October 8, 2004

Weston Wilson
EPA Employee
Denver, Colorado

Honorable Wayne Allard
7340 E. Caley, Suite 215
Englewood, Colorado 80111

Honorable Ben Nighthorse Campbell
6950 E. Belleview Avenue, Suite 200
Greenwood Village, Colorado 80111

Honorable Diana DeGette
600 Grant Street, Suite 202
Denver, Colorado 80203

Dear Senators Allard and Campbell and Representative DeGette,

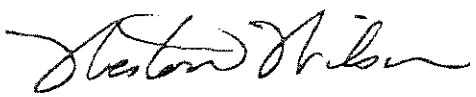
Recent events at EPA have caused me and several of my peers at EPA great concern. In June of this year, EPA produced a final report pursuant to the Safe Drinking Water Act that I believe is scientifically unsound and contrary to the purposes of the law. In this report, EPA was to have studied the environmental effects that might result from the injection of toxic fluids used to hydraulically fracture coal beds to produce natural gas. In Colorado, coal beds that produce natural gas occur within aquifers that are used for drinking water supplies. While EPA's report concludes this practice poses little or no threat to underground sources of drinking water, based on the available science and literature, EPA's conclusions are unsupportable. EPA has conducted limited research reaching the unsupported conclusion that this industry practice needs no further study at this time. EPA decisions were supported by a Peer Review Panel; however five of the seven members of this panel appear to have conflicts-of-interest and may benefit from EPA's decision not to conduct further investigation or impose regulatory conditions.

As these matters are complex, I enclose a technical analysis to further inform you and other members of Congress. I invoke the protections under the First Amendment of the Constitution and the Whistleblowers Protection Act should EPA retaliate against me as a result of speaking with you or other members of Congress or speaking to the press or the public regarding this matter.

I am a resident of Denver in the first Congressional District of Colorado and I am employed by the Environmental Protection Agency in Denver. I have been employed by the EPA's Regional Office in Denver, since 1974. I am currently assigned to the Office of Ecosystems Protection and Remediation, National Environmental Policy Act (NEPA) Team. I am an environmental engineer assigned to assist EPA with its responsibilities under Section 309 of the Clean Air Act to independently review federal agency's compliance with NEPA. Currently I analyze the environmental impacts of coal mining, gold mining, and oil and gas development on public lands. I serve as the Legislative Advocate for the American Federation of Government Employees Local 3607 representing professional and non-professional employees in EPA Region 8. I have also served as the President of Local 3607 in the past.

EPA's failure to regulate the injection of fluids for hydraulic fracturing of coal bed methane reservoirs appears to be improper under the Safe Drinking Water Act and may result in danger to public health and safety. I respectfully request that you investigate this matter and respond as you and other members of Congress deem appropriate.

Sincerely,



Weston Wilson

Enclosure: EPA Allows Hazardous Fluids to be Injected into Ground Water, A report on EPA's failure to protect America's ground water from the impacts of oil and gas production, Weston Wilson, October 7, 2004, 18 pages.

cc: Representative Bob Beauprez
Representative Joel Hefley
Representative Marilyn Musgrave
Representative Scott McInnis
Representative Thomas Tancredo
Representative Mark Udall
EPA Office of the Inspector General

EPA Allows Hazardous Fluids to be Injected into Ground Water

A report on EPA's failure to protect America's ground water
from the impacts of oil and gas production

A technical analysis by Weston Wilson, an employee of the U.S. Environmental Protection Agency

October 8, 2004

Abstract

EPA has established that: 1) coal bed methane hydraulic fracturing occurs within underground sources of drinking water, 2) hydraulic fracturing fluids contain toxic components that are not entirely removed during methane gas production, and 3) this fracturing process can create pathways which allow methane to migrate into high quality ground water. The industry's practice of hydraulically fracturing coal bed reservoirs could endanger underground sources of drinking water and render these aquifers unusable as a future drinking water supply. Therefore, the industry practice of hydraulic fracturing of coal beds should be investigated further by EPA and, if found harmful, or potentially harmful, to ground water and other resources, should be regulated by EPA throughout the United States.

Disclaimer

The views and opinions contained in this report are not those of EPA. I am solely responsible for all information contained in this report. I was not involved in either the preparation or review of EPA's report on the hydraulic fracturing of coal bed methane reservoirs.

I request the rights granted under the first amendment to the United States Constitution and assert protection under the Whistleblowers Protection Act should the Environmental Protection Agency retaliate against me for speaking to members of Congress or speaking to the press or speaking to the public about the matters contained herein.

