Drilling Into Hydraulic Fracturing and Shale Gas Development: A Texas and Federal Environmental Perspective

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DRILLING INTO HYDRAULIC FRACTURING AND SHALE GAS DEVELOPMENT:
A TEXAS AND FEDERAL ENVIRONMENTAL PERSPECTIVE

By Michael Goldman

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Recently, a respected energy economist stated that “[e]nergy self-sufficiency is now in sight” and that “within a decade, the U.S. will no longer need to import crude oil and will be a natural gas exporter.” According to one oil and gas executive, by 2020, the United States will be the largest hydrocarbon producer in the world—“bigger than Russia or Saudi Arabia.” Small energy companies using hydraulic fracturing, along with horizontal drilling, are unlocking vast oil and natural gas deposits trapped in shale all over the United States. Over the past few years, several key technical, economic, and energy policy developments have spurred increased use of hydraulic fracturing for oil and gas extraction over a wider diversity of geographic regions and geologic formations. However, with the expansion of hydraulic fracturing, there have been increasing concerns voiced by the public about potential impacts on drinking water resources, public health, and the environment.

The development and production of oil and gas in the United States, including shale gas, is regulated under a complex set of federal, state, and local laws that address exploration and operation. The laws and regulations that apply to conventional oil and gas exploration and production activities also apply to shale gas development. The United States Environmental Protection Agency (“EPA”) administers most of the federal laws. Many of the federal laws are implemented by the states under agreements and plans, which have been approved by the appropriate federal agencies. This Article will first discuss the existing federal laws and regulations and proposed federal laws that apply to hydraulic fracturing activities as well as current studies and enforcement actions concerning the same. This Article will then discuss Texas statutes and regulations and various activities that are currently being pursued by the regulatory agencies that govern shale gas exploration in Texas. With respect to local matters, this

3. Id.
4. Id.
6. Id.
8. Id.
9. Id.
10. Id.

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Article will also briefly consider municipal regulation of the industry. With the rapid growth of shale gas exploration as a result of hydraulic fracturing, increased litigation has likewise grown. Finally, this Article will also review recent litigation trends that relate to hydraulic fracturing, including an analysis of the typical claims asserted as well as the key applicable defenses under Texas law.

II. FEDERAL

A. Federal Statutes and Regulations

A series of federal laws governs most environmental aspects of hydraulic fracturing and shale gas development. The main statutes include the Safe Drinking Water Act, which regulates the underground injection of fluids from shale gas activities; the Clean Water Act, which regulates surface discharges of water associated with shale gas drilling and production; and the Clean Air Act, which limits air emissions from engines, gas processing equipment, and other sources associated with drilling and production. Additional environmental statutes may also apply to such operations. The following Section provides a brief summary of certain provisions from each of these statutes, particularly as those provisions apply to hydraulic fracturing and shale gas development.

1. Safe Drinking Water Act

In 1974, Congress passed the Safe Drinking Water Act ("SDWA") to protect public health by regulating the nation’s public drinking water supply. The SDWA authorizes the EPA to set national health-based standards to prevent both naturally occurring and man-made contaminants from compromising the nation's drinking water. Then, the EPA, the states, and municipal water-system agencies work together to ensure that these standards are met. One SDWA aspect of protecting the supply of drinking water is a framework for the underground injection control ("UIC") program, which prevents the injection of liquid wastes into the underground sources of drinking water ("USDW"). Both the EPA and the states implement the UIC program, setting standards for safe waste injection practices and banning certain types of injection altogether.

Prior to 1997, the EPA considered hydraulic fracturing to be a well stimulation technique associated with production and therefore not

11. Id.
14. Id.
15. Id.
16. Id.
subject to the UIC program under the SDWA.\textsuperscript{17} However, in 1994, the Legal Environmental Assistance Foundation challenged the EPA's opinion on hydraulic fracturing regulation, and in 1997, the Eleventh Circuit ruled that hydraulic fracturing of coalbed methane wells was indeed subject to the SDWA and UIC regulations under Alabama's UIC program.\textsuperscript{18}

In 1999, the EPA then began a study on hydraulic fracturing used in coalbed methane reservoirs to evaluate the potential risks to USDW.\textsuperscript{19} The EPA's study focused on coalbed methane reservoirs because they are generally closer to the surface and in greater proximity to USDW than conventional gas reservoirs.\textsuperscript{20} The EPA published the coalbed methane study in 2004.\textsuperscript{21} In the report, the EPA concluded that there was little to no risk of fracturing fluid contaminating underground sources of drinking water during hydraulic fracturing of coalbed methane production wells.\textsuperscript{22} Nonetheless, the EPA had, as a precautionary measure, entered into a Memorandum of Agreement in 2003 with companies that conduct hydraulic fracturing of coalbed methane wells to eliminate use of diesel fuel in fracturing fluids.\textsuperscript{23}

In 2005, Congress passed the Energy Policy Act, which amended the SDWA and made clear that "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" was excluded from regulation under the UIC program.\textsuperscript{24}

\begin{itemize}
  \item[18.] Id.; see also Legal Env'tl. Assistance Found., Inc. v. U.S. Env'tl. Prot. Agency, 118 F.3d 1467 (11th Cir. 1997).
  \item[19.] U.S. Env'tl. Prot. Agency, supra note 17.
  \item[20.] Id.
\end{itemize}
Since that time, two bills have been introduced that sought to repeal the 2005 restrictions and would require oil and gas companies to disclose the chemicals used in hydraulic fracturing operations. Neither bill passed.

On May 4, 2012, the EPA “released draft underground injection control (UIC) program permitting guidance for class II wells that use diesel fuels during hydraulic fracturing activities.” The EPA “developed the draft guidance to clarify how companies can comply with [the Energy Policy Act], which exempted hydraulic fracturing operations from the requirement to obtain a UIC permit, except in cases where diesel fuel is used as a fracturing fluid.”

The draft guidance outlines ... requirements for diesel fuels used for hydraulic fracturing wells, technical recommendations for permitting those wells, and a description of diesel fuels for EPA underground injection control permitting. The draft guidance describes diesel fuels for these purposes by reference to six chemical abstract services registry numbers.

The comment period deadline for submitting comments closed August 23, 2012.

2. Clean Water Act

The Clean Water Act ("CWA") is the primary federal law that governs surface water pollution. To protect water quality, the CWA includes regulation of pollutant limits on the discharge of oil and gas related produced water. The CWA does this through a national pollutant discharge elimination system permitting process, which makes it illegal to discharge any pollutant from a point source into the navigable waters of the United States, unless such discharge complies with an approved permit. Shale gas extraction produces large volumes of wastewater from hydraulic fracturing in addition to relatively small

27. Id.
28. Id.
29. Id.
32. Id. at 29–30.
volumes of produced water from the formation.\textsuperscript{33} According to the EPA, the CWA applies to both direct discharges as well as indirect discharges of wastewaters into United States waters through sewer systems connected to publicly owned treatment works.\textsuperscript{34}

\textbf{a. Stormwater Exemption}

However, an oil and gas exemption from environmental regulation is contained within the CWA for certain storm water discharges.

Typically, industrial facilities that generate stormwater runoff (as ‘pollutant’ under the [CWA]) must obtain a stormwater permit under the [CWA] for this runoff; they are required to have a permit both for constructing the facility (at which point soil sediment may run off the site) and operating it (at which point polluted substances may continue to run off the site during precipitation events, for example). The [CWA] does not require oil and gas operators, however, to obtain a permit for uncontaminated ‘discharges of stormwater runoff from . . . oil and gas exploration, production, processing, or treatment operations.’

In the Energy Policy Act of 2005 (EPAct 2005), Congress expanded the definition of oil and gas exploration and production under the [CWA] – a definitional change that potentially allowed for the exemption of more oil and gas activity from stormwater permitting requirements. The EPA subsequently revised its regulations to exempt oil and gas construction activities from the [National Pollutant Discharge Elimination System] stormwater permitting requirements.\textsuperscript{35}

In 2008, however, the United States Court of Appeals for the Ninth Circuit, in Natural Resources Defense Council v. EPA, vacated these regulations.\textsuperscript{36} The EPA has since reinstated its prior requirements for stormwater permits along with “clarification” based on the Energy Policy Act of 2005.\textsuperscript{37} “In sum, oil and gas operators must obtain a stormwater permit under the [CWA] for the construction of a well pad and access road that is one acre or greater, but they need not obtain such a permit for any uncontaminated stormwater from the drilling and fracturing operation.”\textsuperscript{38}

\begin{footnotes}
\item[36.] Id.; see also Natural Res. Def. Council v. U.S. Env'tl. Prot. Agency, 526 F.3d 591 (9th Cir. 2008).
\item[37.] Groat & Grimshaw, supra note 35, at 36.
\item[38.] Id.
\end{footnotes}
b. Spill Prevention, Control, and Countermeasure

In addition, Congress passed the Oil Pollution Act ("OPA") in 1990, which added section 311 to the CWA, providing for spill prevention requirements, spill reporting obligations, and spill response planning.\(^{39}\) The OPA regulates the prevention of, and response to, accidental releases of oil and hazardous substances into navigable waters, on adjoining shorelines, or affecting natural resources belonging to or managed by the United States.\(^{40}\) The OPA's authority is principally exercised through the creation and implementation of response plans.\(^{41}\) Such plans establish procedures to prevent the discharge of oil into United States' navigable waters and adjoining shorelines, as opposed to merely responding to and cleaning up a spill after it occurs.\(^{42}\)

The cornerstone of the OPA's objective to prevent oil spills from reaching the nation's waters is the oil spill prevention, control, and countermeasure plan ("SPCC").\(^{43}\) The EPA promulgated regulations to implement the SPCC, which specify as follows:

1. SPCC Plans must be prepared, certified (by a professional engineer) and implemented by facilities that store, process, transfer, distribute, use, drill for, produce, or refine oil;
2. Facilities must establish procedures and methods and install proper equipment to prevent an oil release;
3. Facilities must train personnel to properly respond to an oil spill by conducting drills and training sessions; and
4. Facilities must also have a plan that outlines steps to contain, clean up and mitigate any effects that an oil spill may have on waterways.\(^{44}\)

Before a facility is subject to the SPCC, however, it must meet three criteria:

1. It must be non-transportation-related;
2. It must have an aggregate aboveground storage capacity greater than 1,320 gallons (31.4 bbls) or a completely buried storage capacity greater than 42,000 gallons (1,000 bbls); and
3. There must be a reasonable expectation of a discharge into or upon navigable waters of the U.S. or adjoining shorelines.\(^{45}\)

c. Proposed Effluent Guidelines

On October 26, 2011, the "EPA published the final 2010 plan for effluent guidelines, which are regulations that improve water quality

\(^{39}\) U.S. DEP'T OF ENERGY, supra note 7, at 33–34.
\(^{40}\) Id. at 34.
\(^{41}\) Id.
\(^{42}\) Id.
\(^{43}\) Id.
\(^{44}\) Id.
\(^{45}\) Id.
by controlling discharges from industrial sources."\textsuperscript{46} The EPA is initiating a process to control wastewater produced by natural gas extraction from underground shale formations.\textsuperscript{47} According to the EPA, shale gas wastewater contains high concentrations of total dissolved solids (i.e., salts), as well as various organic chemicals, inorganic chemicals, metals, and naturally occurring radioactive materials ("NORM").\textsuperscript{48}

Currently, operators are prohibited from directly discharging shale-gas wastewater into waterways and other waters of the United States.\textsuperscript{49} In order to meet this prohibition, a portion of the shale-gas wastewater is reused or re-injected; however, a significant amount still requires disposal.\textsuperscript{50} The wastewater that is not re-injected into disposal wells is transported to public and private treatment plants; unfortunately, these plants may not be equipped to treat this type of wastewater, resulting in the discharge of pollutants into rivers, lakes, or streams where they can impact drinking water or aquatic life.\textsuperscript{51} The EPA's proposed guidelines would add a pretreatment standard to the existing regulation pertaining to oil and gas extraction.\textsuperscript{52} The EPA plans to implement its guidelines in 2014.\textsuperscript{53}

3. Clean Air Act

The Clean Air Act ("CAA") is the EPA's primary method of regulating emissions that potentially affect air quality.\textsuperscript{54} Accordingly, the CAA requires the EPA to set national standards that limit the levels of air pollutants.\textsuperscript{55} The EPA regulates air pollutants by developing human health-based and environmentally and scientifically based (or both) criteria that sets the permissible pollutant levels.\textsuperscript{56} When an oil or gas operator drills and fractures a well, it emits air pollutants, which may include, among other substances, nitrogen oxides and volatile organic compounds.\textsuperscript{57} These air pollutants may arise from the following sources:

\textsuperscript{48} Id.
\textsuperscript{49} Id.
\textsuperscript{50} Id.
\textsuperscript{51} Id.
\textsuperscript{52} Id.
\textsuperscript{53} Id.
\textsuperscript{55} U.S. DEP'T OF ENERGY, supra note 7, at 35.
\textsuperscript{56} Id.
\textsuperscript{57} GROAT & GRIMSHAW, supra note 35, at 65.
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- wellhead (natural gas leaks);
- flared gas (gas that escapes from the well during drilling and fracturing and is burned);
- equipment used for drilling, fracturing, and dehydrating gas (equipment exhaust);
- pipelines (natural gas leaks);
- flowback water tanks and pits (evaporating volatile organic compounds); and
- compressor stations ("When natural gas leaves a well, it is sent to a gathering station and the gas is then compressed by an internal combustion . . . engine(s) and conveyed to a processing facility via pipeline.")

Through the CAA, the EPA has established National Ambient Air Quality Standards ("NAAQS") for certain "criteria" pollutants—"common pollutants from an array of sources, which endanger public health and welfare." The EPA has also "set separate, technology-based standards for hazardous air pollutants, or HAPs, which cause serious and chronic human health effects, such as cancer."

a. Minor and Major Sources

Oil and gas exploration and production activities emit both criteria and hazardous air pollutants. Historically, oil and gas operations faced little federal regulation because the CAA focuses most of its controls on "major" sources, which are sources that emit a certain number of tons per year of a pollutant. A major source includes "any group of stationary sources located within a contiguous area and under common control" that emits a certain number of tons of regulated pollutant annually. Oil and gas operations often are minor sources and are thus regulated under state minor source programs. Not infrequently, however, oil and gas operations can find their way into "major source" status where the jurisdictional agency seeks to aggregate a site as a "single source" if it meets the following criteria: (1) it is located on one or more "contiguous or adjacent" properties; (2) it is owned or controlled by the same person or entity; and (3) the site belongs to the same two digit major Standard Industrial Classifi-

cation code. This determination has been the source of several recent administrative and judicial proceedings. In 2011, the Texas legislature adopted specific restrictions on aggregation of certain stationary sources in the oil and gas industry in the state.

Despite the historic pattern of minor source status in the upstream segment, some oil and gas operations face stricter regulation in so-called “nonattainment” areas, which are areas that have exceeded the NAAQS for a criteria pollutant and necessitate control of smaller air pollution sources than those in areas that do not exceed NAAQS (i.e., attainment areas). This is the case for the Barnett Shale, much of which is located in or near the Dallas-Fort Worth ozone “nonattainment” area. As a result, Barnett Shale production activities must comply with more stringent regulations than similar operations proposed outside of a “nonattainment” area.

It should be noted that on March 17, 2011, the Bringing Reductions to Energy’s Airborne Toxic Health Effects Act (“BREATHE Act”) was introduced in the United States House of Representatives. The BREATHE Act amended the Clean Air Act to do the following: (1) include hydrogen sulfide in the list of hazardous air pollutants; (2) repeal the prohibition on aggregating emissions from any oil or gas exploration or production well and emissions from any pipeline compressor or pump station with emissions from other similar units to determine whether such units or stations are major sources of hazardous air pollutants; (3) repeal the prohibition on aggregating emissions from any oil or gas exploration or production well for any purpose relating to hazardous air pollutant emission standards; and (4) repeal the prohibition against the EPA listing oil and gas production wells as an area source category of hazardous air pollutants.

67. See Groat & Grimshaw, supra note 35, at 66.
68. U.S. Dep’t of Energy, supra note 7, at 36.
69. Id.
71. Id.
b. Proposed New Air Pollution Standards

i. New Federal Subpart OOOO

In January 2009, two citizen groups, WildEarth Guardians and the San Juan Citizens Alliance, sued the EPA, alleging that it had failed to review the New Source Performance Standards ("NSPS") and the air toxic standards for the oil and natural gas industry. In February 2010, the United States District Court for the District of Columbia issued a consent decree that required the EPA to take actions related to the review of these standards (the "WildEarth Consent Decree"). The WildEarth Consent Decree, which was recently revised, required the EPA to take final action by April 17, 2012. In response to the WildEarth Consent Decree, the EPA issued a proposed rule on July 28, 2011.

