



April 24, 2009

Mr. Gerrod Toepfer & Ms. Sandy Pryor
 5577 Hwy 151
 Ignacio, Colorado 81137

RE: Water Well Complaint #200207673
 Water Well Permit #248797

Dear Mr. Toepfer & Ms. Pryor:

Enclosed please find the results of the April 1, 2009 groundwater sampling of your water well, located on your property at 5577 Hwy 151 in La Plata County, Colorado. In your original complaint you indicated that the water coming from your faucet was triggering a portable gas meter alarm and that you had noticed a change in the taste and smell of your water over the past year or so. You expressed a concern that area oil & gas activities in the vicinity may have caused an impact and had health & safety concerns regarding both explosive gases in your home and gases and chemicals in your water. The following letter and documentation provides the results of the Colorado Oil & Gas Conservation Commission's (COGCC) investigation into this matter.

At 9:00 a.m. on Wednesday, April 1, 2009 COGCC staff and our contractor, Four Corners Geoscience (FCG), met at your property to perform both an in-house gas screening of your home and groundwater sampling from your water well. Mr. Josh Joswick of the San Juan Citizens Alliance (SJCA) was also present for the screening and sampling activities. Multiple areas in and around your home were screened for methane, hydrogen sulfide and carbon monoxide gases using a hand-held RKI Instruments GX-2003 multi-gas meter. No measurable gases were detected during this event as detailed in Table 1.

Table 1 – Gas screening results

Location	% LEL (methane)	Hydrogen Sulfide (ppm)	Carbon Monoxide (ppm)
House – ambient	0	0	0
Kitchen tap – cold	0	0	0
Back bath – cold & hot	0	0	0
Back bath; tub – cold & hot	0	0	0
Master Bath – right sink; cold & hot	0	0	0
Furnace closet – ambient	0	0	0
Laundry – ambient	0	0	0
Wellhead vent	0	0	0
Crawl space	0	0	0
Propane tank	0	0	0

FCG and COGCC staff also collected water samples from the outside water tap to analyze for methane and hydrogen sulfide gases, field chemistries, basic chemistries, coliform bacteria, iron-reducing and sulfur-reducing bacteria (BART's), volatile organic constituents (VOC's) and semi-volatile constituents (SVOC's). Water was also collected from the kitchen sink to test for methane gas. Methane and hydrogen sulfide gas and BART's analyses were conducted by FCG in their Bayfield laboratory and the coliform analysis was conducted by San Juan Basin Health in Durango. All other samples were submitted to Green Analytical Laboratories (GAL) in Durango for analyses.

As I relayed to you via telephone on April 2, 2009, no methane or hydrogen sulfide gases were detected in your well water. In addition, no coliform bacteria were identified and sulfur-reducing bacteria were at background or non-aggressive levels. Iron-reducing bacteria were identified at moderately aggressive levels, which is probably what is creating the musty odor in your well water. I have attached a brochure from the Colorado Department of Public Health & Environment (CDPHE) on how to deal with iron bacteria problems in your well water.

Chemical data indicate that your water is a sodium-bicarbonate type which is very typical for shallow groundwater in this area. The Total Dissolved Solids (TDS) of your water is very low at 245 mg/L and all of your tested parameters fall within the Colorado Department of Public Health and Environment (CDPHE) and Environmental Protection Agency's (EPA) primary and secondary drinking water criteria. Table 2 provides a comparison of these criteria and your water well analyses. No VOCs or total petroleum hydrocarbons (TPH) in any of the carbon-chain ranges (C₆-C₁₀ = gasoline; C₁₀-C₂₈ = diesel; and C₂₉-C₃₅ = motor oil) were detected in your water.

Table 2 – Analytical results

Constituent	Result (mg/L)	Regulatory Standard (mg/L)
Methane	<0.0005	2.0*
Hydrogen sulfide	<0.1	NA
Alkalinity, Total	218	NA
Alkalinity, Bicarbonate	218	NA
Alkalinity, Carbonate	<10	NA
Alkalinity, Hydroxide	<10	NA
Calcium	38.9	NA
Chloride	<10	250 ²
Conductivity (µS/cm)	500	NA
Fluoride	0.5	4.0 ¹ /2.0 ²
Iron	<0.05	0.3 ²
Magnesium	8.2	NA
Manganese	<0.0005	0.05 ²
Nitrate/Nitrite as N	8.2	10 ¹
pH (s.u.)	7.75	6.5-8.5 s.u.
Potassium	1.8	NA
Selenium	0.003	0.05
Sodium	64.7	NA
Sulfate	69	250 ²
Total Dissolved Solids (TDS)	245	500 ²
Hardness	131	moderately hard
Bacteria, Total Coliform	Absent	NA
Bacteria, E. coli	Absent	NA

Constituent	Result (mg/L)	Regulatory Standard (mg/L)
Bacteria, sulfur-reducing (SRB)	background	NA
Bacteria, iron-reducing (IRB)	Mod. aggressive	NA
Bacteria, anaerobic	Present	NA
Di-n-octylphthalate	0.010	NA

¹Primary Standard
²Secondary Standard
 NA = not available
 s.u. = standard units
 µS/cm = micro Siemens per centimeter
 mg/L = milligrams per liter

National Primary Drinking Water Regulations are legally enforceable standards that apply to public water systems only however, they are used as a guideline for private wells. The Secondary Standards are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects in drinking water.

A single SVOC, Di-n-octylphthalate (DnOP), was detected in the sample at very low levels. Research into this chemical indicates that it is used to add flexibility to plastics and is commonly found in a variety of commercial products including tarps, plastic bottles, latex gloves and garden hoses. DnOP is approved by the FDA as an indirect food additive and is used in seam cements, bottle cap liners, and conveyor belts. It is not known to be used by the oil & gas industry. Since we used a garden hose to collect the SVOC sample it is very probable that it was introduced during the sampling process and is a field contaminant. However I would be happy to re-sample your water directly from the tap and re-test for this constituent to confirm this likelihood.