Weston Wilson Oct 8, 2004

Weston Wilson, October 8, 2004

A. Author's conclusions about EPA's failure to protect ground water

In June 2004, EPA's Office of Water in Washington, D.C., completed a study on the potential effects to underground sources of drinking water resulting from the industrial practice of hydraulically fracturing coal bed reservoirs to produce methane. EPA concluded this practice poses little or no threat to underground sources of drinking water and does not warrant additional site-specific investigations. As a result of this conclusion, EPA will not regulate this activity anywhere except in the State of Alabama where a federal court ordered that EPA must do so.

Despite EPA's conclusions that this practice poses little or no threat to underground sources of drinking water, EPA obtained a national agreement from three oil and gas industry service companies indicating that these companies would stop injecting hydraulic fracturing fluids containing diesel fuel into coal bed reservoirs with good quality water. EPA has not sought to restrict other entities or any of the other toxic components of the fracturing fluids.

Some formulations of the hydraulic fluids used to fracture coal bed reservoirs are considered proprietary information by the oil and gas industry service companies. Because this information has been kept confidential as proprietary information, the public does not have access to information to determine whether these materials could endanger underground sources of drinking water.

Coal bed hydraulic fracturing, a method used to produce natural gas, may introduce toxic materials such as acids, benzene, toluene, ethyl benzene, xylene, formaldehyde, polyacrylamides, chromates, and other toxic components into underground sources of drinking water. Because it 'fractures' coal beds, hydraulic fracturing can also create new pathways for methane migration into aquifers containing good quality ground water, and thus into privately-owned water wells and community water supplies.

Except in Alabama, neither EPA nor the States regulate the type or quantity of toxic fluids used to fracture coal beds to produce methane. The toxic components of these fracturing fluids are not reported to any regulatory authority or to the public.

B. Hydraulic fracturing of coal bed reservoirs improves natural gas production

Natural gas, or methane, is adsorbed within coal beds. Natural gas can be produced after overlying ground water has been pumped out reducing the fluid pressure that holds the natural gas in place. Hydraulic fracturing in coal beds is the process of pumping thickened fluids into a well at a rate that exceeds the capacity of the coal bed to accept them. A large capacity pump is used to increase the pressure of the injected fluid which results in cracks or fractures, allowing a path to move the injected fluids along these newly formed fractures. The hydraulic fluid often contains propping agents, usually silica sand particles, which hold the fractures open after the pressure is released. While hydraulic fracturing of oil and gas found in conventional geologic traps is well established, hydraulic fracturing of coal beds is relatively new.

According to the Gas Technology Institute, natural gas from coal beds produced approximately 1.3 trillion cubic feet of natural gas in 2000. The Department of Energy estimates that approximately six percent of the U.S. total natural gas production in 2000 was obtained from coal beds and predicts this percentage will increase in the future.[1]

Natural gas is produced from nine coal basins in the United States, from Alabama to Montana, and is being explored in Alaska. Oil and gas service companies inject fluids for hydraulic fracturing of coal beds in Colorado, New Mexico, Utah, Wyoming, Montana, West Virginia, Virginia, Kentucky, Arkansas, Oklahoma, and Alabama. Approximately seventy percent of the total U.S. coal bed methane production is derived from the San Juan Basin in Colorado and New Mexico.

Unlike natural gas developed from conventional oil and gas deposits, geologic formations which contain coal bed methane can be near the surface where ground water may used as a source of drinking water supplies. Conventional oil and gas occurs in geologic traps that are usually associated with deep (generally over 1000 feet deep) and typically highly saline ground water that is unsuitable for drinking water. Enhanced recovery techniques used to develop conventional natural gas and oil in deep geologic structural traps, including fracturing the rock

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[1] Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs, Appendix A, Department of Energy – Hydraulic Fracturing White Paper, EPA Drinking Water Protection Division, Final Report, June 2004, page App. A-1. http://www.epa.gov/safewater/uic/cbmstudy.html

to allow more oil and gas to flow, are thus less likely to risk damage to usable ground water supplies. Although the practice of hydraulic fracturing has been used in the recovery of conventional oil and gas since the 1950s, this practice has been applied for recovery of coal bed methane only since the mid-1990s. And only in the last few years has the industry begun the injection of fluids to conduct hydraulic fracturing in aquifers that supply, or could supply, community and individually-owned drinking water wells.

C. EPA decisions are not consistent with the findings of its study nor have EPA decisions complied with the purposes of the SDWA

In EPA's June 2004 final report and court-directed decisions, EPA has acknowledged the following.

* Hydraulic fracturing fluids are injected into underground sources of drinking water and these fluids contain substances that are toxic and carcinogenic. (EPA apparently takes the position that the composition of these fluids may be propriety information and EPA was unable to find complete chemical analyses of these hydraulic fracturing fluids in the literature.)

* The primary function of these wells is to produce methane from coal beds; therefore, and not to inject fluids underground. Therefore, in EPA's opinion, these wells are not subject to the regulatory provisions of the Safe Drinking Water Act. (A federal appeals court has rejected that position as inconsistent with the Safe Drinking Water Act.)

