



David Neslin
Director, Colorado Oil & Gas Conservation Commission
Written Answers to Follow-Up Questions from the
Senate Committee on the Environment and Public Works
Submitted May 17, 2011

Questions from Senator Barbara Boxer:

1. During your testimony before the Committee, you stated that nearly all of the natural gas wells drilled in Colorado involve horizontal drilling and hydraulic fracturing. In your written testimony, you state the COGCC has investigated hundreds of allegations of groundwater contamination from natural gas drilling operations in Colorado, but that “[t]o date, we have found no verified instance of hydraulic fracturing harming groundwater.” During the hearing, you indicated that your agency has found instances where groundwater has been contaminated from a spill, leak or failure of a cement job.

Question. Do you agree that the use of hydraulic fracturing greatly increases the pressures on a gas well, including the casing, the cementing, and the blowout preventer?

Answer. Hydraulic fracturing involves injection pressures that exceed those of the geologic formation. In practice, however, the well casing, cementing, and blowout preventer are all designed to manage these pressures. In Colorado, regulations adopted by the Oil & Gas Conservation Commission (“COGCC”) further require that the well components manage these pressures. COGCC Rule 317.a states that the “working pressure of any [blowout preventer] shall exceed the anticipated surface pressure to which it may be subjected.” Rule 317.d mandates that well casings be “planned and maintained” to “prevent the migration of oil, gas or water from one (1) horizon to another.” Rules 317.g and 317.h set forth specific cementing requirements. And Rule 317.j requires production casing to be “adequately pressure tested for conditions anticipated to be encountered during completion and production operations.”

I would also like to clarify that to date relatively few natural gas wells drilled in Colorado have involved horizontal drilling.

Question. Do you agree that hydraulic fracturing greatly increases the volumes of liquids which must be properly managed?

Answer. Oil and gas development typically involves large volumes of liquids, which may include liquid hydrocarbons, produced water, and fracturing fluids. We estimate that fracturing fluids constitute about 9% of the total liquids generated by or used for oil and gas development. To ensure that all such liquids are properly managed, Colorado has adopted a variety of regulations, including COGCC Rules 206 (compliance checklists),

209 (protection of water-bearing formations), 317 (general drilling operations), 317A (special drilling operations), 317B (public water system protection), 324A (pollution prevention), 604 (oil and gas facilities), 608 (coalbed methane wells), 902 (general and special pits), 903 (pit permitting), 904 (pit lining), 905 (pit closure), 907 (waste management), 908 (centralized waste management), 1002 (stormwater management), and 1003 (interim reclamation). These regulations were comprehensively updated in 2008.

Question. Do you agree that the increases in well pressures during hydraulic fracturing operations can increase the risk of failure of the well casing, the cement job, and the blowout preventer?

Answer. As explained above, the well casing, cement job, and blowout preventer are designed to manage the hydraulic fracturing pressures, and Colorado has adopted regulations that require the well components to manage such pressures. For example, COGCC Rule 317.j requires pressure testing of the production casing for pressures anticipated during well completion, which would include fracture treatment. In addition, Rule 341 requires bradenhead annulus pressures to be “continuously monitored and recorded” during hydraulic fracturing and verbal notice to be given to the COGCC “as soon as practicable if the bradenhead annulus pressure increases by more than 200 psig.”

Question. Do you agree that groundwater contamination from a spill, leak, or failure of a cement job present public health and environmental threats and must be addressed in natural gas drilling operations?

Answer. Groundwater contamination from a spill, leak, or failure of a cement job presents a threat to public health and the environment and must be addressed in drilling operations. As explained above, Colorado has adopted a variety of regulations to address such risks, and these regulations were comprehensively updated in 2008 to reflect current conditions and best practices. Additional regulations that address groundwater contamination include COGCC Rules 906 (spills and releases), 909 (investigations and remediations), and 910 (concentrations and sampling). Under these updated regulations, Colorado operators are improving their water management. For example, the percentage of well pads utilizing closed loop or pitless drilling systems has increased from 31% in January 2010 to 79% in March 2011.

2. COGCC investigated the Ellsworth drinking water well in Weld County Colorado and found that the Ellsworth well has been contaminated by a mixture of biogenic (natural) and thermogenic (from gas drilling operations) contaminants. Although there were a number of gas wells drilled near the Ellsworth drinking water well, COGCC was unable to determine the particular source because the leaking well may have been fixed and the mixture of biogenic and thermogenic sources made it impossible for COGCC to “fingerprint” the source well. One of the companies responsible for the drilling entered into a voluntary agreement with the Ellsworth’s for replacement water.

Question. Do you agree that this is a verified case of gas drilling operations causing groundwater contamination, even though the particular well that caused the contamination was never determined?

Answer. As the COGCC reported in 2008, the methane contamination found in the Ellsworth water well included thermogenic methane that appeared to be from oil and gas activity. The COGCC could not, however, attribute this methane to gas drilling operations as opposed to subsequent well production.

3. COGCC took enforcement action against Encana relating to its Schwartz 2-15B Well (Enforcement Order 1V-276), after an investigation determined that Encana had performed hydraulic fracturing operations 4 times without notifying COGCC that its cement job had failed (the cement top had fallen), resulting in ground and surface water contamination.

Question. Do you agree that this is a verified case of gas drilling operations causing groundwater contamination?

Answer. The Schwartz 2-15B Well is a verified case of groundwater contamination caused by gas drilling operations, specifically, the failure of a cement job. This episode led the COGCC to impose additional well cementing, testing, and reporting requirements in the vicinity of the Schwartz 2-15B Well. The COGCC also amended Rule 317.o to require all operators in Colorado to run cement bond logs to ensure that proper cement coverage is achieved on all production casing.

Question. Even though the failure of the cement job was the direct cause of the contamination, do you agree that the fact that EnCana performed completion operations that included hydraulic fracturing and flowback water 4 times after the cement top had fallen was a significant contributing factor to the resulting groundwater contamination?

Answer. The COGCC's investigation determined that the groundwater contamination was not caused by hydraulic fracturing. This determination was based upon the following factors: bradenhead pressures during hydraulic fracturing showed no communication above the top of the cement; normal fracture treatment pressure showed containment of the fracturing fluids within the target zone; no indication of fracturing fluids was detected in the groundwater samples; and the gas seep decreased after remedial cementing of the well, which would not have occurred if hydraulically induced fracturing had caused the seep.

Question from Senator Benjamin L. Cardin:

1. The refinement of advanced drilling technologies has led to a significant increase in drilling activities. As drilling has boomed, some geographic locations have experienced unusual seismic activity. For example, Arkansas has recently experienced an earthquake swarm, with about 1,000 earthquakes occurring since September 2010. Some had suggested that this unusual seismic activity is related to natural gas drilling operations.

Has the Colorado Oil and Gas Conservation Commission undertaken any studies relating to the potential for seismic activity as a result of drilling? How much information does COGCC have about the underlying geologic formations in the state? Does it have enough information to scientifically evaluate the potential geologic impacts that expansive drilling activity may have?

Answer. Colorado is very familiar with “induced seismicity” related to human activity tied to a variety of processes, including the deep underground injection of waste. The Colorado Geological Survey and the Colorado School of Mines, as well as the University of Colorado, have a wealth of data on these matters and the COGCC can and does turn to these institutions for assistance. These institutions have identified no notable induced geological impacts from the many thousands of oil and gas wells in Colorado that have been fractured to date.

Questions from Senator James M. Inhofe:

1. Would you walk me through Colorado’s permitting process for natural gas drillers? In your opinion, are states adequately equipped to regulate HF?

Answer. Anyone seeking to drill a natural gas well in Colorado must submit a Form 2, Application for Permit to Drill (“APD”), under COGCC Rule 303.a. The APD includes information on the well location, formations and spacing, and drilling plans and procedures, including the casing, cementing, and blowout preventer. This information is reviewed by engineers and permit technicians at the COGCC, and additional conditions are imposed where necessary to protect public health and the environment.