COGCC staff also contacted BP America (BP) and requested data on all downhole work, including frac's, which had been conducted on any of the vicinity wells that they operate near your home. Data were requested from 2005 to current – coincidental with the installation of your well in March 2005. BP responded on April 7, 2009 with a summary of work conducted on six area wells. Their summary is provided as Table 3. As you can see, no frac work has been conducted in your vicinity since 2005 and the nearby injection well has been shut-in since 2002 and is not in use.

Table 3 – Area BP downhole work since 2005

<u>Baird 18-1 #1</u> - No downhole work since 2005.
<u>Baird 18-1 #2</u> - Tubing downsize work started on 4/11/2007. No frac work was completed in association with the tubing job. - No other downhole work from 2005-present. - Note: the well work that was proposed for 2008 has not been completed.
<u>State Gas Unit CB #1</u> - Tubing downsize work started on 1/2/2007. No frac work was completed in association with the tubing job. - Well head replacement work started on 1/1/2007. No frac work was completed in association with this equipment change. - No other downhole work from 2005-present.

Southern Ute 17-1 1

- Tubing work started on 6/20/2008. No frac work was completed in association with the tubing job.
- Well head replacement work started on 6/19/2008. No frac work was completed in association with this equipment change.
- No other downhole work from 2005-present.

Southern Ute 17-2 1

- Well head replacement work started on 6/11/2008. No frac work was completed in association with this equipment change.
- Tubing downsize work started on 9/27/2007. No frac work was completed in association with the tubing job.
- No other downhole work from 2005-present.

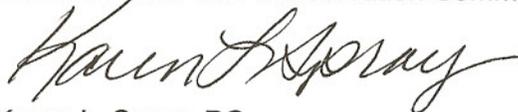
Tiffany Injection Well 3

- This was a nitrogen injection well that is not in use.

In summary, no methane or hydrogen sulfide gases were detected in the air or well water that was sampled during our site visit on April 1, 2009. The basic chemistry of your well water is very good and meets all tested CDPHE and EPA primary and secondary drinking water criteria. No VOCs or TPH were detected in your water and only one SVOC was detected at very low levels, DnOP, which is likely a field contaminant introduced by the garden hose that we collected the sample through. BP records indicate that there has been no downhole frac work in any of the vicinity wells since your well was installed in 2005 and their vicinity injection well has been shut-in since 2002. Based on these data it does not appear that your well is being impacted by vicinity natural gas wells. The musty smell in your water is likely sourced by the moderately aggressive presence of iron-reducing bacteria in your water which can be treated by chlorination, as outlined in the attached CDPHE brochure.

COGCC staff appreciate your cooperation in this investigation. Please feel free to contact me at 970-259-1619 if you have any questions or would like to schedule a confirmation test for DnOP.

Sincerely,
Colorado Oil & Gas Conservation Commission Staff



Karen L. Spray, PG
SW Environmental Protection Specialist

Enc.

Cc: **File #200207673**
La Plata County Office of Emergency Management – Butch Knowlton
San Juan Citizens Alliance – Josh Joswick

Four Corners Geoscience
P.O. Box 4224
Durango, CO 81302
Water Well Test Field Report

Client
Colorado Oil and Gas
Conservation Commission
Karen Spray

Pending 040109-B1
IID(COGCC) FCG #

4/1/2009
DATE

Sandy Pryor
NAME

5577 Hwy 151 Ignacio, CO 81137
AddressWaterWell

5577 Hwy 151 Ignacio, CO 81137
MAILINGADD

970-749-7296
TELEPHONE_

Water Well Location Per DOWR Permit

NWSE 18 33 6 2140S1650E
QTRQTR SECTION TWP North RGE West FTG

248797 200 14 No Record 47
WaterWellPermit# Depth FT Water Level FT Yield(Permit)gpm GallonsPumped

Garmin GPS 12 Decimal Degrees-
NAD Conus 27

-107.53802 37.10198
LongDecDegrees LatDecDegrees

Field Chemistries 7.74 500 313 12.8
PH_FIELD ElectricConductivity TDS_CALC WATERTEMP_

Water samples collected and delivered to analytical lab for COGCC parameters

Methane Result (mg/L)Dissolved

<0.0005 Detection Limit 0.0005 mg/LUSGS/BLM Method
CH4_MG_L

State of Colorado-ColiAlert test for presence
or absence of Coliform Bacteria

Absent
SanJuanBasin HlthSOCBacteria

HACH(TM)HydrogenSulfide Test

<0.1 Detection Limit 0.1 mg/L
H_2_S_MG_L

Garrett Toepfer request to COGCC."Water has gas odor"Sample from faucet on back of house.Water clear,musty odor,no tint,bubbles from end of hose,no sediment.TPH.BTEX.BART.Well located east of house.

COMMENTS

**Four Corners Geoscience
BART (Bacterial Test Results)**

Pending
IID(COGCC)

NAME Sandy Pryor FCG # 040109-B1 DATE 4/1/2009

Water Well Location

QTRQTR NWSE Section 18 TWP(North) 33 RGE(West) 6

Methane Result(mg/L) <0.0005 NO
CH4_MG_L ISOTOPE

SRB

Anaerobic sulfate reducing bacteria present at background or non aggressive levels.
Anaerobic bacteria also present.

**BART Hach Company
BART TYPE: SRB-BART
Batch # 0792-M Lot 0792-M
Expiration Date Sept 2012**

IRB

Iron related bacteria present at moderately aggressive levels. Anaerobic bacteria also present.

**BART Hach Company
BART TYPE:IRB-BART
Batch #: 0491-V Lot #:0491-V
Expiration Date Sept 2012**

GasWell

Baird GU 18-1 #1or #2

**San Juan Basin Health Department
Water Bacteriology Result**

**Coli Alert Test for Presence or Absence
Coliform Bacteria in Water Wells and other Water Sources**

A coli-form bacteria sample was collected at the time of your water well test by Four Corners Geoscience, Inc. This sample was delivered to San Juan Basin Health Department laboratory located in Durango, Colorado. Please see copy of the original report below.

Please call San Juan Basin Health at 970-247-5702 for more information if you have questions.

You may, also, refer to your water well booklet Page 19 for more information. Please contact a water treatment specialist in your area for further instructions regarding water well disinfection.



