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INTRODUCTION

Oil and natural gas power modern civilization on a global scale.[1] As the world's primary energy source, oil fueled forty percent of United States energy consumption in 2007, and natural gas accounted for another twenty-two percent.[2] The recent proliferation of economically feasible hydraulic fracturing[3] has increased public scrutiny and raised environmental concerns, particularly with regard to its effects on underground sources of drinking water.[4] Controversy and confusion followed the Environmental Protection Agency's (EPA) decision to exclude hydraulic fracturing from regulation under the Safe Drinking Water Act (SDWA).[5] Out of this controversy arose two Eleventh Circuit cases brought by the Legal Environmental Assistance Foundation (LEAF), which asked whether hydraulic fracturing qualifies as an underground injection.

In response to the debate, Congress excluded all hydraulic fracturing from SDWA regulation through the enactment of the 2005 Energy Policy Act (2005 Act), citing dual policies valuing economic freedom and energy independence. Although the 2005 Act was a manifestation of congressional alignment with the EPA, the statute did make one exception to the general rule by expressly excluding from the exemption those operations utilizing diesel-based fracturing fluid.[6]

Whether the 2005 Act's diesel exception extends to fracturing fluids containing *biodiesel* is unclear, as the wording of the 2005 Act only includes hydraulic fracturing operations that use "diesel."[7] While

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1. *Fossil Fuels*, ENVTL. & ENERGY STUDY INST., http://www.eesi.org/topics/fossil-fuels/description [http://perma.cc/UZ75-XVCS] (last visited Jan. 21, 2015).

2. GROUND WATER PROT. COUNCIL, U.S. DEP'T OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER, 1 (2009), *available at* http://energy.gov/sites/prod/files/2013/03/f0/ShaleGasPrimerOnline4-2009.pdf [hereinafter SHALE GAS PRIMER].

3. Hydraulic fracturing is a process by which fracturing fluid is pumped under high pressure into a rock formation to generate cracks, allowing natural gas to flow out in profitable quantities. *Id.* at ES-4.

4. Keith B. Hall, *Regulation of Hydraulic Fracturing Under the Safe Drinking Water Act*, 19 BUFF. ENVT'L. L.J. 1, 3 (2011-2012).

5. *See* Legal Envtl. Assistance Found., Inc. v. U.S. EPA, 118 F.3d 1467 (11th Cir. 1997) [hereinafter *LEAF I*].

6. *See* Energy Policy Act of 2005, Pub. L. No. 109-58 § 1252(b)(3), 119 Stat. 594 (2005).

7. *Id.*

conventional wisdom may suggest that the SDWA regulates biodiesel as a form of diesel, a deeper understanding of the underlying science and regulatory structure reveals that conclusion to be ill-conceived. Not only do differences in the chemical composition of the two substances distinguish biodiesel operations from the dangers associated with petroleum-based diesels (petrodiesels), but, additionally, increased regulation of hydraulic fracturing will hamper both the development of this segment of the energy industry and the attainment of national energy independence.[8]

Hydraulic fracturing remains the most cost-effective method of producing oil and natural gas from shale formations[9] and imbues America with the potential to become a dominant petrochemical energy producer. While rich in oil and gas, much of the United States' stores of these resources remain trapped in shale formations.[10] America holds fifty-eight billion barrels of recoverable shale oil[11]—the second largest reserve in the world behind Russia.[12] The United States is also the fourth greatest source of recoverable shale gas in the world, boasting 665 trillion cubic feet of the natural resource.[13]

With these ample potential resource pools, the benefits of hydraulic fracturing become exponentially more enticing. Promoting fracturing simultaneously brings jobs and tax revenue to the country, which in turn provides aid to the American economy. Increased domestic oil and natural gas production also reduces the nation's dependence on oil from the

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8. The American Petroleum Institute (API) commissioned a study predicting the outcomes of three different scenarios: (1) the total elimination of hydraulic fracturing, (2) increased restrictions on fluid use, and (3) the implementation of UIC compliance on hydraulic fracturing wells. *Measuring the Economic and Energy Impacts of Proposals to Regulate Hydraulic Fracturing,* IHS GLOBAL INSIGHT, (2009), http://www.api.org/~/media/Files/Policy/Exploration/IHS-GI-Hydraulic-Fracturing-Natl-impacts.ashx [http://perma.cc/SZ4P-NKVY]. The study concludes that all three scenarios will result in substantial short-term decreases in production, which will increase in the long term due to the growing importance of tight shale formations. *Id.* at 1. This study estimates that, if UIC regulations were to be imposed upon hydraulic fracturing operations, a 20.5% decrease in new well construction and a 10% loss in natural production would result in the period between 2009 and 2014. *Id.* at 2.

9. U.S. Energy Information Administration, TECHNICALLY RECOVERABLE SHALE OIL AND SHALE GAS RESOURCES: AN ASSESSMENT OF 137 SHALE FORMATIONS IN 41 COUNTRIES OUTSIDE THE UNITED STATES (JUNE 13, 2013), *available at* http://www.eia.gov/analysis/studies/worldshalegas (last visited Jan. 21, 2015) [hereinafter SHALE OIL AND GAS RESOURCES].

10. SHALE GAS PRIMER, *supra* note 2, at 13. Shale formations are low permeability formations that make oil and gas difficult to recover.

11. SHALE OIL AND GAS RESOURCES, *supra* note 9.

12. *Id.*

13. *Id.*

Middle East, keeps money inside the United States, and decreases American dependence on politically volatile portions of the world, bolstering the nation's energy security.

Hydraulic fracturing birthed the energy boom that currently supports more than two million jobs and contributes $283 billion to the American gross domestic product.[14] According to the Energy Information Administration, American oil production from hydraulic fracturing reached 9.08 million barrels a day in late 2014—the highest level in more than thirty years.[15] In fact, by December 2014, the United States had overtaken Saudi Arabia in its rate of oil production, attracting the attention of world energy leaders.[16] The Organization of Petroleum Exporting Countries (OPEC) has demonstrated its willingness to continue oil production at normal levels despite plummeting oil prices—an apparent attempt to make American domestic production unprofitable and force domestic producers to scale back in order to ensure continued dependency on OPEC oil in the United States.[17] Justifiably frightened by the potential for American energy independence, OPEC's production directive represented a strategic attempt to defuse that threat. The decision indicates an implicit acknowledgment by the world's energy leaders of the viability of an energy-autonomous America in the near future.