Applicants must also submit a Form 2A, Location Assessment, for the well pad and certain related facilities under COGCC Rule 303.b. The Assessment includes additional information on the location, including information on major equipment, nearby improvements, surface water, access roads, land use, and soils. This information is reviewed by environmental professionals at the COGCC, and again additional conditions are imposed where necessary to protect public health and the environment.

All Location Assessments and associated APDs are subject to public notice and at least 20 days of public comment under COGCC Rule 305. In addition, special notice of such filings is provided to the local government, the surface owner, and, across most of the state, the owners of surface property within 500 feet.

Operators are also required to consult with the surface owner and the local government in locating certain facilities under COGCC Rule 306. If a proposed well pad is located in important wildlife habitat, then the COGCC will consult with the Colorado Division of Wildlife. If the operator seeks a variance from certain environmental regulations or the local government requests, then the COGCC will consult with the Colorado Department of Public Health and Environment.

Following staff review and any consultation and public comment, Location Assessments and APDs are approved by the COGCC Director. The COGCC may attach technically feasible and economically practicable conditions of approval under COGCC Rule 305, and, as noted above, the COGCC often does so to protect public health and the environment. In addition, applicants must provide financial assurance to the State under COGCC Rule 304 and the 700 Series of COGCC Rules. Following the drilling and completion of the well, additional reporting requirements apply under COGCC Rules 308A, 308B, and 309.

In my opinion, Colorado and those states with which I am familiar are adequately equipped to regulate hydraulic fracturing. As I previously testified, Colorado will continue to take appropriate action to ensure that such regulation is effective and efficient.

2. The oil and gas industry is ever-evolving with the advent of new technologies and drilling and production techniques. Could you discuss the process for which your agencies review and update regulations to ensure that the proper safeguards are in place to protect human health and the environment?

Answer. As noted above, the COGCC comprehensively updated its regulations in 2008 to improve protection of public health and the environment. The COGCC has described this rulemaking process as follows:

“All told, the Commission held twenty-two days of hearings, with some [of] the days lasting almost twelve hours. The Commission heard approximately twelve hours of public comment by approximately two hundred people. It heard from approximately one hundred sixty party and staff witnesses and heard approximately seventy-five hours of testimony, cross, examination, and answers to Commissioner questions on twelve days of hearings. The Commission also considered more than thirty legal motions and conducted nine days of initial and final deliberations totaling more than seventy additional hours. Throughout the hearing, the Commission listened to all of the witnesses, questioned aspects of witnesses’ written testimony, directed its staff to work with parties, and asked clarifying questions as necessary. The Commission repeatedly extended the rulemaking hearing in order to hear additional testimony and argument and conduct additional deliberations. It also directed and approved numerous changes to the draft rules that reflect input from the parties.”

In addition, the COGCC has updated its regulations on approximately 40 other occasions since 1990 to address changes in environmental laws, demographics, distribution of oil and gas activities, and potential environmental impacts.

3. In your testimonies, you state that you are not aware of groundwater contamination from hydraulic fracturing in your States. Why do you think hydraulic fracturing has gotten so

much attention? In the framework of regulatory and environmental challenges you each face, are the claims of environmental damage due to hydraulic fracturing justified?

Answer. Hydraulic fracturing, while practiced for decades, is new in many parts of the country. Even where it is not new, it's now deployed commonly as part of natural gas development. We believe much of the attention stems from the fact that, to many, it is a new and unfamiliar technique. The features of fracturing – cracking rock deep underground using high pressures and a relatively small amount of chemicals – have created fears for some that this process could perhaps lead to the migration of chemicals into water supplies. We take the protection of water supplies very seriously, and understand that the public wants assurances that, in fact, such impacts will not occur. In our own experience, we have not found any instances where the process of hydraulic fracturing has contaminated water supplies. To be sure, we have found other instances where activities associated with oil and gas operations have impacted water supplies. These events have typically been tied to incidents such as a leaking storage pit, a poorly cemented oil and gas well, or leaking production equipment. These cases, however, have not been linked to the specific act of hydraulically fracturing hydrocarbon layers thousands of feet below the surface, and typically, thousands of feet below groundwater supplies.

4. Is there anything else you would like to add for the record?

Answer. Attached are the following COGCC documents, all of which are available on our website and provide support for the answers set forth above:

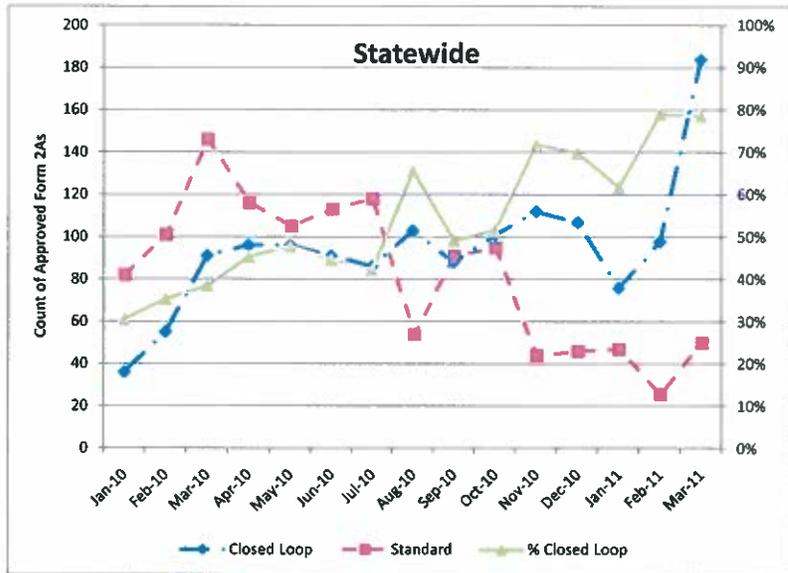
- Closed Loop Drilling System Data (May 16, 2011);
- Gasland Correction Document (September 2010);
- Report on the Ellsworth Water Well Investigation (August 7, 2009);
- Excerpt from the Statement of Basis, Specific Statutory Authority and Purpose for the New Rules and Amendments Adopted by the COGCC (December 11, 2008); and
- COGCC Staff Presentation on Why the West Divide Creek Gas Seep was Not Caused by Hydraulic “Fracing” From the Hearing on the Schwartz 2-15B Well (August 16-17, 2004).

Use of Closed Loop Drilling Systems

As Reported or Conditioned on the Oil and Gas Location Assessment, Form 2A
January 2010 through March 2011

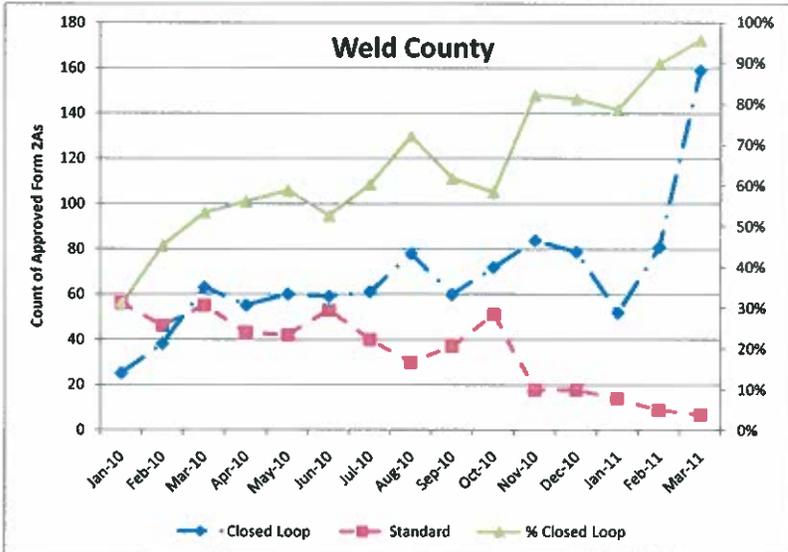
Statewide

Date	Closed Loop	Standard	% Closed Loop
Jan-10	36	82	31%
Feb-10	55	101	35%
Mar-10	91	146	38%
Apr-10	96	116	45%
May-10	96	105	48%
Jun-10	91	113	45%
Jul-10	86	118	42%
Aug-10	103	54	66%
Sep-10	88	91	49%
Oct-10	101	95	52%
Nov-10	112	44	72%
Dec-10	107	46	70%
Jan-11	76	47	62%
Feb-11	98	26	79%
Mar-11	184	50	79%



