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ONE HUNDRED TWELFTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE
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January 31, 2011

The Honorable Lisa Jackson
Administrator
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Dear Administrator Jackson:

We have been investigating the practice of hydraulic fracturing and its potential impact on water quality in the United States. Because EPA is also examining this issue, we are writing to share our findings regarding the use of diesel fuel in hydraulic fracturing fluids.

In 2003, EPA signed a memorandum of agreement with the three largest providers of hydraulic fracturing to eliminate the use of diesel fuel in coalbed methane formations in underground sources of drinking water. Two years later, Congress exempted hydraulic fracturing from the Safe Drinking Water Act except when the fracturing fluids contain diesel. As a result, many assumed that the industry stopped using diesel fuel altogether in hydraulic fracturing.

Our investigation has found that this is not the case. Between 2005 and 2009, oil and gas service companies injected 32.2 million gallons of diesel fuel or hydraulic fracturing fluids containing diesel fuel in wells in 19 states. Halliburton injected more than 7 million gallons of diesel fuel or fluids containing diesel; BJ Services injected even more, 11.5 million gallons.

According to EPA, any company that performs hydraulic fracturing using diesel fuel must receive a permit under the Safe Drinking Water Act. We learned that no oil and gas service companies have sought—and no state and federal regulators have issued—permits for diesel fuel use in hydraulic fracturing. This appears to be a violation of the Safe Drinking Water Act. It also means that the companies injecting diesel fuel have not performed the environmental reviews required by the law.

A key question is whether the unauthorized injection of hydraulic fracturing fluids containing diesel fuel is adversely affecting drinking water supplies. None of the oil and gas service companies could provide data on whether they performed hydraulic fracturing in or near underground sources of drinking water, telling us that the well operators, not the service companies, track that information. We also asked about diesel fuel use in coalbed methane formations, which tend to be shallower and closer to drinking water sources. The three largest companies—Halliburton, BJ Services, and Schlumberger—told us they have stopped using diesel fuel in coalbed methane formations located in underground sources of drinking water. Three smaller companies reported using a limited volume of products containing diesel in coalbed methane wells but did not provide information on the proximity of these wells to drinking water sources.

Background

The oil and gas industry uses hydraulic fracturing to force fluids and propping agents into oil and gas production wells at extremely high pressure, cracking the oil or gas seams and allowing trapped natural gas and oil to escape. In many instances, the fluids used in this process are water-based. There are some formations, however, that are not fractured effectively by water-based fluids because clay or other substances in the rock absorb water. In these formations, diesel fuel or other hydrocarbons may replace water as the primary carrier fluid to transport sand and other proppants into the fractures created by the hydraulic fracturing process.

EPA has raised concerns about the potential public health risks posed by diesel fuel used in hydraulic fracturing fluids. In a 2004 report, EPA stated that the "use of diesel fuel in fracturing fluids poses the greatest threat" to underground sources of drinking water.[1] Diesel fuel contains toxic constituents, including benzene, toluene, ethylbenzene, and xylenes (collectively known as "BTEX" compounds). The Department of Health and Human Services, the International Agency for Research on Cancer, and EPA have determined that benzene is a human carcinogen.[2] Chronic exposure to toluene, ethylbenzene, or xylenes also can damage the central nervous system, liver, and kidneys.[3]

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[1] U.S. Environmental Protection Agency, *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs* (June 2004) (EPA 816-R-04-003) at 4-11.

[2] U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, *Public Health Statement for Benzene* (Aug. 2007).

[3] U.S. Environmental Protection Agency, *Basic Information about Toluene in Drinking Water, Basic Information about Ethylbenzene in Drinking Water,* and *Basic Information about*

In December 2003, EPA entered into a voluntary memorandum of agreement (MOA) with the three largest hydraulic fracturing companies, Halliburton, BJ Services, and Schlumberger, to "eliminate diesel fuel in hydraulic fracturing fluids injected into coalbed methane production wells in underground sources of drinking water."[4] The MOA focused on coalbed methane wells because they tend to be shallower and closer to underground sources of drinking water than other oil and gas production wells. The MOA did not address hydraulic fracturing in other formations.