* There is no further need for EPA to investigate the practice of hydraulic fracturing in coal bed methane reservoirs. (But EPA recognizes there is a lack of field water quality data regarding the fate of the substances in the hydraulic fracturing fluids within these sources of drinking water.)

* In the San Juan Basin of Colorado following coal bed methane production, unwanted methane gas has migrated into underground sources of drinking water from unplugged oil and gas wells. (But EPA did not investigate whether pathways created by hydraulic fracturing may contribute to methane contamination or contamination associated with fracturing fluids in underground sources of drinking water.)

Further, EPA actions do not appear to be based on objective and impartial information.

* EPA relied upon an external peer review panel that supported EPA's findings and conclusions. (However, five of EPA's seven-member Peer Review Panel appear to have conflicts-of-interest.)

* EPA utilized a seven-member Peer Review Panel composed only of external experts. (EPA's Peer Review Panel members did not achieve the needed balance of interests by including EPA professional staff with knowledge and expertise on these matters. Further, EPA did not include its most experienced professional staff to participate and prepare EPA's study of the impacts of this industry practice.)

* EPA obtained a national agreement from three oil and gas service companies to cease the use of diesel fuel in hydraulic fracturing fluids in coal bed methane reservoirs. (However this agreement is voluntary and non-enforceable. EPA has no oversight of these companies to assure that diesel fuel is no longer used in hydraulic fracturing fluids in coal bed methane reservoirs.)

The following information addresses each of the above claims of improper conduct by EPA which may result in danger to public heath and safety. This information was obtained from publicly-available sources including Congress, EPA, Department of Energy, Occupational Safety and Health Administration, or from the scientific literature as noted.

1. Hydraulic fracturing fluids may contain toxic components

Hydraulic fracturing fluids consist of water, foamed liquids, thickening gels, and propping agents. Fracturing fluids used in the northern San Juan Basin, for example, include: 1) hydrochloric acid, 12% to 28% HCl with pH less than 1 to 3, 2) water mixed with hydrocarbon-based solvents such as diesel fuel, 3) gels containing guar-gum or a polymer such as polyacrylamide, and 4) cross-linked gels with 'breaker' chemicals.[2]

[2] Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs, EPA June. 2004, Attachment 1 – San Juan Basin, page A1-7.

In addition to diesel fuel, which contains benzene, toluene, ethyl benzene and xylene, fluids used in coal bed methane hydraulic fracturing may also contain acids, formaldehyde, polyacrylamides[3], chromates, and other potentially toxic or carcinogenic substances.[4] These compounds can reduce viscosity after fracturing so that the gels can be pumped back to the well after treatment, impart corrosion protection for metal casings in the well, reduce bacterial growth, and have other production benefits. Because thickening gels dissolve more readily in diesel fuel than in water, using diesel fuel increases the transport of the sand propping agent in the fracturing fluids. According to EPA's findings: "Many of the compounds listed in Table A1-1 are quite hazardous in their undiluted form. However, these compounds are substantially diluted prior to injection."

Oil and gas production wells, including all coalbed methane production wells in the San Juan Basin, are permitted by either the Colorado Oil and Gas Board or by the New Mexico Oil and Gas Board. Both agencies regulate the underground disposal of coal bed methane produced water as Class II wells under the SDWA. However, based on EPA's analysis of current regulations, "neither agency regulates the type or amount of fluids used for (coal bed methane hydraulic) fracturing."[5]

Oilfield service companies, including Halliburton, Schlumberger, and JB Services Company, supply the fracturing fluids used to fracture the coalbeds as part of their service contracts. Again, according to EPA's findings: "The chemical composition of many fracturing fluids used by these service companies may be proprietary, *and EPA was unable to find complete chemical analyses of any fracturing fluids in the literature.*"[6] (Emphasis added.)

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[3] Polyacrylamide may be contaminated with acrylamide, which is a toxic substance. Polyacrylamide may also degrade in the environment to acrylamide. EPA established a limit of 500 ppm acrylamide contamination in polyacrylamide products to be acceptable for use in water treatment systems. 40 C.F.R. 141.61 See also Smith, et.al. 1996, Environmental degradation of polyacrylamides, Toxicological Sciences 35(2):121-135 and Khan, et.al. 1999, Changes in thyroid gland morphology after acute acrylamide exposure. Toxicological Sciences 47(2):151-157.

[4] Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs, EPA June, 2004, Attachment 1 - San Juan Basin, Table A1-1.

[5] Ibid. Attachment 1- San Juan Basin, page A1-7 which cites the Colorado State Oil and Gas Board Rules and Regulations 400-3, 2001; and New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division Regulations, Title 19, Chapter 15, 2001.

[6] Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs, EPA, June 2004, page A1-7.