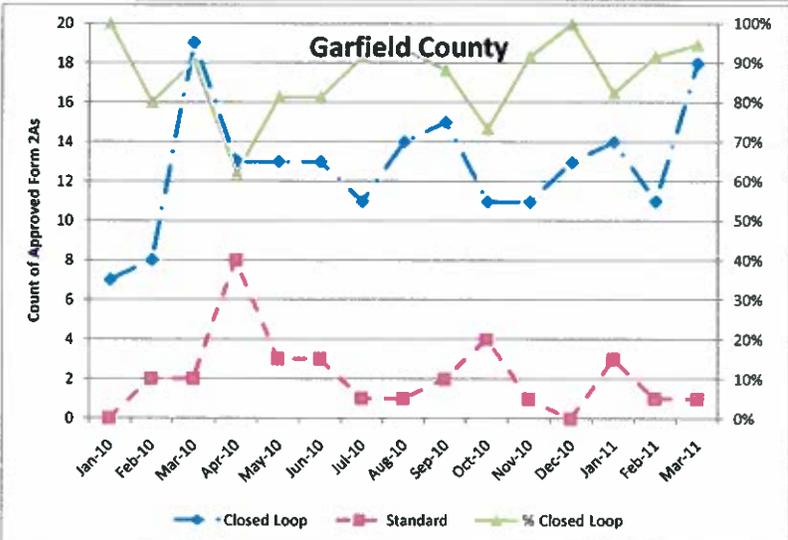
Weld

Date	Closed Loop	Standard	% Closed Loop
Jan-10	25	56	31%
Feb-10	38	46	45%
Mar-10	63	55	53%
Apr-10	55	43	56%
May-10	60	42	59%
Jun-10	59	53	53%
Jul-10	61	40	60%
Aug-10	78	30	72%
Sep-10	60	37	62%
Oct-10	72	51	59%
Nov-10	84	18	82%
Dec-10	79	18	81%
Jan-11	52	14	79%
Feb-11	81	9	90%
Mar-11	159	7	96%



Garfield

Date	Closed Loop	Standard	% Closed Loop
Jan-10	7	0	100%
Feb-10	8	2	80%
Mar-10	19	2	90%
Apr-10	13	8	62%
May-10	13	3	81%
Jun-10	13	3	81%
Jul-10	11	1	92%
Aug-10	14	1	93%
Sep-10	15	2	88%
Oct-10	11	4	73%
Nov-10	11	1	92%
Dec-10	13	0	100%
Jan-11	14	3	82%
Feb-11	11	1	92%
Mar-11	18	1	95%





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

The documentary *Gasland* has attracted wide attention. Among other things, it alleges that the hydraulic fracturing of oil and gas wells has contaminated nearby water wells with methane in a number of states including Colorado. Because an informed public debate on hydraulic fracturing depends on accurate information, the Colorado Oil and Gas Conservation Commission (COGCC) would like to correct several errors in the film's portrayal of the Colorado incidents.

Background

Methane is a natural hydrocarbon gas that is flammable and explosive in certain concentrations. It is produced either by bacteria or by geologic processes involving heat and pressure. Biogenic methane is created by the decomposition of organic material through fermentation, as is commonly seen in wetlands, or by the chemical reduction of carbon dioxide. It is found in some shallow, water-bearing geologic formations, into which water wells are sometimes completed. Thermogenic methane is created by the thermal decomposition of buried organic material. It is found in rocks buried deeper within the earth and is produced by drilling an oil and gas well and hydraulically fracturing the rocks that contain the gas. In Colorado, thermogenic methane is generally associated with oil and gas development, while biogenic methane is not.

The analytical methods used to differentiate between the two types of methane are well-known, scientifically accepted, and summarized in a well-known presentation by Dennis Coleman and papers by I.R. Kaplan and Dennis Coleman. These works, in turn, cite nearly 75 other references related to the topics of methane generation, "fingerprinting," forensic investigations, and stable isotope geochemistry.

Based upon our review of hundreds of Colorado gas samples over many years, the COGCC is able to differentiate between biogenic and thermogenic methane using both stable isotope analysis of the methane and compositional analysis of the gas. In the Denver-Julesburg and Piceance Basins, the COGCC has consistently found that biogenic gas contains only methane and a very small amount of ethane, while thermogenic gas contains not just methane and ethane but also heavier hydrocarbons such as propane, butane, pentane, and hexanes. As explained below, *Gasland* incorrectly attributes several cases of water well contamination in Colorado to oil and gas development when our investigations determined that the wells in question contained biogenic methane that is not attributable to such development.

The Weld County Wells

Gasland features three Weld County landowners, Mike Markham, Renee McClure, and Aimee Ellsworth, whose water wells were allegedly contaminated by oil and gas development. The COGCC investigated complaints from all three landowners in 2008 and 2009, and we issued written reports summarizing our findings on each. We concluded that Aimee Ellsworth's well contained a mixture of biogenic and thermogenic methane that was in part attributable to oil and gas development, and Mrs. Ellsworth and an operator reached a settlement in that case.

However, using the same investigative techniques, we concluded that Mike Markham's and Renee McClure's wells contained biogenic gas that was not related to oil and gas activity. Unfortunately, *Gasland* does not mention our McClure finding and dismisses our Markham finding out of hand.

The Markham and McClure water wells are both located in the Denver-Julesburg Basin in Weld County. They and other water wells in this area draw water from the Laramie-Fox Hills Aquifer, which is composed of interbedded sandstones, shales, and coals. Indeed, the water well completion report for Mr. Markham's well shows that it penetrated at least four different coal beds. The occurrence of methane in the coals of the Laramie Formation has been well documented in numerous publications by the Colorado Geological Survey, the United States Geological Survey, and the Rocky Mountain Association of Geologists dating back more than 30 years. For example, a 1976 publication by the Colorado Division of Water Resources states that the aquifer contains "troublesome amounts of . . . methane." A 1983 publication by the United States Geological Survey similarly states that "[m]ethane-rich gas commonly occurs in ground water in the Denver Basin, southern Weld County, Colorado." And a 2001 report by the Colorado Geological Survey discusses the methane potential of this formation and cites approximately 30 publications on this subject.

Laboratory analysis confirmed that the Markham and McClure wells contained biogenic methane typical of gas that is naturally found in the coals of the Laramie-Fox Hills Aquifer. This determination was based on a stable isotope analysis, which effectively "finger-printed" the gas as biogenic, as well as a gas composition analysis, which indicated that heavier hydrocarbons associated with thermogenic gas were absent. In addition, water samples from the wells were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX), which are constituents of the hydrocarbons produced by oil and gas wells in the area. The absence of any BTEX compounds in these water samples provided additional evidence that oil and gas activity did not contaminate the Markham and McClure wells.