Colorado Department of Public Health and Environment

San Juan Basin Health Department/Laboratory
281 Sawyer Drive
P.O. Box 140
Durango, CO 81302

WATER BACTERIOLOGY

~~TO BE BILLED~~ ^{PAID}

FCC# 040109-131

SAMPLE INFORMATION: COMMUNITY NON-COMMUNITY PRIVATE

PWS ID ROUTINE RAW REPEAT FOR THE MONTH OF

Andrea Pryor NAME OF SYSTEM SPECIAL PURPOSE FINISHED

5577 Hwy 151 Ignacio CO ADDRESS CITY COUNTY

ORDERED BY: (SAMPLE MAY NOT BE TESTED IF ALL INFORMATION IS NOT PROVIDED)

LAB PROCEDURE

STD. MTH

20th ED

9223C

Four Corners Geo NAME PHONE
PO Box 4224 ADDRESS
Durango, CO 81302 CITY / STATE / ZIP

TEST ORDERED STD BACT. OTHER

DATE TIME BY
COLLECTED *4/1/09* AM PM
RECEIVED AM PM

RESULTS:

TOTAL COLIFORM PRESENT ABSENT

E. COLI PRESENT ABSENT

MOST PROBABLE NO. COLIFORM/1000ML

Colilert-18 Colilert-24 Colisure-24 48

ANALYST *B*

no gcc

Green Analytical Laboratories
75 Suttle Street
Durango, CO 81303

COGCC
 PO Box 2651
 Durango, CO 81302
 Attention: Karen Spray

GAL I.D.: 904-006-01

Date Received: 04/01/09

Date Reported: 04/16/09

QC Batches:

PROJECT NAME: Pryor Water Well

PROJECT NUMBER: FCG040109-B1

SAMPLE I.D.: Sandy Pryor

Sample Date: 04/01/09

Sample Matrix: Water

Laboratory Report

RESULTS

PARAMETER	METHOD	REPORT		DIL	UNITS	Maximum Contamination Level
		LIMIT	RESULT			
Alkalinity, Total	2320B	10	218	1	mg/L	
Alkalinity, Bicarbonate	2320B	10	218	1	mg/L	
Alkalinity, Carbonate	2320B	10	<10	1	mg/L	
Alkalinity, Hydroxide	2320B	10	<10	1	mg/L	
Calcium	200.7	0.5	38.9	1	mg/L	
Chloride	4500CL	10	<10	1	mg/L	
Conductivity	2510B	1.0	500	1	uS/cm	
Fluoride	4500F C	0.2	0.5	1	mg/L	4.0
Iron	200.7	0.05	<0.05	1	mg/L	
Magnesium	200.7	0.5	8.2	1	mg/L	
Manganese	200.8	0.0005	<0.0005	1	mg/L	
Nitrate/Nitrite as N	353.3	0.02	0.18	1	mg/L	
pH	150.1	NA	7.75	NA	SU	
Potassium	200.7	0.5	1.8	1	mg/L	
Selenium	200.8	0.001	0.003	1	mg/L	0.05
Sodium	200.7	0.5	64.7	1	mg/L	
Sulfate	4500SO4	10	69	1	mg/L	
TDS	2540C	10	245	1	mg/L	
Hardness	Calc	10	131	1	mg/L	
CAB	Calc		3.06		%	



 Debbie Zufelt, Laboratory Manager



ANALYTICAL RESULTS FOR
 GREEN ANALYTICAL LABORATORIES, INC.
 ATTN: DEBBIE ZUFELT
 75 SUTTLE STREET
 DURANGO, CO 81303

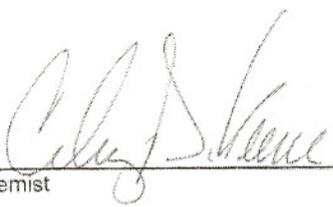
Receiving Date: 04/02/09
 Reporting Date: 04/06/09
 Project Number: 904-006-01
 Project Name: COGCC
 Project Location: NOT GIVEN

Sampling Date: 04/01/09
 Sample Type: GROUND WATER
 Sample Condition: COOL & INTACT
 Sample Received By: CK
 Analyzed By: AB

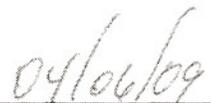
LAB NO.	SAMPLE ID	GRO (C ₅ -C ₁₀) (mg/L)	DRO (>C ₁₀ -C ₂₈) (mg/L)	DRO EXT. (>C ₂₈ -C ₃₅) (mg/L)
---------	-----------	---	---	--

ANALYSIS DATE:	04/03/09	04/03/09	04/03/09
H17183-1 SANDY PRYOR	<1.00	<1.00	<1.00
Quality Control	557	554	-
True Value QC	500	500	-
% Recovery	111	111	-
Relative Percent Difference	0.4	0.8	-

METHODS: TPH GRO & DRO - EPA SW-846 8015 M



 Chemist



 Date

H17183 TPHE GAL

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above-stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

ANALYTICAL RESULTS FOR
 GREEN ANALYTICAL LABORATORIES, INC.
 ATTN: DEBBIE ZUFELT
 75 SUTTLE STREET
 DURANGO, CO 81303
 FAX TO: (970) 247-4227

 Receiving Date: 04/02/09
 Reporting Date: 04/07/09
 Project Number: 904-006-01
 Project Name: COGCC
 Project Location: NOT GIVEN
 Sample ID: SANDY PRYOR
 Lab Number: H17183-1

 Analysis Date: 04/03/09
 Sampling Date: 04/01/09
 Sample Type: GROUNDWATER
 Sample Condition: COOL & INTACT
 Sample Received By: CK
 Analyzed By: ZL