2. EPA's legal position has been rejected by the only court that has considered this matter

The Safe Drinking Water Act (SDWA) is designed to protect underground sources of drinking water from contamination caused by underground injection of fluids. (See 42 U.S.C. Sections 300h to 300h-8.) The law requires EPA to promulgate regulations for states to administer these provisions of the law in order to protect underground sources of drinking water. According to EPA regulations an underground source of drinking water is an aquifer used for drinking water supply or one that is capable of being used in the future, because it contains less than 10,000 parts per million total dissolved solids and has sufficient water yield to serve as a drinking water supply.[7]

The SDWA provides the authority to EPA to regulate underground injection practices. In approving this Act, Congress directed that EPA should not prescribe unnecessary regulation on oil- and gas-related injection.

EPA determined in 2001 it would conduct a nationwide study to assess the potential of hydraulic fracturing of methane bearing coal beds to endanger underground sources of drinking water. Prior to 1997, EPA had not regulated hydraulic fracturing because it determined this process did not fall under the Underground Injection Control Program's authority under the SDWA.[8] EPA at that time believed that methane gas production wells that employed hydraulic fracturing need not be regulated pursuant to the SDWA because the principal function of these wells is methane gas production and not the underground injection of fluids.

In 1994, the Legal Environmental Assistance Foundation (LEAF) petitioned EPA to regulate this practice in Alabama under the SDWA. EPA denied LEAF's petition and LEAF litigated the matter. The Eleventh Circuit Court of Appeals ruled EPA's interpretation was inappropriate. The court stated: "[We] conclude that hydraulic fracturing activities constitute underground injection under Part C of the SDWA. Since EPA's contrary interpretation could not be squared with the plain language of the statute, we granted LEAF's petition and remanded for further proceedings." Further, the court stated that "... as LEAF correctly notes, wells used for the injection of hydraulic fracturing fluids fit squarely within the

[7] 40 C.F.R. part 144.3. http://www.epa.gov/safewater/uic/classes.html
[8] Federal Register, Volume 66, Number 146, pages 39396-39397.

definition of Class II wells. Accordingly, they must be regulated as such."[9] In 1999, Alabama amended its Underground Injection Program to include the regulation of injection of fluids for coal bed reservoir hydraulic fracturing as Class II wells under the SDWA and EPA approved.[10] The court's 1997 decision held that the injection of fluids for hydraulic fracturing is underground injection and in 2001 the court decision held that methane production wells doing hydraulic fracturing were Class II wells. Class II wells under EPA's Underground Injection Control Program regulations include wells which inject fluids for enhanced recovery of oil or natural gas.[11]

The court ordered EPA to require hydraulic fracturing for coal bed methane production to be regulated in Alabama pursuant to the SDWA. EPA has not applied the court's reasoning and interpretation of the law in any other part of the nation, nor did EPA appeal the decision by the 11th Circuit Court. EPA's decision is contrary to the only reported court decision that considered this matter. EPA appears determined to confine the 11th Circuit Court decision to only within the jurisdiction of the 11th Circuit.[12]

In 2001, in response to the 11th Circuit Court's decision and based on concerns by citizens in several states who claimed they may be affected by coal bed methane production practices, EPA proposed a three-phase study design. EPA focused its study on the impacts of the toxic substances contained in fluids used to fracture coalbeds. EPA formed a Peer Review Panel of professional reviewers to evaluate its findings. EPA did not form a federal advisory panel of citizens and other interested parties as appropriate for significant national decisions pursuant to the Federal Advisory Committee Act.

3. EPA should have conducted further investigation based on its findings

EPA proposed a study to be conducted in three phases. In its first phase, EPA conducted a fact-finding effort based on the existing literature. The intent of phase one was to identify and assess the potential threat to underground

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[9] Legal Environmental Assistance Foundation vs. United States Environmental Protection Agency, United States Court of Appeals for the Eleventh Circuit, No. 00-10381, EPA No. 65-02889-Fed. Reg., December 21, 2001. http://www.epa.gov/safewater/uic/leaf2.pdf

[10] Federal Register, Volume 64, Number 204, October 22, 1999, pages 56986-56991. http://www.epa.gov/safewater/uic/alc2.html.

[11] 40 C.F.R. part 144.6(b). www.epa.gov/safewater/contaminants/dw_contamfs/acrylami.html

[12] The 11th Circuit Court of Appeals includes Alabama, Georgia, and Florida. Coal resources are not present in either Georgia or Florida.

sources of drinking water posed by injection of hydraulic fracturing fluids into coal bed reservoirs. In the second phase, EPA planned to conduct field investigations to obtain water quality data near wells that were hydraulically fractured within or near underground sources of drinking water to determine the extent of potential risks. If the second phase of study resulted in identifying potential risks to underground sources of drinking water, EPA planned to conduct a third phase. This third study phase would have considered and analyzed various regulatory mechanisms pursuant to the SDWA to control or minimize any potential risk that EPA had determined existed based on results obtained from the second phase of study.