On April 17, 2012, the EPA signed a new final NSPS to reduce the emissions of methane and volatile organic compounds from the oil and gas industry. The final rule was published in the Federal Register on August 16, 2012. Of particular significance in Texas, the final rules "include the first federal air standards for natural gas wells that are hydraulically fractured, along with requirements for several other sources of pollution in the oil and gas industry that currently are not regulated at the federal level." These new standards are referred to as "Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution" and will be published in 40 C.F.R. part 60, subpart OOOO ("Subpart OOOO"). The new rules also include revisions of 40 C.F.R. part 63, subparts HH and HHH, which relate to National Emissions Standards for Hazardous Air Pollutants for natural gas production, transmission, and storage facilities. The following Sections will examine only the new Subpart OOOO of the final new NSPS that is applicable to hydraulically fractured gas wells.

74. Id.
76. U.S. ENVTL. PROT. AGENCY, supra note 73.
77. See generally Webinar, Final Oil & Gas NSPS OOOO and MACT HH and HHH, ENVTL. RES. MGMT. (Apr. 27, 2012) (on file with author).
ii. Green Completion

According to the EPA, “[a] key component of [Subpart OOOO] is expected to yield a nearly 95 percent reduction in [volatile organic compounds] emitted from more than 11,000 new hydraulically fractured gas wells each year.” 78

This significant reduction would be accomplished primarily through the use of a proven process – known as a “reduced emissions completion” or “green completion” – to capture natural gas that currently escapes to the air [during the phase of completion referred to as “flowback”]. In a green completion, special equipment separates gas and liquid hydrocarbons from the flowback that comes from the well as it is being prepared for production. The gas and hydrocarbons can then be treated and used or sold, avoiding the waste of natural resources that cannot be renewed. 79

The EPA has projected that “[t]he estimated revenues from selling the gas that currently goes to waste are expected to offset the costs of compliance.” 80 The EPA’s analysis of the rules “shows a cost savings of $11 to $19 million when the rules are fully implemented in 2015.” 81 “Some states, such as Wyoming and Colorado, [already] require green completions, as do some cities, including Fort Worth and Southlake, Texas. In addition, data provided to [the] EPA’s Natural Gas STAR program show that a number of companies are using green completions voluntarily.” 82

iii. Phased-In Compliance

In the final rule, the EPA agreed to phase in the rules so that the full array of requirements associated with green completion will be applicable to well completions that begin on and after January 1, 2015. 83 Use of a “completion combustion device” (e.g. flaring) will be required for well completions begun prior to that date (and after August 23, 2011). 84 According to the EPA, use of green completions will reduce volatile organic compounds emissions by 95 percent at each well. 85

78. U.S. ENVTL. PROT. AGENCY, supra note 73.
79. Id.
80. Id.
81. Id.
82. Id.
84. See id.
85. Id.
iv. Exceptions

The final rule also states that green completions are not required for “new exploratory (“wildcat”) wells or delineation wells (used to define the borders of a natural gas reservoir), because they are not near a pipeline to bring the gas to market.”86 In addition, green completions are not required for “low-pressure wells, where natural gas cannot be routed to the gathering line. Operators may use a formula based on well depth and well pressure to determine whether a well is a low-pressure well.”87 The rule further states that “[o]wners/operators must reduce emissions from these wells [by flaring] during the well-completion process, unless such flaring is a safety hazard or is prohibited by state or local regulations.”88

v. General Duty Clause

It is worth mentioning that section 60.5375(a)(4) of the final rule imposes a specific general duty on oil and gas operators. That section states that oil and gas operators have “a general duty to safely maximize resource recovery and minimize releases to the atmosphere during flowback and subsequent recovery.” This requirement could become a vehicle for pervasive enforcement by the EPA in the years to come.89

vi. Subpart OOOO in Texas

Under the existing delegation agreement between the EPA and the State of Texas relative to the NSPS program,90 new NSPS rules are automatically delegated to the State of Texas unless, within thirty days of final promulgation, the State notifies the EPA that implementation or enforcement of the standard is not possible or feasible. Given the potential gap between the scope of the new federal standards and the scope of traditional Texas Commission on Environmental Quality (“TCEQ”) air quality regulation of oil and gas operations, there is

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87. Id.
88. Id.
some possibility that TCEQ might be forced to decline delegation of new Subpart OOOO.

Under the CAA, the TCEQ has historically considered its authority over construction of oil and gas well facilities to be triggered “after the well has been drilled and 72 hours after the well is tested.”91 (The TCEQ considers that point to be the “start of construction” for permitting purposes.)92 “Well tests” are also specifically excluded from the definition of “facility” under the CAA and corresponding regulations.93 Because the scope of Subpart OOOO and traditional TCEQ jurisdiction over gas wells may not coincide in certain circumstances, there is currently a question as to whether or not the TCEQ has the requisite authority to implement and enforce all parts of the new Subpart OOOO. Although the Texas Railroad Commission (“RRC”) has jurisdiction over work practices, operating procedures, and safety measures at oil and gas sites, its legal authority to assume even partial responsibility for implementation and enforcement of these standards is problematic at best.94 The TCEQ is reportedly looking into various options that would allow for delegation to it, but as of the date of this Article, no decisions have been made.

This is an issue that the regulated community will want to closely monitor since the TCEQ may have to make a quick decision about accepting delegation soon after the rule is finally published.

vii. Beyond Subpart OOOO

The EPA’s current methodology for defining “major” sources could also bring many more oil and gas sites beneath the major source umbrella, even in relatively clean “attainment” areas.95 Moreover, newly-built and existing compressor stations that make a modification and increase their hourly emissions already are subject to NSPS for “stationary spark ignition internal combustion engines.”96

viii. Rules Spark Early Criticism

Both industry officials and environmentalists have voiced concerns over how the rules define “natural gas wells.” In response to comments about the intended breadth of the rule, the EPA expanded the definition of a natural gas well in an attempt to provide more certainty

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94. See infra Section IV(A).
95. See Memorandum, supra note 64.
96. Id.
to the regulated community. The final rule states that a “[g]as well or natural gas well means an onshore well drilled principally for production of natural gas.” The EPA expects that the final rule will result in control of hydraulically fractured gas wells drilled in the four formation types generally accepted as gas-producing formations: (1) high-permeability gas, (2) shale gas, (3) other tight reservoir rock, or (4) coal seam.

However, the final rule will not affect (or at least is not supposed to affect) drilling of oil wells. The EPA “acknowledged public comments expressing concerns about wells drilled in principally oil-rich plays that may also be used for natural gas extraction, but cited a lack of sufficient data on volatile organic compound emissions during completion of [hydraulic fracturing] at oil wells to support [reduced emissions completions] requirements for those wells.” Accordingly, the rules might not largely apply in more liquid-rich oil formations, such as the Bakken Shale in North Dakota and Montana or the Eagle Ford Shale in Texas.

Some environmentalists are also concerned that the definition of natural gas well might exclude “hybrid” wells that produce a mixture of both gas and oil. Industry officials also want clarification on the definition of “gas wells” and “oil wells” as it is difficult to determine how and where the controls should be implemented, which could potentially create compliance issues. In addition, industry officials are confused over the provisions in the rule that provide exemptions for “low pressure” wells, which they claim conflict with other language in the rules that provide that green completions should be used based on the “feasibility of routing gas to a collection system to be conveyed to market.”

4. Toxic Substances Control Act

The Toxic Substances Control Act (“TSCA”) of 1976 provides the EPA with the authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances, mixtures, or both. The TSCA complements other federal environmental statutes that regulate pollution by controlling chemical products prior to entering the environment. The core of the TSCA is

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97. U.S. ENVTL. PROT. AGENCY, supra note 83.
99. Id.
100. Id.
101. Id.
informational: chemical manufacturers must provide the EPA with information on the chemicals they produce.

On August 4, 2011, Earthjustice sent a petition to the EPA concerning chemical substances and mixtures used in oil and gas exploration and production ("E&P"), based on section 21 of the TSCA. In its petition, Earthjustice petitioned the EPA to promulgate rules pursuant to (1) TSCA section 4, requiring manufacturers and processors of E&P chemicals to develop test data sufficient to evaluate the toxicity and potential for health and environmental impacts of all substances and mixtures that they manufacture and process and (2) TSCA section 8(a) requiring manufacturers and processors of E&P chemicals to maintain various records related to E&P chemicals including data on potential or demonstrated environmental and health effects of E&P chemicals.

On November 2, 2011, the EPA responded and denied the TSCA section 4 request in the petition for issuance of a test rule on the basis that "[t]he petition did not set forth sufficient facts to support the assertion that it [is] 'necessary to issue' the requested TSCA section 4 rule, as required by TSCA section 21(b)(1)." Specifically, the EPA stated that "the petition did not set forth facts sufficient to support the required findings under TSCA section 4(a)(1)(A) or 4(a)(1)(B) for issuance of a test rule covering all chemical substances and mixtures used in oil and gas exploration and production." The EPA then requested an extension until November 23, 2011, to respond to the requests under TSCA section 8(a) and section 8(d).

On November 23, 2011, the EPA responded to the remaining requests asserted in the petition. In its response, the EPA stated that it had "decided to partially grant the TSCA section 8(a) and section 8(d) requests in the petition." The EPA "believe[d] that there [was] value in initiating a proposed rulemaking process using the TSCA authorities to obtain data on chemical substances and mixtures used in hydraulic fracturing." In this regard, the EPA convened a stakeholder process "to develop an overall approach that would minimize reporting burdens and costs, take advantage of existing information,

104. Id.
106. Id.
107. Id.
108. Owen, supra note 103.
109. Id.
110. Id.
and avoid duplication of efforts."111 This dialogue focused on "how the information reported could best be aggregated and disclosed to maximize transparency and public understanding."112 The EPA stated that its efforts to gather information "would not duplicate, but instead complement, the well-by-well disclosure programs of the states."113 However, the EPA denied the request to invoke the TSCA authorities to collect information on chemicals used in the E&P section in addition to those used in hydraulic fracturing.114

5. Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act ("RCRA") was passed in 1976 to address the growing problems of the increasing volume of municipal and industrial waste.115 RCRA subtitle C established a federal program to manage hazardous wastes from "cradle-to-grave" to ensure that hazardous waste is handled in a manner that protects human health and the environment.116 However, most E&P wastes from fracturing and drilling are exempt from the hazardous waste disposal restrictions in Subtitle C of the RCRA, meaning that states – not the federal government – have responsibility for disposal procedures for the waste. Although Subtitle C of RCRA originally covered oil and gas wastes – thus requiring that operators follow federally-established procedures for handling, transporting, and disposing of the wastes – in the 1980s Congress directed the EPA to prepare a report on oil and gas wastes and determine whether they should continue to be federally regulated. In its report, the EPA noted that some of the wastes were hazardous but ultimately determined that due to the economic importance of oil and gas development and state controls on the wastes, federal regulation under RCRA Subtitle C was unwarranted.

The EPA did note some state regulatory deficiencies in waste control, however, and relied on the development of a voluntary program to improve state regulations. This voluntary program has since emerged as the State Review of Oil and Natural Gas Environmental Regulations (STRONGER), a non-profit partnership between industry, nonprofit groups, and regulatory officials. STRONGER has developed guidelines for state regulation of oil and gas wastes, periodically reviews state regulations, and encourages states to improve certain regulations.117

111. See id.
112. See id.
113. Id.
114. Id.
117. GROAT & GRIMSHAW, supra note 35, at 34–35.
Despite the RCRA exemption, in all states, non-exempt oil and gas wastes, such as unused hydraulic fracturing fluids and other oil and gas wastes that tend to have higher levels of hazardous substances, still must be disposed of in accordance with federal RCRA requirements.\(^\text{118}\)

In September 2010, the Natural Resource Defense Council ("NRDC") filed a petition that called on the EPA to reverse its determination and end the RCRA exemption.\(^\text{119}\) In its petition, the NRDC argued that "hazardous waste rules under RCRA subtitle C are 'necessary to ensure safe management of the[ ] wastes throughout their life cycle from cradle to grave, including generation, transportation, treatment, storage and disposal.'"\(^\text{120}\)

If the EPA were to subject wastewater from drilling operations to subtitle C regulations, it would force UIC directors to apply Class I rules for hazardous waste wells instead of Class II. The Class I well category requires more extensive and stringent siting considerations during the permitting process, including a determination of seismicity in an area being evaluated as a potential site. Further, Class I regulations expressly prohibit siting of wells in areas where earthquakes could occur and compromise the integrity of the injection zone, endangering groundwater, whereas Class II rules do not.\(^\text{121}\)

6. Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), commonly known as "Superfund," was enacted by Congress on December 11, 1980.\(^\text{122}\) The law provides a broad legal framework that creates potential liability for the cost of cleaning up property contaminated with hazardous substances. However, section 101(14) of CERCLA (a/k/a the "petroleum exclusion") excludes certain substances from the definition of hazardous substance, thus exempting them from CERCLA regulation.\(^\text{123}\) The excluded substances include petroleum (i.e., meaning crude oil or any fraction thereof that is not specifically listed as a hazardous substance), natural gas, natural gas liquids, liquefied natural gas, and syn-

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\(^\text{118}\) Id.


\(^\text{120}\) Id.

\(^\text{121}\) Id.


\(^\text{123}\) U.S. DEP’T OF ENERGY, supra note 7, at 40.
the] 2012]  DRILLING INTO HYDRAULIC FRACTURING 205
thetic gas usable for fuel.\textsuperscript{124} However, "[o]il and gas operators still
must report spills of other hazardous wastes of a threshold quantity . . . [those that are not oil and gas] and may ultimately be liable for

As discussed in greater detail below, despite this exemption, the
EPA has recently used its authority under CERCLA to investigate
and address hazardous substances found in drinking-water wells in
Pavilion, Wyoming and Dimock, Pennsylvania that the agency is sig-

7. Emergency Planning and Community Right-to-Know Act

In addition, the following environmental statutes may also apply to
hydraulic fracturing operations. Congress enacted the Emergency
Planning and Community Right-to-Know Act ("EPCRA") in 1986 to
establish requirements for federal, state, and local governments and
industry regarding emergency planning and "community right-to-

Section 304 of
EPCRA "requires reporting of releases to the environment of certain
materials" that are subject to the EPCRA.\textsuperscript{128} "[T]his requirement
would apply to any releases of petroleum products that exceed report-

8. Endangered Species Act

The Endangered Species Act ("ESA") was enacted in 1973 to pro-
tect plants and animals that are listed by the federal government as
"endangered" or "threatened."\textsuperscript{130} Sections 7 and 9 apply to oil and
gas activities.\textsuperscript{131} Section 7, which concerns private parties as opposed
to federal agencies, covers not only federal activities but the issuance of federal permits (e.g., section 404 permits issued by the Corps of

\textsuperscript{124} Id.
\textsuperscript{125} See Groat & Grimshaw, supra note 35, at 35.
\textsuperscript{126} See Bridget DiCosmo, Despite Legal Limit, EPA Using Superfund to Address
1212387944/EPA-Daily-News/Daily-News/despite-legal-limit-epa-using-superfund-to-
address-likely-drilling-waste/menu-id-95.html.
\textsuperscript{127} See Emergency Planning and Community Right-To-Know Act, 42 U.S.C.
§§ 11001–11050 (1986); Learn About Your Right to Know, U.S. Envtl. Prot.
Agency, http://www.epa.gov/epahome/r2k.htm#epcra (last updated Apr. 18, 2012);
Summary of the Emergency Planning & Community Right-To-Know Act, U.S. Envtl.
2012).
\textsuperscript{128} See § 11004; U.S. Dep’t of Energy, supra note 7, at 41.
\textsuperscript{129} See § 11004; U.S. Dep’t of Energy, supra note 7, at 41.
\textsuperscript{130} U.S. Dep’t of Energy, supra note 7, at 38; see also 16 U.S.C. § 1531 (2006);
\textsuperscript{131} U.S. Dep’t of Energy, supra note 7, at 38.
Engineers), for private activities to parties who want to do construction work in waters or wetlands.\textsuperscript{132} Further, section 7 imposes an affirmative duty on federal agencies to make sure that their actions (including permitting) will not jeopardize the continued existence of any listed plant or animal or result in the destruction or modification of critical habitat.\textsuperscript{133} Section 9, on the other hand, makes it illegal for a person to “take” a listed animal, which includes significantly modifying the animal’s habitat.\textsuperscript{134} Section 9 applies to both private parties and private land—landowners are not allowed to harm endangered animals or their habitats on their own property.\textsuperscript{135} Both sections 7 and 9, however, allow “incidental takes” of threatened or endangered species, but only with a permit.\textsuperscript{136} In 2012, Secretary of the Interior Ken Salazar said that the dune sagebrush lizard might not be listed as endangered if enough oil and gas companies voluntarily agree to preserve the sand-dwelling reptile’s habitat, which has threatened development in West Texas and New Mexico.\textsuperscript{137}

9. Migratory Bird Treaty Act

The Migratory Bird Treaty Act (“MBTA”) implements a series of treaties that provide for the international protection of migratory birds.\textsuperscript{138} The MBTA makes it unlawful to pursue, hunt, take, capture, kill, or sell birds listed therein.\textsuperscript{139} The MBTA does not discriminate between live or dead birds and also grants full protection to any bird parts including feathers, eggs, and nests. Over 800 species are currently on the list.\textsuperscript{140} The MBTA is a strict-liability law wherein there is no requirement to prove intent to violate any of its provisions.\textsuperscript{141} Accordingly, operators should ensure that their rigs and surface pits do not attract birds protected under the MBTA.

