unit	Domestic	Agriculture	Units
	04-May-05	06-Feb-08	10-Jun-08				
	Result	Result	Result				
Antimony	NA	ND	ND	mg/l	0.006	NS	mg/l
Boron	ND	ND	ND	mg/l	NS	0.75	mg/l
Copper	0.011	ND(<0.01)	ND(<0.015)	mg/l	1	0.2	mg/l
Arsenic	ND	ND	ND	mg/l	0.01	0.1	mg/l
Barium	0.17	ND(<0.1)	0.074	mg/l	2.0	NS	mg/l
Beryllium	NA	ND	ND	mg/l	0.004	0.1	mg/l
Cadmium	NA	ND	ND	mg/l	0.005	0.01	mg/l
Calcium	29	13	12	mg/l	NS	NS	
Chromium	NA	ND	ND	mg/l	0.1	0.1	mg/l
Iron	0.28	ND(<0.1)	ND(<0.1)	mg/l	0.3	5	mg/l
Lead	ND	ND	ND	mg/l	0.05	0.1	mg/l
Lithium	NA	ND	ND	mg/l	NS	NS	
Magnesium	3.3	1.2	1	mg/l	NS	NS	
Manganese	0.53	ND(<0.1)	ND(<0.01)	mg/l	0.05	0.2	mg/l
Molybdenum	NA	0.0016	ND(<0.002)	mg/l	0.035	NS	mg/l
Nickel	NA	ND	ND	mg/l	0.1	0.2	mg/l
Potassium	0.8	ND(<1)	ND(<3)	mg/l	NS	NS	
Selenium	NA	ND	ND	mg/l	0.05	0.02	mg/l
Silver	NA	ND	ND	mg/l	0.05	NS	mg/l
Sodium	85	80	88	mg/l	NS	NS	
Strontium	NA	0.31	0.28	mg/l	NS	NS	
Thallium	NA	ND	ND	mg/l	0.002	NS	mg/l
Uranium	NA	0.00012	ND(<0.001)	mg/l	0.03	NS	mg/l
Zinc	NA	ND	ND	mg/l	5	2	mg/l
Chloride	6	6.2	7.4	mg/l	250	NS	mg/l
Nitrite	NA	ND	ND	mg/l	1.0	10	mg/l
Nitrate	ND	ND	ND	mg/l	10.0	100	mg/l
Total Nitrite/Nitrate	NA	ND	ND	mg/l	10.0	100	mg/l
Fluoride	0.56	0.82	1.1	mg/l	4.0	NS	mg/l
Total Dissolved Solids	300	270	270	mg/l	400	*1500	mg/l
pH	7.7	8.04	8.1	No units	6.5 - 8.5	6.5 - 8.5	No units
Sulfate	77	67	66	mg/l	250	NS	mg/l
Bromide	NA	ND	ND	mg/l	NS	NS	
Total Alkalinity	160	150	150	mg/l	NS	NS	
Bicarbonate	160	150	150	mg/l	NS	NS	
Carbonate	1	ND	ND	mg/l	NS	NS	
Conductivity	NA	446	460	umhos/cm	NS	NS	
methane	0.72	0.0097	ND(<0.005)	mg/l	NS	NS	
Total Organic Carbon	NA	ND(<1)	1.1	mg/l	NS	NS	

Notes

CDPHE
Domestic
Agriculture
mg/l
umhos/cm
NA
ND
NS

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