In phase one EPA defined two mechanisms whereby hydraulic fracturing could potentially impact underground sources of drinking water: 1) direct injection or injection where there is already a hydraulic communication with an underground source of drinking water, and 2) creation of hydraulic connections with an adjacent underground source of drinking water through fracturing mechanisms.[13] EPA should have also investigated whether this practice resulted in unwanted migration of methane because EPA had received complaints from citizens regarding methane in drinking water wells.

In phase one, EPA also investigated citizen-reported incidents of water quality degradation potentially associated with these mechanisms. Since the hydraulic fracturing practice is not regulated by either EPA or the States, this meant that the data would have to be obtained from the industry itself in order to demonstrate water quality degradation. There was no such water quality data from industry monitoring programs available in the literature.

Based on the existing literature and field visits, EPA identified seven coal basins where the industry was injecting hydraulic fracturing fluids either into, or adjacent to, an underground source of drinking water. Table A presents a summary of the water quality conditions in coal bed methane production areas.

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[13] Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs, EPA, June 2004, Appendix B, Quality Assurance Plan, page App. B-5.

Table A – U.S. coal basins where hydraulic fracturing may take place into, or adjacent to, an underground source of drinking water

Coal Basin	Location by State	Coal bed reservoir used, or adjacent to, drinking water supply	Water Quality total dissolved solids (ppm)
San Juan Basin, northern and eastern edge	Colorado	Yes	180 - 3015[14]
Black Warrior Basin – western edge of basin	Alabama	Yes	50 to less than 10,000[15]
Powder River Basin	Wyoming and Montana	Yes, but hydraulic fracturing is seldom utilized	850[16]
Central Appalachian Coal Basin	Virginia, West Virginia, and Kentucky	Yes	less than 1000[17]
Northern Appalachian Coal Basin	Pennsylvania, West Virginia, Ohio, Kentucky, and Maryland	Yes	2000-5000[18]
Western Interior Basin (Arkoma Basin)	Arkansas and Oklahoma	Yes	55-534[19],
Raton Basin	Colorado	Yes	1000-2500[20]
Sand Wash Basin	Colorado and Wyoming	No	less than 10,000[21]

[14] Ibid, at page A1-4. See Table A1-1. Hydraulic fracturing fluids contain acids, formaldehyde, chromates, polyacrylamides, and diesel which contain benzene, ethyl benzene, toluene, and xylene.
[15] Ibid. at page A2-3 through A2-5. Fracturing fluids contain water and gels and may contain chromates, formaldehyde, and polyacrylamides. See Table A2-1. According to service companies there, diesel fuel is no longer used in Alabama.
[16] Ibid. page A5-8, A5-9. Hydraulic fracturing is rarely used in the Powder River Basin because it would increase groundwater flow into the coal bed methane production wells.
[17] Ibid. page A6-4, A6-5.
[18] Ibid, at page A7-3.
[19] Ibid. at page A8-3 and A8-9. Hydraulic fracturing fluids contain acids, benzene, xylene, toluene, gasoline, diesel, solvents, bleach, and surfactants.
[20] Ibid. at page A9-3. Hydraulic fracturing fluids are typically gels and water with sand propping agents.
[21] Ibid. at page A10-3. There is limited development in this basin by one company using hydraulic fracturing fluids containing gels and water with sand propping agents.

EPA received several citizen reports of cloudy water and objectionable odors in their well water after a service company had conducted hydraulic fracturing services in their neighborhood. Based on the available literature and field data in the San Juan Basin, EPA attributed citizen-reported incidents to causes other than hydraulic fracturing, including the possibility of methane migration associated with nearby abandoned unplugged oil and gas wells.

Most citizens lack the resources needed to obtain reliable water quality data for trace concentrations of hydrocarbons such as benzene which may be associated with hydraulic fracturing fluids. Citizens are also unlikely to have sampled their water supply before and after a service company conducts hydraulic fracturing in order to establish baseline conditions and causality. The industry has not reported water quality data in nearby water wells before or after hydraulic fracturing services in the existing literature.

EPA should have initiated phase two of its study because it concluded that toxic and carcinogenic substances are injected directly into underground sources of drinking water by hydraulic fracturing practices. Conducting phase two of its study would have been consistent with EPA's scientifically-valid principle established in its phase one study design. Therefore, based upon EPA's own findings, EPA should begin phase two of its intended study and conduct site-specific field analysis and independent water quality data investigations wherever hydraulic fracturing is being conducted in underground sources of drinking water.