B. Enforcement Actions and Investigations

1. Region VI

On December 7, 2010, the EPA Region VI issued an Emergency Administrative Order (“the Emergency Order”) against Range Resources Corporation (“Range”) pursuant to its claimed authority

\begin{itemize}
  \item \textsuperscript{132} \textit{Id.}
  \item \textsuperscript{133} \textit{Id.} at 38–39.
  \item \textsuperscript{134} \textit{Id.} at 38.
  \item \textsuperscript{135} \textit{Id.}
  \item \textsuperscript{136} \textit{Id.} at 39.
  \item \textsuperscript{138} Migratory Bird Treaty Act of 1918, 16 U.S.C. §§ 703–711 (1918).
  \item \textsuperscript{139} \textit{Id.}
  \item \textsuperscript{140} \textit{Id.}
  \item \textsuperscript{141} \textit{Id.}
\end{itemize}
under section 1431 of the SDWA.\textsuperscript{142} Range drilled several gas wells south of Fort Worth, Texas, which attempted to draw gas from the Barnett Shale Formation.\textsuperscript{143} In the Emergency Order, the EPA alleged that Range’s activities had affected the water within two domestic water wells in Hood County, Texas, which created “an imminent and substantial endangerment to the health of persons”; the EPA noted that “the level of methane found in the wells could be flammable, and consumption of the benzene present in the wells could contribute to various health problems.”\textsuperscript{144}

In a section entitled ‘Conclusions of Law,’ the Emergency Order concluded that contaminants were present in an underground source of drinking water, that Range had caused or contributed to the endangerment of persons through such contaminants, and that action taken by the EPA as proscribed in the Emergency Order was necessary to protect the health of persons. Range was directed in the Emergency Order to (1) notify the EPA of whether it intended to comply with the Emergency Order within 24 hours; (2) provide replacement water supplies to the recipients of water from the affected water wells within 48 hours; (3) install explosivity meters at the affected dwellings within 48 hours; (4) submit a survey listing water wells within 3,000 feet of the gas wells at issue with a plan for EPA approval to sample those wells to see if they have been contaminated, including a [sic] air and water samplings; (5) submit a plan for EPA approval to conduct soil gas surveys and indoor air concentration analysis of the dwellings served by the affected water wells within 14 days; and (6) submit a plan for EPA approval to identify gas flow pathways to the Trinity Aquifer, eliminate gas flow to the Trinity Aquifer if possible, and remediate areas of the Trinity Aquifer that have been impacted. The Emergency Order notified Range that violation of the Emergency Order could subject it to a civil penalty of up to $16,500 per day of violation. In its Motion, Range contends that the Emergency Order, in only providing for an informal conference with no evidentiary hearing or opportunity to challenge the Emergency Order, does not provide Range with any process to challenge the EPA’s findings.

On December 8, 2010, one day after the Emergency Order was issued, the Railroad Commission called a hearing to consider whether Range’s operation of the gas wells caused or contributed to the contamination of the water wells. As this proceeding continued, Range informed the EPA that it disputed the validity of the Emergency Order and would not abide by some of its terms. The EPA brought this civil enforcement action on January 18, 2011, seeking injunctive relief and civil penalties against Range for its failure to comply with three of the six requirements of the Emergency Order. Range filed a petition for review of the Emergency Order with the

\textsuperscript{143} \textit{Id}. at 817.
\textsuperscript{144} \textit{Id}. at 818.
Fifth Circuit Court of Appeals on January 20, 2011 pursuant to 42 U.S.C. § 300j–7(a)(2). Range argued to the Fifth Circuit that Section 1431 would be unconstitutional if it were construed to be a final agency action in this context, and contended that enforcement of the Emergency Order would violate Range’s due process rights.\(^{145}\)

In a related case under the CWA, the United States Supreme Court recently addressed whether delaying judicial review while waiting for the EPA to bring an enforcement action violates due process in light of the CWA’s penalty scheme for non-compliance.\(^{146}\) Range made a similar argument before the Fifth Circuit. On March 21, 2012, a unanimous Supreme Court held in the Sackett case that administrative consent orders issued under the CWA constitute final agency action.\(^ {147}\) Accordingly, under the Administrative Procedure Act (“APA”), respondents, like the Sacketts, are now afforded pre-enforcement review of the factual and legal basis of administrative consent orders and may bring a civil action under the APA to challenge them.\(^ {148}\)

On March 29, 2012—eight days after the Supreme Court’s ruling in Sackett—the EPA withdrew its Emergency Order against Range. The following day, the EPA and Range filed a joint motion to dismiss both the district court action as well as the matter pending before the Fifth Circuit. In a letter from Range’s counsel, the company agreed to monitor twenty private drinking-water wells in the area of operations to determine whether they were contaminated. Range also agreed to conduct quarterly monitoring and sampling for dissolved gases, carbon dioxide, hydrogen, nitrogen, so-called BTEX compounds, methane, and other contaminants and submit the data to the EPA Region VI for review.

2. Region VIII

The EPA is using CERCLA authority to investigate contamination alleged to have come from drilling operations near Pavillion, Wyoming.\(^ {149}\) Using authority under CERCLA, the EPA and the Agency for Toxic Substances & Disease Registry are studying, among other things, whether fluids from hydraulic fracturing operations contaminated drinking water wells.\(^ {150}\)

On December 8, 2011, the EPA released a draft analysis (“Draft Report”) of data from its Pavillion, Wyoming ground water investiga-

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145. \(\text{id.} \) (citations omitted).
147. \(\text{id. at 1374.} \)
148. \(\text{id.} \)
150. \(\text{See id.} \)
At the request of Pavillion residents, the EPA investigated water quality in private drinking water wells three years earlier. According to the EPA, “[s]ince that time, in conjunction with the state of Wyoming, the local community, and the owner of the gas field, Encana, [the] EPA has been working to assess ground water quality and identify potential sources of contamination.” The EPA’s efforts involved the construction of two deep monitoring wells to sample water in the aquifer. The EPA’s Draft Report analysis indicated that “ground water in the aquifer contain[ed] compounds likely associated with gas production practices, including hydraulic fracturing.” Further, the EPA re-tested private and public drinking water wells in the community and found that “[t]he samples were consistent with chemicals identified in earlier EPA results released in 2010 and [were] generally below established health and safety standards.” The EPA released its findings for public comment and submitted them to an independent scientific review panel. Additionally, the EPA noted that the draft findings were specific to Pavillion, “where the fracturing [was] taking place in and below the drinking water aquifer and in close proximity to drinking water wells – production conditions different from those in many other areas of the country.”

Encana has since issued a press release refuting the EPA’s findings. According to Encana, the “EPA’s data from existing domestic water wells align[ed] with all previous testing done by Encana in the area and show[ed] no impacts from oil and gas development.” Encana further stated that “[o]f most concern, many of the EPA’s findings from its recent deep monitoring wells, including those related to any potential connection between hydraulic fracturing and Pavillion groundwater quality, [were] conjecture, not factual and only serve[d] to trigger undue alarm.” Encana stated that it was “especially disappointed that the EPA released its draft report, outlining preliminary findings, before subjecting it to qualified, third-party, scientific verification.” Further, Encana claimed that “[n]umerous discrepancies exist[ed] in the EPA’s approach, data and analysis.”

151. Id.
152. Id.
153. Id.
154. Id.
155. Id.
156. Id.
157. See id.
158. Id.
160. Id.
161. Id.
162. Id.
163. Id.
Encana stated that the conclusions drawn by the EPA [were] irresponsible given the limited number of sampling events on the EPA deep wells and the number of anomalies seen in the data. At the same time, the EPA repeatedly attempt[ed] to link limited instances of localized shallow groundwater contamination from historical production pit locations to its broader investigation. In 2005, Encana identified and self-reported these pit locations and entered them into a voluntary remediation program administered by the State of Wyoming. According to Encana, "[g]iven the numerous flaws contained in this report, Encana believes genuine, qualified third-party review is essential." Unfortunately, however, "Encana does not believe that the EPA has subjected any of its data to a qualified, truly independent third party for peer review," and it urged the EPA and other government officials to ensure that such independent review is made.

On February 29, 2012, at a hearing before the House Appropriations Committee’s Interior and Environment Panel, the EPA’s top-ranking official stated that the draft report will be subject to a “highly influential scientific assessment,” which will subject the report to the highest standard of peer review that the agency performs.

3. Region III

EPA Region III is also using its CERCLA authority to investigate contamination alleged to have come from drilling operations near Dimock, Pennsylvania. On January 19, 2012, the EPA issued an action memorandum, allowing Region III to undertake additional sampling activities at approximately sixty-one homes in Dimock Township, Pennsylvania and provide residents with alternate water supplies, citing its authority under section 104(a) of CERCLA. In the memorandum, the EPA acknowledged that it had rarely taken such action under CERCLA, given that petroleum and its constituents are exempt from the CERCLA definition of “hazardous substances,” but it said that conditions at the Pennsylvania site met the requirements for a removal action under the National Oil and Hazardous Substances Pollution Contingency Plan (“NCP”) and exemption from the statutory limits.

The EPA said that arsenic, barium, glycol compounds, manganese, phenol, and sodium, all of which it noted are commonly used in drill-

164. Id.
165. Id.
166. Id.
168. Id.
169. Id.
ing fluids, were found in wells used by four homes as primary drinking water sources as a result of Region III’s recent sampling activities.\textsuperscript{170} The EPA stated that historic drilling activities in the Dimock area may have used materials that contained hazardous substances.\textsuperscript{171} The presence of hazardous substances in the four home wells constituted a release, or substantial threat of a release, and the situation met the criteria for conducting a removal action under the NCP.\textsuperscript{172}

In addition to the action under 104(a), the EPA has also filed a notice under section 104(e) with Cabot Oil & Gas Corporation—the drilling company that the EPA has suggested may be responsible for the Dimock contamination—seeking information on the company’s operations, sampling, and other issues that may be relevant to determine the source of the contamination.\textsuperscript{173}

On March 15, 2012, the Associated Press reported that the EPA sent an email to area residents, which declared that well-water testing at eleven homes in Dimock, Pennsylvania showed no signs of contamination from natural gas development.\textsuperscript{174} On July 25, 2012, the EPA issued a press release which confirmed that based on the outcome of its water sampling, the levels of contaminants that were present did not require additional action.\textsuperscript{175}

III. \textsc{texas}

A. \textit{RRC v. TCEQ}

Hydraulic fracturing is overseen by two primary entities in the Texas government that assert jurisdiction over oil and gas activities: (1) the RRC; and (2) the TCEQ:

The TCEQ is charged with the principal responsibility of implementing the state’s policy of maintaining the quality of water in the state, except the [RRC] is expressly declared to be ‘solely responsible for the control and disposition of waste and the abatement and prevention of pollution of surface and subsurface water resulting

\textsuperscript{170} \textit{Id.}

\textsuperscript{171} \textit{Id.}

\textsuperscript{172} \textit{Id.}


from . . . activities associated with the exploration, development, and production of oil or gas.\textsuperscript{176}

The Water Code then grants the [RRC] authority to issue permits for discharge of oil and gas wastes into the waters of the state, but the discharges must meet the water quality standards set forth by the TCEQ.\textsuperscript{177}

"Similarly, while the TCEQ has jurisdiction over the Injection Well Act in Chapter 27 of the Water Code, the [RRC] is granted specific authority over injection wells that dispose of oil and gas wastes."\textsuperscript{178}

The two agencies have adopted a Memorandum of Understanding ("MOU"), which seeks to clarify the respective jurisdictions of the two agencies.\textsuperscript{179} The MOU provides a very detailed listing and description of "the types of waste, both hazardous and nonhazardous, under each agency's jurisdiction."\textsuperscript{180} Under the MOU, the RRC regulates oil and gas wastes, including oilfield pits, discharges into surface waters, injection wells, and saltwater haulers, and the TCEQ regulates solid, municipal, and hazardous wastes, water quality standards, and waste discharge permits and injection wells, except for permits and wells involving oil and gas wastes.\textsuperscript{181}

\textbf{B. Texas Statutes and Regulations}

There are several other Texas statutes and regulations that apply to all oil and gas operations in Texas and therefore will likewise apply to hydraulic fracturing operations. Section 91.101 of the Texas Natural Resources Code gives the RRC broad powers "to prevent pollution of surface water or subsurface water in the state" by regulating the following: (1) the drilling of oil and gas wells; (2) the production of oil and gas; (3) the operation, abandonment, and proper plugging of wells; and (4) the discharge, storage, handling, transportation, reclamation, or disposal of oil and gas waste associated with any operation or activity regulated in the previous three categories.\textsuperscript{182} The RRC regulates such activities primarily through various "statewide rules."

1. New Section 91.851 of the Texas Natural Resources Code

In 2011, Texas passed House Bill 3328, which added section 91.851 to the Natural Resource Code, which requires operators involved with hydraulic fracturing to disclose, among other things, the total amount

\begin{itemize}
\item \textsuperscript{177} Id. (citing Tex. Water Code Ann. § 26.131(b) (West 2008)).
\item \textsuperscript{178} Id. at n.206 (citing Tex. Water Code Ann. § 27.031 (West 2008)).
\item \textsuperscript{179} Id. at 56.
\item \textsuperscript{180} Id.
\item \textsuperscript{181} Id. at 58.
\item \textsuperscript{182} Id. (citing Tex. Nat. Res. Code Ann. § 91.101(a) (West 2011)).
\end{itemize}
of water used as well as the chemical ingredients of the fracturing fluids subject to the requirements of 29 C.F.R. § 1910.1200(g)(2). The bill also requests the RRC to establish a process for operators to assert trade secret privilege for chemical ingredients of hydraulic fracturing fluids and a process for providing notice of challenges to the assertion of the trade secret privilege.

The legislation gave the RRC until July 1, 2013, to finalize regulations; however, RRC members have stated that they will begin the process of developing regulations soon, and one commissioner has said that he will push to finalize regulations a year early, by July 1, 2012. In this regard, on August 22, 2011, the RRC issued a memorandum with proposed rules to implement section 91.851. The RRC accepted comments on the proposed rules through October 11, 2011.

On December 13, 2011, the RRC adopted rules to implement section 91.851. The rules require that "not later than 15 days following the completion of hydraulic fracturing treatment(s) on a well, the supplier or the service company must provide to the operator of the well . . . [specific information] concerning each chemical ingredient intentionally added to the hydraulic fracturing fluid." Additionally, operators of wells must disclose, inter alia, the following:

(i) the operator name;
(ii) the date of completion of the hydraulic fracturing treatment(s);
(iii) the county in which the well is located;
(iv) the API number for the well;
(v) the well name and number;
(vi) the longitude and latitude of the wellhead;
(vii) the total vertical depth of the well;
(viii) the total volume of water used in the hydraulic fracturing treatment(s) of the well or the type and total volume of the base fluid used in the hydraulic fracturing treatment(s), if something other than water;

184. Id.
187. Id.
(ix) each additive used in the hydraulic fracturing treatments and the trade name, supplier, and a brief description of the intended use or function of each additive in the hydraulic fracturing treatment(s); [and]
(x) each chemical ingredient used in the hydraulic fracturing treatment(s) of the well that is subject to the requirements of 29 Code of Federal Regulations § 1910.1200(g)(2), as provided by the chemical supplier or service company or by the operator, if the operator provides its own chemical ingredients.\textsuperscript{190}

The information is to be disclosed on the FracFocus website.\textsuperscript{191}

If a supplier, service company, or operator claims that the specific identity or amount of any chemical ingredient is entitled to protection as a trade secret, it need not disclose it.\textsuperscript{192} The rules provide for the opportunity for certain persons to challenge a claim of entitlement to trade secret protection.\textsuperscript{193} Should the RRC receive such a request, the owner of the trade secret will be required to provide certain information to the Office of the Attorney General, Open Records Division, to substantiate its claim of entitlement in accordance with chapter 552 of the Texas Government Code.\textsuperscript{194}

The owner of the trade secret must make a factual showing that the information meets the following factors, "in accordance with the definition of 'trade secret' in the Restatement of Torts, comment B to section 757 (1939), as adopted by the Texas Supreme Court in Hyde Corp. v. Huffines":

\begin{itemize}
  \item[(A)] the extent to which the information is known outside of the company;
  \item[(B)] the extent to which it is known by employees and others involved in the company's business;
  \item[(C)] the extent of measures taken by the company to guard the secrecy of the information;
  \item[(D)] the value of the information to the company and its competitors;
  \item[(E)] the amount of effort or money expended by the company in developing the information; and
  \item[(F)] the ease or difficulty with which the information could be properly acquired or duplicated by others.\textsuperscript{195}
\end{itemize}

The rule also states that only the following persons may challenge a claim of entitlement to trade secret protection:

\begin{itemize}
  \item[(A)] the landowner on whose land the wellhead is located;
\end{itemize}

\textsuperscript{190} Id. § 3.29(c)(2)(A).
\textsuperscript{191} Id. § 3.29(a)(8).
\textsuperscript{192} Id. § 3.29(e).
\textsuperscript{193} Id. § 3.29(f).
\textsuperscript{194} Id. § 3.29(e)(1).
\textsuperscript{195} Id.; see also Hyde Corp. v. Huffines, 314 S.W.2d 763, 776 (Tex. 1958).
(B) the landowner who owns real property adjacent to property . . . ; or
(C) a department or agency . . . with jurisdiction over a matter to which a claimed trade secret is relevant.  

