STATE OF COLORADO
OIL & GAS
CONSERVATION COMMISSION

DEPARTMENT OF NATURAL RESOURCES
John W. Hickenlooper, Governor
1120 Lincoln St. Suite 801
Denver, CO 80203
Phone: (303) 894-2100
FAX: (303) 894-2109
www.colorado.gov/cogcc

December 28, 2011

Mr. Rocky Peterson
36921 County Road 63
P.O. Box 795
Galeton, CO 80622

RE: COGCC Complaint #200327803
Water Quality Results for Domestic Water Well (DWR Permit #267021)
NENE Section 31, T-7-N, R-63-W
Weld County, Colorado

Dear Mr. Peterson

In response to your concerns regarding possible impacts to water quality from oil & gas operations in the area near your home, the Colorado Oil and Gas Conservation Commission (COGCC) conducted a field visit to your property on November 15, 2011. A water sample was collected from your water well (DWR Permit #209270) for general organic and inorganic water quality testing as well as for the analysis of dissolved methane and gas composition.

FIELD TESTING

The water sample was collected from an exterior faucet on the south side of your house. The water was turned on at approximately 10:00 and allowed to run for 25 minutes at an estimated rate of 7.5 gallons per minute. The water was clear with no odor and displayed moderate effervescence as it was allowed to run into a bucket. No sediment accumulated in the bucket and the characteristics of the water did not change during the 25 minutes it ran. The sample was collected at 10:25 and delivered to Test America Laboratories (Test America) in Arvada, Colorado for general inorganic and organic chemical analyses. A split of the water sample was delivered to Isotech Laboratories, Inc. (Isotech) in Champaign, Illinois for gas compositional analyses.

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 sample 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 data pages of the analytical report from Test America are included in Attachment 2.

- Total Dissolved Solids (TDS): CDPHE has established a TDS standard for human drinking water of 500 milligrams per liter (mg/l). The standard is called the secondary maximum contaminant level (SMCL) 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. Although CDPHE does not have an agricultural standard for TDS, other agencies recommend concentrations below 1,500 mg/l for irrigation, and below 5,000 mg/l for most livestock watering. TDS concentrations are related to the presence of naturally occurring elements and chemical compounds such as chloride, sodium, potassium, calcium, magnesium, and sulfate.

  TDS was detected in the water sample from your water well at a concentration of 570 mg/L, which is greater than the CDPHE SMCL.

- 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 0.019 mg/L, which is below the CDPHE human health standard.

- Fluoride (F): CDPHE has established a fluoride (F) standard for drinking water of 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 was detected in the water sample from your water well at a concentration of 0.98 mg/L, which is below the CDPHE human health standard.

- Chloride (Cl): The CDPHE chloride standard for human drinking water is 250 mg/l. Chloride concentrations in excess of 250 mg/l usually produce a noticeable taste in drinking water.

  Chloride was detected in the water sample from your water well at a concentration of 12 mg/l, which is less than the CDPHE drinking water standard.

- Sulfate (SO_4): The CDPHE sulfate standard for human drinking water is 250 mg/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 occurs naturally in the ground water in many areas in Colorado at concentrations that exceed the drinking water standard.

Sulfate was detected in the water sample from your water well at a concentration of 170 mg/l, which is less than the CDPHE drinking water standard.

- Total Nitrate (NO_3) + Nitrite (NO_2) as Nitrogen (N): The CDPHE total nitrate (NO_3) + nitrite (NO_2) as nitrogen (N) standard for human drinking water is 10 mg/l. Nitrate and nitrite are common contaminants in ground water from agricultural sources, such as fertilizer and animal wastes. They are known to cause infant cyanosis or "blue baby disease" in humans and, at concentrations greater than 100 mg/l as nitrogen (N), may be dangerous to livestock. High concentrations of nitrate and nitrite in ground water are known to occur in agricultural areas in Colorado.

  Total nitrate/nitrite, as N was not detected in the water sample from your water well.

- Iron (Fe): The CDPHE iron standard for human drinking water is 0.3 mg/l. Small amounts of iron are common in ground water. Iron may produce 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 water sample from your water well.

- Manganese (Mn): The CDPHE secondary drinking water standard for manganese is 0.05 mg/l and for agricultural water it is 0.2 mg/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 water sample from your 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.

- 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 8.66, which is above the CDPHE drinking water and agricultural standards.