In 2005, Congress passed the Energy Policy Act, which contained a provision addressing the application of Safe Drinking Water Act (SDWA) to hydraulic fracturing. Congress modified the definition of "underground injection" to exclude "the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities."[5]

The effect of this law is to exempt hydraulic fracturing from the underground injection control (UIC) permit requirements unless the fluid being injected is diesel fuel. As EPA states on its website:

> While the SDWA specifically excludes hydraulic fracturing from UIC regulation under SDWA § 1421 (d)(1), the use of diesel fuel during hydraulic fracturing is still regulated by the UIC program. Any service company that performs hydraulic fracturing using diesel fuel must receive prior authorization from the UIC program.[6]

Perhaps as a result of the actions of EPA and Congress, some have assumed that the oil and gas industry has stopped using diesel in hydraulic fracturing. EPA staff told the Committee that the agency assumed that the MOA had eliminated most diesel use.[7] In a 2004 letter to

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Xylenes in Drinking Water (online at http://water.epa.gov/drink/contaminants/basicinformation/index.cfm) (accessed Jan. 21, 2011).

[4] Memorandum of Agreement between the U.S. Environmental Protection Agency and BJ Services Company, Halliburton Energy Services, Inc., and Schlumberger Technology Corporation (Dec. 12, 2003).

[5] 42 U.S.C. § 300h(d).

[6] U.S. Environmental Protection Agency, Regulation of Hydraulic Fracturing by the Office of Water (online at http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells_hydroreg.cfm) (accessed Jan. 21, 2011).

[7] Phone briefing by Ann Codrington, U.S. Environmental Protection Agency, to Committee Staff (Oct. 22, 2010).

Senator Jim Jeffords, Benjamin Grumbles, the Acting Assistant Administrator for EPA at the time, wrote that the MOA "accomplished the intended goal of removing diesel from hydraulic fracturing fluids in a matter of months."[8] At a hearing on hydraulic fracturing in the Committee on Oversight and Government Reform in 2007, Rep. Darrell Issa asserted, "this practice does not include the use of diesel fuel."[9] In January 2010, Energy In Depth, a group representing most of America's oil and gas producers, wrote that "diesel fuel is simply not used in fracturing operations."[10]

Our Investigation

On February 18, 2010, the Committee commenced an investigation into the practice of hydraulic fracturing and its potential impact on water quality across the United States. This investigation was intended to build on work begun by Ranking Member Henry A. Waxman in 2007 as Chairman of the Committee on Oversight and Government Reform.

The Committee initially sent letters to eight oil and gas service companies engaged in hydraulic fracturing in the United States regarding the type and volume of chemicals they used in hydraulic fracturing fluids between 2005 and 2009. In May, the Committee sent letters to six additional oil and gas service companies to assess a broader range of industry practices.[11]

The 14 oil and gas service companies voluntarily provided the Committee with data on the volume of diesel fuel and other hydraulic fracturing fluids they used during the five year period.[12] For each hydraulic fracturing fluid, the companies provided the Committee a Material

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[8] Letter from Benjamin Grumbles, Acting Assistant Administrator, U.S. Environmental Protection Agency, to Senator Jim Jeffords (Dec. 7, 2004) as cited in the Congressional Record, S7278 (June 23, 2005).

[9] House Committee on Oversight and Government Reform, Opening Statement of Rep. Darrell Issa, *Oil and Gas Exemptions in Federal Environmental Protections*, 110th Cong. (Oct. 31, 2007).

[10] Energy in Depth, *When Gummy Bears Attack* (Jan. 20, 2010) (online at http://www.energyindepth.org/2010/01/when-gummy-bears-attack/) (accessed Jan. 21, 2011).

[11] The Committee sent letters to Basic Energy Services, BJ Services, Calfrac Well Services, Complete Production Services, Frac Tech Services, Halliburton, Key Energy Services, RPC, Sanjel Corporation, Schlumberger, Superior Well Services, Trican Well Service, Universal Well Services, and Weatherford.

[12] BJ Services, Halliburton, and Schlumberger already had provided Chairman Henry A. Waxman and the Oversight Committee with data for 2005 through 2007. For BJ Services, the

Safety Data Sheet (MSDS) detailing the fluid's chemical components. If the MSDS for a particular product listed a chemical component as proprietary, the company that used that product was asked to provide the proprietary information.