This comment asserts that the EPA must amend its regulations to clarify that the 2005 Act does not intend to regulate biodiesel-based fracturing operations under the SDWA. Part I explains the scientific underpinnings of hydraulic fracturing with regards to biodiesel and petrodiesel fluids. Part II provides a background on the legal disputes surrounding the SDWA carried out via the EPA, courts, and Congress. Finally, Part III argues against the inclusion of biodiesel in SDWA regulation.

I. HYDRAULIC FRACTURING AND BIODIESEL

To get to the root of the controversy, a deeper understanding of the complicated processes involved in hydraulic fracturing is imperative. Equally important is the role that biodiesel plays within those processes.

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14. Chris Faulkner, *Lifting the U.S. ban on oil exports would send OPEC a message*, L.A. TIMES (Dec. 15, 2014), http://www.latimes.com/opinion/op-ed/la-oe-1216-faulkner-fracking-opec-oil-prices-20141216-story.html [http://perma.cc/N2TK-746L].

15. *Id.*

16. *Id.*

17. *Id.* Domestic production declined in mid-2015, as a response to falling oil prices. Lynn Doan and Dan Murtaugh, *Shale Oil Boom Could End in May After Price Collapse*, BLOOMBERG BUSINESS (OCT. 14, 2015), http://www.bloomberg.com/news/articles/2015-04-13/shale-oil-boom-seen-ending-in-may-after-price-collapse [http://perma.cc/ES37-V3JB].

The entire regulatory dispute turns on the chemical composition of that fuel source, and resolution must be sought through comparison of its unique properties to those of petrodiesel.

A. Hydraulic Fracturing: The Process and the Panic

The practice of hydraulic fracturing in the oil and gas industry has existed almost as long as the industry itself.[18] Commercial development of hydraulic fracturing techniques began in the late 1940s, but the practice only became economically feasible in recent years[19] due to the cultivation of improved fracturing techniques, advances in horizontal drilling, and the appreciation of natural gas prices.[20]

The hydraulic fracturing process uses various fluids to create fractures in underground low-permeability rock formations containing oil and gas.[21] The fluid pumped into fracturing sites is typically composed of a mixture of water and additives[22] containing proppants—small particles like sand, or ceramic or bauxite fragments specifically manufactured for use in fracturing operations[23]—which remain in the pore spaces of a rock formation to prop them open and facilitate the flow of oil and gas.[24] Water and proppants make up roughly 99.5% of the fracturing fluid,[25] with other additives, including gelling agents, biocides, corrosion inhibitors, and friction reducers, comprising the remainder.[26] During hydraulic fracturing operations, operators pump these fluids into formations at exceedingly high pressures, causing fracturing in the shale.[27] Recovered fluid is referred to as "flowback."[28]

The industry often engages in horizontal drilling in conjunction with hydraulic fracturing, whereby a well is initially drilled vertically and then

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18. Keith B. Hall, *Hydraulic Fracturing and the Baseline Testing of Groundwater,* 48 U. RICH. L. REV. 857, 861 (2014).
19. Hall, *supra* note 4, at 3.
20. SHALE GAS PRIMER, *supra* note 2, at 9.
21. *Id.* at 9.
22. *Id.* at 61.
23. CERAMIC PROPPANT, http://www.carboceramics.com/ceramic-proppant [http://perma.cc/7X6D-HBVU] (last visited Oct. 29, 2015). Artificial proppants can be used in lieu of natural proppants such as sand. Ceramic proppants provide greater uniformity and strength than sand, and can improve production in a variety of reservoir conditions.
24. *Id.*
25. SHALE GAS PRIMER, *supra* note 2, at 61. "Overall the concentration of additives in most slickwater fracturing fluids is a relatively consistent 0.5% to 2% with water making up 98% to 99.5%."
26. *Id.* at 63.
27. SHALE GAS PRIMER, *supra* note 2, at ES-4.
28. Keith B. Hall, *Hydraulic Fracturing: What Are the Legal Issues?*, 59 La. B.J. 250, 251 (2011). Flowback is also referred to as "produced water."

turned horizontally.[29] Since oil-bearing and gas-bearing formations can extend laterally for many miles,[30] this process exposes more of the formation to the well bore.[31] When compared with vertical drilling, horizontal drilling creates the opportunity for greater recovery proportionate to a given formation.[32]

The proliferation of hydraulic fracturing has caused significant public backlash related to water access and contamination. Fracturing requires high volumes of water and produces large quantities of flowback, disposal of which can be problematic.[33] Anti-fracturing advocates worry that regional overconsumption by oil and gas corporations will deplete water sources and deprive local communities of sufficient access to safe water supplies.[34] Even when water *is* available, residents in areas of prolific fracturing often fear that hydraulic fracturing will contaminate groundwater, either through improper well construction, imprudent flowback disposal, or via the fracturing process itself.[35] These concerns are not without merit, substantiated to some extent by a number of complaints across the American West alleging evidence of methane contamination linked to local fracturing operations.[36] Disputes over hydraulic fracturing that stem from these concerns can lead to entrenched legal battles, with oil and gas companies facing off against landowners that blame them for degradation of the environment and public health. Yet while

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29. *See* DANIEL YERGIN, THE QUEST: ENERGY, SECURITY, AND THE REMAKING OF THE MODERN WORLD 17 (2011).

30. Lamont C. Larsen, *Horizontal Drafting: Why Your Form JOA May Not Be Adequate for Your Company's Horizontal Drilling Program,* 48 ROCKY MTN. MIN. L. FOUND. J. 51, 43 (2011).

31. *Id.* at 330.

32. SHALE GAS PRIMER, *supra* note 2, at ES-3.

33. SHALE GAS PRIMER, *supra* note 2, at ES-4. Depending on formation characteristics, the amount of water needed to drill and fracture a horizontal shale gas well ranges from two to four million gallons of water.