The COGCC has also reviewed the records for all oil and gas wells located within one-half mile of the Markham and McClure wells, which is more than double the typical hydraulic fracture length in Colorado. This review indicated that: all oil and gas wells near the Markham well were drilled and hydraulically fractured in 1991, except for two wells that were fractured in 2005 and 2006, respectively; and all oil and gas wells near the McClure well were drilled and hydraulically fractured in 2002, except for one well that was hydraulically fractured in 2005. The records do not reflect any pressure failures or other problems associated with these wells that would indicate a loss of fracture fluid or gas from the well bore into the surrounding geologic formations.

In support of its thesis that the Markham and McClure water wells were contaminated by oil and gas development, the *Gasland* website makes several arguments that merit a brief response. First, the website quotes Professor Anthony Ingraffea of Cornell University for the proposition that drilling and hydraulic fracturing could cause biogenic methane to migrate into aquifers under certain circumstances. However, Professor Ingraffea's statement does not suggest that these circumstances apply to the Markham and McClure wells, nor does it address the extensive scientific literature establishing that biogenic methane is naturally present in the aquifer in question. Second, the website quotes Weston Wilson, an Environmental Protection Agency employee, speculating that oil and gas operators in Weld County are withdrawing large amounts of groundwater and that these withdrawals are releasing biogenic methane. However, oil and gas companies in Weld County obtain most of their water from municipalities, which obtain such water from surface water sources such as the Colorado-Big Thompson and Windy

Gap projects. Finally, the website asserts that the water in the Markham and McClure wells deteriorated after drilling and hydraulic fracturing occurred nearby. However, COGCC records indicate little or no temporal relationship between the Markham and McClure complaints and nearby drilling and hydraulic fracturing activities, which occurred several years earlier and in most cases many years earlier.

The West Divide Creek Seeps

Gasland also addresses complaints about oil and gas activity in the West Divide Creek area of the Piceance Basin in Garfield County, though it again confuses issues related to biogenic gas with those related to thermogenic gas. The film focuses on two seeps that are in close geographic proximity but derive from different origins. One of the seeps occurs in a wetland on property owned by Lisa Bracken, who appears in the film; it contains biogenic methane. The other seep, which the COGCC terms the West Divide Creek gas seep, is about 1,500 feet to the south on property owned by a neighbor; it contains thermogenic methane caused by EnCana's failure to properly cement a natural gas well.

Gasland adopts the claim that the West Divide Creek gas seep was caused by hydraulic fracturing. After investigating the matter thoroughly in 2004, COGCC staff concluded the seep was caused by gas migrating up a gas well borehole that had not been properly cemented and in which the upper portion of the gas bearing Williams Fork Formation had not been isolated. On August 16, 2004, following a public hearing, the COGCC commissioners approved an enforcement order (Order 1V-276) that incorporated the staff's causation conclusions and assessed a substantial fine against the operator.

In investigating the West Divide gas seep, the COGCC determined that it contains thermogenic methane. The gas composition and stable isotope signature of the gas closely matched that of the gas being produced from the Williams Fork Formation. The gas from both the West Divide Creek seep and the Williams Fork Formation is composed primarily of methane, but it also contains ethane, propane, butane, pentane, and hexanes. In addition, BTEX compounds were detected in ground and surface water in the vicinity of the West Divide Creek seep, which indicates that the gas is related to oil and gas activities and not of biogenic origin.

In contrast, the laboratory results for the gas samples collected from the seep on Ms. Bracken's property have demonstrated that the gas is biogenic. The COGCC has collected nine gas samples on six different occasions during 2004, 2007, 2009, and 2010. With respect to each sample, the gas composition was found to be 100 percent methane, no heavier hydrocarbon compound was detected, and the stable isotope ratio indicated that the gas is biogenic. The COGCC has also collected six water samples on four different occasions during 2004, 2007, and 2009 and ten soil samples on multiple occasions during 2008 and 2009 from Ms. Bracken's property. BTEX compounds and/or other hydrocarbons associated with oil and gas operations were not detected in any of these samples. Based on these results, the COGCC has concluded that the gas seep on Ms. Bracken's property resulted from the fermentation of organic matter by methanogenic bacteria. This is not uncommon in wetland areas, such as those that exist along West Divide Creek.

Other Information

Oil and gas development is an industrial activity, and property owners sometimes complain that it has contaminated their water well. The COGCC investigates all such complaints and reports the results individually to the complainant and collectively to the Colorado Water Quality Control

Division. In some cases, the COGCC has found that the well contains thermogenic methane linked to oil and gas development. In most cases, however, the COGCC has found that contamination is not present or that the methane comes from biogenic sources and is not attributable to oil and gas production. The following excerpt from a report summarizing the COGCC's investigation following the contamination of the Ellsworth water well is illustrative:

In response to concerns regarding the presence of methane gas in water wells completed in the Laramie/Fox Hills Aquifer, COGCC, Noble Energy, and Anadarko/Kerr McGee sampled a total of 28 water wells between March 25, 2009 and April 7, 2009 across an approximately 170 square mile area. Sample results show that these wells contained either no methane gas or biogenic (biological generated) methane gas. None of these wells, other than the Ellsworth water well, contained thermogenic methane gas. The sample results along with letters discussing the results were sent by COGCC staff to the 28 well owners [who had requested testing].

Nevertheless, it remains important to establish prudent regulations to ensure that other resources, such as groundwater, are protected. Producing oil and gas formations in much of Colorado, including the Denver-Julesburg and Piceance Basins, lie at depths of up to 8,000 feet below the ground surface, while the aquifers that sustain domestic water wells are generally less than 1,000 feet below the ground surface. COGCC regulations establish casing and cementing standards to ensure that gas being produced from 8,000 feet down does not leak into the shallower aquifers. These regulations require wells to be cased with steel pipe and the casing to be surrounded by cement to create a hydraulic seal within the annular space between the wall of the well bore and the steel pipe. In addition, a number of recent amendments to the COGCC regulations address concerns raised about hydraulic fracturing:

- Rule 205 requires operators to inventory chemicals, including fracturing fluids, and to provide this information upon request to the COGCC and certain health care professionals;
- Rule 317 requires cement bond logs to confirm that aquifers are protected;
- Rule 317B imposes mandatory setbacks and enhanced environmental precautions on oil and gas development occurring near public drinking water sources;
- Rule 341 requires well pressures to be monitored during hydraulic fracturing;
- Rule 608 mandates additional pressure testing and water well sampling for coalbed methane wells; and
- Rules 903 , 904 , and 906 impose enhanced requirements for pit permitting, lining, monitoring, and secondary containment to ensure that pit fluids, including hydraulic fracturing flowback, do not leak.

Finally, it should be understood that the COGCC Director, Dave Neslin, offered to speak with *Gasland's* producer, Josh Fox, on camera during the filming of the movie. Because the issues are technical and complex and arouse concerns in many people, Director Neslin asked that he be allowed to review any material from the interview that would be included in the final film. Unfortunately, Mr. Fox declined. Such a discussion might have prevented the inaccuracies noted above.



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

August 7, 2009

Mr. and Mrs. Ellsworth
20991 Weld Count Road 20
Fort Lupton, CO 80621

RE: Ellsworth Water Well Investigation (WW Permit No. 201558)
SESE Section 16 – Township 2 North - Range 65 West
COGCC Complaint Investigation No. 200196553
Weld County, Colorado

Dear Mr. and Mrs. Ellsworth:

This letter summarizes the process, results, and conclusions of the Colorado Oil and Gas Conservation Commission (COGCC) staff investigation into the occurrence of hydrocarbon gases in your water well under COGCC Complaint Investigation No. 200196553.

The Division of Water Resources (DWR) permit number for your water well is No. 201558 and according to the DWR water well record it was drilled in October 1998 to a total depth of 695 feet below the ground surface (fbgs) and completed as a Laramie-Fox Hills Aquifer water well. The well is screened from 475 to 685 fbgs. The well was drilled under a permit issued to Ronald Lakey of Longmont, Colorado. In 2001, the Dickhausens of Thornton, Colorado submitted to DWR a Pump Installation and Test Report for this water well. The test report shows the installation of a submersible water pump with an intake at a depth of 500 fbgs and a pumping rate of 15 gallon per minute.