4. EPA did not investigate pathways for unwanted methane migration

EPA's report acknowledges that methane has migrated into domestic wells used to supply drinking water associated with coal bed methane production, specifically in the San Juan Basin in Colorado. Methane is a highly flammable and asphyxiating gas. In confined spaces, methane at sufficient concentrations can induce unsafe conditions due to the risk of combustion or simple asphyxiation. Methane can saturate soils resulting in reduced plant growth, even killing plants and trees by depleting oxygen supply to plant roots. In the San Juan Basin of Colorado, the U.S. Department of the Interior's Bureau of Land Management provided a history of gas seeps and methane contamination of drinking water wells following citizen reports of methane in wells.[22] The composition of the gas in samples from shallow, private drinking water well was

[22] Ibid. page 6-6. See also, Bureau of Land Management, Draft Environmental Impact Statement, Southern Ute Gas Development, 1999.

analyzed to confirm the well owners' observations. The data obtained showed that the methane in approximately half of the samples appeared to have originated in the Fruitland Formation coal beds, the source of coal bed methane in the basin.[23] Methane migrated into soils near the Fruitland Formation outcrop in the northern edge of the basin resulting in dead grasses and trees. Amoco operates coal bed methane production in the San Juan Basin and decided to buy three ranches after La Plata county officials tested indoor air and found extremely high levels of methane.[24]

The1999 Bureau of Land Management report regarding the San Juan Basin attributed the following possible pathways for methane to move from a deep source to a shallow aquifer: 1) natural fractures, 2) hydraulically-induced fractures, 3) disposal of produced water from coal bed methane wells, 4) poorly constructed, sealed, or cemented conventional gas wells, 5) coal bed methane wells, 6) shallow drinking water wells, and 7) cathodic protection wells installed to protect oil and gas pipelines from corrosion.[25]

EPA's study failed to investigate that methane could travel along the pathways created by the hydraulic fracturing process. This is an especially important contamination pathway that is more likely to result from hydraulic fracturing in shallow, near-surface, coal beds. Hydraulically-induced fractures break at right angles to the least stress. In deep formations, generally greater than 1000 feet, fractures are more likely to be break vertically due to the intense overburden pressure which restrains fracturing horizontally. In shallow hydraulic fracturing locations, generally less than 1000 feet, fracturing can occur horizontally at significant distances from the well.[26] Shallow locations are most likely to include underground sources of drinking water. EPA made no attempt in its study to investigate the movement of unwanted methane as a result of hydraulic fracturing inducing such new pathways.

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[23] Ibid. page 6-7.

[24] Ibid. page 6-3. Methane threshold limit values are established by the Occupation Safety and Health Administration. See http://www.osha.gov/dts/chemicalsampling/data/CH_250700.html.

[25] Ibid. page 6-8. See also, Bureau of Land Management, Draft Environmental Impact Statement, Southern Ute Gas Development, 1999.

[26] Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs, EPA, June 2004, Appendix A, Department of Energy - Hydraulic Fracturing White Paper, pages A6-A11.

5. Five members of EPA's Peer Review Team appear to have conflicts-of-interest

EPA's peer review process uses one of two forms. The review team may consist primarily of relevant experts from within EPA who have no other involvement with respect to the work product that is to be evaluated, known as the "internal peer review" process. A peer review team may also consist primarily of independent experts from outside EPA, known as the "external peer review" process. Peer review teams may also be formed with representatives of both internal and external experts.[27] For this study, EPA selected an external peer review team that did not include any EPA expert.

According to EPA's policy, external peer reviewers should be chosen to ensure an independent and objective evaluation. The affiliations of peer reviewers should be identified on the public record, so as to avoid undercutting the credibility of the peer-review process by conflicts-of-interest. EPA's policy states that peer reviewers should be free of real or perceived conflicts-of-interest or there should be a balancing of interests among peer reviewers. EPA's policy states that the matter of obtaining a fair and credible peer review, as well as maintaining the credibility of the Agency and the Agency's scientific products, is of paramount importance. EPA's managers are encouraged to assure peer reviewers do not have a legal or perceived conflict of interest that creates the appearance that the peer reviewer lacks impartiality or objectivity. According to EPA's policies, conflicts-of-interest could occur if reviewers are affected by their private interests or when the reviewers and their associates would derive economic or other benefit from incorporation of their point of view in an Agency product.[28]

Five of the seven members of EPA's Peer Review Panel formed to evaluate the impacts of hydraulic fracturing of coalbed methane reservoirs appear to have a conflict of interest. The Peer Review Panel includes three individuals employed by the oil and gas industry. These individuals may benefit from incorporation of their point of view if EPA and the States do not regulate the practice of hydraulic fracturing. Peer Review Team members with a possible financial conflict of

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[27] Peer Review and Peer Involvement at the U.S. Environmental Protection Agency, 1 EPA/600/9-91/050, March 1992.