34. *Id.*

35. Hall, *supra* note 4.

36. *See* WILLIAM M. KAPPEL & ELIZABETH A. NYSTROM, U.S. GEOLOGICAL SURVEY, DISSOLVED METHANE IN NEW YORK GROUNDWATER 1 (2012), *available at* http://pubs.usgs.gov/of/2012/1162/pdf/ofr2012-1162_508_09072012.pdf. Complaints arose in the San Juan Basin in Colorado and New Mexico. EVALUATION OF IMPACTS TO UNDERGROUND SOURCES OF DRINKING WATER BY HYDRAULIC FRACTURING OF COALBED METHANE RESERVOIRS, at 6-2 (2004), *available at* http://nepis.epa.gov/Adobe/PDF/P100A99N.PDF [hereinafter EVALUATION]. A New Mexico citizen complained that the methane levels in his well rose after the beginning of coalbed methane drilling activity in the area. *Id* at 6–7. Citizens in Colorado reported methane concentrations in their water wells and complained that the water turned cloudy with grayish sediment. *Id.* at 6–3. Similar complaints were made in the Power River Basin of Wyoming and Montana, where individuals near the basin complained of increased methane content and "frothing and bubbles" in their water. *Id.* at 6–9.

fracturing can present real threats to surrounding communities, not all fracturing methodologies are created equal.

B. Biodiesel and Petrodiesel: Strange Stepbrothers

Both petrodiesel and biodiesel may be incorporated into fracturing fluid. As chemically distinct compounds, each would present different dangers if introduced into an underground source of drinking water. Despite the significant differences between the compounds, the similarity of their names has led to regulatory confusion by parties the wrongfully conflate the two substances. Nevertheless, biodiesel and petrodiesel should not be treated interchangeably under the SDWA. They are simply not the same material; they cannot therefore be synonymous.

The word diesel derives its origin from the surname of Rudolf Diesel, the man who invented the diesel engine.[37] The original engines developed by Diesel ran on a variety of fuels. Of these fuels, vegetable oil proved a viable option due to its high energy content.[38] Diesel himself was a proponent of vegetable oil fuels, as he believed farmers would benefit greatly from the ability to produce their own fuel.[39] However, after Diesel's death in 1913, petroleum fuels became cheap and widely available, and they soon gained recognition as the standard for engines over the next eighty years.[40] Under these circumstances, the word diesel entered the popular lexicon as the term for the petroleum fuel most commonly used in diesel engines.[41]

As its name implies, petrodiesel derives from petroleum,[42] specifically from a fraction of petroleum "composed primarily of aliphatic (linear or unbranched) hydrocarbons."[43] It also contains a subset of chemical

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37. *See* W. ROBERT NITSKE & CHARLES MORROW WILSON, RUDOLF DIESEL: PIONEER OF THE AGE OF POWER (1965).

38. *History of Biodiesel*, BIODIESEL.COM, http://www.biodiesel.com/biodiesel/history [http://perma.cc/NN8Q-A33H] (last visited Jan. 21, 2015).

39. *Id.*

40. *Id.*

41. In layman's terms, diesel oil and diesel fuel are "heavy mineral oil[s] used as fuel in diesel engines." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 629 (1986).

42. Jesse Jin Yoon, *What's the Difference between Biodiesel and Renewable (Green) Diesel,* ADVANCED BIOFUELS USA (Oct. 12, 2014, 5:17 PM), http://advancedbiofuelsusa.info/wp-content/uploads/2011/03/11-0307-Biodiesel-vs-Renewable_Final-_3_-JJY-formatting-FINAL.pdf [http://perma.cc/SCR8-MPHH].

43. ALLEN L. HAMMOND ET AL., ENERGY AND THE FUTURE 159 (1973).

compounds known collectively as BTEX compounds.[44] Compared with other petroleum products, petrodiesel is slightly heavier and distills in the range of 250 to 400 degrees Celsius.[45] Its applications include use as a light fuel oil and as fuel for internal combustion engines.[46]

While hydraulic fracturing operations rarely incorporate petrodiesels into fracturing fluids,[47] their properties make them useful to (1) prevent damage to water-sensitive rock formations; (2) adjust fluid properties, such as viscosity and lubricity; and (3) act as solvents for the delivery of gelling agents.[48] Because they have a lower freezing point than water, they are particularly useful in in cold climate operations, helping to prevent the fracturing fluid from freezing.[49] Further, more gels can be dissolved in fracturing fluid containing petrodiesel, thereby increasing the efficiency of proppant transport in fracturing fluid.[50]

By comparison, biodiesel is a form of fuel that, although similar to petrodiesel, is produced by mixing vegetable oil or animal fat[51] with alcohol and a hydroxide catalyst.[52] Its primary use is fuel to power diesel

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44. "BTEX" is an acronym for benzene, toluene, ethylbenzene, and xylene compounds. U.S. ENVTL. PROT. AGENCY, PERMITTING GUIDANCE FOR OIL AND GAS HYDRAULIC FRACTURING ACTIVITIES USING DIESEL FUELS: UNDERGROUND INJECTION CONTROL PROGRAM GUIDANCE #84, at 3 (2014), *available at* http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/upload/epa816r14001.pdf [hereinafter GUIDANCE FINAL]. BTEX compounds are a form of aromatic hydrocarbons. AROMATIC HYDROCARBONS, http://hyperphysics.phy-astr.gsu.edu/hbase/organic/aromatic.html [http://perma.cc/BM6J-LF57] (last visited Nov. 10, 2014). Aromatic hydrocarbons are hydrocarbons that contain one or more benzene rings. They are called "aromatic" because many have strong, pungent aromas. These compounds are found in petroleum products such as petrodiesel fuel. GUIDANCE FINAL.

45. Yoon, *supra* note 42.

46. Allen, *supra* note 43, at 159.

47. FracFocus, a website managed by the Ground Water Protection Council and Interstate Oil and Gas Compact Commission, provides public information on the contents of fracturing fluids. As of October 2015, twenty-three states use FracFocus as a means of official state chemical disclosure. In those states, only twenty-four of over 99,000 registered fracturing well sites in the United States used petrodiesel in their fracturing fluid. FRACFOCUS, http://www.fracfocus.org [http://perma.cc/E5U4-3LFH] (last visited Oct. 18, 2015).

48. GUIDANCE FINAL, *supra* note 44. Gelling agents are substances used to thicken the fracturing fluid in order to suspend proppants. Examples include guar gum and hydroxyethyl cellulose, which find more conventional use in ice cream, cosmetics, toothpaste, baked goods and sauces. SHALE GAS PRIMER, *supra* note 2, at 63.