On or around September 18, 2008, Mrs. Ellsworth contacted COGCC staff for assistance in investigating the occurrence of methane gas in your water well. You indicated that you had recently purchased the property and water well at 20991 WCR 2, and that when the water well was pumped you noticed significant bubbling in the water and when the water treatment system was “back-washed” into the septic tank the septic pump shut off automatically. On your behalf, a third party contractor had collected and analyzed samples of the gas collected from the house kitchen sink and determined that the gas was methane. Because there are active oil and gas production wells and facilities in the area in which you live, you were concerned that the methane gas in your water well might be related to a release from one of these facilities/wells.

On August 10, 2008, you had also collected samples from the water well and submitted these samples to Weld County Department of Public Health and Environment (WCDPHE) for analysis. Methane was not one of the constituents analyzed by the WCDPHE. You have provided the COGCC staff with the analytical results from that sampling.

In response to your complaint, on September 22, 2008, COGCC staff collected samples from your water well for analysis of general water quality parameters, organic compounds associated with oil and gas production, gas composition and stable isotopes of methane and deuterium, and for nuisance bacteria. Upon receipt of the analytical results the COGCC staff sent you a summary letter on October 27, 2008, presenting and discussing the results from the COGCC sampling. In addition, the COGCC letter compared the results with those from the WCDPHE analyses. The methane gas present in the September 22, 2009, COGCC sample was identified as being a mixture of thermogenic and biogenic gas and the heavier hydrocarbon gases were thermogenic. The thermogenic gases are likely related to oil and gas operations.

As a result of the determination that the gas in your water well was in part thermogenic, the COGCC staff began an investigation of the producing oil and gas wells in the vicinity of your water well for evidence of a release of production gas into the Laramie-Fox Hills Aquifer. The operators of these wells are Noble Energy (Noble) and Kerr McGee/Anadarko (KMG). COGCC staff contacted Noble and KMG to inform them that a water well impacted by thermogenic gas had been discovered and that the COGCC would be investigating the source of the gas.

From the date of your original contact with the COGCC, the staff has devoted significant resources to try to determine the source of the thermogenic hydrocarbon gases in your water well. Six staff members have been involved to varying degrees in this effort. As is the COGCC's standard procedure, you have been kept informed about all phases of the investigation. When available, analytical results and a discussion of the COGCC's interpretation of the results have been sent to you. The COGCC staff has answered numerous inquiries from you totaling approximately 40 separate email and telephone communications. In addition, staff has prepared approximately 20 written communications for you explaining the steps being taken in our investigation. The following is a summary of our investigation activities and conclusions.

ENGINEERING AND WATER WELL INVESTIGATION

Engineering Investigation – Oil and Gas Wells

Concurrent with evaluation of your water well sample results, the COGCC Engineering staff initiated review of drilling, well construction, and well completion records for the 37 oil and gas wells within a one-mile radius of your water well. The review included checking the surface casing depth, checking whether the Laramie-Fox Hills Aquifer was protected by the well construction, and checking whether there were anomalies in gas production that might indicate gas leakage from the well.

Based on COGCC staff experience investigating impacts to ground water, we focused the field testing of oil and gas wells to those within ½ mile of your water well. This is because, except in very rare instances, oil and gas wells that have impacted water wells are located less than 1,000 feet from the impacted water well, so our process of field testing oil and gas wells located up to ½ mile or 2,640 feet from an impacted water well extends by more than 2½ times this distance. In addition, thermogenic gas or a mixture of thermogenic and biogenic gas was not detected in

any other water wells so we conclude that the impact to the Laramie-Fox Hills Aquifer that is affecting your well is localized.

There are nine oil and gas wells within ½ mile of your water well. On October 15, 2008, COGCC staff witnessed measurement of bradenhead pressures on these nine wells. The bradenhead valve is connected to the open space between the production casing and the surface casing and opening the valve to measure pressure and check for gas and fluids is a technique used to help determine whether there is a casing or wellhead leak. Bradenhead pressures were not measured and fluids were not present in any of the nine wells tested.

On January 8, 2009, Noble performed a mechanical integrity test (MIT) on the Powers 21-22 well which had been selected by the COGCC staff for further investigation based on some earlier well casing/well cementing issues. The MIT involves pressuring-up the production casing of an oil and gas well and observing any pressure loss which would indicate a possible production casing leak. This well passed the MIT. In March 2009, the remaining wells within the ½ mile radius were MITed. All these wells passed the MITs.

The results of the bradenhead pressure measurements and MITs indicate that the oil and gas wells within ½ mile of your water well are operating properly and not leaking gas, but do not negate the possibility of a prior leak that was subsequently remediated.

Former Powers No. 1 well

Staff review of COGCC well files showed that an old well, the Powers No. 1 (API 05-123-05076), had been drilled sometime around 1946 in Section 22, Township 2 North, Range 65 West, which is southeast of your property. However, the COGCC records regarding the Powers No. 1 did not specify the exact well location or include information about the depth, casing, or how the well was abandoned. Because of the limited amount of information in the COGCC records and because this old well had the potential to be a source or conduit for ground water contamination, the COGCC conducted a search for additional information about this well. Records concerning the Powers No. 1 well were found at the Denver Earth Resources Library, which provided a specific location and information about both well casing and depth. According to the records, the Powers No. 1 well was spud on April 18, 1946 by J. Clayton and drilled to a total depth of 1,005 fbs with well casing set to a depth of 335 fbs. Other than some information about the rocks encountered during the drilling of the well (i.e., lithologic information), no additional information was found.

Between May 26, 2009, and June 16, 2009, the COGCC reentered the old well bore, sampled the well for gas and general water quality, and abandoned the well by cementing the borehole from total depth to the surface. Results of a sample collected on May 27, 2009, show that the former Powers No. 1 did not have gas in it and there were no unusual water quality results observed. A second sample collected on June 11, 2009, was analyzed for gas composition and stable isotopes of carbon and hydrogen. A small amount of biogenic methane gas, similar to the biogenic gas that occurs frequently in the Laramie-Fox Hills aquifer, was detected.

As a result of the reentry and sampling, the COGCC staff determined that the Powers No. 1 well is not the source of the thermogenic gas observed in your water well. The COGCC spent approximately \$107,000 on reentering and properly plugging this well.

Water Well Investigation

On February 20, 2009, COGCC staff collected a second sample of gas from your water well and on March 11, 2009, a second water sample was collected. The analytical results for these two samples are similar to the results for the water and gas samples collected by staff on September 22, 2008.

Between October 22, 2008, and April 7, 2009, COGCC staff collected production gas samples from the nine oil and gas wells within ½ mile of your water well for gas composition and stable isotope analysis. As part of the COGCC staff evaluation of the thermogenic gas in your water well, the analytical results of these production gas samples were compared to the analytical results for the gas from your water well. Unfortunately, after a thorough review of all of the analytical results the COGCC staff is unable to identify any of the oil and gas wells within ½ mile of your water well as the source of the thermogenic hydrocarbon gases (methane, ethane, propane, iso- and n-butananes, iso- and n-pentanes, and hexanes) present in your well.