Using this information, our staff calculated how much diesel fuel and fracturing fluids containing diesel fuel these 14 companies used between 2005 and 2009.[13]

Use of Diesel Fuel in Hydraulic Fracturing

Between 2005 and 2009, 12 of the 14 companies used 32.2 million gallons of diesel fuel or fluids containing diesel fuel.[14] BJ Services used the most diesel fuel and fluids containing diesel, more than 11.5 million gallons, followed by Halliburton, which used 7.2 million gallons. Four other companies, RPC (4.3 million gallons), Sanjel (3.6 million gallons), Weatherford (2.1 million gallons), and Key Energy Services (1.6 million gallons), used more than one million gallons of diesel fuel and fluids containing diesel.

These 12 companies injected these diesel-containing fluids in 19 states. Diesel-containing fluids were used most frequently in Texas, which accounted for half of the total volume injected, 16 million gallons. The companies injected at least one million gallons of diesel-containing fluids in Oklahoma (3.3 million gallons), North Dakota (3.1 million gallons), Louisiana (2.9 million gallons), Wyoming (2.9 million gallons), and Colorado (1.3 million gallons).

Tables 1 and 2, which are attached to this letter, list the companies that reported using diesel-containing fluids and the states in which they injected them.

Diesel fuel was a significant component of the diesel-containing fluids these companies injected. The companies used 10.2 million gallons of straight diesel fuel and 21.8 million gallons of products containing at least 30% diesel fuel.

2005-2007 data is limited to natural gas wells. For Schlumberger, the 2005-2007 data is limited to coalbed methane wells.

[13] The Committee reviewed all MSDSs produced to the Committee and included the following in the category of "diesel": diesel fuel, products with components with the Chemical Abstracts Service (CAS) registry number of 68476-34-6, 68476-30-2, or 68334-30-5, and products with "diesel" named as a component but lacking a CAS number.

[14] Calfrac Well Services and Universal Well Services did not use any fracturing fluids containing diesel during this time period.

Lack of Regulation

Under the Safe Drinking Water Act, oil and gas service companies that inject diesel fuel or fluids containing diesel fuel as part of the hydraulic fracturing process must obtain a permit under the underground injection control program.[15] The purpose of this permitting requirement is to distinguish between underground injections that threaten drinking water supplies, which are denied permits, and those that do not, which are allowed to go forward. EPA's regulations prohibit any underground injection that "allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation … or may otherwise adversely affect the health of persons."[16] The person seeking the injection permit has the burden of demonstrating that the injection will not endanger drinking water sources.[17]

To assess whether the companies obtained the required permits before using diesel fuel or hydraulic fracturing fluids containing diesel, our staff contacted the state agencies and regional EPA offices responsible for overseeing underground injection wells in the 19 states where the companies reported using products containing diesel fuel.[18] The staff asked these agencies if they had ever issued a permit under the UIC program for diesel fuel or hydraulic fracturing fluids containing diesel or if an oil and gas service company had ever requested such a permit. Each state and regional EPA office contacted stated that no such permit had ever been sought or granted.

In some instances, the officials we contacted expressed doubt that companies still used diesel as a hydraulic fracturing fluid or additive or were unaware of continued diesel fuel use. An engineer from the Colorado Oil and Gas Conservation Commission, for example, said that diesel is "rarely used" and said he knew of only one time diesel fuel was used in hydraulic

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[15] U.S. Environmental Protection Agency, Regulation of Hydraulic Fracturing by the Office of Water (online at http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells_hydroreg.cfm) (accessed Jan. 21, 2011).

[16] 40 CFR § 144.12(a).

[17] 42 USC 300h (b)(1).

[18] Committee staff spoke with state agencies and regional EPA offices responsible for Class II injection wells in Alabama, Alaska, Arkansas, Colorado, Florida, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Montana, New Mexico, Oklahoma, Pennsylvania, Texas, Utah, and Wyoming. Despite repeated attempts, Committee staff was unable to speak with anyone at the North Dakota Industrial Commission or California Department of Conservation.

fracturing in Colorado.[19] The Railroad Commission of Texas, which regulates oil and gas activity in the state, responded that it only recently learned that handful of companies may have used diesel fuel without prior approval. The Commission has contacted these operators for additional information.[20]

Impact on Underground Sources of Drinking Water

A key unanswered question is whether the unregulated injection of diesel fuel or fluids containing diesel is adversely affecting drinking water supplies. In an attempt to answer this question, we asked each of the oil and gas service companies to provide data on whether it has performed hydraulic fracturing in or near underground sources of drinking water. None of the hydraulic fracturing service companies could provide this data because they do not track the proximity of the wells they fracture to underground sources of drinking water. They reported that the operators of the oil and gas wells would be more likely to maintain the requested information.