49. GUIDANCE FINAL, *supra* note 44, at 3.

50. EVALUATION, *supra* note 36, at ES-12.

51. *Biodiesel Basics,* U.S. DEP'T OF ENERGY (Oct. 12, 2014, 5:32 PM), http://www.afdc.energy.gov/pdfs/47504.pdf [http://perma.cc/5HQP-QQGL].

52. *What is Biodiesel?* BIODIESEL EDUCATION (Oct. 12, 2014, 5:13 PM), http://www.biodieseleducation.org [http://perma.cc/23MN-LK7U].

engines and fuel injection systems.[53] Because biodiesels possess higher lubricity than petrodiesel,[54] they can provide a preferable lubricant for fracturing operations. Unlike petrodiesel, biodiesels are water-soluble[55]—a potentially valuable asset when interacting with various other additives. However, biodiesels are not well suited for use in colder climates, as they contain compounds that crystalize in very cold weather.[56] These properties distinguish biodiesel as a unique, distinct chemical compound, separate and apart from petrodiesel. As such, the two fuel sources present different regulatory concerns and should be dealt with independently under the law.

II. THE SDWA, LEAF, AND THE 2005 ENERGY POLICY ACT

This section explores the evolution of the regulatory definition of "underground injection" as applied to hydraulic fracturing. In order to understand the dispute over whether biodiesel should be regulated under the SDWA, an understanding of the relevant portions of the Act itself is imperative. Legal disputes over hydraulic fracturing have centered on the SDWA's definition of "underground injection," particularly in the two cases brought by LEAF and the congressional reaction thereto.

A. The SDWA

The SDWA was enacted by Congress in 1974 to "assure that water supply systems serving the public meet minimum national standards for protection of public health."[57] The SDWA imparts regulatory authority upon the EPA,[58] which in turn defines the minimum standards for state underground injection control (UIC) programs.[59] UIC programs are the administrative structures through which states regulate underground injections. If the EPA determines that a state UIC program meets the SDWA's minimum standards,[60] the state

53. *Biodiesel Basics, supra* note 51.
54. Yoon, *supra* note 42.
55. U.S. Patent No. 20,090,291,859 at [0007] (filed Nov. 26, 2009).
56. *Biodiesel Basics, supra* note 51.
57. H.R. REP. NO. 93-1185, at 6454 (1974), *reprinted in* 1974 U.S.C.C.A.N. 6454.
58. SAFE DRINKING WATER ACT, 42 U.S.C. § 300f (2012).
59. Hall, *supra* note 4, at 10.
60. The SDWA states that State programs "(A) shall prohibit, effective on the date on which the applicable underground injection control program takes effect, any underground injection in such State which is not authorized by a permit issued by the State (except that the regulations may permit a State to authorize underground injection by rule); (B) shall require (i) in the case of a program which provides for authorization of underground injection by permit, that the applicant for the permit to inject must satisfy the State that the underground injection will not endanger drinking water sources, and (ii) in the case of a program which provides for such an

has primacy in regulation.[61] The state retains primacy until the EPA determines that the state UIC program no longer meets the standards of the SDWA.[62] However, when a state fails to meet the minimum standards, the EPA must then establish a UIC program on behalf of that state.[63] In order to meet SDWA requirements, the UIC program must prohibit any underground injection not authorized by permit or rule.[64] Additionally, the UIC program must classify injection wells under the EPA's classification system,[65] which is composed of five different categories for injection wells.[66]

B. The LEAF Litigation

The controversy surrounding the EPA's stance on hydraulic fracturing eventually made its way into the courts in *Legal Environmental Assistance Foundation v. United States EPA* (*LEAF I*).[67] The grounds for the litigation arose on August 2, 1982, when the EPA approved Alabama's UIC program for Class II wells. These wells were administered by the Oil and Gas Board (OGB) of Alabama,[68] which did not qualify hydraulic fracturing wells under Class II. Moreover, Alabama's Department of Environmental Management (ADEM) did not classify hydraulic fracturing operations under Classes I, III, IV or V, rendering hydraulic fracturing in Alabama unregulated under the SDWA.[69]

LEAF petitioned the EPA to withdraw its approval of Alabama's UIC program on the grounds that the Alabama OGB did not regulate hydraulic

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authorization by rule, that no rule may be promulgated which authorizes any underground injection which endangers drinking water sources; (C) shall include inspection, monitoring, recordkeeping, and reporting requirements; and (D) shall apply (i) as prescribed by section 300j-6(b) of this title, to underground injections by Federal agencies, and (ii) to underground injections by any other person whether or not occurring on property owned or leased by the United States." 42 U.S.C. § 300h(b)(1)(A)–(D).

61. Hall, *supra* note 4, at 11.

62. *LEAF I*, 118 F.3d at 1469.

63. Hall, *supra* note 4, at 11.

64. 40 C.F.R. § 145.11(a)(5) (2005).

65. Hall, *supra* note 4, at 11.

66. Class I wells are used to dispose of hazardous, industrial, or municipal wastes beneath underground sources of drinking water. Class II wells inject fluids that "are brought to the surface in connection with . . . conventional oil or natural gas production," "for the enhanced recovery of oil or natural gas," and "for storage of hydrocarbons." Class III wells inject for the purpose of extracting minerals, Class IV wells are used to dispose of hazardous or radioactive wastes in or above underground drinking water sources, and Class V wells are those injection wells that do not fall within any of the aforementioned categories. 40 C.F.R. § 144.6 (2010).

67. *LEAF I*, 118 F.3d 1467.

68. *Id.* at 1470.

