



## DEPARTMENT OF NATURAL RESOURCES

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September 11, 2013

Mr. Thomas and Mrs. Teri Peterson  
16786 WCR 32  
Platteville, CO 80651

Re: Water Well Sampling Results  
Peterson Water Well DWR Permit No. 176702  
COGCC Sample Facility ID 705064 (Project Facility ID 434043)

Dear Mr. and Mrs. Peterson:

The Colorado Oil and Gas Conservation Commission (COGCC) is conducting an investigation of the potential presence of methane in water produced from domestic water wells in your area. You agreed to allow COGCC to collect a sample from your water well, and on August 21, 2013, COGCC Staff conducted a field visit to visually inspect the water well, purge water from the well and to collect a water sample. The water sample was analyzed for general organic and inorganic constituents, and dissolved gasses. This letter summarizes the water quality results.

This is the second sample collected from your water well for which results are present in the COGCC Environmental Sample Database. A previous sample was collected by an industry contractor on April 21, 2006 in accordance with COGCC Rule 318A, which required Operators to collect baseline ground water samples prior to drilling oil and gas wells termed "infill wells" in a governmental Section.

### FIELD TESTING

The water sample was collected from a faucet near the pressure tank in the well house. The valve on the faucet was turned on at approximately 10:30 a.m. and allowed to run for 20 minutes at a rate of approximately 8 to 10 gallons per minute. The water was clear, with no discernible effervescence or sediment. A slight sulfur odor was present in the purge water. The sample was collected in laboratory certified containers at 11:00 a.m. The containers were labeled, placed on ice in a cooler, and delivered to ALS Environmental in Fort Collins, Colorado with a chain-of-custody form.

### DISCUSSION OF ANALYTICAL RESULTS

The Water Quality Control Commission (WQCC) of the Colorado Department of Public Health and Environment (CDPHE) established "Domestic Use – Quality" Human Health Standards and Secondary Drinking Water Standards in Regulation 41 "The Basic Standards for Groundwater" (5CCR 1002-41). It is important to note that these standards were established for **municipal public drinking water supplies**, and that people often use and consume groundwater from private wells

that exceeds these standards. The COGCC is an implementing agency of the groundwater standards for impacts associated with oil and gas exploration and production activities.

Analytical data for the sample from your water well was compared to the CDPHE Human Health Standards and Secondary Drinking Water Standards in the table provided as Attachment 1. The complete laboratory analytical report is provided as Attachment 2. None of the parameters that COGCC analyzed and that have CDPHE Human Health Standards were detected in the sample collected from your water well.

#### METHANE GAS ANALYSIS

**Dissolved methane** was detected in the sample from your domestic water well at a concentration of 0.3 mg/l (ppm).

*Methane gas alone is physiologically inert and non-toxic to humans. Normal breath exhalation contains methane at a ratio of 1 to 99 parts per million. Based on the results of extensive testing for methane gas in water wells throughout Colorado, concentrations of methane gas below 1 mg/l are considered harmless, with concern for possible hazards from the methane increasing at concentrations in well waters at or exceeding 7 mg/l. The presence of methane in drinking water does not present a known health hazard to humans or other animals via ingestion; however, methane in domestic water supplies can be associated with undesirable and potentially serious side effects. Methane gas dissolved in water "exsolves" when exposed to the atmosphere and dissipates rapidly because it is lighter than air. This is often responsible for the "fizzing" observed in water wells that contain methane gas. If the methane occurs at a high enough concentration and if it is allowed to accumulate in a confined space, such as a well pit, crawl space, closet, etc., an explosion hazard can be established. In addition, if methane concentrations in well water are high, bubbles of free gas form within the water and cause the well pump to cavitate and no longer bring water to the surface. Methane gas occurs naturally and is common in water wells in Colorado. Methane is commonly found as a gas in coal or black shale seams in the subsurface. Methane is also often found as a byproduct of the decay of organic matter, and the presence of bacteria in water wells can provide favorable conditions for the production of methane (either from the activity or decay of bacteria).*

#### INORGANIC ANALYTICAL RESULTS

Concentrations of sulfate and total dissolved solids (TDS) exceeded the CDPHE Secondary Drinking Water Standards in the sample collected from your water well.

- **Total Dissolved Solids (TDS)** was detected in the August 21, 2013 sample from your domestic well at a concentration of 1500 mg/l, similar to the April 21, 2006 concentration of 1430 mg/l.

*CDPHE has established a TDS standard for human drinking water of 500 milligrams per liter (mg/l). The standard is called the secondary drinking water standard and is based on the aesthetic quality of the water (such as taste and odor) and is intended as a guideline for public water supply systems and is not an enforceable standard. TDS concentrations are related to the presence of naturally occurring elements and chemical compounds such as chloride, sodium, potassium, calcium, magnesium, and sulfate.*

- **Sulfate** was detected in the August 21, 2013 sample from your domestic well at a concentration of 680 mg/l, similar to the April 21, 2006 sample concentration of 690 mg/l.

*The CDPHE sulfate ( $\text{SO}_4$ ) domestic supply drinking water 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.*

The sample from your well was also analyzed for calcium, magnesium, potassium, sodium, bromide, alkalinity content, specific conductivity and sodium adsorption ratio. There are no CDPHE drinking water standards for these parameters. A sodium concentration of 20 milligrams per liter is often recommended by some physicians for patients on salt restricted diets or those suffering from hypertension or heart disease.

#### *VOLATILE ORGANIC COMPOUNDS ANALYTICAL RESULTS*

A target list of 69 volatile organic compounds (VOC) was utilized during analysis of water from your well. Certain VOCs (benzene, toluene, ethylbenzene, total xylenes, and naphthalene) can be one indication of contamination or impacts from oil and gas operations or other hydrocarbon sources. No VOCs were detected in the sample collected from your water well.

#### **CONCLUSIONS**

The concentration of total dissolved solids and sulfate detected in your well water were above the secondary drinking water standards established by the Water Quality Control Commission (WQCC) of the Colorado Department of Public Health and the Environment.

The concentrations of all parameters analyzed in the August 21, 2013 sample were similar to the concentrations of parameters analyzed in the April 21, 2006 sample.

No volatile organic compounds were detected in the sample collected from your water well.

Of all the parameters analyzed in the sample from your water well, none exceeded the CDPHE human health based standards for domestic water supplies. The COGCC maintains a water quality database where the results from your water well sample will be recorded.

Based on the results of this sampling, it does not appear that your water well has been impacted by oil and gas activity at this time.

If you have any questions or would like to discuss these matters further, please contact me at 970-461-2970 or by email at [rick.allison@state.co.us](mailto:rick.allison@state.co.us).

Sincerely,

Colorado Oil and Gas Conservation Commission



Richard Allison, PG

Environmental Protection Specialist – Northeast Colorado

Enclosures    Attachment 1   Analytical Summary Table  
                  Attachment 2   Laboratory Analytical Report  
                  Attachment 3   Well Photographs

cc:       Jim Milne, COGCC Environmental Manager w/o attachments  
           John Axelson, COGCC Environmental Supervisor w/o attachments