VOLATILES - 8260 (mg/L)	Sample Result H17183-1	Method Blank	QC	%Recov.	True Value QC	
1	Dichlorodifluoromethane	<0.001	<0.001	0.026	104	0.025
2	Chloromethane	<0.001	<0.001	0.021	84.8	0.025
3	Vinyl chloride	<0.001	<0.001	0.024	96.0	0.025
4	Bromomethane	<0.001	<0.001	0.025	100	0.025
5	Chloroethane	<0.001	<0.001	0.023	92.0	0.025
6	Trichlorofluoromethane	<0.001	<0.001	0.029	116	0.025
7	1,1-Dichloroethene	<0.001	<0.001	0.025	98.4	0.025
8	Carbon disulfide	<0.001	<0.001	0.028	112	0.025
9	Iodomethane	<0.001	<0.001	0.028	110	0.025
10	Methylene chloride	<0.001	<0.001	0.022	88.8	0.025
11	trans-1,2-Dichloroethene	<0.001	<0.001	0.025	98.0	0.025
12	1,1-Dichloroethane	<0.001	<0.001	0.026	102	0.025
13	Vinyl acetate	<0.005	<0.005	0.022	86.4	0.025
14	cis-1,2-Dichloroethene	<0.001	<0.001	0.024	94.4	0.025
15	2,2-Dichloropropane	<0.001	<0.001	0.028	110	0.025
16	Bromochloromethane	<0.001	<0.001	0.027	106	0.025
17	Chloroform	<0.001	<0.001	0.029	116	0.025
18	Carbon tetrachloride	<0.001	<0.001	0.025	102	0.025
19	1,1,1-Trichloroethane	<0.001	<0.001	0.024	96.0	0.025
20	2-Butanone	<0.005	<0.005	0.024	94.4	0.025
21	1,1-Dichloropropene	<0.001	<0.001	0.028	110	0.025
22	Benzene	<0.001	<0.001	0.029	115	0.025
23	1,2-Dichloroethane	<0.001	<0.001	0.021	84.0	0.025
24	Trichloroethene	<0.001	<0.001	0.029	114	0.025
25	Dibromomethane	<0.001	<0.001	0.024	96.4	0.025
26	1,2-Dichloropropane	<0.001	<0.001	0.025	98.4	0.025
27	Bromodichloromethane	<0.001	<0.001	0.027	106	0.025
28	cis-1,3-Dichloropropene	<0.001	<0.001	0.027	106	0.025
29	2-Chloroethyl vinyl ether	<0.005	<0.005	0.022	88.0	0.025
30	Toluene	<0.001	<0.001	0.027	108	0.025
31	Tetrachloroethene	<0.001	<0.001	0.028	112	0.025

ANALYTICAL RESULTS FOR
 GREEN ANALYTICAL LABORATORIES, INC.
 ATTN: DEBBIE ZUFELT
 75 SUTTLE STREET
 DURANGO, CO 81303
 FAX TO: (970) 247-4227

 Receiving Date: 04/02/09
 Reporting Date: 04/07/09
 Project Number: 904-006-01
 Project Name: COGCC
 Project Location: NOT GIVEN
 Sample ID: SANDY PRYOR
 Lab Number: H17183-1

 Analysis Date: 04/03/09
 Sampling Date: 04/01/09
 Sample Type: GROUNDWATER
 Sample Condition: COOL & INTACT
 Sample Received By: CK
 Analyzed By: ZL

VOLATILES - 8260 (mg/L)	Sample Result H17183-1	Method Blank	QC	%Recov.	True Value QC
32 4-Methyl-2-pentanone	<0.005	<0.005	0.029	114	0.025
33 trans-1,3-Dichloropropene	<0.001	<0.001	0.026	102	0.025
34 1,1,2-Trichloroethane	<0.001	<0.001	0.025	101	0.025
35 Dibromochloromethane	<0.001	<0.001	0.025	102	0.025
36 1,3-Dichloropropane	<0.001	<0.001	0.026	104	0.025
37 1,2-Dibromoethane	<0.001	<0.001	0.024	96.0	0.025
38 2-Hexanone	<0.005	<0.005	0.023	93.6	0.025
39 Chlorobenzene	<0.001	<0.001	0.027	108	0.025
40 Ethylbenzene	<0.001	<0.001	0.025	100	0.025
41 1,1,1,2-Tetrachloroethane	<0.001	<0.001	0.023	92.8	0.025
42 m, p - Xylene	<0.002	<0.002	0.050	100	0.050
43 o-Xylene	<0.001	<0.001	0.028	111	0.025
44 Styrene	<0.001	<0.001	0.028	112	0.025
45 Bromoform	<0.001	<0.001	0.023	92.8	0.025
46 Isopropylbenzene	<0.001	<0.001	0.027	108	0.025
47 Bromobenzene	<0.001	<0.001	0.024	96.0	0.025
48 n-Propylbenzene	<0.001	<0.001	0.026	104	0.025
49 1,1,2,2-Tetrachloroethane	<0.001	<0.001	0.022	88.0	0.025
50 2-Chlorotoluene	<0.001	<0.001	0.024	96.0	0.025
51 1,3,5-Trimethylbenzene	<0.001	<0.001	0.025	102	0.025
52 1,2,3-trichloropropane	<0.001	<0.001	0.021	85.2	0.025
53 4-Chlorotoluene	<0.001	<0.001	0.023	92.0	0.025
54 tert-Butylbenzene	<0.001	<0.001	0.022	88.8	0.025
55 1,2,4-Trimethylbenzene	<0.001	<0.001	0.024	94.8	0.025
56 sec-Butylbenzene	<0.001	<0.001	0.030	118	0.025
57 p-Isopropyltoluene	<0.001	<0.001	0.021	84.0	0.025
58 1,3-Dichlorobenzene	<0.001	<0.001	0.021	84.4	0.025
59 1,4 Dichlorobenzene	<0.001	<0.001	0.026	104	0.025
60 n-Butylbenzene	<0.001	<0.001	0.023	93.2	0.025
61 1,2-Dichlorobenzene	<0.001	<0.001	0.020	80.4	0.025
62 1,2-Dibromo-3chloropropane	<0.001	<0.001	0.028	112	0.025

ANALYTICAL RESULTS FOR
GREEN ANALYTICAL LABORATORIES, INC.
ATTN: DEBBIE ZUFELT
75 SUTTLE STREET
DURANGO, CO 81303
FAX TO: (970) 247-4227