However, the rule also provides for disclosure to health professionals and emergency providers under certain circumstances even though a trade secret might be involved.  

It should be noted that on March 22, 2012, Earthjustice filed a petition on behalf of Powder River Basin Resource Council, Wyoming Outdoor Council, Earthworks, and OMB Watch “asking a court to require the Wyoming Oil and Gas Conservation Commission (WOGCC) to disclose information about chemicals used during hydraulic fracturing.” In particular, the groups asked a court “to rule whether WOGCC acted illegally in granting the trade secrets requests,” and they argued that “companies must reveal the identities of chemicals used during [hydraulic fracturing].” 

Under regulations approved in 2010, Wyoming became the first state in the nation to require well operators to disclose the identities of chemicals that are mixed with water and injected into the ground during hydraulic fracturing. However, according to Earthjustice, since the regulations were adopted, the RRC has approved some fifty chemical secrecy requests by various oil and gas service companies. “The case now before Wyoming’s Seventh District Court could set a broad legal precedent – as the states of Texas, Arkansas, Pennsylvania, Colorado, Montana, and Michigan all have [hydraulic fracturing] chemical disclosure regulations similar to Wyoming’s.”

2. Statewide Rules

Various statewide rules will also apply to hydraulic fracturing and shale gas exploration. Like all oil and gas operations, operators participating in hydraulic fracturing operations will be required to obtain a permit to drill or deepen a well pursuant to Statewide Rule 3.5. According to the RRC, it states that one of its greatest responsibilities is the protection of fresh water resources. Water protection is a major consideration in many of the RRC’s statewide rules and is the

196. § 3.29(f).
197. Id. § 3.29(c)(4).
199. Id.
200. Id.
201. Id.
202. See 16 TEX. ADMIN. CODE § 3.5 (2012).
sole purpose of Statewide Rule 8. Rule 8(b) states that “no person conducting activities subject to regulation by the commission may cause or allow pollution of surface or subsurface water in the state.” However, some practitioners have argued that the rule only prohibits present actions, not historical conditions, and that it does not address soil contamination unless it poses a threat to groundwater or surface water. In addition, if past operations have resulted in extensive soil and groundwater contamination, but those operations have ceased, then arguably no violation of Statewide Rule 8 exists. Rule 8(d) governs pollution control for disposal pits. In Texas, pits are not required to be lined unless otherwise requested by the RRC. With regard to the timing of closure of pits, completion-workover pits must be closed within thirty days of completion of workover operations and back-filled, compacted within 120 days. Reserve and mud circulation pits closed within one year of cessation of drilling operations for low chloride and thirty days for high chloride.

Statewide Rule 13 regulates casing, cementing, drilling, and completion requirements to ensure that “all usable-quality water zones be isolated and sealed off to effectively prevent contamination or harm, and all potentially productive zones be isolated and sealed off to prevent vertical migration of fluids and gases behind the casing.” The casing rules are lengthy with many technical requirements that implement section 91.011 of the Texas Natural Resource Code, which requires operators to encase wells to exclude freshwater contamination. For instance, Rule 13 requires “steel casing that has been hydrostatically pressure tested with an applied pressure at least equal to the maximum pressure to which the pipe will be subjected in the well.” It also requires that

[s]urface casing strings must be allowed to stand under pressure until the cement has reached a compressive strength of at least 500 psi in the zone of critical cement before drilling plug or initiating a test. The cement mixture in the zone of critical cement shall have a 72-hour compressive strength of at least 1,200 psi.

In addition, the operator is to provide a completion and plugging report, a basic electric log, and information on any “change in perforations, or open hole or casing records.” With respect to blowout

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204. 16 Tex. Admin. Code § 3.8(b) (2012).
205. Id. § 3.8(d).
206. See id. § 3.8.
207. Id. § 3.8(d)(4)(G)(i)(III).
208. Id. § 3.8(d)(4)(G)(i)(II).
210. Id.
211. Id.
212. Id.
213. 16 Tex. Admin. Code § 3.16(b)–(c) (2012).
prevention, Texas only requires an operator to “keep the well under control at all times.”

Under the federal underground injection control regulations, wells used in oil and gas operations are classified as Class II injection wells. The RRC asserts its jurisdiction over Class II injection wells through Statewide Rules 9 and 46. Statewide Rule 9 regulates “disposal wells” that inject saltwater and other oil and gas wastes into zones not productive of oil, gas, or geothermal resources. Statewide Rule 46, on the other hand, “regulates ‘fluid injection wells’ that inject water (salt or fresh), steam, gas, or other energy sources into zones that are productive of oil and gas.” “Rule 46 wells are often used for pressure maintenance, secondary and tertiary recovery, or cycling.” The RRC does not currently regulate hydraulic fracturing largely because the federal regulations for UIC do not include hydraulic fracturing within its definition of Class II underground injection. However, if the federal law changes in this area in the future, Texas would likely regulate hydraulic fracturing operations through Statewide Rule 46.

With respect to seismic testing, Rule 100 requires a permit for a seismic hole or core hole that penetrates “protection depth,” which is defined as “depth or depths at which usable quality water must be protected or isolated,” as determined by the TCEQ. The rule also requires plugging and a letter of protection depth from the TCEQ. With respect to construction of a well pad, Rule 30 states that the RRC regulates stormwater discharges to the extent permitted by federal law. According to Rules 8 and 37, Texas does not require any well or pit setbacks from natural resources or public water supplies. Nonetheless, the Texas Government Code states that a well may not be drilled within 200 feet of a private residence located in a municipality. As discussed below, by ordinance, some Texas cities have increased this distance even further.

With respect to the disposal of Naturally Occurring Radioactive Material (“NORM”), Texas prohibits disposal into surface or subsurface waters by spreading it on public or private roads. However,

214. Id. § 3.13(b).
216. § 3.9.
217. § 3.46; see also Smith & Weaver, supra note 176, § 14.4(A), at 68.
218. Smith & Weaver, supra note 176, § 14.4(A), at 68.
219. See id.
221. Id.
Texas allows the disposal of NORM wastes (1) in a “plugged and abandoned well” at a depth of “at least 250 feet below the base of usable quality water,” (2) through treatment and burial at the site where NORM was generated, (3) landfarming at the site where the NORM waste was generated, (4) disposal at a licensed facility, or (5) injection into a disposal well.226

3. Section 106.352 of the Texas Administrative Code

On January 26, 2011, the TCEQ repealed the existing permit by rule ("PBR") provisions for oil and gas handling facilities in the Barnett Shale area, and it adopted both a new PBR and standard permit for oil and gas production facilities in that area.227 “The new PBR and standard permit include operating specifications and emissions limitations for typical equipment (facilities) during normal operation, which includes production and planned maintenance, start-up and shutdown.”228 “The PBR and standard permit both include a list of best management practices” and require all oil and gas facilities at a site to be permitted under one authorization.229 The PBR and standard permit became effective on April 1, 2011.230

4. Water Use Issues

Hydraulic fracturing consists of pumping large volumes of fresh water into the formation, which “generally has been treated with a friction reducer, biocides, scale inhibitor, and surfactants, and contains sand as the propping agent.”231

The water treating fluid maximizes the horizontal length of the fracture while minimizing the vertical fracture height. The fractures, which are held open by the sand, result in increased surface area, which further results in increases in the desorption of the gas from the shale and increases in the mobility of the gas. The result is more efficient recovery of a larger volume of the gas-in-place.232

a. Texas Water Development Board Study

The RRC estimates that hydraulic fracturing of a typical well in the Barnett Shale “can use over 3.5 million gallons (over 83,000 barrels)
of water." Additionally, "the wells may be refractured multiple times after producing for several years."

Increasing water use due to growing population, drought, and Barnett Shale development has heightened concerns about water availability in North-Central Texas. In January of 2007, the Texas Water Development Board published a study of a 19-county area in North Texas that includes the Barnett Shale development area. Th[e] report . . . includes estimates of water used in Barnett Shale development.

b. Regulation of Surface Water

In Texas, the water that flows in creeks, rivers, and bays is owned and managed by the state. If a person diverts such water, he must have authorization (or a water right) from the state through the TCEQ. Consequently, a person who withdraws surface waters for hydraulic fracturing activities must obtain a water rights permit from TCEQ.

c. Regulation of Groundwater

In Texas, groundwater ownership rights are subject to regulation and control by both the courts and the state legislature. Groundwater may either be managed individually by landowners under the rule of capture or collectively by landowners and groundwater conservation districts ("GCDs").

Under the rule of capture, landowners may pump as much water as they choose, without liability to surrounding landowners who might claim that the pumping is depleting their wells. There are very few restrictions to the rule of capture:

The Texas Legislature has authorized the creation of GCDs as the State's preferred method of groundwater management. These districts are empowered and charged to conserve, preserve, protect, recharge, and prevent waste of groundwater resources within their boundaries. GCDs may be created through a special legislative act, a landowner petition process to the [TCEQ], a landowner petition

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233. Id.
234. Id.
235. Id. (citing JAMES BÊNE, P.G., ET AL., TEX. WATER DEV. BD., NORTHERN TRINITY/WOODBINE GAM ASSESSMENT OF GROUNDWATER USE IN THE NORTHERN TRINITY AQUIFER DUE TO URBAN GROWTH AND BARNETT SHALE DEVELOPMENT (2007)).
237. Id. (citing chapter 11 of the Texas Water Code relating to water rights).
238. Id.
239. Id.
240. Id.
process to join an existing GCD, or TCEQ initiative in a priority groundwater management area. 241

It should be noted that section 36.117 of the Texas Water Code prohibits the issuance of a permit for the drilling of a water well used solely to supply water for a rig that is actively engaged in drilling or exploration operations for oil and gas. 242

In addition, the RRC regulates groundwater in Texas. According to the RRC, much of the water used in association with hydraulic fracturing activities is saline or brackish water produced from the same formations where the oil fields are located. 243

A very small percentage of the water used for enhanced recovery is fresh water or slightly saline water produced from outside sources as needed to replace the volume of oil removed. Saline or brackish water is drawn from underground reservoirs that are below the base of usable quality water. The [RRC] requires a permit for wells associated with oil and gas activities that draw such water from formations below the base of usable quality water. 244

Recently, the Texas Supreme Court held that landowners have an ownership interest in the water beneath their property that cannot be taken for public use without adequate compensation under the Texas Constitution. 245 Texas courts have long held that landowners have ownership in oil and gas beneath their property, and the Court found no reason to treat groundwater differently. 246 Accordingly, under Texas law, landowners are regarded as having absolute title in severality to the groundwater in place beneath their land. 247 The Court stated that “[t]he only qualification of that rule of ownership is that it must be considered in connection with the law of capture.” 248 Therefore, “a landowner has a right to exclude others from groundwater beneath his property, but one that cannot be used to prevent ordinary drainage.” 249 Moreover, landowners have a constitutionally compensable interest in groundwater. 250 On remand, the lower court was di-

241. Id. (citing chapter 36 of the Texas Water Code).
243. R.R. COMM’N OF TEX., supra note 236.
244. Id. For instance, the RRC’s statewide rule 5, 16 TEX. ADMIN. CODE § 3.5 (2012), requires a RRC drilling permit to drill an injection water supply well that penetrates the base of usable quality water. Statewide rule 13, 16 TEX. ADMIN. CODE § 3.13 (2012), requires that an injection supply water well that penetrates the base of usable quality water be completed in accordance with the criteria in the rule, and the injection supply water well must be plugged in accordance with statewide rule 14, 16 TEX. ADMIN. CODE § 3.14 (2012).
246. Id. at *4.
247. Id. at *11.
248. Id.
249. Id. at *9.
250. Id. at *15.
rected to determine whether an agency’s denial of a landowner’s application for a drilling permit constituted a taking.251

C. Surface Casing Program Transferred From TCEQ to RRC

On September 1, 2011, article 2 of House Bill 2694 was passed, which transferred from the TCEQ to the RRC “duties relating to the protection of groundwater resources from oil- and gas-associated activities.”252 Specifically, the law transferred “duties pertaining to the responsibility of preparing groundwater protection advisory/recommendation letters.”253 After the transfer, the RRC became responsible for providing surface casing and groundwater protection recommendations for the following activities:

1. exploration, development, or production of oil and gas resources—new drilling, other drilling activities including, but not limited to, enhanced recovery injection wells, injection wells for brine mining, injection wells for underground storage of hydrocarbons, seismic exploration and cathodic protection wells, well integrity tests, plugging of abandoned wells, core holes, and microseismic boreholes;
2. subsurface disposal and injection of oil and gas waste—saltwater disposal wells; and
3. anthropogenic carbon dioxide injection wells and geologic storage facilities under the RRC’s jurisdiction.254

D. The Oil Field Cleanup Fund and RRC Voluntary Cleanup Program

In 1991, the Texas Legislature created the Oilfield Cleanup Fund (“OFCF”) within the RRC to deal with the burgeoning abandoned well problem.255 Funding for the program came from regulatory fees, permit fees, and bond fees paid by the oil and gas industry.256 According to the RRC, “[a]n abandoned site becomes a candidate for state cleanup when the responsible party fails or refuses to take action, or is unknown, deceased or bankrupt. Cleanup prioritization is based on public health, safety, and the protection of the environment.”257

251. Id. at *20.
253. Id.
254. Id. (numerals added for clarity).
257. Id.
The Voluntary Cleanup Program ("RRC-VCP") provides an incentive to remediate oil and gas related pollution by participants as long as they did not cause or contribute to the contamination.\(^{258}\) Applicants to the program receive a release of liability to the state in exchange for a successful cleanup.\(^{259}\) When cleanup is completed, the RRC will issue a certificate of completion, which embodies the release of liability to the state for a participant (and subsequent owners) who did not cause or contribute to the contamination and did not acquire the certificate by fraud, misrepresentation, or knowing failure to disclose material information.\(^{260}\) However, some practitioners have argued that the RRC-VCP is not as attractive as the equivalent program under the TCEQ.\(^{261}\) With regard to the TCEQ program, current owners oftentimes have exposure for cleanup even if they did not cause the contamination and will enter the TCEQ's VCP in order to avoid enforcement and to obtain a certificate of completion that permits them to more easily sell the property.\(^{262}\) However, with respect to the RRC-VCP, "non-operating surface interest owners generally do not have liability for oil field contamination and are therefore, less likely to volunteer to clean it up."\(^{263}\) In addition, the statutory authority for the TCEQ program also permits cost-recovery claims against the responsible parties.\(^{264}\) However, the authority for the RRC-VCP does not have an equivalent provision. Accordingly, one who is not otherwise liable for cleanup has less incentive to volunteer to clean it when there is no hope of collecting their costs against the responsible party.\(^{265}\)

IV. Local

A. Ordinances

The RRC neither has jurisdiction, nor exercises its regulatory authority, over private or public roads or road use.\(^{266}\) Further, the RRC's permits for oil and gas exploration, production, and waste disposal do not limit the independent authority of municipalities, counties, or other state agencies with respect to road use.\(^{267}\) The RRC also has no statutory authority over noise- or nuisance-related issues; such

\(^{260}\) Id.
\(^{262}\) Id.
\(^{263}\) Id.
\(^{265}\) Smiley, supra note 261.
\(^{266}\) Barnett Shale Information, R.R. Comm'n of Tex., http://www.rrc.state.tx.us/barnettshale/#water (last updated June 28, 2012).
\(^{267}\) Id.
issues are governed by local ordinances.\textsuperscript{268} Although the RRC does not have regulatory authority over odors or air contaminants, cities may enact ordinances with respect to such nuisances for wells located within city limits.\textsuperscript{269}

Due to the increase in oil and gas activity, several cities in the Barnett Shale area have passed natural gas well ordinances to regulate issues such as distance requirements, sound level, water usage, and permitting processes.\textsuperscript{270} According to the Barnett Shale Energy Education Council, setback distances (the minimum length between a dwelling and a gas well that is required by a city) and limits on noise levels that may be generated in both daytime and nighttime operations are the most common municipal regulations.\textsuperscript{271} However, these requirements may vary from city to city.\textsuperscript{272} For example, the Southlake ordinance provides that a well must be at least 1,000 feet from any habitable structure, or from the property line of any occupied public or private school or hospital, whereas the City of Fort Worth ordinance only requires that the well be 600 feet away from such structures.\textsuperscript{273}

\section*{B. Moratoriums}

Several cities in the Barnett Shale have also requested moratoriums on drilling permits in their area in order to provide them with time to consider whether to adopt regulations. For instance, on January 18, 2011, Southlake City Council passed a resolution to place a 180-day moratorium on oil and gas permits to determine whether to amend its current regulations.\textsuperscript{274} On June 10, 2008, the City of Flower Mound adopted a six-month moratorium for new permits for certain pipelines

\begin{footnotesize}
\begin{enumerate}
\item[\textsuperscript{268}] Id.
\item[\textsuperscript{269}] Id.
\item[\textsuperscript{271}] \textit{Barnett Shale Energy Educ. Council, supra note 270; see Southlake \S\ 9.5-242; Richland Hills \S\ 90.382; Halton City \S\S\ 43-17-43-18; Fort Worth \S\S\ 15-36, 15-42.}
\item[\textsuperscript{272}] \textit{Barnett Shale Energy Educ. Council, supra note 270; see Southlake \S\ 9.5-242; Richland Hills \S\ 90.382; Halton City \S\S\ 43-17-43-18; Fort Worth \S\S\ 15-36, 15-42.}
\item[\textsuperscript{273}] \textit{Compare Southlake \S\ 9.5-242, with Fort Worth \S\ 15-36.}
\end{enumerate}
\end{footnotesize}
and centralized collection facilities. Chapter 212 of the Local Government Code governs moratoriums in Texas.