The following parameters were also measured as part of the laboratory analysis although there are no CDPHE standards.

- Sodium (Na): Although CDPHE does not have a standard for sodium, people on salt restricted diets should be aware of the sodium concentration in the water they drink. Drinking water with a concentration of sodium 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 at concentrations that exceed the recommended level.

Sodium was detected in the water sample from your water well at a concentration of 240 mg/l, which is greater than the recommended level for people on salt restricted diets.

- Calcium (Ca): The calcium concentration in the sample collected from your well was 3.1 mg/L.
- Magnesium (Mg): The magnesium concentration in the sample collected from your well was 0.51 mg/L.
- Potassium (K): Potassium was not detected in the sample collected from your well.
- Bicarbonate as ($CaCO_3$): The bicarbonate concentration in the sample collected from your well was 290 mg/L.
- Carbonate as ($CaCO_3$): The carbonate concentration in the sample collected from your well was 34 mg/L.
- Bromide (Br): The bromide concentration in the sample collected from your well was 0.2 mg/L.

VOLATILE ORGANIC COMPOUNDS ANALYSIS

The water sample collected from your well was analyzed for the volatile organic compounds (VOCs) benzene, toluene, ethylbenzene and xylenes. These constituents were not detected in the sample from your well.

TOTAL PETROLEUM HYDROCARBONS ANALYSIS

Due to your concerns regarding land application of drilling fluids on a property immediately adjacent to yours, and the potential for those fluids to contain residual hydrocarbons, the water sample from your well was also analyzed for total petroleum hydrocarbons (TPH). This is a common analytical method used to screen for dissolved petroleum hydrocarbons in water. Both gasoline range organics (GRO) and diesel range organics (DRO) were analyzed. The results of TPH were below the method detection limit for both GRO and DRO in the sample collected from your well.

METHANE GAS CONCENTRATION

A trace of methane was detected in the sample collected from your well at a concentration of 0.029 mg/L. The concentration of methane in the water produced from the well and entering your house is below the threshold level of 1.1 mg/L that could theoretically allow methane to accumulate in confined, unventilated spaces and potentially be explosive.

Methane gas is common in water wells in Colorado. It occurs naturally and the source of the methane is commonly from one or more of the sources listed below.

- Methane is commonly found as a gas in coal or black shale seams in the subsurface.
- Methane is commonly found as a byproduct of the decay of organic matter and the presence of bacteria in water wells can provide the conditions favorable for the production of methane either from the activity or decay of bacteria.

GAS HYDROCARBON COMPOSITION

Due to the observation of moderate effervescence in the water during sample collection, a split of the water sample was sent to Isotech labs for gas composition and isotopic analysis. The Isotech results were consistent with the Test America results indicating only a trace of methane. A trace of ethane was also detected. Typically the naturally occurring biogenic gas in the Laramie-Fox Hills aquifer contains only methane and ethane. In addition to much higher quantities of methane and ethane, the composition of thermogenic natural gas produced in the area near your residence generally contains propane, iso-butane, normal butane, iso-pentane, normal pentane, and hexane. None of these hydrocarbons were detected in the sample from your water well. A copy of the Isotech lab report is provided in Attachment 3.

The composition of gas in your water well closely resembled the composition of air. An illustration of the gas composition from your well compared to that of common air is provided in Attachment 4.

ISOTOPIC GAS COMPOSITION

Due to the very low concentration of methane in the sample collected from your well, isotopic analysis of the stable carbon isotopes ($\partial^{13}C$ and ∂D) was not possible.

BACTERIA OCCURENCE

COGCC also collected samples of your well water for the determination of the presence of bacteria using the Biological Activity Reaction Test (**BART™**) for the following: Iron Related Bacteria (IRB), Sulfate Reducing Bacteria (SRB), and Slime Forming Bacteria (SFB). None of these bacteria were detected in the sample collected from your well.

SODIUM ADSORPTION RATIO & SPECIFIC CONDUCTANCE

The sample from your water well was also analyzed for sodium adsorption ratio (SAR) and electrical conductivity (EC). The result for SAR was 33. SAR is a proportion of sodium to calcium plus magnesium and is used to determine the sodium hazard in irrigation water. Generally, water with SAR values between 1-9 has a low sodium hazard. The result for electrical conductivity (EC) in your water was 0.96 mmhos/cm (millimhos per centimeter). EC is often used to determine the salinity hazard of irrigation water. Water with EC of 0.25 – 0.75 mmhos/cm is considered good.

