



June 10, 2009

Mrs. Nancy Meadows
19560 County Road 30.1
Weston, CO 81091

RE: Complaint #200209273
Water Well Analysis
NWSW5, T33S, R66W
Las Animas, Colorado

Dear Mrs. Meadows:

In response to your request for additional water quality analysis of the water in your water well the Colorado Oil and Gas Conservation Commission (COGCC) retained an environmental contractor to collect a sample for laboratory analysis. The sample was collected on March 30, 2009 and was shipped via overnight delivery to Paragon Laboratories, Inc. (Paragon) in Fort Collins, Colorado for analysis. This letter summarizes the field activities and results of the chemical analyses and compares the laboratory data to published water quality standards and previous analytical testing of your well.

Field Activities

Whetstone Associates, Inc. formerly of LaVeta, Colorado collected the sample on March 30, 2009 in accordance with standard environmental protocols. The sample location was an exterior tap after the water passed through the pressure tank. The tap was opened and water purged for ten minutes at approximately 5 gallons per minute until field parameters had stabilized. A technical memorandum from Whetstone is attached that describes the sampling procedure in more detail and includes a summary of the field stabilization parameters (Attachment 1).

Analytical Summary

The water sample was submitted for analysis of metals, inorganic parameters, volatile organic compounds (VOC), semi-volatile organic compounds (SVOC) and dissolved methane. The laboratory data package that includes the sample results and the laboratory quality assurance quality control (QA/QC) data is included as Attachment 2.

The analytical results were compared to the Colorado Department of Public Health and Environment (CDPHE) Basic Standards for Ground Water – Regulation 41. This regulation established statewide standards and a system for classifying ground water and adopting water quality standards for such classifications.

Metals and Inorganic Analytical Data

The metals and inorganic data are summarized in Table 1 (Attachment 3) which also includes

data from previous sampling rounds. The metals and inorganic water quality results meet the Regulation 41 Domestic Standards for Human Health and Drinking Water Supply and have remained consistent through three sampling rounds starting in 2005. The Human Health Standards listed in Regulation 41 are maximum contaminant levels (MCLs) established for public water supplies. The Drinking Water Supply Standards in Regulation 41 are compounds or physical characteristics that can affect the aesthetic quality of the water.

Organic Analytical Data

The sample collected on March 30, 2009 was also submitted for analyses of volatile organic compounds (VOC) including benzene, toluene, ethyl benzene and total xylenes (BTEX) and semi volatile organic compounds (SVOC). No BTEX compounds were detected (Table 1).

The laboratory results however do show trace levels of the following compounds:

- tert-Butanol (TBA) was detected a concentration of 51 ug/l (parts per billion). Paragon qualified this value (J Flag) because it is an estimated value detected above the method detection limit but below the reporting limit/practical quantitation limit. There are no Colorado groundwater or drinking water standards for this compound.
- Iodomethane was detected at a level of 0.17 ug/l. It is also a qualified value (J Flag) in that it is an estimated value also detected above the method detection limit but below the reporting limit. There are no Colorado groundwater or drinking water standards for this compound.

The sample was also analyzed for SVOC. SVOC were non-detect with the exception of the tentatively identified compound oxygenated hydrocarbon. The concentration was estimated to be 7.1 ug/l. This report was qualified with a J Flag as it is an estimated value detected below the reporting limit but above the method detection limit. It was also given a B qualifier as it was detected in a laboratory QA/QC sample. Because it was also detected the laboratory QA/QC sample the detection could represent a laboratory error. There are no Colorado groundwater or drinking water standards for this compound.

Methane Gas Analysis

Dissolved methane was detected in the water sample collected from your well at a concentration of 2.5 mg/l as noted in Table 2 (Attachment 4). Methane concentrations have increased since monitoring began in 2005 (Table 2). Methane gas alone is physiologically inert and non-toxic to humans. 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 safety issues. An additional sample collected on May 14, 2009 from a utility sink inside the house had a dissolved methane concentration of 0.28 mg/l.

Conclusions

The basic water quality in your well is good and has been relatively consistent since baseline sampling started in 2005. It meets all numerical standards for groundwater established by the Water Quality Control Commission as administered by the Colorado Department of Public Health and Environment.