Receiving Date: 04/02/09
Reporting Date: 04/07/09
Project Number: 904-006-01
Project Name: COGCC
Project Location: NOT GIVEN
Sample ID: SANDY PRYOR
Lab Number: H17183-1

Analysis Date: 04/03/09
Sampling Date: 04/01/09
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: CK
Analyzed By: ZL

VOLATILES - 8260 (mg/L)		Sample Result	Method	QC	%Recov.	True Value
		H17183-1	Blank			QC
63	Hexachlorobutadiene	<0.001	<0.001	0.022	89.6	0.025
64	1,2,4-Trichlorobenzene	<0.001	<0.001	0.028	112	0.025
65	Naphthalene	<0.001	<0.001	0.026	102	0.025
66	1,2,3-Trichlorobenzene	<0.001	<0.001	0.023	92.0	0.025

Surrogates	% Recovery
Dibromodifluoromethane	103
Fluorobenzene	110
Toluene-d8	92.6
4-Bromofluorobenzene	83.4

METHODS: EPA SW-846-8260.

Chemist

04/09/09

Date

ANALYTICAL RESULTS FOR
GREEN ANALYTICAL LABORATORIES, INC.

Receiving Date: 04/02/09
Reporting Date: 04/09/09
Project Number: 904-006-01
Project Name: COGCC
Project Location: NOT GIVEN
Sample ID: SANDY PRYOR
Lab Number: H17183-1

ATTN: DEBBIE ZUFELT
75 SUTTLE STREET
DURANGO, CO 81303

Analysis Date: 04/07/09
Sampling Date: 04/01/09
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: CK
Analyzed By: CK/AB

SEMIVOLATILES - 8270 (mg/L) Sample Result Method True Value

	H17183-1	Blank	QC	% Recov.	QC
1 Pyridine	<0.008	<0.008	0.041	82.0	0.050
2 n-Nitrosodimethylamine	<0.010	<0.010	0.041	82.0	0.050
3 2-Picoline	<0.006	<0.006	0.045	90.0	0.050
4 Methylmethanesulfonate	<0.006	<0.006	0.042	84.0	0.050
5 Ethylmethanesulfonate	<0.005	<0.005	0.039	78.0	0.050
6 Phenol	<0.004	<0.004	0.039	78.0	0.050
7 Aniline	<0.005	<0.005	0.037	74.0	0.050
8 bis (2-Chloroethyl) ether	<0.006	<0.006	0.038	76.0	0.050
9 2-Chlorophenol	<0.004	<0.004	0.042	84.0	0.050
10 1,4-Dichlorobenzene	<0.004	<0.004	0.043	86.0	0.050
11 1,3-Dichlorobenzene	<0.004	<0.004	0.055	110	0.050
12 Benzyl Alcohol	<0.005	<0.005	0.049	98.0	0.050
13 1,2-Dichlorobenzene	<0.005	<0.005	0.055	110	0.050
14 2-Methylphenol	<0.005	<0.005	0.048	96.0	0.050
15 bis (2-Chloroisopropyl) ether	<0.007	<0.007	0.048	96.0	0.050
16 Acetophenone	<0.004	<0.004	0.052	104	0.050
17 3&4-Methylphenol	<0.005	<0.005	0.066	66.0	0.100
18 n-Nitroso-di-n-propylamine	<0.007	<0.007	0.046	92.0	0.050
19 Hexachloroethane	<0.007	<0.007	0.052	104	0.050
20 Nitrobenzene	<0.004	<0.004	0.050	100	0.050
21 n-Nitrosopiperidine	<0.006	<0.006	0.046	92.0	0.050
22 Isophorone	<0.006	<0.003	0.052	104	0.050
23 2-Nitrophenol	<0.005	<0.005	0.044	88.0	0.050
24 2,4-Dimethylphenol	<0.005	<0.005	0.048	96.0	0.050
25 bis (2-Chloroethoxy) methane	<0.005	<0.005	0.050	100	0.050
26 2,4-Dichlorophenol	<0.005	<0.005	0.051	102	0.050
27 1,2,4-Trichlorobenzene	<0.005	<0.005	0.053	106	0.050
28 Naphthalene	<0.002	<0.002	0.058	116	0.050
29 4-Chloroaniline	<0.005	<0.005	0.049	98.0	0.050
30 2,6-Dichlorophenol	<0.008	<0.008	0.046	92.0	0.050
31 Hexachlorobutadiene	<0.008	<0.008	0.060	120	0.050
32 n-Nitroso-di-n-butylamine	<0.004	<0.004	0.059	118	0.050
33 4-Chloro-3-methylphenol	<0.006	<0.006	0.049	98.0	0.050
34 2-Methylnaphthalene	<0.005	<0.005	0.054	108	0.050
35 1,2,4,5-Tetrachlorobenzene	<0.007	<0.007	0.056	112	0.050
36 Hexachlorocyclopentadiene	<0.005	<0.005	0.044	88.0	0.050
37 2,4,6-Trichlorophenol	<0.005	<0.005	0.055	110	0.050

ANALYTICAL RESULTS FOR
GREEN ANALYTICAL LABORATORIES, INC.

Receiving Date: 04/02/09
Reporting Date: 04/09/09
Project Number: 904-006-01
Project Name: COGCC
Project Location: NOT GIVEN
Sample ID: SANDY PRYOR
Lab Number: H17183-1

ATTN: DEBBIE ZUFELT
75 SUTTLE STREET
DURANGO, CO 81303

Analysis Date: 04/07/09
Sampling Date: 04/01/09
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: CK
Analyzed By: CK/AB

SEMIVOLATILES - 8270 (mg/L)