BJ Services, for example, responded that the company "does not track or maintain such data because it is the responsibility of the well operator to drill in compliance with the applicable statutes and regulations concerning subsurface aquifers."[21] Calfrac Well Services stated that "the presence of 'underground sources of drinking water' is a matter which is addressed by the well operator and governmental authorities in the well permitting and drilling process."[22] Frac Tech similarly stated that "the location of drinking water aquifers and the isolation of the well from any drinking water aquifers is handled by others in the well process."[23] Key Energy Services asserted that "because Key is not the owner nor the operator of the wells on which it provides

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[19] E-mail from State of Colorado Oil and Gas Conservation Commission to Committee staff (Sept. 23, 2010).

[20] E-mail from Railroad Commission of Texas to Committee staff (Nov. 2, 2010).

[21] Letter from Mark R. Paoletta, Counsel to BJ Services, to Henry A. Waxman, Chairman, Committee on Energy and Commerce, and Edward J. Markey, Chairman, Subcommittee on Energy and Environment (Mar. 5, 2010).

[22] Letter from John Grisdale, President, Calfrac Well Services, to Henry A. Waxman, Chairman, Committee on Energy and Commerce, and Edward J. Markey, Chairman, Subcommittee on Energy and Environment (Mar. 19, 2010).

[23] E-mail from Ronald J. Tenpas, Counsel to Frac Tech, to Committee staff (Mar. 24, 2010).

services, Key does not possess information about the location of drinking water, if any, around the wells."[24]

We then asked the oil and gas companies that operate the wells the same question. Several of these companies responded that they operated wells only in formations where natural gas deposits lie deep below the water table.[25] Other companies, however, reported operating wells in shallower formations that meet the SDWA definition of drinking water.[26]

Although the oil and gas service companies did not keep records of whether they operated in or near underground sources of drinking water, they were able to report on whether their wells were drilled in coalbed methane formations. Diesel use in coalbed methane formations is of particular concern, since these formations tend to be shallower and closer to drinking water sources than conventional oil and gas production wells.[27] For this reason, we asked each company that reported using products containing diesel fuel whether they used these products in coalbed methane formations.

The three largest companies—Halliburton, BJ Services, and Schlumberger—told the Committee that they stopped using diesel fuel in coalbed methane formations located in underground sources of drinking water. Three smaller companies reported using a limited

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[24] Letter from Peter S. Spivack, Counsel to Key Energy Services, to Henry A. Waxman, Chairman, Committee on Energy and Commerce, and Edward J. Markey, Chairman, Subcommittee on Energy and Environment (May 28, 2010).

[25] *See, e.g.*, Letter from Jason B. Hutt, Counsel to Chesapeake, to Henry A. Waxman, Chairman, Committee on Energy and Commerce, and Edward J. Markey, Chairman, Subcommittee on Energy and Environment (Aug. 27, 2010); Letter from Jeff Wojahn, President, Encana, to Henry A. Waxman, Chairman, Committee on Energy and Commerce, and Edward J. Markey, Chairman, Subcommittee on Energy and Environment (Aug. 19, 2010).

[26] *See, e.g.*, Letter, Appendix, from Shirley C. Woodward, Counsel to BP, to Henry A. Waxman, Chairman, Committee on Energy and Commerce, and Edward J. Markey, Chairman, Subcommittee on Energy and Environment, (Aug. 12, 2010) (stating that BP operates wells in underground sources of drinking water); Letter from William F. Whitsitt, Executive Vice President, Public Affairs, Devon, to Henry A. Waxman, Chairman, Committee on Energy and Commerce, and Edward J. Markey, Chairman, Subcommittee on Energy and Environment (Aug. 5, 2010) (stating that Devon operates wells at depths of 1,000 to 2,000 feet and that "fresh water zones are present at this depth of field").

[27] U.S. Environmental Protection Agency, *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs* (June 2004) (EPA 816-R-04-003) at ES-7.

volume of products containing diesel in coalbed methane wells but did not provide information on the proximity of these wells to drinking water sources.