However, methane concentrations have steadily increased. Although there are no numerical standards for methane in the Colorado Ground Water Standards there is a narrative standard that states ground water shall be free from pollutants which could pose a danger to the public health safety or welfare.

The qualified SVOC and VOC compounds discussed above have not been analyzed for in previous samples so there is no comparison possible; the detections could have been introduced in the sampling process or even possibly during laboratory analysis. In attempt to identify the source of these compounds and to ascertain whether they are actually present in the water from your well the COGCC would like to collect additional samples from your water system. The COGCC suggests collecting samples from the pitless adaptor, the tap downstream of the pressure tank and an inside point such as the utility sink. Dissolved methane will also be analyzed. I will call you in next several weeks to schedule this sampling event.

If you have any questions or would like to discuss these matters further, please contact me at 303-894-2100, ext. 110 or by email at Margaret.ash@state.co.us.

Sincerely,
Colorado Oil and Gas Conservation Commission

A handwritten signature in dark ink, appearing to read 'Margaret A. Ash', with a long, sweeping horizontal line extending to the right.

Margaret A. Ash
Environmental Protection Supervisor

Attachments: 1 Whetstone Associates, Inc. Technical Memorandum
2 Paragon Laboratories Inc., Data Package
3 Table 1 Analytical Summary
4 Table 2 Summary of Dissolved Methane Concentrations

ATTACHMENT 1

To: Margaret Ash, COGCC
From: Christa Whitmore, Whetstone Associates
Date: May 6, 2009
Subject: Water Quality Sampling, Meadows and Damelil Domestic Wells

4143A

Whetstone Associates collected groundwater samples from domestic water wells at the Meadows and Damelil properties near Bon Carbo, Colorado, on March 30, 2009, in accordance with standard environmental protocols for purging and sampling. The Meadows and Damelil wells are recorded as COGCC Complaint #200206998 and #20026992, respectively.

At the Meadows property (19560 CR 30.1), the sample was collected from an exterior tap, after the water had passed through a pressure tank in the basement of the home. The tap was opened and allowed to purge for ten minutes at a flow rate of approximately 5 gallons per minute. Field parameters were monitored every four minutes. Electrical conductivity, pH, and dissolved oxygen levels had stabilized after 10 minutes of purging (Table 1), although temperature values were increasing (perhaps due to pumping).

The sample was collected in 10 bottles provided by Paragon Analytics of Fort Collins, CO and stored on ice. After sample collection, gas concentrations were measured at the wellhead using an RKI GX-2003 4-gas meter. Oxygen levels were 20.9% v/v, and no methane, hydrogen sulfide, or carbon monoxide were detected.

At the Damelil property (19733 CR 30.1), the sample was collected from an exterior spigot located behind the house. The tap was opened and allowed to purge for ten minutes at a flow rate of approximately 1.5 gallons per minute. (Ms. Jennifer Damelil reported that the well might pump for only 20 minutes before shutting down.) Field parameters were monitored every five minutes. Electrical conductivity, pH, and dissolved oxygen levels had stabilized after 10 minutes of purging (Table 2), at which time the sample was collected in 10 bottles provided by Paragon Analytics and stored on ice. After sample collection, gas concentrations were measured at the wellhead using an RKI GX-2003 4-gas meter. Oxygen levels were 20.9% v/v, and no methane, hydrogen sulfide, or carbon monoxide were detected.

The sample cooler was shipped from Trinidad, Colorado, via express carrier to Paragon Analytics of Fort Collins for analysis.

Table 1. Field Parameters Collected During Meadows Well Purging and Sampling

Date	Time	Flow Rate (gpm)	Volume Pumped (gal.)	pH (s.u.)	Temperature (°C)	E.C. (µS/cm)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Comments
3/30/09	10:05	5	---	---	---	---	---	---	Water on
3/30/09	10:06	5	5.0	7.22	7.8	450	41.9	4.95	
3/30/09	10:10	5	25.0	7.23	7.8	450	40.8	4.83	
3/30/09	10:14	5	45.0	7.23	8.3	449	39.6	4.60	
3/30/09	10:15	5	50.0	---	---	---	---	---	collect sample