Throughout large areas of Weld County the Laramie-Fox Hills Aquifer, in which your water well is completed, has naturally occurring bacterially produced methane (biogenic methane). The source of this natural methane is likely from coals present in the aquifer. Isotopically and compositionally, this biogenic gas has a distinctive signature that is different from the composition of the thermogenic gas and the stable isotopes of the methane produced from the oil and gas wells in your area. Generally, these differences make identifying the presence of thermogenic gas in a water well versus naturally occurring biogenic gas relatively straight forward. However, when the gas in a water well is a mixture of biogenic and thermogenic gas the isotopic signature of the gas is not as definitive a tool for determining the source. When this occurs, the evaluation of the other hydrocarbon gases, propane, iso- and n-butananes, iso- and n-pentanes, and hexanes (C3 through C6), which are present in the production gas, is very important and often helps in identifying a possible source. The biogenic gas in the Laramie-Fox Hills Aquifer does not contain C3 through C6 gases and, when present in a Laramie-Fox Hills Aquifer water well, it is evidence of an impact from thermogenic gas (as was noted in the October 2008 evaluation of your water well).

Comparison of the C3 through C6 compounds from an impacted water well to those in the gas produced from oil and gas wells in the area is a tool used by the COGCC staff to identify a possible source. The COGCC staff looked at both the isotopes of methane and the occurrences of the other hydrocarbon gases in the samples collected both from your water well and the oil and gas wells. The methane gas in your water well is a mixture of both naturally occurring biogenic gas and thermogenic gas which, as discussed earlier, makes the identification of a specific source difficult. Based on isotopic evaluation of the methane in your water well and the samples from the production wells, the COGCC staff are unable to identify a particular oil and gas well as the source of thermogenic gas in your water well. Our evaluation of the C3 through

C6 compounds from the production well samples and your water well also failed to positively identify a particular oil and gas well as the source.

Other Water Well Sampling

As part of the investigation into the occurrence of methane gas in your water well and to determine whether other water wells had been impacted, 26 water wells were sampled. This sampling and analysis was conducted by the COGCC, Noble, and KMG. Thermogenic gas was not detected in any of these other water wells. Because the results of this sampling and analysis have been discussed in earlier communication and correspondence with you, they will not be discussed in this letter. The COGCC spent approximately \$30,000 collecting and analyzing samples from water wells and oil and gas wells.

You have expressed concern that some of the samples collected from water wells were collected at a time when nearby oil and gas wells had been “killed.” You have further stated that the “killing” of these wells rendered the analytical results invalid because it had effectively cut off gas that was leaking out of a well or wells. However, it is COGCC's experience that if an oil and gas well has leaked and impacted ground water the effects of that leak can be detected long after the leak has been repaired or the well has been plugged and abandoned; therefore, we believe that if another water well had been impacted by gas leaking from an oil and gas well the thermogenic gas that would have been entrained in the ground water would still be present and would have been detected in the water sample. That being said, if any of your neighbors still believe that their water well contains thermogenic gas or has been impacted by gas leaking from an oil and gas well they should contact us and we will collect additional samples from their water well for laboratory analysis.

Mitigation of the Gas in Your Water Well

On March 21, 2009, Noble voluntarily began providing you with temporary substitute water for domestic use at your home. By letter dated June 17, 2009, you and Noble jointly advised me that you had recently agreed upon certain measures to further mitigate the natural gas detected in your water well. That letter states that Noble will install a filtration system to remove the gas from your water well and make such well safe for your use. The letter also states that you and Noble have further agreed to cooperate and work diligently to resolve any remaining issues between you. It is our understanding that the filtration system is designed to mitigate the methane and other gases entrained in your water and eliminate possible fire or explosion hazards and is now operating.

CONCLUSION

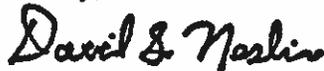
The method used by the COGCC staff to investigate and address the impact to your water well has been thorough and appropriate. The COGCC staff's conclusion, supported by all the investigation records, is that your water well contains a mixture of both biogenic and thermogenic gas and that the thermogenic gas appears to be from oil and gas activity; however, the COGCC staff has been unable to identify any current activity or existing well as the source of the impact. As previously discussed, all current oil and gas wells within ½ mile of your water well are operating properly and not leaking gas, but this does not negate the possibility of a prior leak that was subsequently remediated. Based on our experience investigating other groundwater impacts, as well as our review of oil and gas well records and water well samples, we do not believe that the gas in your water well is attributable to an oil and gas well located more than ½ mile away.

Because no responsible party for the water well impact can be identified, the staff will not be issuing a notice of violation (NOAV) or pursuing enforcement against any oil and gas operator as a result of the investigation of Complaint No. 200196553. Because Noble voluntarily has constructed a water treatment system to mitigate the gas in your well water and because all oil and gas wells within ½ mile of your water well are operating properly, the COGCC staff considers the situation mitigated and COGCC complaint No. 200196553 closed. Nonetheless, if you wish, the COGCC staff will continue to collect samples from your water well for gas composition and stable isotope analysis on an annual basis. In the event that such analysis or any other future information allows us to identify the party responsible for the thermogenic gas in your water well, then we may issue an NOAV or pursue enforcement at that time.

Under COGCC Rule 522, you as the complainant, have the right to file an application for a hearing with the Commission regarding this complaint if you are not satisfied with this resolution. If you wish to apply for a hearing, please contact Rob Willis, COGCC Hearings Officer at 303-894-2100 ext. 5125.

If you have any questions or would like to discuss these matters further, please contact me at 303-894-2100 ext. 5122, or Debbie Baldwin, COGCC Environmental Manager at ext. 5111, or Dave Dillon, COGCC Engineering Manager at ext. 5104.

Respectfully,



David Neslin
Director
Colorado Oil & Gas Conservation Commission

cc: Weld County Commissioners

Exhibit B

Statement of Basis, Specific Statutory Authority, and Purpose

New Rules and Amendments to Current Rules of the Colorado Oil and Gas Conservation Commission, 2 CCR 404-1

This statement sets forth the basis, specific statutory authority, and purpose for new rules and amendments to the Rules and Regulations and Rules of Practice and Procedure (“Rules”) promulgated by the Colorado Oil and Gas Conservation Commission (“COGCC”) on December 11, 2008. These rules are promulgated to protect public health, safety, and welfare, including the environment and wildlife resources, from the impacts resulting from the dramatic increase in oil and gas development in Colorado. They also implement new statutory authority and update existing regulations where appropriate. They are intended to foster the responsible and balanced development of oil and gas resources.

Unless otherwise specified, the new rules and amendments become effective on May 1, 2009 on federal land and April 1, 2009 on all other land.

In adopting the new rules and amendments, the Commission relied upon the entire administrative record for this rulemaking proceeding, which formally began in March 2008 and informally began in the summer of 2007. This record includes the proposed rules and numerous recommended modifications and alternatives; thousands of pages of public comment, written testimony, and exhibits; and 12 days of public and party hearings. The Commission spent another 12 days deliberating on the rules before taking final action.

Statutory Authority

The additions and amendments to the rules are promulgated pursuant to the authority granted to COGCC by House Bills (“HB”) 07-1298 and 07-1341, codified at sections 34-60-106 and 34-60-128, C.R.S., of the Oil and Gas Conservation Act (“Act”). Additional authority for the promulgation of the rules is provided by sections 34-60-102, 34-60-103, 34-60-104, 34-60-105, and 34-60-108, C.R.S. of the Act. The Commission also adopted the following statement of basis and purpose consistent with section 24-4-103(4), C.R.S., of the Administrative Procedure Act. This statement is hereby incorporated by reference in the rules adopted.

The rulemaking hearing for these rules was held on May 22, 2008 (initial motions); June 10, 2008 (public testimony); June 23-27, 2008 (public and party testimony); June 30-July 1, 2008 (party testimony); July 15-17, 2008 (party testimony); August 19-20, 2008 (deliberations); September 9-11, 2008 (deliberations); September 22-23, 2008 (deliberations); October 26-27, 2008 (deliberations); and December 9-11, 2008 (deliberations).