	Sample Result H17183-1	Method Blank	True Value		
			QC	% Recov.	QC
38 2,4,5-Trichlorophenol	<0.005	<0.005	0.055	110	0.050
39 2-Chloronaphthalene	<0.006	<0.006	0.052	104	0.050
40 2-Nitroaniline	<0.006	<0.006	0.049	98.0	0.050
41 Acenaphthylene	<0.002	<0.002	0.052	104	0.050
42 Dimethylphthalate	<0.003	<0.003	0.052	104	0.050
43 2,6-Dinitrotoluene	<0.005	<0.005	0.047	94.0	0.050
44 3-Nitroaniline	<0.009	<0.009	0.043	86.0	0.050
45 Acenaphthene	<0.005	<0.005	0.057	114	0.050
46 2,4-Dinitrophenol	<0.020	<0.020	0.018	36.0	0.050
47 Dibenzofuran	<0.004	<0.004	0.059	118	0.050
48 Pentachlorobenzene	<0.005	<0.005	0.057	114	0.050
49 4-Nitrophenol	<0.005	<0.005	0.047	94.0	0.050
50 1-Naphthylamine	<0.006	<0.006	0.043	86.0	0.050
51 2,4-Dinitrotoluene	<0.007	<0.007	0.059	118	0.050
52 2-Naphthylamine	<0.006	<0.006	0.040	80.0	0.050
53 2,3,4,6-Tetrachlorophenol	<0.004	<0.004	0.063	126	0.050
54 Fluorene	<0.004	<0.004	0.060	120	0.050
55 4-Chlorophenyl-phenylether	<0.005	<0.005	0.058	116	0.050
56 Diethylphthalate	<0.004	<0.004	0.062	124	0.050
57 4-Nitroaniline	<0.009	<0.009	0.063	126	0.050
58 4,6-Dinitro-2-methylphenol	<0.009	<0.009	0.016	32.0	0.050
59 Diphenylamine	<0.006	<0.006	0.059	118	0.050
60 4-Bromophenyl-phenylether	<0.007	<0.007	0.060	120	0.050
61 Phenacetin	<0.004	<0.004	0.064	128	0.050
62 Hexachlorobenzene	<0.005	<0.005	0.065	130	0.050
63 4-Aminobiphenyl	<0.005	<0.005	0.044	88.0	0.050
64 Pentachlorophenol	<0.018	<0.018	0.051	102	0.050
65 Pentachloronitrobenzene	<0.015	<0.015	0.062	124	0.050
66 Pronamide	<0.003	<0.003	0.072	144	0.050
67 Phenanthrene	<0.002	<0.002	0.056	112	0.050
68 Anthracene	<0.003	<0.003	0.055	110	0.050
69 Di-n-butylphthalate	<0.006	<0.006	0.058	116	0.050
70 Fluoranthene	<0.003	<0.003	0.055	110	0.050
71 Benzidine	<0.012	<0.012	0.040	80.0	0.050
72 Pyrene	<0.003	<0.003	0.053	106	0.050
73 p-(Dimethylamino)azobenzene	<0.004	<0.004	0.051	102	0.050
74 Butylbenzylphthalate	<0.004	<0.004	0.045	90.0	0.050

PLEASE NOTE: **Liability and Damages.** Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever shall be deemed waived if not in writing and received by Cardinal within thirty (30) days after Page 2 of 3 applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above-stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.



PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
GREEN ANALYTICAL LABORATORIES, INC.

Receiving Date: 04/02/09
Reporting Date: 04/09/09
Project Number: 904-006-01
Project Name: COGCC
Project Location: NOT GIVEN
Sample ID: SANDY PRYOR
Lab Number: H17183-1

ATTN: DEBBIE ZUFELT
75 SUTTLE STREET
DURANGO, CO 81303

Analysis Date: 04/07/09
Sampling Date: 04/01/09
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: CK
Analyzed By: CK/AB

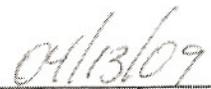
SEMIVOLATILES - 8270 (mg/L)	Sample Result H17183-1	Method Blank	True Value		
			QC	% Recov.	QC
75 Benzo[a]anthracene	<0.003	<0.003	0.035	69.0	0.050
76 3,3'-Dichlorobenzidine	<0.005	<0.005	0.054	108	0.050
77 Chrysene	<0.005	<0.005	0.079	158	0.050
78 bis (2-Ethylhexyl) phthalate	<0.020	<0.020	0.087	174	0.050
79 Di-n-octylphthalate	0.010	<0.005	0.069	138	0.050
80 Benzo [b] fluoranthene	<0.007	<0.007	0.053	106	0.050
81 Benzo [k] fluoranthene	<0.009	<0.009	0.057	114	0.050
82 Benzo [a] pyrene	<0.004	<0.004	0.052	104	0.050
83 3- Methylcholanthrene	<0.007	<0.007	0.065	130	0.050
84 Indeno [1,2,3-cd] pyrene	<0.012	<0.012	0.053	106	0.050
85 Dibenz [a,h] anthracene	<0.009	<0.009	0.061	122	0.050
86 Benzo [g,h,i] perylene	<0.011	<0.011	0.058	116	0.050

% Recovery	
90 2-Fluorophenol	7.90
91 Phenol-d5	4.30
92 Nitrobenzene-d5	107
93 2-Fluorobiphenyl	129
94 2,4,6-Tribromophenol	66.7
95 Terphenyl-d14	92.7

METHODS: EPA SW 846-8270



Chemist



Date

PLEASE NOTE: **Liability and Damages.** Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above-stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

FORM NO. GWS-31 01/93

WELL CONSTRUCTION AND TEST REPORT
STATE OF COLORADO, OFFICE OF THE STATE ENGINEER

For Office Use Only
RECEIVED

MAR 23 2005

WATER RESOURCES
STATE ENGINEER

1. WELL PERMIT NUMBER **248797**
2. OWNER NAME(S) **Sandra Pryor**
Mailing Address 101 Crystal Lane
City, State, Zip Durango, Co 81301
Phone 970-247-2275

3. WELL LOCATION AS DRILLED: Northwest 1/4 Southeast 1/4, Sec. 18 Twp. 33 N, Range 6 W New Mex pm.
2140 ft. from South Sec. Line and 1650 ft. from East Sec. Line OR
SUBDIVISION: _____ LOT _____ BLOCK _____ FILING (UNIT) _____
STREET ADDRESS AT WELL LOCATION: _____

4. GROUND SURFACE ELEVATION _____ FT. DRILLING METHOD Air Rotary
DATE COMPLETED: 03-15-05 TOTAL DEPTH 200 FT. DEPTH COMPLETED 200 FT.