Table 2. Field Parameters Collected During Damelil Well Purging and Sampling

Date	Time	Flow Rate (gpm)	Volume Pumped (gal.)	pH (s.u.)	Temperature (°C)	E.C. (µS/cm)	Disolved Oxygen (%)	Disolved Oxygen (mg/L)	Comments
3/30/09	10:50	1.5	---	---	---	---	---	---	Water on
3/30/09	10:50	1.5	0.0	7.12	7.7	450	0.20	1.5	
3/30/09	10:55	1.5	7.5	7.10	8.3	450	0.18	1.3	
3/30/09	11:00	1.5	15.0	7.10	8.9	449	0.14	1.3	
3/30/09	11:00	1.5	15.0	---	---	---	---	---	collect sample

ATTACHMENT 2

ATTACHMENT 3

TABLE 1
ANALYTICAL SUMMARY
COMPLAINT #200209273
MEADOWS WATER WELL
LAS ANIMAS COUNTY COLORADO
COGCC FACILITY ID #704577

Parameter	Sample Date			CDPHE Regulation 41 Standards For Ground Water	
	31-Mar-09	20-Jun-06	10-Nov-05		
	Result	Results	Result	Domestic	Units
Arsenic	ND	ND	ND	0.01	mg/l
Antimony	0.00056	NA	NA	0.006	mg/l
Barium	0.2	0.27	0.36	2.0	mg/l
Beryllium	ND	NA	NA	0.004	mg/l
Cadmium	ND	ND	ND	0.005	mg/l
Chromium	ND	ND	ND	0.1	mg/l
Lead	ND	ND	ND	0.05	mg/l
Molybdenum	0.006	NA	NA	0.035	mg/l
Nickel	ND	NA	NA	0.01	mg/l
Selenium	ND	ND	ND	0.05	mg/l
Silver	ND	ND	ND	0.05	mg/l
Thallium	ND	NA	NA	0.002	mg/l
Uranium	ND	NA	NA	0.03	mg/l
Nitrite	ND	ND	ND	1.0	mg/l
Nitrate	ND	ND	ND	10.0	mg/l
Total Nitrite/Nitrate	ND	ND	ND	10.0	mg/l
Fluoride	2.1	1.6	1.1	4.0	mg/l
Boron	ND	NA	NA	NS	mg/l
Cobalt	ND	NA	NA	NS	mg/l
Lithium	0.011	NA	NA	NS	mg/l
Zinc	ND	NA	NA	5	mg/l
COPPER	ND	ND	NA	1	mg/l
Manganese	ND	ND	ND	0.05	mg/l
Sulfate	2.2	ND	6.5	250	mg/l
Chloride	16	14	12	250	mg/l
pH	8.37	7.9	7.8	6.5 - 8.5	No units
Iron	ND	ND	ND	0.3	mg/l
TDS	270	270	250	400**	mg/l
Strontium	0.44	NA	NA	NS	mg/l
Bromide	ND	0.20	0.21	NS	
Potassium	1.4	ND	ND	NS	mg/l
Magnesium	1.7	2.4	4.7	NS	mg/l
Calcium	13	17	27	NS	mg/l
*Sodium	87	89	84	NS	mg/l
Total Alkalinity	230	220	220	NS	mg/l
Bicarbonate	230	220	220	NS	mg/l
Carbonate	20	ND	ND	NS	mg/l
Spec. Conductance	455	450	460	NS	umhos/cm
Benzene	ND	ND	NA	5	ug/l
Toluene	ND	ND	NA	560-1000	ug/l
Ethyl Benzene	ND	ND	NA	700	ug/l
Total Xylenes	ND	ND	NA	1400-10000	ug/l

Notes

*

Sodium has a health advisory standard of 20 mg/l for people on salt restricted diets.

TABLE 1
ANALYTICAL SUMMARY
COMPLAINT #200209273
MEADOWS WATER WELL
LAS ANIMAS COUNTY COLORADO
COGCC FACILITY ID #704577

****TDS**

Total Dissolved Solids: Standard is implmeneted on a sliding scale based on background conditions.

	Table 1 - Domestic - Human Health Standards
	Table 2 - Domestic - Drinking Water Supply Standards
	Table A Groundwater Organic Chemical Standards

mg/l	Milligrams per liter
ug/l	Micrograms per liter
ND	Not Detected
NS	No Standard
NA	Not Analyzed