Purpose

Address Growing Impacts of Increase in Oil and Gas Activity

A major reason for adopting these regulations was to address concerns created by the unprecedented increase in the permitting and production of oil and gas in Colorado in the past few years. In 1996, the COGCC, through its Director, approved 1,002 applications for permits to drill (“APD”). In 2004, that number increased to 2,915 approved APDs. In 2007, the COGCC approved 6,368 APDs. The COGCC anticipates that it will approve approximately 7,500 APDs in 2008. This increase in permitting levels generally corresponds to an increase in drilling

activity, particularly in the Piceance Basin, where drilling has extended into new areas with more extensive wildlife and water resources, more challenging terrain, and additional people. These increases require the COGCC to re-evaluate its regulatory scheme to ensure that its rules are appropriate for the heightened level and broader geographic extent of development activity in Colorado. In addition, as the level and extent of drilling activity has increased, so has the public concern for the health, safety and welfare of Colorado's residents. The level of public concern for Colorado's environment and wildlife resources has also risen with the increase in permitting and drilling over the past few years. With the number of approved APDs increasing by approximately 750% in twelve years (and 257% in just four years) and the public concerns engendered by the increased activity, the COGCC's re-evaluation was necessary and appropriate.

Implement 2007 Legislation

In 2007, upon the urging and initiative of the Colorado Department of Natural Resources, the General Assembly passed legislation to increase the Commission's regulatory authority and oversight obligations to better address the potential adverse impacts that can accompany oil and gas development. The General Assembly declared that it is in the public's interest to foster the *responsible, balanced* development of Colorado's oil and gas resources consistent with the protection of public health, safety, and welfare, *including protection of the environment and wildlife resources*. C.R.S. § 34-60-102(1) (emphasis added).

The new rules comply with the legislative mandate to: (1) foster oil and gas development consistent with the protection of public health, safety, and welfare, including the environment and wildlife resources; (2) promote the conservation of wildlife habitat in connection with the development of oil and gas; and (3) minimize adverse impacts to wildlife resources affected by oil and gas operations and ensure proper reclamation of wildlife habitat. C.R.S. § § 34-60-106, 34-60-128.

In order to protect the health, safety, and welfare of the general public, the COGCC staff developed the rules in consultation with the Colorado Department of Public Health and Environment ("CDPHE"). C.R.S. § 34-60-106(11)(a)(II). As directed by the legislature, the rules provide a timely and efficient procedure by which the CDPHE has an opportunity to provide comments during the COGCC's decision-making process. *Id.*

In order to minimize adverse impacts to wildlife resources and ensure proper reclamation of wildlife habitat, the COGCC staff developed the rules in consultation with the Colorado Division of Wildlife ("CDOW"). C.R.S. § 34-60-128(3)(d)(I). As directed by the legislature, the rules: (1) develop a timely and efficient consultation process with the CDOW governing notification and consultation to minimize adverse impacts and other issues relating to wildlife resources; (2) encourage operators to utilize comprehensive drilling plans and geographic area analysis strategies to provide for orderly development of oil and gas fields; and (3) minimize surface disturbance and fragmentation in important wildlife habitat by incorporating appropriate best management practices in certain COGCC orders and decisions. *See* C.R.S. § 34-60-128(d)(I-III).

Update Existing Rules Where Appropriate

The COGCC staff also identified existing rules to update in order to enhance clarity, respond to new information, and reflect current practice and procedure. Although the Commission has annually adopted or amended particular rules, the last set of comprehensive amendments occurred more than a decade ago and various rules had become outdated. For example, before

amendment some of the environmental and financial assurance rules no longer adequately addressed current needs and conditions. Similarly, before amendment some of the procedural rules did not reflect current COGCC practices. Therefore, the Commission used this as an opportunity to update existing rules where appropriate.

Background

Development of the Draft Rules

The General Assembly entrusted the Commission with the weighty task of fine-tuning the balancing act between the development of the oil and gas resources and the protection of public health, safety, and welfare, including the environment and wildlife resources. The COGCC staff therefore began the development of the draft rules with the understanding that the continuation of oil and gas development is important to Colorado, as is the protection of Colorado's citizens and environment from the negative impacts of such development.

In the summer of 2007, staff members of the COGCC, CDPHE, and CDOW met and began identifying specific areas where new COGCC regulations were required to properly address identified problems and implement HBs 07-1298 and 07-1341. In addition, the staff members of the three agencies began contacting individuals who participated in drafting HBs 07-1298 and 07-1341 and other people that either expressed an interest in or were believed to potentially be affected by the proposed rulemaking, including representatives from the oil and gas industry, the environmental community, local governments, federal agencies, sportsmen, and property owners.

In November 2007, the COGCC staff circulated a document entitled "Initial pre-draft rulemaking proposal to implement HBs 07-1298 and 07-1341" ("pre-draft proposal") to stakeholders. The COGCC also posted this document on its website. The pre-draft proposal was a conceptual, narrative document, which was intended to frame the issues and facilitate public input prior to development of the draft rules. Once the pre-draft proposal was distributed, all stakeholders and members of the public were given the opportunity to review and comment on the document, and thousands of pages of such comments were received by the COGCC staff. Once the public comment began in December 2007, all public comment pertaining to the rulemaking was posted on the COGCC website as time and resources allowed.

To obtain additional public comment prior to development of the draft rules, the COGCC, CDPHE, and CDOW staffs held five meetings in January 2008 in communities significantly affected by oil and gas development. These meetings were held in Parachute, Greeley, Wray, Durango, and Trinidad, and they were collectively attended by approximately 1,700 people. They provided the staffs with substantial additional input on the pre-draft proposal and rulemaking and apprised the public of the rulemaking process.

Also during January and February 2008, the COGCC staff convened nine technical work groups to discuss some 67 issues associated with the pre-draft proposal. These work groups held a total of 37 meetings, which lasted about 150 hours, and were attended by about 250 stakeholders. Through these meetings, the participants shared their perspectives on a range of issues associated with the pre-draft proposal and the rulemaking, including existing problems, regulatory costs and benefits, efficiency and timing concerns, and alternative approaches. All of these meetings were noticed on the COGCC website, and were open to interested members of the public.

Through the initial meetings, pre-draft proposal, public meetings, and technical work groups, the COGCC staff received broad stakeholder and public input before the draft rules were prepared

and the formal rulemaking process began. Local governments, oil and gas companies, environmental groups, sportsmen, and other members of the public received and took advantage of numerous opportunities to offer input regarding the development of the draft rules.

After careful consideration of this input, the COGCC staff in consultation with the CDPHE and CDOW drafted proposed rules which were provided to the Commission and posted on the COGCC website on March 31, 2008 and published in the Colorado Register on April 10, 2008. The draft rules differed substantially from the pre-draft proposal. Of 21 topics addressed in the draft rules, 17 of them reflected significant changes from the pre-draft proposal. Changes were made to simplify requirements, better differentiate between different geologic basins, further minimize adverse impacts to public health, the environment, and wildlife resources, and ensure timely and efficient action. These changes improved the draft rules and better balanced the development of oil and gas with the protection of public health, safety and welfare, including the environment and wildlife resources.

Rulemaking Hearing and Development of the Final Rules

The COGCC staff submitted its prehearing statement in support of the draft rules on April 18, 2008, which included extensive written testimony and exhibits from COGCC, CDPHE, and CDOW staff. This testimony described the problem each draft rule was designed to address, explained how each proposed change would address the problem and result in greater protection for public health or the environment, and evaluated whether the proposed rule would affect industry's ability to develop the resource efficiently and whether it would effectively balance development of oil and gas resources with protection of public health, safety, and welfare, including the environment and wildlife resources.

Eighty-five different individuals or organizations requested party status to this rulemaking, including government organizations, oil and gas companies, conservation groups, and agricultural associations. These parties filed responsive prehearing statements in May 2008. Their responses included thousands of pages of additional written testimony and exhibits. In addition to filing responsive prehearing statements, these parties to the rulemaking were given numerous opportunities to present witnesses and written materials to the Commission throughout the rulemaking hearing, as described below.