CONCLUSIONS

The sample collected from your water well contained Total Dissolved Solids above the CDPHE secondary drinking water standards. The pH of the water also slightly exceeded the CDPHE secondary drinking water standard. None of the analyzed constituents exceeded the CDPHE primary drinking water standards.

The water sample did not contain concentrations of VOCs or TPH above the method detection limits. The composition of gas in the water from your well is not similar to the composition of natural gas produced from deeper formations in the area near your residence. In addition, the gas composition resembled that of common air.

Based on the information gathered to date, there are no indications of oil & gas related impacts to your water well. As a result, the complaint regarding potential impacts to groundwater quality is closed with this letter.

If you have any questions or would like to discuss the sample results further, please contact me via e-mail john.axelson@state.co.us or by phone at (303) 637-7178.

Respectfully,

John Axelson, P.G.
Environmental Protection Specialist, Northeast Region
Colorado Oil and Gas Conservation Commission

Enclosures

Attachment 1 – Table 1 – Analytical Summary
Attachment 2 – Test America Laboratories Report – Data Pages Only
Attachment 3 – Isotech Laboratories Analysis Report
Attachment 4 – Gas Composition Comparison to Common Air

cc: Debbie Baldwin – COGCC Environmental Manager
Steve Lindblom – COGCC Environmental Supervisor

ATTACHMENT 1

Table 1 – Analytical Summary

TABLE 1
ANALYTICAL SUMMARY
Complaint #200327803
Peterson Water Well

Parameter	Water Well Sample		CDPHE Standards		
	Sample Date				
	15-Nov-11				
	Result	Unit	Domestic	Agriculture	Units
Barium	0.019	mg/l	2.0		mg/l
Calcium	3.1	mg/l	NS		
Iron	ND	mg/l	0.3	5	mg/l
Lead	ND	mg/l	0.05	0.1	mg/l
Magnesium	0.51	mg/l	NS		
Manganese	ND	mg/l	0.05	0.2	mg/l
Potassium	ND	mg/l	NS		
Sodium	240	mg/l	NS		
Chloride	12	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	0.98	mg/l	4.0	NS	mg/l
Total Dissolved Solid	**570**	mg/l	500	*1500	mg/l
pH	**8.66**	No units	6.5 - 8.5	6.5 - 8.5	No units
Sulfate	170	mg/l	250		mg/l
Sodium Adsorption R	33	No units	NS		
Bromide	0.2	mg/l	NS		
Total Alkalinity	320	mg/l	NS		
Bicarbonate	290	mg/l	NS		
Carbonate	34	mg/l	NS		
Conductivity	0.96	mmhos/cm	NS		
Methane	0.029	mg/l	NS		

CDPHE	Colorado Department of Public Health and the Environment.
Domestic	Standards for Domestic Water Supply, Human Health and Drinking Water Standards.
Agriculture	* Standards for agriculture compiled from CDPHE and other of sources.
mg/l	Milligrams per liter (equals parts per million).
CDPHE Standards	Water Quality Control Commission 5 CCR 1002-41, Regulation No. 41 - The Basic Standards For Groundwater.
mmhos/cm	**millimhos per centimeer**
NA	Not analyzed.
ND	Not detected.
NS	No Standard.
**	Health Advisory.
	Human health standard.
	Secondardy standard.

ATTACHMENT 2

Test America Laboratory Report

(Data Pages Only)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 280-22826-1

Job Description: Peterson Complaint #200327803

For:
Colorado Oil&Gas Conservation Commision
1120 Lincoln St.
Suite 801
Denver, CO 80203

Attention: John Axelson

Approved for release.
Joseph J Egry
Project Manager I
11/30/2011 10:38 AM

Joseph J Egry
Project Manager I
joseph.egry@testamericainc.com
11/30/2011

The Lab Certification ID# is E87667.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