C. Limitations

The Texas Constitution requires that adequate compensation be paid when private property is taken for public use. However, all property is held subject to the valid exercise of the police power. A municipality is not required to make compensation for losses occasioned by the proper and reasonable exercise of its police power. Under the police power, municipalities in Texas have the authority to regulate the drilling for, and production of, oil and gas within their corporate limits when they are acting for the protection of their citizens and the property is within their limits; this authority preserves good government, peace, and order. However, if a municipality goes too far in the regulation of oil and gas activities, the municipality may be held to have taken property, thus requiring it to pay just compensation to the owner. The question of whether a police power regulation is proper or whether it constitutes a compensable taking is a question of law.

Although there is no bright line for distinguishing between an exercise of the police power that constitutes a taking and one that does not, there are two related requirements taken into consideration when assessing the validity of an exercise of police power. "First, the regulation must be adopted to accomplish a legitimate goal; it must be 'substantially related' to the health, safety, or general welfare of the people. . . . Second, the regulation must be reasonable; it cannot be arbitrary." In other words, it must "substantially" advance the legitimate goals of the city.

Although the Texas ordinances have not been challenged, there is case law from other jurisdictions in this regard. For instance, on August 12, 2011, a West Virginia court overturned a city’s ordinance ban-

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276. See 212 TEX. LOC. GOV'T CODE ANN. §§ 212.001–.904 (2012).
278. Id.
279. Id.
282. Turtle Rock Corp., 680 S.W.2d at 804.
283. Id. at 804–05.
284. Id. at 805.
ning the hydraulic fracturing of the Marcellus Shale. The city, characterizing the hydraulic fracturing process as a nuisance, argued that it had the authority to enact and enforce the ordinance pursuant to the rights given to the city by the "Home Rule" provisions of the West Virginia Constitution. However, the court ruled that the state's interest in oil and gas development and production as set forth in the West Virginia Code provides for the exclusive control of this area of law to be within the hands of the state environmental agency. Moreover, the court held that the agency's regulations "do not provide any exception or latitude to permit the city . . . to impose a complete ban on fracking or to regulate oil and gas development and production." Because the city's ordinance encroaches upon the state's all-encompassing authority regarding the production and development of oil and gas resources, the court held that the ordinance was preempted by state law.

However, on February 21, 2012, a New York court upheld a town's zoning amendment that banned hydraulic fracturing within its jurisdiction. The zoning amendment was enacted in response to a petition from town residents concerned about the impact of hydraulic fracturing on ground and surface water supplies. An energy company that had obtained gas leases covering more than one-third of the town's total area prior to the amendment argued that the state's Oil, Gas and Solution Mining Law preempted the zoning amendment. However, the court held that the law lacks "a clear expression of legislative intent to preempt local zoning control over land use concerning oil and gas production." The court, therefore, granted the town's motion for summary judgment validating the amendment.

In addition, on February 24, 2012, another New York court upheld a town's enactment of a zoning law that banned oil and gas drilling, including hydraulic fracturing, within the geographical borders of the township. In that case, the holder of two gas leases argued that section 23-0303 of New York's Environmental Conservation Law preempted the zoning law. The relevant section provided that "this

287. Id.
288. Id.
289. Id.
290. Id.
292. Id. at 465.
293. Id. at 466.
294. Id. at 467.
295. Id. at 474.
297. Id. at 723–24.
article shall supersede all local laws or ordinances relating to the regulation of oil, gas and solution mining industries."\textsuperscript{298} However, the court ruled that neither the plain reading of the statute nor its legislative history led to the conclusion that the phrase "was intended . . . to abrogate the constitutional and statutory authority vested in municipalities to enact legislation affecting land use."\textsuperscript{299} Rather, the court held that "the 'natural and most obvious sense' of the word 'regulation'" was that the legislature intended to insure state-wide standards with regard to the method and manner to be used in oil, gas, and solution drilling or mining.\textsuperscript{300} According to the court, the state determines the "how" of such procedures, but the municipalities maintain control over the "where."\textsuperscript{301} Accordingly, the court held that a local municipality may enact a land use regulation that permits or prohibits oil and gas drilling within the confines of its geographical jurisdiction.\textsuperscript{302}

V. Government Studies

A. Federal

1. Environmental Protection Agency

In 2010, the United States House of Representatives Appropriation Conference Committee directed the EPA to conduct research to examine the relationship between hydraulic fracturing and drinking water resources. In February 2011, the EPA released its Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources.\textsuperscript{303} The scope of the study includes the full lifespan of water in hydraulic fracturing—from acquisition of the water through the mixing of chemicals and actual fracturing to the post-fracturing stage, including the management of flowback and produced water, and its ultimate treatment and disposal.\textsuperscript{304} The EPA has identified the following fundamental questions for each stage of the hydraulic fracturing lifecycle:

- **Water acquisition:** How might large volume water withdrawals from ground and surface water impact drinking water resources?
- **Chemical mixing:** What are the possible impacts of releases of hydraulic fracturing fluids on drinking water resources?
- **Well injection:** What are the possible impacts of the injection and fracturing process on drinking water resources?

\textsuperscript{298} Id. at 724.  
\textsuperscript{299} Id. at 728.  
\textsuperscript{300} Id. at 729.  
\textsuperscript{301} Id. at 729.  
\textsuperscript{302} Id. at 729–30.  
\textsuperscript{304} Id. at vii.
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- **Flowback and produced water**: What are the possible impacts of releases of flowback and produced water on drinking water resources?
- **Wastewater treatment and waste disposal**: What are the possible impacts of inadequate treatment of hydraulic fracturing wastewater on drinking water resources?\(^305\)

The study will involve retrospective case studies that will focus on investigating reported instances of drinking water resource contamination or other impacts in areas where hydraulic fracturing has already occurred, as well as prospective case studies that will involve sites where hydraulic fracturing will occur after the research is initiated.\(^306\)

The EPA asked the EPA Science Advisory Board ("SAB") to provide a peer review of the draft study plan and for the SAB to provide suggestions and comments.\(^307\) The SAB, an independent, external federal advisory committee, met in April 2010 to provide advice on the proposed approach to be used to frame the hydraulic fracturing study design and on the areas that will be addressed by research relevant to hydraulic fracturing. The SAB's ideas were provided to the EPA in a June 2010 Report to the Administrator.

The EPA considered SAB's comments, as well as stakeholder comments, in the development of the Final Study Plan.\(^308\) On November 3, 2011, the EPA announced the release of the Final Draft of Hydraulic Fracturing Study Plan.\(^309\) Initial research results are expected by the end of 2012 with a goal for a report in 2014.

The EPA has selected seven case studies located in various formation locations across the country that it believes will provide the most useful information about the potential impacts of hydraulic fracturing on drinking water resources under a variety of circumstances.\(^310\) Two prospective case studies, where the EPA will monitor key aspects of the hydraulic fracturing process at future hydraulic fracturing sites, are located in (1) the Haynesville Shale—DeSoto Parish, Louisiana

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305. Id. at 15.
306. Id. at vii.
308. Id.
and (2) the Marcellus Shale—Washington County, Pennsylvania.\textsuperscript{311} Five retrospective case studies, which will investigate reported drinking water contamination due to hydraulic fracturing operations at existing sites, are located in (1) the Bakken Shale—Killdeer and Dunn Counties, North Dakota, (2) the Barnett Shale—Wise and Denton Counties, Texas, (3) the Marcellus Shale—Bradford and Susquehanna Counties, Pennsylvania, (4) the Marcellus Shale—Washington County, Pennsylvania, and (5) the Raton Basin—Los Animas County, Colorado.\textsuperscript{312} Recently, Texas Railroad Commissioner David Porter expressed his concerns about the scope, methodology, and science of the EPA’s study.\textsuperscript{313}

In addition, on August 11, 2011, the EPA sent letters to nine oil and gas companies requesting their voluntary participation in the study.\textsuperscript{314} The EPA requested data on well construction, design, and well operation practices for 350 oil and gas wells that were hydraulically fractured in 2009 to 2010.\textsuperscript{315} The EPA made this request as part of its national study to examine the potential impacts of hydraulic fracturing on drinking water resources.\textsuperscript{316} All nine oil and gas companies said that they planned to assist the EPA.\textsuperscript{317} Nine companies received the letter: Clayton Williams Energy, ConocoPhillips, EQT Production, Hogback Exploration, Laramie Energy II, MDS Energy, Noble Energy, Sand Ridge Operating, and Williams Production.\textsuperscript{318}

On September 9, 2010, the EPA issued voluntary information requests to nine hydraulic fracturing service providers.\textsuperscript{319} The data requests included the following:

- the chemical composition of fluids used in the hydraulic fracturing process,
- data on the impacts of the chemicals on human health and the environment,
- standard operating procedures used at hydraulic fracturing sites, and

\textsuperscript{311} Id.

\textsuperscript{312} Id.


\textsuperscript{315} Id.

\textsuperscript{316} Id.

\textsuperscript{317} Id.


\textsuperscript{319} U.S. ENVTL. PROT. AGENCY, \textit{supra} note 314.
2. Department of Energy

On May 5, 2011, United States Energy Secretary Steven Chu charged the Secretary of Energy Advisory Board ("SEAB") Natural Gas Subcommittee (the "Subcommittee") "to make recommendations to improve the safety and environmental performance of natural gas hydraulic fracturing from shale formations."323 Moreover, President Obama directed Secretary Chu to form the Subcommittee as part of the President's "Blueprint for a Secure Energy Future."324

On August 11, 2011, the Subcommittee produced its first ninety-day report.325 The report contains numerous findings and recommenda-

320. Id.
321. Id.
322. Id.
tions, including the need to (1) improve public information about shale gas operations; (2) improve communication among state and federal regulators; (3) improve air quality; (4) protect water quality; (5) disclose fracturing fluid composition; (6) reduce use of diesel fuel; (7) manage short-term and cumulative impacts on communities, land use, wildlife, and ecologies; (8) organize for best practices; and (9) increase research and development.\textsuperscript{326} The report also identified four major areas of concern: (1) possible pollution of drinking water from methane and chemicals used in fracturing fluids; (2) air pollution; (3) community disruption during shale gas production; and (4) cumulative adverse impacts that intensive shale production can have on communities and ecosystems.\textsuperscript{327}

On November 18, 2011, the Subcommittee produced its second ninety-day report in which it focused largely on implementation of the twenty recommendations presented in its first ninety-day report.\textsuperscript{328}

3. Department of the Interior

The Interior Department’s Bureau of Land Management (“BLM”) is readying its own draft rules requiring drillers to disclose fracturing chemicals used in operations on public lands, which include provisions for disclosing wastewater composition and management practices.\textsuperscript{329} The draft, which is modeled on Colorado’s disclosure plan, includes a broad mandate requiring drillers to disclose “the complete chemical makeup of all materials used in the actual stimulation fluid without regard to original source additive.”\textsuperscript{330} But it also includes language outlining the bar companies would have to meet to avoid public disclosure of materials considered confidential business information. In this regard, operators must “specifically identify information claimed to be exempted from public disclosure by a Federal statute or regulation, . . . identify the law or regulation that protects the information, and explain in detail why the specific information is exempted from public disclosure,” and verify that the information is not publicly available through any other means, such as state mandates.\textsuperscript{331}

\textsuperscript{326} Id. at 1–4.
\textsuperscript{327} Id. at 8.
\textsuperscript{330} Id.
\textsuperscript{331} Id.
4. Department of Health and Human Services

In January 2010, the National Institute for Occupational Safety and Health ("NIOSH"), which is part of the Centers for Disease Control and Prevention within the Department of Health and Human Services, stated that "[t]here is a lack of existing information regarding the variety and magnitude of chemical exposure risks to oil and gas extraction workers."332 To determine if risks are present, NIOSH seeks to "develop partnerships with the oil and gas extraction industry to identify, characterize and (if needed) control workplace chemical exposures."333 The goals of NIOSH field efforts include

(1) identifying processes and activities where chemical exposures could occur; (2) characterizing potential exposures to vapors, gases, particulates and fumes (e.g., solvents, diesel particulate, crystalline silica, acids, metals, aldehydes, and possibly other chemicals identified during the study); [and] (3) depending on results of the field effort, recommending safe work practices and/or proposing and evaluating exposure controls (to include engineering controls, substitution, and personal protective equipment).334

In addition, on November 7, 2011, the Agency for Toxic Substances and Disease Registry ("ATSDR"), investigated the water quality of seven residential wells surrounding a Chesapeake natural gas well site in Leroy Township, Bradford County, Pennsylvania, at the request of the EPA following a well blowout.335 The ATSDR found that "several wells had elevated levels of salts and other chemicals," and "[w]hile it [was] unclear how the wells were contaminated, the available data suggest to [the] ATSDR that one well was impacted by natural gas activities."336 In addition, the ATSDR was involved in analysis of groundwater samples from incidents involving oil and gas operations in Pavillion, Wyoming.337

5. Securities and Exchange Commission

"As a result of recent scrutiny of the environmental ramifications of using hydraulic fracturing operations to drill shale formations, the SEC staff has asked registrants to describe steps they have taken to

333. Id.
334. Id.
336. Id.
minimize the potential environmental impacts of these operations.\textsuperscript{338}\textsuperscript{39} Such steps include the following:

- Ensuring that drilling, casing, and cementing adhere to known best practices.
- Monitoring the rate and pressure of the fracturing treatment for abrupt changes.
- Evaluating the environmental impact of additives to the hydraulic fracturing fluid.
- Minimizing the use of water or disposing of it in a way that reduces the impact on nearby surface water.\textsuperscript{339}

“The SEC staff has also asked registrants to provide the SEC with reports detailing the chemicals used in hydraulic fracturing fluids, including the volume/concentration and total amounts used in the fluid formulation.”\textsuperscript{340}

6. Delaware River Basin Commission

According to the Delaware River Basin Commission ("DRBC"), the Delaware River is the longest un-dammed river in the United States, east of the Mississippi; it extends 330 miles from the confluence of its east and west branches at Hancock, New York to the mouth of the Delaware Bay where it meets the Atlantic Ocean.\textsuperscript{341} “Over 15 million people (approximately five percent of the nation’s population) rely on the waters of the Delaware River Basin for drinking, agricultural, and industrial use.”\textsuperscript{342} The DRBC is a federal-interstate compact government agency that was formed by concurrent legislation enacted in 1961 by the United States and the four basin states—Pennsylvania, New York, New Jersey, and Delaware.\textsuperscript{343} Its five members include the basin state governors and the Division Engineer, North Atlantic Division, United States Army Corps of Engineers, who serves as the federal representative.\textsuperscript{344} The DRBC has legal authority over both water quality and water quantity related issues throughout the basin.\textsuperscript{345}

In connection with natural gas drilling, the DRBC has identified three major areas of concern:

\textsuperscript{339} Id.
\textsuperscript{340} Id.
\textsuperscript{341} See Basin Information, DEL. RIVER BASIN COMM’N, http://www.state.nj.us/drbc/basin/ (last modified May 7, 2012).
\textsuperscript{342} Id.
\textsuperscript{344} Id.
\textsuperscript{345} Id.
(1) Gas drilling projects in the Marcellus Shale or other formations may have a substantial effect on the water resources of the basin by reducing the flow in streams and/or aquifers used to supply the significant amounts of fresh water needed in the natural gas mining process.

(2) On-site drilling operations may potentially add, discharge or cause the release of pollutants into the ground water or surface water.