Halliburton reported that it used diesel-containing products in a small number of coalbed methane wells between 2005 and 2007, but the company explained that the fracturing occurred either below any drinking water source or in aquifers that do not meet the definition of an underground source of drinking water. The company says it has not used products containing diesel fuels in coalbed methane wells since 2007.[28] Schlumberger reported that the company has policies in place to ensure that company employees do not use fluids containing diesel in coalbed methane formations.[29]

In 2008, BJ Services informed the Committee on Oversight and Government Reform that it had used 1,700 gallons of diesel-based polymer slurries in Arkansas and Oklahoma between 2005 and 2007 "in violation of the MOA."[30] BJ Services now maintains that these injections did not violate the MOA, stating that the "inadvertent use" of diesel-based polymer slurries in Arkansas and Oklahoma occurred "hundreds or thousands of feet" beneath any freshwater-bearing zone.[31] BJ Services confirmed that it "has not used diesel fuel in coalbed methane formations in USDWs since the 2003 MOA was put in place."[32]

Three other companies reported using some products containing diesel fuel in coalbed methane formations in small amounts: RPC (28,600 gallons), Sanjel (4,600 gallons), and Weatherford (2,300 gallons). We did not receive any information from these companies on the proximity of the coalbed methane wells to underground sources of drinking water.

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[28] Letter from Robert J. Moran, Halliburton, to Henry A. Waxman, Chairman, Committee on Energy and Commerce, and Edward J. Markey, Chairman, Subcommittee on Energy and Environment (Aug. 26, 2010); e-mail from Thomas C. Jackson to Committee staff (Sept. 10, 2010).

[29] Letter from Steven R. Ross and John F. Sopko, Counsel to Schlumberger, to Henry A. Waxman, Chairman, Committee on Energy and Commerce, and Edward J. Markey, Chairman, Subcommittee on Energy and Environment (Sept. 15, 2010).

[30] Letter from L. Andrew Zausner, Counsel to BJ Services, to Henry A. Waxman, Chairman, Committee on Oversight and Government Reform (Jan. 24, 2008).

[31] Letter from Jason B. Hutt, Counsel to BJ Services, to Committee staff (Oct. 15, 2010).

[32] *Id.*

Conclusion

The information we have reviewed shows that the oil and gas industry has injected millions of gallons of diesel fuel and hydraulic fracturing fluids containing diesel fuel since 2005. These activities appear to be a violation of the Safe Drinking Water Act because the companies did not obtain permits authorizing the injection of diesel fuel.

We are unable to draw definitive conclusions about the potential impact of these injections on public health or the environment. The oil and gas service companies we contacted were able to provide only limited information about the proximity of their hydraulic fracturing operations to underground sources of drinking water. Moreover, because the companies did not apply for the permits required under the Safe Drinking Water Act, the regulatory agencies that would have reviewed the permit applications knew little about the diesel injections or what their potential impact might be.

We urge you to examine the use of hydraulic fracturing fluids containing diesel fuel as part of your investigation into the industry's practices. This appears to be an area of significant noncompliance with the requirements of the Safe Drinking Water Act.

Sincerely,

Henry A. Waxman
Ranking Member
Committee on Energy and Commerce

Edward J. Markey
Ranking Member
Committee on Natural Resources

Diana DeGette
Ranking Member
Subcommittee on Oversight and Investigations

Attachment

cc: The Honorable Fred Upton
Chairman

The Honorable Joe Barton
Chairman Emeritus

The Honorable Cliff Stearns
Chairman
Subcommittee on Oversight and Investigations

Attachment

Table 1. Injection of Hydraulic Fracturing Fluids Containing Diesel Fuel: By Company (2005-2009)

Company	Volume (gallons)
Basic Energy Services	204,013
BJ Services	11,555,538
Complete	4,625
Frac Tech	159,371
Halliburton	7,207,216
Key Energy Services	1,641,213
RPC	4,314,110
Sanjel	3,641,270
Schlumberger	443,689
Superior	833,431
Trican	92,537
Weatherford	2,105,062
Total	**32,202,075**

Table 2. Injection of Hydraulic Fracturing Fluids Containing Diesel Fuel: By State (2005-2009)

State	Volume (gallons)
AK	39,375
AL	2,464
AR	414,492
CA	26,466
CO	1,331,543
FL	377
KS	50,304
KY	212
LA	2,971,255
MI	8,007

State	Volume (gallons)
MS	221,044
MT	662,946
ND	3,138,950
NM	605,480
OK	3,337,325
PA	589
TX	16,031,927
UT	404,572
WY	2,954,747
Total	**32,202,075**