[28] Science Policy Handbook, Office of Science Policy, U.S. Environmental Protection Agency, Office of Research and Development, December 2000, EPA 100-B-00-001, Sections 3.4.5-6. http://epa.gov/osa/spc/htm/prhandbk.pdf

interest include Ian Palmer, a petroleum engineer with BP Amoco, Buddy McDaniel, a technical advisor for Halliburton Energy Services, Inc, and David Hill, an engineer with the Gas Technology Institute. Two other members have an appearance of potential conflict of interest as a result of previous employment in the oil and gas industry including Morris Bell, an engineer with the Colorado Oil and Gas Conservation Commission who was formerly an employee of BP Amoco, and Jon Olson, an assistant professor at the University of Texas, formerly employed by Mobil Exploration. The other peer review panel members are Peter E. Clark, an associate professor at the University of Alabama, and Norm Warpinski, from Sandia Laboratories.

6. EPA did not include in its Peer Review Panel any EPA expert nor did EPA include its most experienced professional staff to participate in its study of hydraulic fracturing of coal bed methane reservoirs

EPA did not include on its Peer Review Team any qualified, experienced professional employed by EPA that is knowledgeable with: 1) the industries' hydraulic fracturing practices in each coal basin, 2) human and animal toxicological effects with regard to the toxic and carcinogenic components of the injected fluids, or 3) groundwater flow in these coal basins regarding the fate and transport of these fluids in these specific underground conditions. Had EPA included on its Peer Review Panel key experienced EPA staff, not directly involved in the preparation of EPA's study, it may have provided a balancing of interests among peer reviewers to achieve the goals cited in EPA's science policy.

Utilizing a Peer Review Panel composed largely of the members of the regulated industry with real or perceived conflicts-of-interest and failing to assign EPA's most experienced and independent professionals has contributed to EPA producing a decision that lacks impartiality and objectivity.

Further, EPA did not include its most experienced professional staff to prepare and review EPA's study of the impacts of this industry practice. EPA should have included as part of its team of experts preparing this study experienced professional staff including toxicologists and hydrogeologists knowledgeable about the fate and transport of trace substances associated with the ground water flow conditions unique to each coal basin.

7. Three service companies have agreed not to inject diesel fuel in hydraulic fluids used for hydraulic fracturing of coal bed methane reservoirs

In the study, EPA acknowledges that potentially hazardous substances may be introduced into underground sources of drinking water when fracturing fluids are injected into coal bed reservoirs. In particular, EPA notes that diesel fuel, if used in hydraulic fracturing fluids, could introduce toxic substances because diesel fuel contains benzene, toluene, ethyl benzene, and xylene which are toxic at low concentrations.[29] EPA has established the maximum concentration limit for benzene in drinking water at five parts per billion. Benzene is a carcinogen and therefore harmful to those who drink it.[30] EPA established goal for benzene concentrations in drinking water is not to exceed the level of analytical detection which is less than one part per billion.[31]

Based on its June 2004 study, EPA concludes that the practice of hydraulic fracturing in coal bed reservoirs is safe, poses little of no threat to underground sources of drinking water, and does not need to be further studied or regulated. EPA supports this conclusion based on an action that EPA believes will reduce the risks of endangerment to underground sources of drinking associated with injecting diesel fuel into coal bed methane reservoirs. EPA obtained an agreement from three oil and gas industry service companies to *voluntarily* eliminate diesel fuel injection into underground sources of drinking water for coalbed methane production.[32]

These companies did not agree with EPA's concerns. The agreement states: "While the companies do not necessarily agree that hydraulic fracturing fluids using diesel fuel endanger USDWs (underground sources of drinking water) when they are injected into CBM (coal bed methane) production wells, the companies are prepared to enter into this agreement in response to EPA's concerns and to reduce potential risks to the environment."[33]

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[29] Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coaled Methane Reservoirs, EPA, June 2004, at page ES-16.

[30] 40 C.F.R. 141.61 http://www.epa.gov/safewater/contaminants/dw_contamfs/benzene.html

[31] 40 C.F.R. 141.50

[32] Memorandum of Agreement Between the United States Environmental Protection Agency and BJ Services Company, Halliburton Energy Services, Inc. and Schlumberger Technology Corporations, Elimination of Diesel Fuel in Hydraulic Fracturing Fluids Injected into Underground Sources of Drinking Water During Hydraulic Fracturing of Coalbed Methane Wells, signed by G. Tracy Mehan, III; EPA Office of Water and representatives of the above companies, December 12, 2003.

[33] See Memorandum of Agreement, ibid. page 2.

Because the agreement is voluntary, the public and regulators cannot determine whether these service companies will comply with the conditions established in the agreement.

The agreement does not appear to be enforceable by EPA or any party and EPA has no oversight to assure that the conditions established in the agreement are achieved. The agreement states: "Any company or EPA may terminate its participation in this MOA (memorandum of agreement) by providing written notice to the other signatories."[34]

This agreement also does not refer to any other toxic or carcinogenic substance that could be contained in hydraulic fracturing such as acids, formaldehyde, polyacrylamides, chromium, and other substances. As some hydraulic fracturing fluids remain proprietary, it is not known if other toxic substances are contained in hydraulic fracturing fluids.