(3) The recovered “frac water” must be treated and disposed of properly.346

At their May 5, 2010, meeting, the commissioners “unanimously directed staff to develop draft regulations in the shales for notice and comment rulemaking and postponed the DRBC’s consideration of well pad dockets until regulations are adopted.”347 The special meeting scheduled for November 21, 2011, to consider the adoption of draft natural gas development regulations was postponed to allow additional time for review by the five DRBC members.348 As there are still unresolved issues that the commissioners are working through, no new date has been announced to vote on the draft regulations.349

7. Susquehanna River Basin Commission

According to the Susquehanna River Basin Commission (“SRBC”), the Susquehanna River is the nation’s sixteenth largest river and is the largest river lying entirely in the United States that flows into the Atlantic Ocean.350 “The Susquehanna and its hundreds of tributaries drain 27,510 square miles, an area nearly the size of South Carolina, spread over parts of the states of New York, Pennsylvania, and Maryland.”351 In 1970, Congress and the legislatures of New York, Pennsylvania, and Maryland adopted the Susquehanna River Basin Compact (the “Compact”), which provided a “mechanism to guide the conservation, development, and administration of the water resources of the vast river basin.”352 The Compact further established the SRBC as the agency to coordinate the water resources efforts of the three states and the federal government.353 Recently, the SRBC issued proposed natural gas drilling rules to regulate all withdrawals of surface water and groundwater and consumptive water uses within

346. Id.
347. Id.
348. Id.
349. Id.
351. Id.
352. Id.
353. Id.
the basin for natural gas development in certain tight shale formations.354

8. Department of Transportation

On August 25, 2011, the Department of Transportation, Pipeline and Hazardous Materials Safety Administration ("PHMSA") issued an advanced notice of proposed rulemaking ("ANPR") related to its safety program for natural gas transmission pipelines. The ANPR asks for comment[s] on various questions concerning whether pipeline integrity management ("IM") requirements and other regulatory requirements relating to system integrity should be enhanced. Written comments were due by December 2, 2011, though parties requested additional time to submit comments.

The PHMSA administers a series of statutes known as the Pipeline Safety Laws, which are minimum safety standards for transportation of gas by pipeline. PHMSA notes that IM requirements have increased the level of safety concerning the transportation of gas in high consequence areas ("HCAs"). . . .

The ANPR seeks public comment on 14 specific topics within two broad categories: (1) should IM requirements be revised and strengthened to bring more pipeline mileage under IM requirements and to better assure safety of pipeline segments in HCAs; and (2) should non-IM requirements be strengthened or expanded to address other issues associated with pipeline system integrity? Each broad category includes specific topics such as: modifying the definition of an HCA, modifying repair criteria, revising the requirements for collecting, validating and integrating pipeline data, valve spacing and the need for remotely or automatically controlled valves, corrosion control, and more.355

9. Department of Commerce

The National Oceanic and Atmospheric Administration ("NOAA"), the federal agency that focuses on the condition of the oceans and the atmosphere, completed a study that measured air emissions, starting just outside Denver, Colorado, that may help explain smog problems across parts of the Western US.

The federal scientists concluded that emissions from oil and gas drilling in the area . . . help explain the region's smog problem. They


also found that airborne emissions from these drilling sites had been underestimated. . . .

10. Department of State

The Department of State (“DOS”) launched the Global Shale Gas Initiative (“GSGI”) in April 2010, which is intended “to help countries seeking to utilize their unconventional natural gas resources to identify and develop them safely and economically.” According to the GSGI, future climate policies could increase demand for shale gas since it is a lower-carbon “bridge fuel” to reduce CO2 emissions. Although the U.S. shale gas experience cannot be precisely duplicated, its application through GSGI can be instrumental in helping governments understand the complexities of shale gas development. Governments often have limited capability to assess their own country’s shale resource potential or are unclear about how to develop shale gas in a safe and environmentally sustainable manner through establishing the right regulatory policy and fiscal structures. The ultimate goals of GSGI are to achieve greater energy security, meet environmental objectives and further U.S. economic and commercial interests.

11. Department of Agriculture

Wayne National Forest (the “Forest”) recently announced that the USDA Forest Service has withdrawn over 3,000 acres of public lands from a federal oil and gas lease sale scheduled for December 7, 2012. According to the news release, the Forest will assemble a team of natural resource specialists to conduct further analysis and to “review the best scientific information available with regard to the surface effects of deep horizontal drilling and lateral hydraulic fracturing.” The results will disclose the effects on the surface that are

358. Id.
360. Id.
associated with this new technology and assist the Forest in deciding whether the 2006 Forest Plan needs to be amended or revised.\textsuperscript{361}

B. Texas

1. TCEQ Barnett Shale Air Studies

Since 2002, gas production activity in the Barnett Shale area has experienced significant growth, and according to the TCEQ, it "has been improving emissions data from oil and gas production and is conducting in-depth measurements to fully evaluate potential health effects."\textsuperscript{362} The TCEQ is using state-of-the-art technology to address emissions from Barnett Shale activities and overall oil and gas operations.\textsuperscript{363} In particular, the TCEQ has used infrared gas-imaging cameras to study emissions from individual tanks or tank batteries associated with upstream oil and gas production in various counties within the Barnett Shale.\textsuperscript{364} Information and results from such studies, as well as of other activities, are detailed on the TCEQ's website.\textsuperscript{365}

2. RRC Appoints Eagle Ford Task Force

The Eagle Ford Shale is rapidly becoming one of Texas' largest domestic crude oil and natural gas discoveries in more than forty years.\textsuperscript{366} Roughly fifty miles wide and 400 miles long, the Eagle Ford spreads across Texas from the Mexican border and covers twenty-four counties.\textsuperscript{367} The RRC recently announced that it has appointed the Eagle Ford Task Force.\textsuperscript{368} The task force's main purpose is "to serve as a forum for dialogue, so that task force members can bring issues and concerns from their constituents to the table and work toward solutions."\textsuperscript{369} Over the next year, it will discuss the following issues:

(1) Water usage as it relates to hydraulic fracturing;

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{361} Id.
\item \textsuperscript{363} Id.
\item \textsuperscript{367} Id.
\item \textsuperscript{369} Id.
\end{enumerate}
\end{footnotesize}
The impact of oil and gas production on community infrastructure;

The need for public education regarding oil and gas production; [and]

Promoting economic development stemming from oil and gas production.\(^{370}\)

On October 12, 2011, the RRC announced that the task force adopted the following advisements with respect to pipelines:

1. The placement of pipelines should avoid steep hillsides and watercourses where feasible.
2. Pipeline routes should take advantage of road corridors to minimize surface disturbance.
3. When clearing is necessary, the width disturbed should be kept to a minimum and topsoil material should be stockpiled to the side because retaining topsoil for replacement during reclamation can significantly accelerate successful revegetation.
4. Proximity to buildings or other facilities occupied or used by the public should be considered. Particular consideration should be given to homes.
5. Unnecessary damage to trees and other vegetation should be avoided. [and]
6. After installation of a new line, all rights-of-way should be restored to conditions compatible with existing land use.\(^{371}\)

With respect to roads, the task force adopted the following advisements:

1. The task force supports trucking companies partnering with the Texas Department of Public Safety to develop a program that would alert companies when their drivers receive moving violations or drivers license suspensions. [and]
2. The task force supports the creation of road use agreements or trucking plans between operators and local authorities. These agreements could include parameters such as:
   (a) Operators must avoid peak traffic hours, school bus hours and community events.
   (b) Operators must establish overnight quiet periods. [and]
   (c) Operators must ensure adequate off-road parking and delivery areas at all sites to avoid lane/road blockage.\(^{372}\)

On January 26, 2012, the RRC announced the task force’s conclusion that

based on the information presented, the Carrizo Wilcox Aquifer in South Texas appears to contain enough water resources to support

\(^{370}\) Id.


\(^{372}\) Id.
oil and gas drilling activities, including hydraulic fracturing, in the Eagle Ford Shale while meeting all other projected uses.

The data presented to the group indicated that drilling and completions in the Eagle Ford Shale account for approximately six percent of the water demand in South Texas, while irrigation accounts for 64 percent and municipal uses account for 17 percent.

In addition, the industry as a whole has reduced the amount of water it uses to hydraulically fracture wells. Currently, industry is reporting an average use of approximately 11 acre-feet of water used to complete each well, down from the approximately 15 acre-feet previously used.

Industry experts informed the task force that approximately 2,600 to 2,800 new wells are expected to be completed annually in the Eagle Ford Shale at peak demand, which translates into about 30,000 acre-feet of water per year during the heaviest point of development of the Eagle Ford Shale. In 2008, the Carrizo Wilcox Aquifer contained 540,000 acre-feet of available water.

The task force will continue to meet monthly to examine issues pertinent to the region.

3. Fort Worth Natural Gas Air Quality Study

On March 9, 2010, in response to concerns from citizens and community groups in the Fort Worth area, the Fort Worth City Council adopted a resolution that appointed a committee “to review air quality issues associated with natural gas exploration and production.”

This committee was composed of private citizens, members of local community groups, members of environmental advocacy groups, and representatives from [the] industry. The committee was charged to make recommendations to the City Council on a scope of work for a comprehensive air quality assessment to evaluate the impacts of natural gas exploration and production, to evaluate proposals submitted in response to a solicitation for conducting this study, and to ultimately choose a qualified organization to conduct the study.

Eastern Research Group, Inc. was ultimately selected to perform the Fort Worth Natural Gas Air Quality Study. The results of the study were released on July 13, 2011; the results indicated that Fort Worth’s 600-foot setback distance was adequate and that there were

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374. Id.
376. Id.
377. Id.
not any significant health threats in residential areas beyond those setback distances.\textsuperscript{378}

VI. UNIVERSITY & INDUSTRY STUDIES

A. Is the Greenhouse Gas Footprint of Shale Gas More Than Coal?

1. Cornell University I

In April 2011, researchers at Cornell University published a study that challenged the assumption that shale gas has a low greenhouse gas ("GHG") footprint.\textsuperscript{379} Although the study acknowledged that less carbon dioxide is emitted from burning natural gas than burning coal per unit of energy generated, it nonetheless concluded that the GHG footprint of shale gas is "significantly larger than that from conventional gas, due to methane emissions with flow-back fluids and from drill out of wells during well completion."\textsuperscript{380} According to the study, "[t]he large GHG footprint of shale gas undercuts the logic of its use as a bridging fuel over coming decades, if the goal is to reduce global warming."\textsuperscript{381}

Interestingly, on January 3, 2012, a different group of researchers at Cornell University published a study that was critical of the first study referenced above.\textsuperscript{382} The study began by stating that it is not in dispute that "[n]atural gas is widely considered to be an environmentally cleaner fuel than coal because it does not produce detrimental by-products such as sulfur, mercury, ash and particulates and because it provides twice the energy per unit of weight with half the carbon footprint during combustion."\textsuperscript{383} However, in the recent publication referenced above, the first Cornell researchers reported that "their life-cycle evaluation of shale gas drilling suggests that shale gas has a larger GHG footprint than coal and that this larger footprint 'undercuts the logic of its use as a bridging fuel over the coming decades.'"\textsuperscript{384}

\textsuperscript{378} Id. A number of Texas cities have adopted or are in the process of adopting local controls for hydraulic fracturing operations within their boundaries. See, e.g., SOUTHLAKE, TEX., ORDINANCE NO. 880-A (2011); RICHLAND HILLS, TEX., ORDINANCE NO. 996-04 (2004); HALTOM CITY, TEX., ORDINANCE NO. 0-2004-026-15 (2004); FORT WORTH, TEX., ORDINANCE NO. 18449-02-2009 (2009).


\textsuperscript{380} Id.

\textsuperscript{381} Id.

\textsuperscript{382} Lawrence M. Cathles III et al., Commentary, The Greenhouse-Gas Footprint of Natural Gas in Shale Formations, 113 Climate Change 525-35 (2012), available at http://www.springerlink.com/content/x001g12t2332462p/fulltext.pdf?MUD=MP.

\textsuperscript{383} Id.

\textsuperscript{384} Id.
2. Cornell University II

The second group of researchers argue that the first group’s analysis is seriously flawed in that they significantly overestimate the fugitive emissions associated with unconventional gas extraction, undervalue the contribution of ‘green technologies’ to reducing those emissions to a level approaching that of conventional gas, base their comparison between gas and coal on heat rather than electricity generation (almost the sole use of coal), and assume a time interval over which to compute the relative climate impact of gas compared to coal that does not capture the contrast between the long residence time of CO₂ and the short residence time of methane in the atmosphere.385

The researchers concluded that “[u]sing more reasonable leakage rates and bases of comparison, shale gas has a GHG footprint that is half and perhaps a third that of coal.”386

3. Carnegie Mellon University

On August 5, 2011, researchers at Carnegie Mellon University released a study that “estimates the life cycle [of] greenhouse gas emissions from the production of Marcellus shale natural gas and compares its emissions with national average US natural gas emissions produced in the year 2008, prior to any significant Marcellus shale development.”387 The study concluded that “Marcellus shale natural gas GHG emissions are comparable to those of imported liquefied natural gas.”388 Further, the study found that “[n]atural gas from the Marcellus shale has generally lower life cycle GHG emissions than coal for production of electricity in the absence of any effective carbon capture and storage processes, by 20–50% depending upon plant efficiencies and natural gas emissions variability.”389 The study received financial support from the Sierra Club.390

4. The National Energy Technology Laboratory

On October 24, 2011, the National Energy Technology Laboratory (“NETL”), a division of the Department of Energy, issued a report that rebutted the findings of the first Cornell study.391 In the report, the NETL found that “[n]atural gas-fired baseload power production

385. Id.
386. Id.
388. Id. at 1.
389. Id.
390. Id. at 8.
has life cycle greenhouse gas emissions 42 to 53 percent lower than those for coal-fired baseload electricity, after accounting for a wide range of variability and compared across different assumptions of climate impact timing.”

According to the report,

The lower emissions for natural gas are primarily due to differences in the current fleets’ average efficiency – 53 percent for natural gas versus 35 percent for coal, and a higher carbon content per unit of energy for coal than natural gas. Even using unconventional natural gas, from tight sands, shale and coal beds, and compared with a 20-year global warming potential (GWP), natural gas-fired electricity has 39 percent lower greenhouse gas emissions than coal per delivered megawatt-hour (MWh) using current technology.

5. Worldwatch Institute

In August 2011, a new study from the Worldwatch Institute and the Deutsche Bank Climate Change Advisors concluded that over its full cycle of production, distribution, and use, natural gas emits just over half as many greenhouse gas emissions as coal does for equivalent energy output. The analysis clarifies the role of methane releases in the calculation of comparative emissions between the two fossil fuels and explores how the growing share of natural gas production from shale formations could change that fuel’s footprint.

6. University of Maryland

In December 2011, a group of researchers at the University of Maryland compared the greenhouse gas footprints of both conventional and unconventional natural gas with coal “in a transparent and consistent way, focusing primarily on the electricity generation sector.” The researchers concluded that “for electricity generation the GHG impacts of shale gas are only marginally higher than those of conventional gas, and both remain substantially lower than those of coal under standard assumptions.” In particular, they stated that even with high existing uncertainties in fugitive emissions from the hydraulic fracturing process, the greenhouse footprint of shale gas and other unconventional gas resources is about 11% higher than that of conventional gas for electricity generation, and still 56% that of coal. Moreover, if the spread in future fleet efficiencies between

392. Id.
393. Id.
395. Id. at 2.
397. Id.
gas and coal increases over the coming decades, this differential from coal will continue to increase.398

B. Does Hydraulic Fracturing Cause Contamination of Groundwater?

1. Duke University

On April 14, 2011, Duke University researchers published a report concluding that “[i]n aquifers overlying the Marcellus and Utica shale formations of northeastern Pennsylvania and upstate New York,” there was “systematic evidence for methane contamination of drinking water associated with shale gas extraction.”399 The report states that although methane concentrations were detected in generally 85% of the drinking water wells across the region, regardless of gas industry operations, “concentrations were substantially higher closer to natural-gas wells.”400 Specifically, “[m]ethane concentrations were ... 17-times higher on average ... in shallow wells from active drilling and extraction areas than in wells from non-active areas.”401 They then analyzed the origin of the methane and concluded that much of the gas found near the active sites was consistent with deeper thermogenic methane gas from sources such as the Marcellus and Utica Shales at the active sites as opposed to shallower biogenic gas.402 However, despite its conclusion with regard to methane, the report states that they “found no evidence for contamination of drinking-water samples with deep saline brines or fracturing fluids.”403

On July 9, 2012, Duke University researchers published a second report that concluded that within the Appalachian Basin naturally occurring pathways, “unrelated to recent drilling activities, exist in some locations between deep underlying formations and shallow drinking water aquifers.”404 The report states that a “strong geochemical fingerprint in the salinized ... groundwater sampled from the Alluvium, Catskill, and Lock Haven aquifers suggests possible migration of Marcellus brine through naturally occurring pathways.”405 The researchers claimed that “[t]he occurrences of saline water d[id] not cor-

398. Id.
400. Id.
401. Id.
402. Id.
403. Id.
405. Id.
relate with the location of shale-gas wells.” However, the presence of these fluids suggests there is an “increased risk for contamination of shallow drinking water resources, particularly by fugitive gases, because of natural hydraulic connections to deeper formations.”