On May 16, 2008, the COGCC staff, in consultation with the CDPHE and CDOW, submitted a cost-benefit and regulatory analysis, to provide additional information to the Commission, parties, and public, and to comply with the Administrative Procedure Act, C.R.S. § 24-4-101 *et. seq.* This 182-page analysis addressed each of the proposed rules and described, *inter alia*, the likely beneficiaries of the proposed rule and the nature of any anticipated benefit, the likely costs expected to be incurred as a consequence of the proposed rule, and any adverse effects of the proposed rule on small businesses or consumers. For each proposed rule, the cost-benefit and regulatory analysis compared the overall benefits and costs of the proposed rule to alternative approaches and explained why the alternative approaches had been rejected.

The Commission commenced the rulemaking hearing on May 22, 2008 in Denver, reviewing a prehearing order and considering appeals from any party regarding procedural decisions contained therein. The Commission also addressed initial motions filed by the parties, including motions seeking to bifurcate or limit the proceeding. Both staff and parties to the rulemaking subsequently filed rebuttal prehearing statements in early June 2008.

The Commission heard approximately eight hours of public testimony on June 10, 2008 in Grand Junction, Colorado and approximately four hours of public testimony on June 23, 2008 in Denver, Colorado. The Commission began hearing testimony from parties and party witnesses on June 23, 2008 in Denver. For the next six days, the Commission heard testimony from parties or party witnesses, cross-examination by parties, and answers to Commissioner questions from parties or party witnesses. The Commission reconvened for three more days of testimony, cross-examination, and questioning during July 15-18, 2008 in Denver.

Throughout this period, the COGCC staff was in frequent discussion with parties regarding the draft rules. Based upon these discussions and its own further evaluation, the COGCC staff issued clarifications to several of the proposed rules in May and June 2008. In consideration of arguments and alternative proposals contained in the parties' responsive prehearing statements and rebuttal statements, the COGCC staff issued a comprehensive set of suggested revisions to the proposed rules on June 18, 2008. The Commission invited groups of parties to submit alternative language for the proposed rules by July 30, 2008. Each of the party groups submitted alternative language, and some party groups submitted additional material in support of their proposed alternative approaches. The COGCC staff reviewed these submittals and, on August 11, 2008, submitted alternative recommended language for several of the draft rules.

The Commission closed the evidentiary record and commenced deliberations on August 19-20, 2008 in Denver on those rules for which the COGCC staff had developed alternative recommended language. During these deliberations, the Commission initially approved each of these rules, subject to changes provisionally approved in the deliberations. During these two days of deliberations, the Commission gave initial approval to fifty of the proposed rules.

The COGCC staff then reviewed the parties' July 30, 2008 submittals for the balance of the proposed rules and, on September 3-5, 2008, submitted recommended alternative language for each of the remaining draft rules. The Commission conducted deliberations on these draft rules on September 9-11 and 22-23, 2008 and on October 26-27, 2008. During these deliberations, the Commission gave initial approval to the remainder of the proposed rules.

At the conclusion of the initial deliberations, COGCC staff reviewed the transcripts of the proceedings and prepared final rule language. Where the Commission directed the staff to prepare new language for particular rules, the staff gave the parties an opportunity to review and comment to the Director on that new language. On November 7, 2008, the COGCC staff submitted final rule language for the Commission's review and consideration. The Commission conducted final deliberations on this language and adopted the final rules on December 9-11, 2008.

This was the most extensive rulemaking hearing in the Commission's history. All told, the Commission held twenty-two days of hearings, with some the days lasting almost twelve hours. The Commission heard approximately twelve hours of public comment by approximately two hundred people. It heard from approximately one hundred sixty party and staff witnesses and heard approximately seventy-five hours of testimony, cross, examination, and answers to Commissioner questions on twelve days of hearings. The Commission also considered more than thirty legal motions and conducted nine days of initial and final deliberations totaling more than seventy additional hours. Throughout the hearing, the Commission listened to all of the witnesses, questioned aspects of witnesses' written testimony, directed its staff to work with parties, and asked clarifying questions as necessary. The Commission repeatedly extended the

rulemaking hearing in order to hear additional testimony and argument and conduct additional deliberations. It also directed and approved numerous changes to the draft rules that reflect input from the parties.

The Commission believes that the resulting final rules responsibly address the recent increase in oil and gas development, implement the 2007 legislation, and update the prior rules where appropriate. It also believes that these rules will ensure the protection of the public health, safety and welfare, including the environment and wildlife resources, while also fostering the responsible, balanced development, production, and utilization of oil and gas resources. C.R.S. § 34-60-102(1)(b). These rules will, among other things:

- Provide additional protection for public health and the environment through several new measures. These measures include requirements that operators maintain an inventory of chemicals kept onsite for use downhole, restrict operations in areas near drinking water sources, install emission control devices on certain equipment located near homes, schools, and other occupied buildings, and implement additional stormwater management measures. *See* Rules 205, 317B, 805, and 1002;
- Minimize adverse impacts on wildlife resources by requiring operators to work with CDOW regarding site-specific mitigation for sensitive wildlife habitat (mostly located in Western Colorado) and to avoid the most critical habitat areas where technically and economically feasible. *See* Rules 1201-1205;
- Provide for consultation with the CDPHE and CDOW in appropriate circumstances. These consultations will result in recommendations to the COGCC Director on appropriate conditions of approval to protect public health, the environment, and wildlife. For wildlife conditions, the Director's decision will be subject to surface owner consent. *See* Rules 306, 1202;
- Provide for timely efficient permitting through measures such as limiting the duration of CDPHE and CDOW consultation and public comment, expediting approvals under certain circumstances, and Commission review if permitting decisions are not timely issued. The rules also omit earlier proposals to develop an expansive new application form and require wildlife surveys. *See* Rules 216, 303, 305, 306, and 1201;
- Encourage landscape level planning through operator-initiated Comprehensive Drilling Plans, which will facilitate early and collaborative review and in certain circumstances aggregate and expedite regulatory approvals. While such Plans will be optional, the rules contain incentives for their use. *See* Rule 216;
- Provide for enhanced transparency by notifying surface owners, the owners of nearby surface property, local governments, the CDPHE and CDOW, and the public of permit applications and providing them with a minimum 20-day period to submit comments to the Director. *See* Rule 305; and
- Avoid a one-size-fits-all approach by tailoring numerous rules to the individual circumstances of the location or region. This includes rules concerning the requirements for compliance checklists, permit applications, notice, drinking water protection, odor control, and wildlife habitat protection. *See* Rules 206, 303, 305, 317B, 318A, 318B, 805, and 1202-1205.

Colorado Oil and Gas Conservation Commission

Cause No. 1V Docket 0408-OV-27

COGCC Staff Presentation

August 16 and 17, 2004

EVIDENCE WHY WEST DIVIDE CREEK GAS SEEP WAS NOT CAUSED BY HYDRAULIC “FRACING”

- **BRADENHEAD PRESSURE MONITORING DURING FRAC SHOWED NO COMMUNICATION ABOVE TOP OF CEMENT**
- **NORMAL FRACTURE TREATMENT PRESSURE SHOWED CONTAINMENT OF FRAC FLUIDS WITHIN THE TARGET ZONE**
- **NO INDICATION OF FRAC FLUIDS WERE DETECTED IN SEEP AREA SAMPLES**
- **WEST DIVIDE CREEK GAS SEEP DECREASED AFTER THE REMEDIAL CEMENTING OF THE SCHWARTZ 2-15B WELL. THIS WOULD NOT HAVE OCCURRED IF HYDRAULICALLY INDUCED FRACING CAUSED THE SEEP**