This agreement does not refer to the potential of hydraulic fracturing creating new pathways for methane migration to endanger underground sources of drinking water.

This agreement does not apply to any other service company or any owner of a well that may inject diesel fuel to hydraulic fracturing coal beds for methane recovery.

D. EPA should conduct additional analysis and consider regulatory options

Congress is considering exempting the practice of hydraulic fracturing by the oil and gas industry perhaps before EPA can conduct further investigations. The public should be wary of exempting this practice from regulatory oversight by EPA. EPA should correct is faulty analysis. This can be accomplished if EPA reverses its decisions and begins anew its proposed three-phase study of the impacts of injection of fluids for hydraulic fracturing of coal bed reservoirs, provided it is conducted, this time, in compliance with EPA's science policies.

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[34] Memorandum of Agreement, ibid. page 5.

1. The oil and gas industry is now seeking to exempt the practice of hydraulic fracturing from the requirements of the SDWA

Congress has a legislative amendment under consideration that would exempt the practice of hydraulic fracturing from compliance with the SDWA with support based, in part, on EPA's flawed analysis. Section 327 of the proposed Energy Bill (H.R. 6)[35] would amend sections 1421(d) of the Safe Drinking Water Act (42 U.S.C. 300h(d)) to exclude the underground injection of fluids or propping agents pursuant to hydraulic fracturing operations related to oil and gas production activities.

This legislative change, if approved by Congress, would exempt this practice for both coal bed methane production and for conventional oil and gas production. EPA has not applied its authority under the SDWA to investigate the risks of endangerment to underground sources of drinking water that might result from hydraulic fracturing in underground sources of drinking water associated with conventional oil and gas production.

The oil and gas service companies that are parties to the Memorandum of Agreement could withdraw from the conditions set forth in the agreement as soon as legislation is in place with little or no recourse by EPA or affected citizens. These service companies could recommence the practice of injecting fluids containing diesel fuel into coal bed methane reservoirs which could risk public health or the safety of the environment.

2. The public should be wary of exempting this practice from compliance with the Safe Drinking Water Act

The reasons that exemption of this industry practice from the regulatory provisions of the SDWA may not be warranted at this time include: 1) the risks of endangering underground sources of drinking water from hydraulic fracturing practices are poorly understood due to a lack of field monitoring data; 2) these risks deserve extensive additional study; 3) the injection practices introduce toxic and carcinogenic materials that are not likely to be fully recovered during production; 4) the content of these hydraulic fracturing fluids is unknown; 5) the majority of EPA's external peer review panel, whose review supports the decision, appear to have conflicts-of-interest, and; 6) the only national precedent

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[35] H.R 6 PP. http://thomas.loc.gov/cgi-bin/query/D?c108:5:./temp/~c108BCiRdc::

established to control impacts to underground sources of drinking water from hydraulic fracturing is an unenforceable voluntary agreement.

3. Recommendations to EPA to correct its faulty analysis

a) EPA should revise and amend EPA's June 2004 study conclusions. EPA should begin anew its three-phase study of the risks to underground sources of drinking water from the hydraulic fracturing of coal bed methane reservoirs. This revised study should also investigate migration of unwanted methane associated with the practice of hydraulic fracturing in coal bed methane reservoirs.

b) EPA should form a federal advisory panel including interested citizens to provide oversight of EPA's study efforts consistent with the Federal Advisory Committee Act.

c) EPA should form a new Peer Review Panel and include a balance of interests among peer reviewers by assigning internal and external peer reviewers. This panel must be comprised to avoid reviewers with real or perceived conflicts-of-interest.

d) If the data and analytical results of phase two indicate that an underground source of drinking has or may become endangered as a result of hydraulic fracturing in coal bed reservoirs, EPA should conduct phase three of its study to investigate regulatory program options consistent with the Safe Drinking Water Act and the Toxic Substances Control Act. This effort should identify the benefits and costs of Alabama's application of that state's SDWA Underground Injection Control Program which regulates hydraulic fracturing in coal bed methane reservoirs.

Professional qualifications of the author

Wilson received a Bachelors of Science degree in Geological Engineering in 1969 and a Masters of Science degree in Water Resources Administration in 1973 from the University of Arizona. He has received numerous honors and awards for his professional accomplishments at the EPA during his 30-year career with the federal government. In 2003, Wilson received the "Four C's Award" from Kathleen Clark, Director of the Bureau of Land Management, for his analysis of the surface water quality impacts associated with coal bed methane development in Montana and Wyoming. The 'Four C's Award' is awarded to federal employees for their "consultation, cooperation, communication, (for) conservation."