EXECUTIVE SUMMARY - Detections

Client: Colorado Oil&Gas Conservation Commision

Job Number: 280-22826-1

Lab Sample ID / Analyte	Client Sample ID	Result	Qualifier	Reporting Limit	Units	Method
280-22826-1	**PETERSON WW**					
Methane		28		5.0	ug/L	RSK-175
Sodium Adsorption Ratio		33		0.40	No Unit	20B
Bromide		0.20		0.20	mg/L	300.0
Chloride		12		3.0	mg/L	300.0
Fluoride		0.98		0.50	mg/L	300.0
Sulfate		170		25	mg/L	300.0
Total Anions		10			meq/L	SM 1030F
Total Cations		11			meq/L	SM 1030F
Percent Difference		1.5			%	SM 1030F
Anion/Cation Balance		1.5			%	SM 1030F
Total Alkalinity		320		5.0	mg/L	SM 2320B
Bicarbonate Alkalinity as CaCO3		290		5.0	mg/L	SM 2320B
Carbonate Alkalinity as CaCO3		34		5.0	mg/L	SM 2320B
Specific Conductance		960		2.0	umhos/cm	SM 2510B
Total Dissolved Solids		570		10	mg/L	SM 2540C
pH		8.66	HF	0.100	SU	SM 4500 H+ B
Dissolved						
Barium		19		10	ug/L	6010B
Calcium		3100		200	ug/L	6010B
Magnesium		510		200	ug/L	6010B
Sodium		240000		1000	ug/L	6010B

Client: Colorado Oil&Gas Conservation Commision

Job Number: 280-22826-1

Client Sample ID: **PETERSON WW**

Lab Sample ID: 280-22826-1
Client Matrix: Water

Date Sampled: 11/15/2011 1025
Date Received: 11/15/2011 1530

8260B Volatile Organic Compounds (GC/MS)

Analysis Method:	8260B	Analysis Batch:	280-97828	Instrument ID:	MSV_H
Prep Method:	5030B	Prep Batch:	N/A	Lab File ID:	H8225.D
Dilution:	1.0			Initial Weight/Volume:	20 mL
Analysis Date:	11/28/2011 1505			Final Weight/Volume:	20 mL
Prep Date:	11/28/2011 1505				

Analyte	Result (ug/L)	Qualifier	RL
Benzene	ND		1.0
Ethylbenzene	ND		1.0
Toluene	ND		1.0
m-Xylene & p-Xylene	ND		2.0
o-Xylene	ND		1.0

Surrogate	%Rec	Qualifier	Acceptance Limits
1,2-Dichloroethane-d4 (Surr)	92		70 - 127
Toluene-d8 (Surr)	101		80 - 125
4-Bromofluorobenzene (Surr)	100		78 - 120
Dibromofluoromethane (Surr)	97		77 - 120

Client: Colorado Oil&Gas Conservation Commision

Job Number: 280-22826-1

Client Sample ID: **PETERSON WW**

Lab Sample ID: 280-22826-1
Client Matrix: Water

Date Sampled: 11/15/2011 1025
Date Received: 11/15/2011 1530

8015B Gasoline Range Organics - (GC)

Analysis Method:	8015B	Analysis Batch:	280-97151	Instrument ID:	GCV_B
Prep Method:	5030B		N/A	Initial Weight/Volume:	5 mL
Dilution:	1.0			Final Weight/Volume:	5 mL
Analysis Date:	11/18/2011 1706			Injection Volume:	5 mL
Prep Date:	11/18/2011 1706			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Gasoline Range Organics (GRO)-C6-C10	ND		25

Surrogate	%Rec	Qualifier	Acceptance Limits
a,a,a-Trifluorotoluene	87		82 - 110

Client: Colorado Oil&Gas Conservation Commision

Job Number: 280-22826-1

Client Sample ID: **PETERSON WW**

Lab Sample ID: 280-22826-1
Client Matrix: Water

Date Sampled: 11/15/2011 1025
Date Received: 11/15/2011 1530

RSK-175 Dissolved Gases in Water

Analysis Method:	RSK-175	Analysis Batch:	280-96662	Instrument ID:	GCV_J
	N/A		N/A	Initial Weight/Volume:	18 mL
Dilution:	1.0			Final Weight/Volume:	18 mL
Analysis Date:	11/16/2011 1204			Injection Volume:	
Prep Date:	N/A			Result Type:	PRIMARY

Analyte	Result (ug/L)	Qualifier	RL
Methane	28		5.0

Client: Colorado Oil&Gas Conservation Commision

Job Number: 280-22826-1

Client Sample ID: **PETERSON WW**

Lab Sample ID: 280-22826-1
Client Matrix: Water

Date Sampled: 11/15/2011 1025
Date Received: 11/15/2011 1530

RSK-175 Dissolved Gases in Water

Analysis Method:	RSK-175	Analysis Batch:	280-96662	Instrument ID:	GCV_J
	N/A		N/A	Initial Weight/Volume:	18 mL
Dilution:	1.0			Final Weight/Volume:	18 mL
Analysis Date:	11/16/2011 1204			Injection Volume:	
Prep Date:	N/A			Result Type:	SECONDARY