69. *Id.* at 1471. For an explanation of well classes, see *supra* note 66.

fracturing as an underground injection for SDWA purposes.[70] LEAF alleged that, due to the state's failure to regulate fracturing wells, hydraulic fracturing projects had diminished water quality drawn from a drinking well owned by two of its members.[71] The EPA denied the request on the grounds that fracturing did not fall under the SDWA's definition of "underground injection," which involved only those wells with the "principal function" of underground emplacement of fluids.[72] In response, LEAF sought judicial review in the Eleventh Circuit Court of Appeals, arguing that the EPA's interpretation of the ADEM regulations was erroneous, being inconsistent with the SDWA.[73]

The primary issue presented to the court was whether hydraulic fracturing was a form of underground injection under the SDWA.[74] In its brief, the EPA argued that the language of the SDWA provided an ambiguous statutory definition of what constituted an underground injection.[75] The EPA noted that ADEM did not regulate hydraulic fracturing under its UIC regulations because fracturing fluid is recovered from the ground; fracturing does not permanently deposit fluid underground. This interpretation of the regulations, the EPA argued, was not only consistent with the language of the statute; it also aligned with congressional intent. The EPA maintained that Congress intended the SDWA to apply only to those wells for which the primary purpose was subterranean injection—thus excluding wells from UIC regulation when their principal function was not injecting fluids underground.[76] Therefore, according to the EPA the regulations in question were based on a reasonable interpretation of the SDWA.[77] On those grounds, both ADEM and the EPA justified their refusal to consider hydraulic fracturing an underground injection.[78]

The Eleventh Circuit rejected the EPA's argument that the SDWA's statutory language was ambiguous, holding that it was "clear that Congress dictated that *all* underground injections be regulated under the UIC programs."[79] The court went on to define "underground injection" by giving the words their ordinary meaning: "subsurface emplacement of fluids by forcing them into cavities and passages in the ground through a

70. *Id.* at 1471.
71. *Id.*
72. *Id.*
73. *LEAF I,* 118 F.3d at 1472.
74. *Id.* at 1469.
75. *Id.* at 1473.
76. *Id.* at 1473–4.
77. *Id.* at 1473.
78. Hall, *supra* note 4, at 16.
79. *LEAF I,* 118 F.3d at 1474.

well."[80] Under that definition, the court found it obvious that hydraulic fracturing fell within the realm of underground injections.[81] Furthermore, because a portion of fracturing fluid is not recovered, regulation under a UIC program was mandatory.[82] The Eleventh Circuit, in further support of its ruling, pointed out that the EPA treated other activities involving the temporary placement of fluids underground as underground injections pursuant to the SDWA.[83]

The court went on to analyze the language of the SDWA and found that, to achieve the statutory purpose of "preventing underground injection which endangers drinking water sources," Congress intended UIC regulations to govern *any* underground injection in a given state.[84] The Eleventh Circuit reached this conclusion by applying the analytic framework set forth by the Supreme Court in *Chevron v. NRDC* for the review of agency interpretation of legislative statutes:[85] "First, always, is the question whether Congress has directly spoken to the precise question at issue. If the intent of Congress is clear, that is the end of the matter; for the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress."[86] But, where Congress does not express its intent unambiguously, the court must defer to the agency's interpretation insofar as it is "based on a permissible construction of the statute."[87]

Finding the language of the SDWA unambiguous and the EPA's interpretation thereby undeserving of *Chevron* deference, the Eleventh Circuit granted LEAF's petition to initiate withdrawal of the Alabama UIC program for its failure to regulate hydraulic fracturing.[88] Even so, the EPA did not amend its pertinent regulations in accordance with the ruling, nor did it require SDWA compliance by hydraulic fracturing operations outside the Eleventh Circuit.[89]

Predictably, the controversy did not end there; in 2001, the Eleventh Circuit handed down its second decision related to the *LEAF* litigation (*LEAF II*). Prior to the withdrawal of its UIC program, Alabama proposed a revised UIC program under Section 1425 of the SDWA.[90] That section allowed a state to obtain primacy of regulatory authority by showing that

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80. *Id.* The Eleventh Circuit relied on the Random House Dictionary of the English Language 983 (2d ed. unabridged 1987) for a definition of "injection."
81. *Id.*
82. *Id.* at 1478 n.10.
83. *Id*.
84. *LEAF I,* 118 F.3d at 1474.
85. *Id.* at 1473.
86. Chevron, U.S.A., Inc. v. NRDC, Inc., 467 U.S. 837, 842 (1984).
87. *Id.* at 843.
88. *LEAF I,* 118 F.3d at 1478.
89. Hall, *supra* note 4, at 17.
90. *Id.* at 17–18.

their UIC program met the requirements of SDWA Section 1421(b)(1)(A)-(D) and served as an "effective program to prevent underground injection which endangers drinking water sources."[91] The EPA approved Alabama's proposed program, but LEAF once again objected, this time on the grounds that hydraulic fracturing was not an activity covered under Section 1425 approval.[92] They additionally argued that fracturing wells should be classified as Class II wells[93] and that, even if the Alabama program met Section 1425 approval, the EPA's regulations under the SDWA were arbitrary and capricious.[94]

The Eleventh Circuit disagreed with LEAF's analysis of Section 1425 approval, holding that the EPA's decision to place hydraulic fracturing under that section was a permissible construction of the statute under *Chevron*.[95] The court emphasized the heavy burden LEAF carried in establishing the arbitrary and capricious nature of the EPA's actions. As a reviewing court, it refrained from deciding the issue itself, as it could not "substitute [its] judgment for that of the agency and [could] set aside an agency's decision only if the agency relied on improper factors, failed to consider important relevant factors, or committed a clear error of judgment that lacks a rational connection between the facts found and the choice made."[96]

However, the Eleventh Circuit agreed with LEAF that hydraulic fracturing fit "squarely within the definition of Class II wells."[97] The EPA's decision to classify methane production via hydraulic fracturing of coal beds as a "Class II-like underground injection activity," as opposed to classifying it under Class II proper, was "inconsistent with the plain language of [the SDWA]" and thus was set aside.[98] The court then remanded to the EPA for determination of whether Alabama's revised UIC program complied with Class II well requirements.[99]

C. 2005 Energy Policy Act

Congress passed the 2005 Act in direct response to *LEAF II*,[100] with legislators proclaiming the need to "ensure jobs for our future with secure,

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91. Legal Envtl. Assistance Found., Inc. v. United States EPA, 276 F.3d 1253, 1257 (11th Cir. 2001) [hereinafter *LEAF II*].
92. *Id.* at 1256.
93. *Id.*
94. *Id.* at 1265.
95. *Id.* at 1261.
96. Arango v. U.S. Dep't of the Treasury, 115 F.3d 922, 928 (11th Cir. 1997).
97. *LEAF II*, 276 F.3d at 1263.
98. *Id.* at 1264.
99. *Id.*
100. Terry W. Roberson, *The State of Texas Versus the EPA Regulation of Hydraulic Fracturing*, 48 Houston Lawyer 24 (2011).