5. GEOLOGIC LOG:
Depth Description of Material (Type, Size, Color, Water Location)

6. HOLE DIAM. (in.) From (ft.) To (ft.)
7 7/8" 0- 40
6 3/4" 40- 200

0 to 9 Clay, Topsoil
9 to 200 Shale, Sandstone

7. PLAIN CASING
OD (in) Kind Wall Size From (ft) To (ft.)
5 Steel .188 0- 20
4 1/2 PVC SCH40 20- 40
4 1/2 PVC SCH40 80- 120
4 1/2 PVC SCH 40 180- 200

PERF. CASING: Screen Slot Size: .010

4 1/2 PVC SCH 40 40- 60
4 1/2 PVC SCH 40 60- 80
4 1/2 PVC SCH 40 120- 180

REMARKS: **H20 @ 53', 72', 148'**

8. FILTER PACK
Material Pea gravel
Size 3/8"
Interval 40-200

9. PACKER PLACEMENT
Type _____
Depth _____

10. GROUTING RECORD:
Material Amount Density Interval Placement
Cement 10 bags 12 lbs. 0-40 Pumped

11. DISINFECTION: Type HTH Amount Use 6 oz.

12. WELL TEST DATA: Check box if Test Data is submitted on Form No. GWS 39 Supplemental Well Test.
TESTING METHOD Air Lift
Static Level 14 ft. Date/Time measured 03-15-05, Production Rate 4.5 gpm.
Pumping Level Unknown ft. Date/Time measured 03-15-05, Test length (hrs.) 1.
Remarks _____

13. I have read the statements made herein and know the contents thereof, and that they are true to my knowledge. [Pursuant to Section 24-4-104 (13) (a) C.R.S., the making of false statements herein constitutes perjury in the second degree and is punishable as a class 1 misdemeanor.]
CONTRACTOR: Beeman Bros. Drilling, Inc. Phone: (970) 259-1195 Lic. No. 1374.
Mailing Address: PO Box 5180; Durango, Colorado 81301

Name/Title (Please type or print)
Matthew Beeman, Drilling Contractor

Signature
Matthew Beeman

Date
3-16-05

FORM NO. GWS-31 01/93		WELL CONSTRUCTION AND TEST REPORT STATE OF COLORADO, OFFICE OF THE STATE ENGINEER		For Office Use Only	
1. WELL PERMIT NUMBER 248797				MAR 23 2005 WATER DIVISION STATE ENGINEER	
2. OWNER NAME(S) Sandra Pryor Mailing Address 101 Crystal Lane City, State, Zip Durango, Co 81301 Phone 970-247-2275					
3. WELL LOCATION AS DRILLED: Northwest 1/4 Southeast 1/4, Sec. 18 Twp. 33 N, Range 6 W New Mex pm. 2140 ft. from South Sec. Line and 1650 ft. from East Sec. Line OR SUBDIVISION: _____ LOT _____ BLOCK _____ FILING (UNIT) _____ STREET ADDRESS AT WELL LOCATION: _____					
4. GROUND SURFACE ELEVATION _____ FT. DRILLING METHOD Air Rotary DATE COMPLETED: 03-15-05 TOTAL DEPTH 200 FT. DEPTH COMPLETED 200 FT.					
5. GEOLOGIC LOG:		6. HOLE DIAM. (in.) From (ft.) To (ft.)			
Depth	Description of Material (Type, Size, Color, Water Location)	7 7/8"	0-	40	
		6 3/4"	40-	200	
0 to 9	Clay , Topsoil	7. PLAIN CASING			
9 to 200	Shale, Sandstone	OD (in)	Kind	Wall Size	From (ft) To (ft.)
		5	Steel	.188	0- 20
		4 1/2	PVC	SCH40	20- 40
		4 1/2	PVC	SCH40	80- 120
		4 1/2	PVC	SCH 40	180- 200
		PERF. CASING: Screen Slot Size: .010			
		4 1/2	PVC	SCH 40	40- 60
		4 1/2	PVC	SCH 40	60- 80
		4 1/2	PVC	SCH 40	120- 180
		8. FILTER PACK		9. PACKER PLACEMENT	
		Material Pea gravel		Type _____	
		Size 3/8"		Depth _____	
		Interval 40-200			
		10. GROUTING RECORD:			
		Material	Amount	Density	Interval
		Cement	10 bags	12 lbs.	0-40
					Pumped
REMARKS: H2O @ 53' , 72' , 148'					
11.	DISINFECTION: Type HTH Amount Use 6 oz.				
12.	WELL TEST DATA: <input type="checkbox"/> Check box if Test Data is submitted on Form No. GWS 39 Supplemental Well Test. TESTING METHOD Air Lift Static Level 14 ft. Date/Time measured 03-15-05 , Production Rate 4.5 gpm. Pumping Level Unknown ft. Date/Time measured 03-15-05 , Test length (hrs.) 1. Remarks _____				
13.	I have read the statements made herein and know the contents thereof, and that they are true to my knowledge. [Pursuant to Section 24-4-104 (13) (a) C.R.S., the making of false statements herein constitutes perjury in the second degree and is punishable as a class 1 misdemeanor.] CONTRACTOR: Beeman Bros. Drilling, Inc. Phone: (970) 259-1195 Lic. No. 1374. Mailing Address: PO Box 5180; Durango, Colorado 81301				
Name/Title (Please type or print) Matthew Beeman, Drilling Contractor		Signature <i>Matthew Beeman</i>		Date 3-16-05	

Raising the water heater temperature will temporarily solve the odor problem, but sulfur-reducing bacteria will quickly reinvade unless more permanent measures are taken.

Removing the sacrificial anode will eliminate the problem, but it can also shorten the water heater's lifespan significantly and may void the warranty. Replacing the magnesium rod with one made of zinc won't totally eliminate sulfur-reducing bacteria, but it will greatly reduce the number of bacteria. Consult with a plumber before attempting to modify your water heater.

Point-of-Use Treatment (Carbon Filters)

Some point-of-entry (POE) and point-of-use (POU) systems can inhibit reproduction of bacteria and reduce associated odors and tastes. To determine the best system, you can use the NSF International online product database of drinking water treatment units. Visit the NSF International website at www.nsf.org or call 1-800-673-6275.