Analyte	Result (ug/L)	Qualifier	RL
Methane	29		5.0

Client: Colorado Oil&Gas Conservation Commision

Job Number: 280-22826-1

Client Sample ID: **PETERSON WW**

Lab Sample ID: 280-22826-1
Client Matrix: Water

Date Sampled: 11/15/2011 1025
Date Received: 11/15/2011 1530

8015B Diesel Range Organics (DRO) (GC)

Analysis Method:	8015B	Analysis Batch:	280-97433	Instrument ID:	GCS_U
Prep Method:	3510C	Prep Batch:	280-96858	Initial Weight/Volume:	1048 mL
Dilution:	1.0			Final Weight/Volume:	1000 uL
Analysis Date:	11/21/2011 2029			Injection Volume:	1 uL
Prep Date:	11/17/2011 2110			Result Type:	PRIMARY

Analyte	Result (mg/L)	Qualifier	RL
C10-C36	ND		0.48

Surrogate	%Rec	Qualifier	Acceptance Limits
o-Terphenyl	104		50 - 115

Client: Colorado Oil&Gas Conservation Commision

Job Number: 280-22826-1

Client Sample ID: **PETERSON WW**

Lab Sample ID: 280-22826-1
Client Matrix: Water

Date Sampled: 11/15/2011 1025
Date Received: 11/15/2011 1530

20B Sodium Adsorption Ratio

Analysis Method:	20B	Analysis Batch:	280-96675	Instrument ID:	MT_025
	N/A		N/A	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	
Analysis Date:	11/17/2011 0720			Final Weight/Volume:	1.0 mL
Prep Date:	N/A				

Analyte	Result (No Unit)	Qualifier	RL
Sodium Adsorption Ratio	33		0.40

6010B Metals (ICP)-Dissolved

Analysis Method:	6010B	Analysis Batch:	280-97133	Instrument ID:	MT_025
Prep Method:	3005A	Prep Batch:	280-96697	Lab File ID:	25A4111811.asc
Dilution:	1.0			Initial Weight/Volume:	50 mL
Analysis Date:	11/18/2011 1952			Final Weight/Volume:	50 mL
Prep Date:	11/18/2011 0600				

Analyte	Result (ug/L)	Qualifier	RL
Barium	19		10
Calcium	3100		200
Iron	ND		100
Lead	ND		9.0
Magnesium	510		200
Manganese	ND		10
Potassium	ND		3000
Sodium	240000		1000

General Chemistry

Client Sample ID: **PETERSON WW**

Lab Sample ID: 280-22826-1
Client Matrix: Water

Date Sampled: 11/15/2011 1025
Date Received: 11/15/2011 1530

Analyte	Result	Qual	Units	RL	Dil	Method
Bromide	0.20		mg/L	0.20	1.0	300.0
Analysis Batch: 280-96646	Analysis Date: 11/15/2011 2114					
Chloride	12		mg/L	3.0	1.0	300.0
Analysis Batch: 280-96646	Analysis Date: 11/15/2011 2114					
Nitrite as N	ND		mg/L	0.50	1.0	300.0
Analysis Batch: 280-96594	Analysis Date: 11/15/2011 2114					
Fluoride	0.98		mg/L	0.50	1.0	300.0
Analysis Batch: 280-96646	Analysis Date: 11/15/2011 2114					
Sulfate	170		mg/L	25	5.0	300.0
Analysis Batch: 280-96646	Analysis Date: 11/16/2011 0452					
Nitrate as N	ND		mg/L	0.50	1.0	300.0
Analysis Batch: 280-96594	Analysis Date: 11/15/2011 2114					
Total Alkalinity	320		mg/L	5.0	1.0	SM 2320B
Analysis Batch: 280-97305	Analysis Date: 11/21/2011 1712					
Bicarbonate Alkalinity as CaCO3	290		mg/L	5.0	1.0	SM 2320B
Analysis Batch: 280-97305	Analysis Date: 11/21/2011 1712					
Carbonate Alkalinity as CaCO3	34		mg/L	5.0	1.0	SM 2320B
Analysis Batch: 280-97305	Analysis Date: 11/21/2011 1712					
Hydroxide Alkalinity	ND		mg/L	5.0	1.0	SM 2320B
Analysis Batch: 280-97305	Analysis Date: 11/21/2011 1712					
Total Dissolved Solids	570		mg/L	10	1.0	SM 2540C
Analysis Batch: 280-97109	Analysis Date: 11/21/2011 0712					