affordable, and reliable energy."[101] Generally, the 2005 Act exempts hydraulic fracturing from the existing environmental regulatory framework.[102] The 2005 Act amends Paragraph 1 of Section 1421(d) of the SDWA to clarify that the term "underground injection" excludes "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."[103] The passage of the 2005 Act legislatively overruled *LEAF II* in part, excluding almost all hydraulic fracturing activity from SDWA regulation.[104]

D. The Halliburton Controversy & The FRAC Act

The 2005 Act incited a firestorm of controversy over the so-called "Halliburton Loophole," a term for the various provisions within the 2005 Act that "stripped the [EPA] of its authority to regulate . . . hydraulic fracturing."[105]

The controversy over the Halliburton Loophole has subjected the entire 2005 Act to scrutiny and generated enough controversy to spur some legislators to action. On March 15, 2011, Democrats in both the House of Representatives and the Senate introduced the Fracturing Responsibility and Awareness of Chemicals (FRAC) Act, which was intended to close the Halliburton Loophole by repealing a "certain exemption" for hydraulic fracturing.[106] The FRAC Act specifically defined underground injection to include "the underground injection of fluids or propping agents pursuant to hydraulic fracturing operations relating to oil or gas production activities."[107] The FRAC Act, however, stalled out after being referred to

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101. Energy Policy Act of 2005, Pub. L. No. 109-58 § 1252(b)(3), 119 Stat. 594 (2005).

102. Emily C. Powers, *Fracking and Federalism: Support for an Adaptive Approach that Avoids the Tragedy of the Regulatory Commons,* 19 J.L. & Pol'y 913, 938–39 (2011).

103. Energy Policy Act of 2005, Pub. L. No. 109-58 § 1252(b)(3), 119 Stat. 594 (2005).

104. Hall, *supra* note 4, at 28.

105. *The Halliburton Loophole,* N.Y. TIMES, (Oct. 12, 2014, 6:25 PM), http://www.nytimes.com/2009/11/03/opinion/03tue3.html [http://perma.cc/884S-QLMQ]. (Contending that the Halliburton Loophole was one of many "dubious" provisions in the 2005 Act.) *See also* Adam Garemezy, *Balancing Hydraulic Fracturing's Environmental and Economic Impacts: The Need for a Comprehensive Federal Baseline and the Provision of Local Rights*, 23 DUKE ENVTL. L. & POL'Y F. 405, 408 (2013). (The Halliburton reference alludes to allegations that former Vice President Dick Cheney [a former Halliburton executive] played an instrumental role in inserting the "dubious provisions" in the 2005 Act).

106. FRAC Act, S. 587, 112th Cong. (2011), *available at* https://www.govtrack.us/congress/bills/112/s587 (last visited Dec. 11, 2015).

107. *Id.*

committee in both Houses.[108] With the FRAC Act never reaching a vote, the 2005 Act remains the law of the land.

III. EPA REGULATIONS MUST DISTINGUISH BETWEEN BIODIESEL AND DIESEL FOR SDWA REGULATION

While the 2005 Act removed most of the EPA's authority to regulate hydraulic fracturing under the SDWA, it carved out one exception for those operations utilizing diesel components in their fracturing fluids. Still, the Act left a legal gap regarding biodiesel-based fluids, leading to confusion over whether the SDWA regulates operations taking advantage of biodiesel's unique properties. The solution to this quandary is simple: the EPA must clarify that biodiesel is not a form of diesel for the purposes of hydraulic fracturing regulation under the SDWA. No evidence exists to indicate that Congress intended to classify biodiesel as a form of diesel when the SDWA was amended through the 2005 Act. Similarly, nothing indicates concern on the part of the EPA—the organization entrusted with enforcement of the SDWA[109]—about biodiesel entering the underground drinking water supply through hydraulic fracturing.

Keeping federal regulation out of biodiesel hydraulic fracturing is good public policy. Continuation of domestic fracturing development depends on the discretionary use of biodiesel by oil and gas companies. While petrodiesels are a relatively rare ingredient in hydraulic fracturing fluid today, the discovery of more water-sensitive formations may necessitate the use of a less-regulated analogue to facilitate the lucrative recovery of oil and gas. Additionally, new developments in hydraulic fracturing technology, such as the invention of novel gelling agents, may require the inclusion of biodiesel in fracturing fluid.

Furthermore, biodiesel's incorporation as a component in drilling fluids is becoming more prevalent. Biodiesel-based drilling fluids were patented in the United States in 2009[110] and in China in 2013.[111] In early 2015, developer Dinero Operating Company disclosed its use of biodiesel in two hydraulic fracturing wells in New Mexico.[112] With the growing application of biodiesels in oil and gas drilling, as well as the regulation of petrodiesel in fracturing fluids, it naturally follows that oil and gas companies will increasingly turn to biodiesel as an alternative fracturing fluid additive when they find a formation requiring its use.

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108. *Id.*
109. SAFE DRINKING WATER ACT, 42 U.S.C. § 300f (2012).
110. U.S. Patent No. 20,090,291,859 (filed May 22, 2008) (issued Nov. 26, 2009).
111. BIODIESEL-BASED DRILLING FLUID, CN 103305196 A, *available at* http://www.google.com/patents/CN103305196A?cl=en.
112. FRACFOCUS, *supra* note 47.

Confusion over the legality of employing biodiesel in fracturing will discourage its use and hamper domestic oil and gas production. A clear regulatory statement that the SDWA presents no barriers to the use of biodiesel in hydraulic fracturing fluid would allow oil and gas companies to extract oil and natural gas from a wider variety of formations, maximizing the competitive edge of the American oil and gas industry. By specifying that biodiesel is not a form of diesel for the purposes of SDWA fracturing regulation, the EPA will give oil and gas companies access to more efficient and economical choices. Opening the biodiesel door will undoubtedly encourage oil and gas companies to continue fracturing development on American soil, bringing jobs and tax revenue in the process. Furthermore, since the United States contains the second largest shale oil and the fourth largest shale gas reserves in the world,[113] increased production could lead to a climate in which the United States is able to meet its own energy demands and become independent of foreign oil and gas.