2. Cabot Oil & Gas

On December 5, 2011, Cabot Oil & Gas Corporation, along with GSI Environmental, Inc., released a study that indicated the methane in Pennsylvania water wells is unrelated to Marcellus Shale fracturing. The study stated that the results from more than 1,700 water wells sampled and tested prior to proposed drilling in Susquehanna County, Pennsylvania revealed methane to be ubiquitous in shallow groundwater, with a clear correlation of methane concentrations with surface topography. Specifically, water wells located in lowland valley areas exhibit significantly higher dissolved methane levels than water wells in upland areas, with no relation to proximity of existing gas wells. According to the study, the correlation of methane concentrations with elevation indicates that, on a regional level, elevated methane concentrations in groundwater are a function of geologic features, rather than shale gas development.

Furthermore, based upon a “multiple-lines-of-evidence” approach, the study indicates that the methane found is either thermogenic, originating from deposits overlying the Marcellus Shale, or biogenic, originating from alluvial or glacial drift deposits. In either case, the study claims that the assertion by the Duke study that hydraulic fracturing of the Marcellus Shale is contributing thermogenic methane to local water wells is unsubstantiated. Rather, the study concludes that the thermogenic methane encountered in the water wells is related to the shallow Upper and/or Middle Devonian gases.

3. The University of Texas

On November 9, 2011, the University of Texas at Austin’s Energy Institute announced that “[p]reliminary findings from a study on the use of hydraulic fracturing in shale gas development suggests no direct
link to reports of groundwater contamination." The researchers stated that from what they have seen so far, “many of the problems appear[ed] to be related to other aspects of drilling operations, such as poor casing or cement jobs, rather than to hydraulic fracturing, per se.”

On February 16, 2012, the Energy Institute issued its final report, which found that “many problems ascribed to hydraulic fracturing are related to processes common to all oil and gas drilling operations, such as casing failures or poor cement jobs.” University researchers also concluded that many reports of contamination can be traced to above-ground spills or other mishandling of wastewater produced from shale gas drilling, rather than from hydraulic fracturing per se.

Other findings from the Energy Institute study include the following:

1. Natural gas found in water wells within some shale gas areas (e.g., Marcellus) can be traced to natural sources and probably was present before the onset of shale gas operations.
2. Although some states have been proactive in overseeing shale gas development, most regulations were written before the widespread use of hydraulic fracturing.
3. Media coverage of hydraulic fracturing is decidedly negative, and few news reports mention scientific research related to the practice.
4. Overall, surface spills of fracturing fluids pose greater risks to groundwater sources than from hydraulic fracturing itself.
5. The lack of baseline studies in areas of shale gas development makes it difficult to evaluate the long-term, cumulative effects and risks associated with hydraulic fracturing.

Further, the University of Texas “provided an overview of two other Energy Institute initiatives related to the use of hydraulic fracturing in shale gas development.”

The first project, which will commence in April, is a detailed case study focusing on claims of groundwater contamination in North Texas' Barnett Shale. The research will entail an examination of various aspects of shale gas development, including site preparation, drilling, production, and handling and disposal of flow-back water.

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416. Id.
417. New Study Shows No Evidence of Groundwater Contamination from Hydraulic Fracturing, Univ. of Tex. at Austin (Feb. 16, 2012), http://www.utexas.edu/news/2012/02/16/energy institute hydraulic fracturing groundwater contamination/.
418. Id.
419. Id.
420. Id.
Researchers also will identify and document activities unrelated to shale gas development that have resulted in water contamination. It will also assess the quantity of fresh groundwater used in shale gas development and evaluate ways to reduce the amount. A second project, currently under development, would include a field and laboratory investigation of whether hydrological connectivity exists between water in the units above and below the shale unit being fractured as a result of the fracturing process. As envisioned, the project calls for university researchers to conduct field sampling of hydraulic fracturing fluid, flow-back water, produced water, and water from aquifers and other geologic units within the Barnett Shale.\textsuperscript{421}

Researchers will also supplement the study with "an examination of reports relating to atmospheric emissions and seismic activity attributed to hydraulic fracturing, which have emerged as significant issues of concern in recent months."\textsuperscript{422} The Environmental Defense Fund assisted in developing the scope of work and methodology for the study.\textsuperscript{423}

4. Pennsylvania State University

In October 2011, Pennsylvania State University released a study entitled "The Impact of Marcellus Gas Drilling on Rural Drinking Water Supplies," which was conducted by researchers from the University and was funded by the Center for Rural Pennsylvania.\textsuperscript{424} The study was intended to

provide an unbiased and largescale study of water quality in private water wells in rural Pennsylvania before and after the drilling of nearby Marcellus Shale gas wells. It also looked to document both the enforcement of existing regulations and the use of voluntary measures by homeowners to protect water supplies.

For the study, the researchers evaluated water sampled from 233 water wells in proximity to Marcellus gas wells in rural regions of Pennsylvania in 2010 and 2011. Among these were treatment sites (water wells sampled before and after gas well drilling nearby) and control sites (water wells sampled though no well drilling occurred nearby).

According to the study results, approximately 40 percent of the water wells failed at least one Safe Drinking Water Act water quality standard, most frequently for coliform bacteria, turbidity and manganese, before gas well drilling occurred. . . .

\textsuperscript{421} Id.
\textsuperscript{422} Id.
\textsuperscript{423} Id.
The study’s pre-drilling results for dissolved methane also provided new information that documented its occurrence in about 20 percent of water wells, although levels were generally far below any advisory levels.

In the study, statistical analyses of post-drilling versus pre-drilling water chemistry did not suggest major influences from gas well drilling or hydrofracturing (fracking) on nearby water wells, when considering changes in potential pollutants that are most prominent in drilling waste fluids. When comparing dissolved methane concentrations in the 48 water wells that were sampled both before and after drilling (from Phase 1), the research found no statistically significant increases in methane levels after drilling and no significant correlation to distance from drilling.425

C. Does Hydraulic Fracturing Cause Earthquakes?

1. National Research Council

On June 15, 2012, the National Research Council released a report which concluded that “[h]ydraulic fracturing has a low risk for inducing earthquakes . . ., but underground injection of wastewater produced by hydraulic fracturing and other energy technologies has a higher risk of causing such earthquakes.”426 Three major findings emerged from the study: (1) the process of hydraulic fracturing a well as presently implemented for shale gas recovery does not pose a high risk for inducing felt seismic events; (2) injection for disposal of wastewater derived from energy technologies into the subsurface does pose some risk for induced seismic activity, but very few events have been documented over the past several decades relative to the large number of disposal wells in operation; and (3) CCS, due to the large net volumes of injected fluids, may have potential for inducing larger seismic events.427

2. Department of Interior

On April 11, 2012, the Deputy Secretary of the United States Department of the Interior stated that scientists have been investigating the recent increase in the number of earthquakes in the United States to determine whether there is scientific evidence of a link between unconventional oil and gas production and seismic activity.428 The preliminary findings did not suggest that hydraulic fracturing caused

425. Id. at 4.
427. Id.
the increased rate of earthquakes. Instead, "at some locations the increase in seismicity coincide[d] with the injection of wastewater in deep disposal wells." In this regard, there were several instances for which "an uptick in seismic activity [was] observed in areas where the disposal of wastewater through deep-well injection increased significantly."431

D. What Are the Air Impacts From Shale Gas Development?

1. Colorado School of Public Health

On March 19, 2012, the Colorado School of Public Health released preliminary results from a study that "raise[d] concerns about the potential public health impact of air emissions from unconventional gas drilling operations,"432 Researchers at the Colorado School of Public Health "examined three years of air monitoring data in Garfield County, Colorado and concluded that residents living near natural gas wells may face increased exposure to benzene, a known human carcinogen, and other toxic chemicals, such as ethylbenzene, toluene, and xylene."433

The researchers found higher lifetime cancer risks for people living closer to the wells. They also concluded that these nearby residents have a higher risk of experiencing neurological and respiratory health effects, such as headaches, throat and eye irritation, impaired lung capacity, dizziness, fatigue, numbness in the limbs, and tremors.434

On March 21, 2012, the Colorado Oil & Gas Association issued a press release in response to the Colorado School of Public Health report saying it is based on faulty assumptions, including over stating how long it takes to drill a well and outdated data that fails to reflect


429. Id.
430. Id.
431. Id.
433. COMM. ON ENERGY & COMMERCE, supra note 432.
434. Id.
significant regulatory changes resulting in reduced emissions.\textsuperscript{435} The Association states that Colorado State University is crafting an emissions study for Garfield County, in collaboration with the EPA and others, that will “provide the reliable, relevant data that must precede health impact studies related to oil and gas drilling.”\textsuperscript{436}

2. American Petroleum Institute & America’s Natural Gas Alliance Study

On June 1, 2012, the American Petroleum Institute and America’s Natural Gas Alliance jointly released a report, which found that methane emissions are 50% lower than the EPA’s estimates for gas wells, thus undermining the EPA’s projected benefits from the new green completion rules.\textsuperscript{437} According to the report, methane emissions from natural gas operations such as liquids unloading (a technique used to remove water and other liquids from the wellbore to improve the flow of natural gas) are 86% lower than the EPA’s estimates.\textsuperscript{438} The report also states that methane emissions from well re-fracturing operations (a technique used to prolong production of an existing gas-producing well) are 72% lower than the EPA’s estimates.\textsuperscript{439}

The report examined data on 91,000 wells distributed over a broad geographic area and operated by over twenty companies, which was ten-times larger than the EPA’s.\textsuperscript{440} According to the report, the EPA’s calculation method substantially overestimated the amount of methane emissions from hydraulic fracturing and other unconventional natural gas production activities.\textsuperscript{441} In 2011, the EPA introduced a new calculation method that more than doubled the estimated emissions from natural gas production; the EPA’s estimates were based on a small set of data submitted by a limited number of companies.\textsuperscript{442}

\textsuperscript{436} Id.
\textsuperscript{437} Id.
\textsuperscript{438} Id.
\textsuperscript{439} Id.
\textsuperscript{440} Id.
\textsuperscript{441} Id.
\textsuperscript{442} Id.
E. What are the Financial and Political Benefits or Harms from Shale Gas Development?

1. MIT Study

In June 2010, MIT released an interdisciplinary study entitled “The Future of Natural Gas,” which discussed “the role of natural gas in a carbon-constrained economy.” The study stated that “[t]he environmental impacts of shale development are challenging but manageable.”

Shale development requires large-scale fracturing of the shale formation to induce economic production rates. There has been concern that these fractures can also penetrate shallow freshwater zones and contaminate them with fracturing fluid, but there is no evidence that this is occurring. There is, however, evidence of natural gas migration into freshwater zones in some areas, most likely as a result of substandard well completion practices by a few operators. There are additional environmental challenges in the area of water management, particularly the effective disposal of fracture fluids. Concerns with this issue are particularly acute in regions that have not previously experienced large-scale oil and natural gas development, especially those overlying the massive Marcellus shale, and do not have a well-developed subsurface water disposal infrastructure. It is essential that both large and small companies follow industry best practices; that water supply and disposal are coordinated on a regional basis and that improved methods are developed for recycling of returned fracture fluids.

2. Rice University

In July 2011, researchers at the James A. Baker III Institute for Public Policy at Rice University released a study that discussed the effect of shale gas on the United States’ national security. The study “examined some of the geopolitical consequences of rising supplies of natural gas from shale and the implications for U.S. security and foreign policy.” The study found that full development of commercial shale gas resources in the United States will have multiple beneficial effects for U.S. energy security and national interests. The full and timely development of U.S. shale gas resources will limit the need for expensive imports of liquefied natural gas, reducing the energy-related swelling of the U.S.

444. Id. at 7.
445. Id. at 7–8.
447. Id. at 52.
trade deficit and thereby helping to strengthen the U.S. economy. Shale gas will also lower the cost to average Americans of reducing greenhouse gases as the country switches to cleaner fuels.\(^{448}\)

Moreover, the study found that

as greater shale gas production creates greater competition among suppliers in global markets, U.S. and international prices for natural gas are kept from rising substantially. Increased competition among world natural gas suppliers due to shale gas developments also reduces the threat that a Gas-OPEC can be formed, and it will trim the petro-power of energy producing countries such as Russia, Iran, and Venezuela to assert themselves using an "energy" weapon or "energy diplomacy" to counter U.S. interests abroad.\(^{449}\)

The study concluded that

it will be essential for the United States to promote a stable investment climate with regulatory certainty. In particular, the United States will need [to] adopt policies that ensure shale gas exploitation can proceed steadily and predictably with sound environmental oversight. The United States should focus squarely on setting the policies needed to ensure that shale gas can play a significant role in the U.S. and global energy mix, thereby contributing to greater diversification of global energy supplies and to the long-term national interests of the United States.\(^{450}\)

VII. Litigation Trends

A. Recent Texas Lawsuits

Although civil lawsuits against oil and gas operators for alleged pollution are not new in Texas, there has been a significant increase in recent litigation that relates to hydraulic fracturing operations. For instance, the following lawsuits have recently been filed:

1. **Scoma v. Chesapeake Energy Corp.**

On June 1, 2010, Jim and Linda Scoma filed suit against Chesapeake Energy Corporation in the 413th Judicial District Court in Johnson County, Texas. Chesapeake subsequently removed the matter to the Northern District of Texas. On August 11, 2010, the Scomas filed their amended complaint in the Northern District of Texas.\(^{451}\) According to the amended complaint, the Scomas' house is near a Chesapeake oil and gas well in Johnson County, within the Barnett Shale.\(^{452}\) The Scomas claimed that Chesapeake's activities (including

\(^{448}\) Id.

\(^{449}\) Id.

\(^{450}\) Id. at 56.


\(^{452}\) Id.
hydraulic fracturing) contaminated their water well, which turned an orange/yellow color, tasted bad, and gave off a foul odor. The Scomas alleged that “[t]esting results performed on the well water in 2008 and again in 2009 show[ed] an increased concentration of harmful petroleum constituents, such as benzene, toluene, ethylbenzene, xylene, barium, and iron.” The Scomas asserted causes of action for nuisance, trespass, and negligence and sought exemplary damages as well as a permanent injunction, “precluding future drilling and fracking activities near [the Scomas’] land.” The Scomas also claimed that the continuing tort doctrine tolled their statute of limitations.

On May 10, 2011, Chesapeake filed a motion for summary judgment in this matter. In the motion, Chesapeake argued the following: (1) it was not a proper party to the lawsuit as it was not the lessee under the lease, it did not own any minerals, and it did not conduct any drilling or completion operations and activities near the Scomas’ property; (2) each of the Scomas’ claims were barred by limitations, and the alleged conduct of Chesapeake was not subject to the continuing tort doctrine; (3) the Scomas’ nuisance claim failed as a matter of law because they had admittedly suffered no damages; (4) the Scomas’ trespass claim failed as a matter of law, as Chesapeake had never intentionally or voluntarily entered the property and the Scomas had admittedly suffered no damages; and (5) the Scomas’ negligence claim failed as a matter of law because they admittedly had suffered no damages, Chesapeake owed no duty to them, and Chesapeake was not making use of the surface of their property. In response, the Scomas filed an “Emergency Motion to Stay for 58 Days Plaintiffs’ Response to Defendant Chesapeake Energy Corporation’s Motion for Summary Judgment,” which was granted by the court. The parties subsequently settled or otherwise resolved their claims, and a final judgment was entered on December 9, 2011, which dismissed the matter.

2. Sizelove v. Williams Production

District Court in Denton County, Texas.\(^{458}\) The Sizeloves alleged that the defendants' compressor and gas drilling operations caused them to suffer headaches and respiratory problems. The defendants allegedly installed a drill water collection site and gas compressor station 250 feet from the home, a gas pipeline just 400 feet from the home, and eight gas drills within a three-quarter mile radius. The complaint contended that the defendants cut down trees on the property and allowed workers to use the land as a toilet. The defendants' operations allegedly lowered the property value with constant noise and toxic formaldehyde, sulfur dioxide, benzene, toluene, and xylene emissions. The Sizeloves alleged claims for nuisance and trespass, and they sought property damages, damages for mental anguish, and exemplary damages. The case is currently set for trial on November 26, 2012.

3. **Heinkel-Wolfe v. Williams Production**

On November 3, 2012, Margaret Heinkel-Wolfe, Individually and as Next Friend for Paige Caroline Wolfe, a minor, filed suit against Williams Production Company, LLC, Mockingbird Pipeline, L.P., XTO Energy, Inc., Gulftx Operating, Inc., Trio Consulting & Management, LLC, and Exexo, Inc. in the 362nd Judicial District Court in Denton County, Texas.\(^{459}\) Similar to the Sizelove matter, Ms. Heinkel-Wolf alleged injuries due to the installation of a drill water collection site and gas compressor station just 990 feet from their home as well as a gas pipeline just 700 feet away and eight gas drills within a three-quarter mile radius. Ms. Heinkel-Wolf alleged that these operations have lowered her property value with constant racket and toxic formaldehyde, sulfur dioxide, benzene, toluene, and xylene emissions. Ms. Heinkel-Wolf claimed to suffer from headaches, respiratory ailments, and troubled breathing as a result of the defendants' drilling and compressing operations, which were polluting the air and water surrounding her home. In her amended complaint, Ms. Heinkel-Wolf dropped the negligence claims and allegations of water contamination, but she retained causes of action for nuisance and trespass. The matter is currently set for trial on September 17, 2012, as of this publication.