Analyte	Result	Qual	Units	Dil	Method
Total Anions	10		meq/L	1.0	SM 1030F
Analysis Batch: 280-97564	Analysis Date: 11/23/2011 1044				
Total Cations	11		meq/L	1.0	SM 1030F
Analysis Batch: 280-97564	Analysis Date: 11/23/2011 1044				
Percent Difference	1.5		%	1.0	SM 1030F
Analysis Batch: 280-97564	Analysis Date: 11/23/2011 1044				
Anion/Cation Balance	1.5		%	1.0	SM 1030F
Analysis Batch: 280-97564	Analysis Date: 11/23/2011 1044				

Analyte	Result	Qual	Units	RL	Dil	Method
Specific Conductance	960		umhos/cm	2.0	1.0	SM 2510B
Analysis Batch: 280-97665	Analysis Date: 11/27/2011 1340					
pH	8.66	HF	SU	0.100	1.0	SM 4500 H+ B
Analysis Batch: 280-97082	Analysis Date: 11/19/2011 1204					

Chain of Custody Record

Sampler ID _____

Temperature on Receipt 5.1 [illegible] MS 11/15

Drinking Water? Yes ☑ No ☐

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124-280 (0508)

Client	Project Manager	Date	Chain of Custody Number
COGCC	John Axelson	11/15/11	146735

Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page
1120 Lincoln St., Ste. 801	303-637-7178 / 7179		Page 1 of 1

City	State	Zip Code	Site Contact	Lab Contact
Denver	CO	80203	JA	

Project Name and Location (State)	Carrier/Waybill Number
Peterson Complaint #200327803	NA

Contract/Purchase Order/Quote No.

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis (Attach list if more space is needed): 6010B Dissolved Metals	2540C-TDS, EC, pH, Alk, Anions	8015B-DRO	8015B-GRO	8260-BTEX	RSK-175 Methane	pH	SAR	Sperge			Special Instructions/ Conditions of Receipt
Peterson WW	11/15/11	10:25		X			8			6			X	X	X	X	X	X	X	X				Metals - Filter by lab

Page 100 of 101

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☑ Disposal By Lab ☐ Archive For _____ Months
(A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other Standard

QC Requirements (Specify)

	Relinquished By	Date	Time	Received By	Date	Time
1.	John Axelson	11/15/11	15:30	[illegible]	11/15/11	1530
2.						
3.						

Comments: Major Anions/Cations & Metals — Ba, Ca, Pb, Mg, Mn, K, Na, Fe, Br, F, Cl, Nitrate/Nitrite as N, Alkaline Group, SO4, Anion/Cation Balance. Remit pdf of lab report to John.Axelson@State.co.us

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

11/30/2011

Login Sample Receipt Checklist

Client: Colorado Oil&Gas Conservation Commision

Job Number: 280-22826-1

Login Number: 22826

List Source: TestAmerica Denver

List Number: 1

Creator: Bindel, Aaron M

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ATTACHMENT 3

Isotech Laboratories Analysis Report

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Lab #:	228845	Job #:	16954
Sample Name/Number:	Peterson WW		
Company:	Colorado Oil & Gas Conservation		
Date Sampled:	11/15/2011		
Container:	Dissolved Gas Bottle		
Field/Site Name:	Complaint #200327803		
Location:	Weld Co., CO		
Formation/Depth:			
Sampling Point:			
Date Received:	12/04/2011	Date Reported:	12/19/2011

Component	Chemical mol. %	$\delta^{13}C$ ‰	δD ‰	$\delta^{18}O$ ‰
Carbon Monoxide	nd			
Hydrogen Sulfide	na			
Helium	na			
Hydrogen	nd			
Argon	1.45			
Oxygen	6.07			
Nitrogen	92.10			
Carbon Dioxide	0.20			
Methane	0.181			
Ethane	0.0006			
Ethylene	nd			
Propane	nd			
Propylene	nd			
Iso-butane	nd			
N-butane	nd			
Iso-pentane	nd			
N-pentane	nd			
Hexanes +	nd			