Follow-up Procedures

Shock chlorination or the other methods discussed should solve the immediate problems associated with iron or sulfur bacteria, but they may not be long-term solutions. Iron and sulfur bacteria tend to build up again a few months after treatment. Bacteria problems are much easier to control after the initial contamination has been treated. However, to keep down bacterial regrowth, well owners can periodically disinfect their wells by shock chlorinating with a weaker chlorine solution, or by installing a chlorination unit that will constantly chlorinate the water. A licensed well contractor can advise you on which option is best for you.

Laboratory Services Division – (303) 692-3090

Fax: (303) 344-9989

<http://www.cdphe.state.co.us/lr>

Chemistry Laboratory – (303) 692-3048

Microbiology Laboratory – (303) 692-3490

Bottle Order Line (menu driven) –

(303) 692-3074

**Colorado Department of Public
Health and Environment
Laboratory Services Division**
8100 Lowry Boulevard
Denver, CO 80230



COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

LABORATORY SERVICES DIVISION

Iron and Sulfur Bacteria in Water Supplies

CHEMISTRY LABORATORY

(303) 692-3048

MICROBIOLOGY LABORATORY

(303) 692-3490

Bacterial contamination of a water supply doesn't always indicate the existence of a health hazard. Some types of bacterial contamination are more annoying than harmful. The normal bacteria test performed on drinking water is specific for coliform and E. coli. A sample may test negative for coliform but still contain other nuisance bacteria. Two of the most common bacterial contaminants are iron and sulfur bacteria. They are not particularly harmful, but they can be incredibly annoying.

Iron Bacteria

Iron bacteria are generally more common than sulfur bacteria because iron is abundant in ground water. Iron bacteria are oxidizing agents and combine iron or manganese dissolved in ground water with oxygen. A side effect of the process is a foul-smelling brown slime that can cause unpleasant odors, corrode plumbing equipment and fixtures, and clog well screens and pipes. If conditions are right, the bacteria can grow at amazing rates, rendering an entire well system useless in just a few months.

Signs that may indicate an iron bacteria problem include yellow-, red- or orange-colored water; rusty slime deposits in toilet tanks; and strange smells resembling fuel oil, cucumbers, or sewage. Sometimes the odor will only be apparent in the morning or after other extended periods of non-use.

Sulfur Bacteria

There are two categories of sulfur bacteria; sulfur oxidizers and sulfur reducers. Sulfur-reducing bacteria are the more common. Sulfur-oxidizing bacteria produce effects similar to those of iron bacteria. They convert sulfide into sulfate, producing a dark slime that can clog plumbing. Sulfur-reducing bacteria live in oxygen-deficient environments. They break down sulfur compounds, producing hydrogen sulfide gas in the process. The distinctive "rotten egg" odor of hydrogen sulfide gas is the most obvious sign of a sulfur bacteria problem. Hydrogen sulfide gas is foul smelling and highly corrosive. As with odors caused by iron bacteria,

the sulfur smell may only be noticeable when the water hasn't been run for several hours.

If the odor is only present when hot water is run, sulfur-reducing bacteria could be building up in the water heater. Blackening of water or dark slime coating the inside of the toilet tank may also indicate a sulfur bacteria problem.

Iron bacteria and sulfur bacteria contaminations are often difficult to tell apart because the symptoms are so similar. To complicate matters, sulfur-reducing bacteria often live in complex symbiotic relationships with iron bacteria, so both types may be present. Fortunately, both types of bacteria can be treated using the same methods.

Prevention

The best treatment for both iron and sulfur bacteria is prevention. Unsanitary well drilling can often introduce bacteria into a previously clean water supply. Therefore, anything that will be going into the ground during the drilling process needs to be disinfected. Tools, pumps, pipes, gravel pack material, and even water used during drilling should be treated with a 200-milligrams-per-liter chlorine solution. When the well is completed, it should be shock chlorinated. Well owners should be alert for any signs of iron or sulfur bacteria contamination.

Shock Chlorination

Shock chlorination involves adding chlorine to water to disinfect the water or to obtain other biological or chemical results. Chlorine is a common disinfectant used in water systems, and is highly toxic to coliform and similar types of bacteria. Iron and sulfur bacteria are more resistant to chlorine's effects because iron and sulfur bacteria occur in thick layers and are protected by the slime they secrete. A standard chlorine treatment may kill off bacterial cells in the surface layer but leave the rest untouched. In the case of iron bacteria, iron dissolved in the water may absorb disinfectant before it reaches the bacteria.

For all of these reasons, iron and sulfur bacteria may be able to survive a chlorine treatment that would kill other types of bacteria. For information on shock chlorinating iron- or sulfur-bacteria contaminated wells, contact the Laboratory Services Division at 303-692-3048 and request the "Shock Chlorination of Wells and Water Systems" fact sheet.

Acid Treatment

For severe cases, treatment with a strong acid and salt solution following thorough shock chlorination may be required. The acid solution (commercial hydrochloric acid, commonly known as muriatic acid) may be able to penetrate thick incrustations of bacteria that the chlorine solution was unable to kill. This procedure should only be performed by a licensed well contractor.

Water Heater Treatment

As noted earlier, sulfur-reducing bacteria can often contaminate water heaters, creating a foul smell when hot water is turned on. A water heater provides a good environment for sulfur-reducing bacteria because it contains a "sacrificial anode." This anode is a magnesium rod that helps protect the water heater by corroding instead of the tank lining. Electrons released from the anode as it corrodes nourish sulfur-reducing bacteria.

Water heaters infested with sulfur-reducing bacteria can be treated. Sulfur-reducing bacteria die at temperatures of 140 degrees Fahrenheit or above, which is roughly equivalent to the "medium" setting on most home water heaters. Setting the water heater on "high" will raise the water temperature to approximately 160 degrees Fahrenheit and kill any sulfur-reducing bacteria in the tank. (Do this only if the water tank has a pressure relief valve and everyone in the house is warned, to prevent scalding.) After about eight hours, the tank can be drained and the temperature setting returned to normal.