A. Biodiesel is Not Diesel for the Purposes of the SDWA

Counterintuitive though it may sound, biodiesel is not a form of diesel for the purposes of the SDWA. The EPA defines "diesel fuel" as a substance with diesel as its primary name or synonym, assuming this is the meaning Congress intends.[114] Based on nomenclature alone, the conclusion might be drawn, albeit incorrectly so, that biodiesel is the same as petrodiesel for the purpose of fracturing regulation such that no specific identification of biodiesel is necessary.

Assuming the equivalence of biodiesel and petrodiesel is inappropriate, as biodiesel lacks the dangerous BTEX compounds that concern the EPA with regard to petrodiesel fluids.[115] The EPA issued a report in 2004 outlining the effects of hydraulic fracturing on underground sources of drinking water.[116] Although the EPA found no evidence of underground water contamination related to hydraulic fracturing, it identified some "constituents of potential concern" used during normal fracturing operations,[117] including the BTEX

113. *Shale oil and shale gas resources are globally abundant*, U.S. ENERGY INFO. ADMIN. (Jan. 2, 2014), http://www.eia.gov/todayinenergy/detail.cfm?id=14431 [http://perma.cc/F6JJ-J7H8].

114. U.S. ENVTL. PROT. AGENCY, PERMITTING GUIDANCE FOR OIL AND GAS HYDRAULIC FRACTURING ACTIVITIES USING DIESEL FUELS: RESPONSE TO SUMMARY COMMENTS, at 36 (2014), *available at* http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/upload/epa816d14001.pdf [hereinafter EPA RESPONSE].

115. EVALUATION, *supra* note 36, at ES-1.

116. Hall, *supra* note 4, at 23.

117. EVALUATION, *supra* note 36, at ES-1.

compounds present in petrodiesel.[118] BTEX compounds not only threaten to compromise environmental wellness, they also pose particularized health risks, including increased susceptibility to anemia, decreased blood pressure, as well as nervous system, kidney, and liver damage.[119] Because BTEX compounds are highly mobile in groundwater, keeping them out of underground sources of drinking water is particularly important.[120] Apprehension over BTEX contamination has moved the EPA to enter into agreements with three major oil and gas companies to voluntarily eliminate petrodiesel fuel from fracturing fluid injected directly into areas where it might reach underground sources of drinking water.[121]

However, the use of biodiesels eliminates the threat of BTEX compounds because biodiesels are not petroleum-based. Vegetable oil contains a negligible amount of aromatic compounds of any type, including BTEX compounds.[122] By contrast, a petrodiesel fuel may contain up to twenty-five percent BTEX compounds by weight, depending on the refining process.[123]

Simply put, biodiesel is chemically distinct from petrodiesel. Conflating two different substances merely because they share part of the same name leads to absurd results. By analogy, following that logic would demand the conclusion that a tiger and a tiger shark are functionally the same animal. Although biodiesel performs similarly to petrodiesel in some respects, the chemical structures and compositions of the two fuels are different.[124] Major distinctions in the production and composition of the two compounds belie the disparities in the dangers they present. Any sensible regulatory scheme must take these incongruities into account.

B. The 2005 Energy Policy Act Indicates a Lack of Congressional Interest in Regulating Hydraulic Fracturing Using Biodiesel

The *LEAF I* decision holding fracturing to be an underground injection[125] illustrates the range within which the SDWA can be interpreted. The case also shows that the EPA's regulatory decisions are not per se trustworthy in the eyes of environmental organizations or the

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118. *Id.* at ES-12.
119. MARYLAND DEP'T OF THE ENV'T, BTEX FACT SHEET (Jan. 12, 2007), http://www.mde.state.md.us/assets/document/OilControl/Fact_Sheet_BTEX.pdf [http://perma.cc/D38N-RJ9P].
120. GUIDANCE FINAL, *supra* note 44, at 3.
121. EVALUATION, *supra* note 36, at ES-2.
122. AMIT SARIN, BIODIESEL: PRODUCTION AND PROPERTIES 159 (2012).
123. GUIDANCE FINAL, *supra* note 44, at 4.
124. *What's So Different About Biodiesel Fuel?,* PENN STATE COLL. OF AGRIC. SCIENCES, 1 (Oct. 12, 2014, 5:20 PM), http://pubs.cas.psu.edu/FreePubs/pdfs/uc205.pdf [perma.cc/YK8B-VEZH].
125. *LEAF I,* 118 F.3d at 1473.

courts.[126] In light of this confusing regulatory situation, the 2005 Act represents a unilateral congressional intervention to clarify the legislature's position.[127] The congressional intent underlying the 2005 Act is clear: with a single exception, hydraulic fracturing is *not* to be considered an underground injection for the purposes of the SDWA.[128]

The plain language of the 2005 Act imposes the presumption that Congress sought to regulate hydraulic fracturing in only one specific scenario. Any interpretation of the 2005 Act must assume that, had Congress intended to extend regulation, it would have done so expressly—as it did in the existing exception. Any ambiguities should be interpreted on the side of minimal regulation, as that was the generalized policy driving passage of the 2005 Act.

The word biodiesel is not used in the 2005 Act's exception, despite the fact that biodiesel is mentioned several times[129] in other parts of the 2005 Act.[130] Furthermore, the 2005 Act neglects to define diesel. Because no definition is included, the SDWA cannot be turned to for further guidance.[131]

C. EPA Does Not Define Biodiesel as Diesel for Purposes of Hydraulic Fracturing Under the SDWA

After the Eleventh Circuit ruled against the EPA in *LEAF I*,[132] Congress endorsed the EPA's position, overruling the holding by amendment to the SDWA.[133] Congress trusted the EPA to make the proper determination regarding specific regulatory policies under the SDWA,[134] and the EPA has released considerable guidance concerning SDWA regulation of biodiesel in hydraulic fracturing. While none of these publications have addressed the issue directly, they clearly indicate that the EPA does not consider biodiesel a form of diesel for the purpose of hydraulic fracturing regulation.