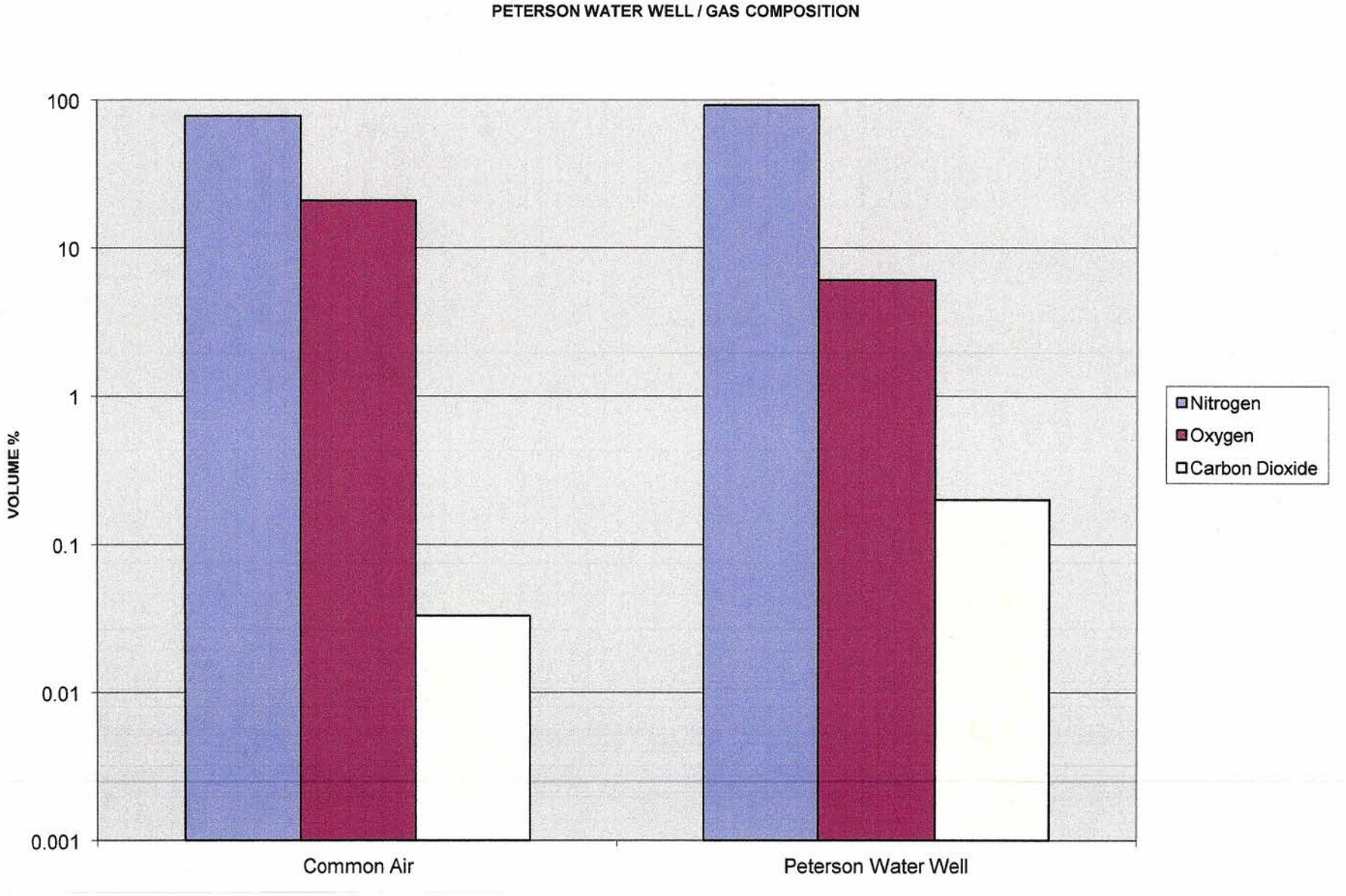
Total BTU/cu.ft. dry @ 60deg F & 14.7psia, calculated: 2 Specific gravity, calculated: 0.982

Remarks:
Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.69
*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

ATTACHMENT 4

Gas Composition Comparison to Common Air


PETERSON WATER WELL / GAS COMPOSITION
100
10
1
0.1
0.01
0.001
VOLUME %
Common Air
Peterson Water Well
Nitrogen
Oxygen
Carbon Dioxide