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126. *See id.*
127. Roberson, *supra* note 100, at 24.
128. Energy Policy Act of 2005, Pub. L. No. 109-58 § 1252(b)(3), 119 Stat. 594 (2005).
129. *See id.* The word biodiesel appears in the text sixty-nine times, with some sections dedicated entirely to biodiesel.
130. Energy Policy Act of 2005, Pub. L. No. 109-58 § 1252(b)(3), 119 Stat. 594 (2005). Mention of biodiesel is most notable in the Act's provision establishing a biodiesel engine testing program.
131. EPA RESPONSE, *supra* note 114, at 36.
132. *See LEAF I,* 118 F.3d at 1474.
133. *See* Energy Policy Act of 2005, Pub. L. No. 109-58 § 1252(b)(3), 119 Stat. 594 (2005).
134. SAFE DRINKING WATER ACT, 42 U.S.C. § 300f (2012).

For instance, in February 2014, the EPA published permitting guidance "to ensure protection of [underground sources of drinking water] in accordance with the [SDWA]."[135] The final version of that guidance report does not mention biodiesel,[136] but a preliminary draft did. That version stated, "EPA UIC permit writers should not consider the use of biodiesel in [hydraulic fracturing] activities as diesel fuel under the SDWA unless biodiesel is blended with petroleum-derived diesel fuels."[137] However, this statement was excluded from the final guidance.

The exclusion indicates, at most, division within the EPA regarding SDWA regulation of biodiesel use in hydraulic fracturing. Alternatively, the EPA may have been attempting to remove a controversial element of the regulatory scheme to avoid opposition and potential litigation by environmental groups. Whatever the case, no evidence suggests that the EPA as a whole intends to regulate biodiesel use in hydraulic fracturing.

The removal could be construed to suggest that the EPA excised the exception because it rejected the premise and wished to regulate biodiesel under the SDWA. But this interpretation is without merit—the removal of the biodiesel exception proves nothing. No evidence exists to show that the EPA changed its policy because it intended to regulate biodiesel. If the EPA did want to regulate biodiesel, why wouldn't it explicitly say so? If the addition and subsequent removal of the biodiesel exception must prove anything, it only demonstrates the EPA's awareness of biodiesel's possible utility in hydraulic fracturing. If the agency intended to regulate biodiesel under the SDWA, then surely it would have made this intention explicit, both in order to avoid confusion and to close a loophole.

The EPA issued another report in February of 2014 that definitively outlined its position on SDWA regulation of hydraulic fracturing.[138] Entitled *When does a hydraulic fracturing activity require a UIC Class II permit?*,[139] the report identified five chemicals that most appropriately met the statutory term "diesel."[140] The list made clear that petrodiesel fuels are the *only* diesels whose use requires a UIC Class II permit—biodiesel

135. *See* GUIDANCE FINAL, *supra* note 44, at 1.

136. *See id.*

137. U.S. ENVTL. PROT. AGENCY, PERMITTING GUIDANCE FOR OIL AND GAS HYDRAULIC FRACTURING ACTIVITIES USING DIESEL FUELS – DRAFT: UNDERGROUND INJECTION CONTROL PROGRAM GUIDANCE #84, at 10 (2012).

138. U.S. ENVTL. PROT. AGENCY, FACT SHEET: IMPLEMENTATION OF THE SAFE DRINKING WATER ACT'S EXISTING REQUIREMENTS FOR OIL AND GAS HYDRAULIC FRACTURING ACTIVITIES USING DIESEL FUELS (2014), *available at* http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/upload/epa816f14001.pdf.

139. *Id.*

140. *Id.* These chemicals have the primary names of diesel fuel, diesel fuel No. 2, fuel oil No. 2, fuel oil No. 4, and kerosene.

appeared nowhere in the report. While reports are not binding, this publication clearly evinced the EPA's intention to limit the definition of diesel to five petrodiesels. Thus, this clear statement of agency interpretation should be accorded due deference.

Forcing the EPA to regulate against its will makes little sense. The fact that the EPA did not change its practices in any jurisdiction outside of the Eleventh Circuit in the aftermath of the *LEAF* litigation belies the agency's unwillingness to extend regulation.[141] Moreover, the EPA's own writings indicate a lack of concern about the use of biodiesel in hydraulic fracturing operations. Thus, the EPA's avoidance of regulating biodiesel-based fracturing—either by choosing not to write any regulations on biodiesel fluids or simply by turning a blind eye to non-regulating states outside the Eleventh Circuit—should be reasonably expected.

CONCLUSION

Hydraulic fracturing creates the opportunity for the United States to meet its own energy needs and wean itself off foreign oil dependency. The oil and gas industry is an integral part of the national economy, providing millions of jobs for American workers. The regulation of oil and gas must therefore stay within reasonable boundaries so as to not hamper industrial development. If UIC regulations are imposed upon hydraulic fracturing, the domestic market will experience an immediate decline that would only continue into the future. SDWA regulations do indeed help mitigate the risk of biodiesel contamination, but this risk is negligible when compared to the economic detriment imposed by adoption of such a stringent regulatory perspective.

For these reasons, it is imperative that the EPA clearly establish that biodiesel fracturing operations do not fall under SDWA regulations. The regulation of biodiesel fracturing operations has no basis in the law as set forth in the SDWA. With the passage of the 2005 Energy Policy Act, Congress demonstrated a general desire to exclude hydraulic fracturing from SDWA regulation. The EPA certainly agrees with the legislature's position, as their decision to leave fracturing out of SDWA regulation predates the 2005 Act.

The 2005 Act's provision regarding SDWA regulation of hydraulic fracturing operations incorporating diesel reflects the EPA's concerns over the presence of BTEX compounds in petrodiesels. Since biodiesel contains no BTEX compounds, it does not qualify as a diesel for the purposes of that provision and should not be regulated under the SDWA. Furthermore,

141. Hall, *supra* note 4, at 17.

diesel and biodiesel are different compounds with distinct properties, and thus grafting a regulation that applies to one upon the other would be nonsensical. Keeping hydraulic fracturing operations that use biodiesel out of SDWA regulation is both the sensible interpretation of the law and the most beneficial to the welfare of the American economy. In light of the myriad benefits and the plain letter of the law, regulators, ALJs, and courts have no reason to include biodiesels in the SDWA's diesel exception. Courts should build jurisprudential precedent limiting the exception's application strictly to petrodiesels.

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