4. **Brock v. Jack Grace Production**

On September 15, 2011, Charles and Sharee Brock filed suit against Jack Grace Production in Montague County.\(^{460}\) The Brocks' house is allegedly near oil and gas operations of the defendant. According to the petition, after watching the 2010 Gasland documentary, the


Brocks lit their tap water on fire, which they attributed to the defendants’ operations. The Brocks’ water allegedly contained various pollutants as well as dissolved methane. The Brocks asserted claims for nuisance, trespass, and negligence and sought various damages including exemplary damages. They also claimed that the continuing tort doctrine tolled their statute of limitations. Following initial rounds of discovery, the Brocks sought to non-suit the matter, which was granted on June 15, 2011.\(^{461}\)

5. **Mitchell v. Encana Oil & Gas (USA), Inc.**

On December 15, 2010, Grace Mitchell filed suit against Encana Oil & Gas and Chesapeake in the Northern District of Texas.\(^{462}\) According to the complaint, Ms. Mitchell’s house was near the defendants’ oil and gas wells located in Johnson County, Texas, which is within the Barnett Shale. Ms. Mitchell claimed that her groundwater, which was her primary source of water, became contaminated soon after the defendants commenced their drilling and hydraulic fracturing. Ms. Mitchell claimed that she could no longer use the water from her own well for consumption, bathing, or washing clothes because in May 2010, the well water started to feel slick to the touch and gave off an oily, gasoline-like odor. Test results performed on the groundwater well confirmed it was contaminated with various chemicals, including various hydrocarbons, similar to diesel fuel. Ms. Mitchell had asserted claims for nuisance, trespass, fraud, fraudulent concealment, and strict liability for ultra-hazardous and abnormally dangerous activities. Ms. Mitchell also sought various damages, including exemplary damages and damages for future medical monitoring.

On March 15, 2011, Chesapeake filed a motion to dismiss.\(^{463}\) In its motion, Chesapeake argued that (1) Ms. Mitchell’s nuisance, trespass, and negligence claims failed Federal Rule of Civil Procedure 8’s “Plausibility” Test; (2) Ms. Mitchell failed to plead her fraud and fraudulent concealment claim with specificity under Federal Rule of Civil Procedure 8 and 9(b); and (3) Texas law does not recognize abnormally dangerous activities doctrine as a basis for strict liability. On March 16, 2011, Encana Oil & Gas also filed a motion to dismiss that raised several of the same arguments.\(^{464}\) The parties subsequently set-


\(^{463}\) See Motion to Dismiss, Mitchell v. Encana Oil & Gas (USA), Inc., No. 3:10-CV-02555-N (N.D. Tex. filed Mar. 15, 2011).

\(^{464}\) See Motion to Dismiss, Mitchell v. Encana Oil & Gas (USA), Inc., No. 3:10-CV-02555-N (N.D. Tex. filed Mar. 16, 2011).
tled or otherwise resolved their claims, and the court entered a final judgment dismissing the matter on December 27, 2011.465

6. Harris v. Devon Energy Production Co., L.P.

On December 15, 2010, Doug and Diana Harris filed suit against Devon Energy Production Company, L.P. in the Northern District of Texas.466 According to the Complaint, the Harrises' house was near the defendants' oil and gas wells located in Denton County, Texas, which was within the Barnett Shale. According to the Harrises, soon after defendant commenced drilling and hydraulic fracturing operations, their groundwater became contaminated. The Harrises also claimed that they could no longer use the water from their well for consumption, bathing, or washing clothes. In April 2008, their groundwater became polluted with a gray sediment. They claimed that testing results performed on the groundwater well showed water contamination with high levels of metals: aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, nickel, potassium, sodium, strontium, titanium, vanadium, and zinc, some of which upon information and belief, are contained in a commercial compound called “bentonite” used in drilling mud. The Harrises have similarly asserted claims for nuisance, trespass, fraud, fraudulent concealment, and strict liability for ultra-hazardous and abnormally dangerous activities. They also sought various damages, including exemplary damages and damages for future medical monitoring.

On December 22, 2010, because the Harrises resided in Denton County, which is located in the Eastern District of Texas, the court sua sponte transferred the matter to the Eastern District of Texas, Sherman Division.467 On January 6, 2011, Devon filed a partial motion to dismiss on the basis that (1) the Harrises' one-paragraph fraudulent concealment claim amounted to nothing more than conclusory allegations without any supporting facts, which had not been plead with sufficient particularity under Federal Rules of Civil Procedure 8 and 9(b) and (2) Texas law does not recognize the abnormally dangerous activities doctrine as a basis for strict liability.468 In response, the Harrises withdrew their strict liability claim and filed a motion seeking leave to

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file a new complaint—one that added in certain "improved edits . . . to satisfy the elements of their fraud claim."469

The court eventually granted the Harrises' motion for leave to file their amended complaint and thus, denied Devon's motion to dismiss as moot. On April 8, 2011, the Harrises filed their first amended complaint containing their alleged cause of action for fraud.470 On April 18, 2011, Devon filed its second partial motion to dismiss the fraud claim for failure to state a claim upon which relief can be granted.471 In addition, on May 26, 2011, Devon filed a motion for summary judgment against the Harrises' remaining claims on the basis that they claimed that their water well was contaminated as a result of Devon's drilling, fracking, and storage activities was not scientifically possible.472

On December 6, 2011, the Harrises filed a motion to dismiss without prejudice.473 According to the Harrises, even though testing showed toxic contamination in their well water when the lawsuit was filed in December 2010, recent testing had shown that the contamination was no longer at a toxic level for human consumption.474 Devon objected to the request because it permitted the Harrises to avoid a dispositive ruling on the merits of Devons' motion for summary judgment as well as prevented Devon from recovering its taxable court cost.475 Nonetheless, the court entered a final judgment dismissing the matter without prejudice on January 25, 2012.476 On February 2, 2012, Devon filed a notice of appeal to the Fifth Circuit.477

7. Town of Dish v. Atmos Energy Corp.


474. Id.


Court in Denton County, Texas. Two other suits were also filed by Dish property owners—one by town Commissioner William Sciscoe and his wife, Denise, and another by the owners of nearby properties. In the petition, Dish claimed that excessive emissions, noise, and light from the defendants’ compressor station facilities amounted to a public nuisance. They also accused the defendants of trespassing for allowing emissions to pollute the town’s air.

8. **Parr v. Aruba Petroleum, Inc.**

On March 8, 2011, Lisa Parr filed suit against Aruba Petroleum, Inc., Ash Grove Resources, L.L.C., Encana Oil & Gas (USA), Inc., Halliburton Company, Republic Energy, Inc., Ryder Scott Company, L.P., Ryder Scott Oil Company, Tejas Production Services, Inc., and Tejas Western Corp. in County Court at Law No. 5 in Dallas County, Texas. Parr claimed that defendants’ natural gas exploration and development activities occurred close to her home that was located in Decatur, Texas, which is within the Barnett Shale. She claimed that defendants had caused releases, spills, emissions, and discharges, which had exposed her and her property to hazardous gases, chemicals, and industrial wastes. Parr asserted causes of action for assault, intentional infliction of emotional distress, negligence, gross negligence, negligence per se, nuisance, trespass, and strict liability for abnormally dangerous activity. She sought various damages, including exemplary damages and damages for future medical monitoring.

9. **Lipsky v. Range Production Co.**

On June 20, 2011, Steven and Shyla Lipsky filed suit against Durant, Carter, Coleman, L.L.C., Silverado on the Brazos Development Company #1 Ltd., Jerry V. Durrant, James T. Coleman, Estate of Preston Carter, Range Production Company, and Range Resources Corporation in Parker County, Texas. The Lipskys’ property was the subject of the *EPA vs. Range* enforcement matter referenced above. In this matter, the Lipskys asserted private causes of action against the various developers for breach of contract, violation of the Texas Deceptive Trade Practices Act, and tortious interference with contract, as well as for negligence, gross negligence, malice, and nuisance. The

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Lipskys sought 4.5 million dollars in actual damages and 2 million dollars in mental anguish.

On August 18, 2011, Range filed a plea to the jurisdiction or, in the alternative, motion for summary judgment on the basis that the Lipskys' nuisance and trespass claims were an impermissible collateral attack on the RRC's Final Order, which found that Range's operations "have not caused or contributed, and are not causing or contributing to contamination of any domestic water wells." The trial court agreed and granted Range's motion on January 27, 2012. However, Range still maintains its counterclaims against the Lipskys in this matter.

B. Typical Claims

As referenced above, the typical causes of action asserted by the plaintiffs are nuisance, trespass, and negligence. Some of the plaintiffs have also asserted claims for breach of contract, fraud, fraudulent concealment, and strict liability for ultra-hazardous and abnormally dangerous activities. The plaintiffs seek various damages, including exemplary damages and damages for future medical monitoring as well as injunctive relief. The following Section describes each of these causes of action under Texas law.

1. Nuisance

A nuisance is "a condition that substantially interferes with the use and enjoyment of land by causing unreasonable discomfort or annoyance to persons of ordinary sensibilities attempting to use or enjoy it."482 "[A] condition that causes aesthetic changes to the view, scenery, landscape, or beauty of an area is not a nuisance."483

A nuisance may arise by causing (1) physical harm to property, such as by the encroachment of a damaging substance or by the property's destruction, (2) physical harm to a person on his property from an assault on his senses or by other personal injury, and (3) emotional harm to a person from the deprivation of the enjoyment of his property through fear, apprehension, or loss of peace of mind.484

"For an actionable nuisance, a defendant must generally engage in one of three kinds of activity: (1) intentional invasion of another's interests; (2) negligent invasion of another's interests; or (3) other conduct, culpable because abnormal and out of place in its surroundings,

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484. Walton, 65 S.W.3d at 270.
that invades another's interests.\textsuperscript{485} Accordingly, "proof of negligence is not essential to the imposition of liability for the creation and maintenance of a nuisance."\textsuperscript{486} This makes this cause of action very attractive for plaintiffs as nuisance can have the same practical effect as strict liability.\textsuperscript{487} Several Texas courts have held that "one may create a private nuisance by using property in a way that causes reasonable fear in those who own, lease, or occupy property nearby."\textsuperscript{488} Generally, proof of due care is not a defense because nuisance looks only to effect, not to the culpable conduct of the defendant.\textsuperscript{489}

The appropriate measure of damages depends on whether the nuisance causing the injury is permanent or temporary.\textsuperscript{490} The differences between permanent and temporary injury is discussed in greater detail below. Nuisance claims permit injunctive relief and recovery for punitive damages.\textsuperscript{491} Nuisance claims also permit recovery of damages for sickness, annoyance, discomfort, or other substantial bodily harm caused by a nuisance that impairs the comfortable enjoyment of real property.\textsuperscript{492}

2. Trespass

Trespass is defined as the intentional physical interference with the exclusive possession of property.\textsuperscript{493} To establish a trespass, one must prove actual physical invasion of the right of possession.\textsuperscript{494} "Physical invasion" means that a party enters another's property without a legal right of possession.\textsuperscript{495} Trespass can also result from a party causing or


\textsuperscript{486} Bible Baptist Church v. City of Cleburne, 848 S.W.2d 826, 829 (Tex. App.—Waco 1993, writ denied).

\textsuperscript{487} Id.


\textsuperscript{489} See Hill v. Villarreal, 362 S.W.2d 348, 349 (Tex. Civ. App.—Waco 1962, writ ref'd n.r.e.).

\textsuperscript{490} Schneider Nat'l Carriers, Inc. v. Bates, 147 S.W.3d 264, 276 (Tex. 2004).


\textsuperscript{492} Vestal v. Gulf Oil Corp., 235 S.W.2d 440, 441–42 (Tex. 1951).


\textsuperscript{495} Schronk, 380 S.W.2d at 744; Johnson, 93 S.W.2d at 558.
allowing an object to cross onto another’s land.\textsuperscript{496} Since possession is the protected right, a trespass can occur whether or not actual damage occurs to the invaded property.\textsuperscript{497} This cause of action can afford injunctive relief, as well as recovery for actual and punitive damages.\textsuperscript{498}

Several types of oil and gas operations can result in the unauthorized invasion of the property of another without any entry onto the surface of that land.\textsuperscript{499} These types of invasions are often referred to as “subsurface trespass.”\textsuperscript{500} The issue of whether such invasions caused by hydraulic fracturing operations constitute a trespass was recently addressed by the Texas Supreme Court in \textit{Coastal Oil & Gas Corp. v. Garza Energy Trust}.\textsuperscript{501} Although declining to rule on the broad issue of whether such intrusions constitute a trespass in general, the Court held that the rule of capture precludes trespass claims that assert drainage of the natural gas as the only injury.\textsuperscript{502}

The Texas Supreme Court has recently spoken on waste water injection wells as well.\textsuperscript{503} In \textit{FPL Farming Ltd. v. Environmental Processing Systems, L.C.}, a landowner that owned tracts of land near a nonhazardous wastewater injection well sued the operator for trespass.\textsuperscript{504} The court of appeals (relying on the \textit{Garza} opinion), held that a party was shielded from civil tort liability merely because it received a permit to operate a deep subsurface wastewater injection well.\textsuperscript{505} The court reasoned that “[w]hen a state agency authorized deep subsurface injections, no trespass occurs when fluids that were injected at deep levels are then alleged to have later migrated at those deep levels into the deep subsurface of nearby tracts.”\textsuperscript{506} The Texas Supreme Court disagreed and held that “[a]s a general rule, a permit granted by an agency does not act to immunize the permit holder from civil tort liability . . . for actions arising out of the use of the permit.”\textsuperscript{507} The Court also distinguished wastewater injection from hydraulic fracturing as one deals with the extraction of minerals;

\begin{footnotesize}
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\item \textsuperscript{496} See Gregg v. Delhi–Taylor Oil Corp., 344 S.W.2d 411, 416 (Tex. 1961).
\item \textsuperscript{499} Smith & Weaver, supra note 176, § 7.2(A)(2), at 18.
\item \textsuperscript{500} Id.
\item \textsuperscript{501} Coastal Oil & Gas Corp. v. Garza Energy Trust, 268 S.W.3d 1, 11–12 (Tex. 2008).
\item \textsuperscript{502} Id. at 12–13.
\item \textsuperscript{503} FPL Farming v. Envtl. Processing Sys., L.C., 351 S.W.3d 306 (Tex. 2011).
\item \textsuperscript{505} Id. at 744.
\item \textsuperscript{506} Id.
\item \textsuperscript{507} FPL Farming, 351 S.W.3d at 310–15.
\end{itemize}
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therefore, the rule of capture applies and negates the element of injury to a trespass claim.\textsuperscript{508}

3. Negligence and Negligence Per Se

As in any other negligence case, the plaintiff must show that the defendant owed the plaintiff a duty, the defendant breached that duty, that the plaintiff was injured, and that the plaintiff’s injury was proximately caused by the defendant’s breach. Although the plaintiff need not prove negligence under a nuisance theory, negligence is typically included in the laundry list of theories of recovery nonetheless. In this context, the plaintiff generally claims that the defendant owed a duty to conduct operations so as not to pollute the plaintiff’s property.\textsuperscript{509}

However,

\textsuperscript{508} Id.


\textsuperscript{510} Id. at 527–28.

\textsuperscript{511} Id. at 528.
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if so, whether the violation was a proximate cause of the accident.\textsuperscript{512}

In Texas, Statewide Rule 8 could potentially serve as the basis for a negligence per se claim related to oilfield contamination.\textsuperscript{513}

4. Miscellaneous Other Claims and Issues

Breaches of contract claims usually relate to breach of a mineral lease agreement between the mineral interest owner and the operator or breach of a surface use agreement between the operator and the surface estate owner. Such agreements might contain clauses that require the operator to restore the property to pre-drilling condition following operations.\textsuperscript{514} Contamination might be a breach of such agreements as well as a breach of an implied covenant to manage and administer the lease as a reasonable, prudent operator.\textsuperscript{515}

With regard to strict liability, the Texas Supreme Court has held that it is not a basis for recovery in water pollution cases.\textsuperscript{516} Further, "Texas does not recognize a cause of action of strict liability for ‘ultrahazardous’ or ‘abnormally dangerous’ activities."\textsuperscript{517} Texas case law also supports that medical monitoring is not a recognized cause of action in Texas.\textsuperscript{518} Intentional infliction of emotional distress is a "gap-filler" tort, created to permit recovery in "those rare instances in which a defendant intentionally inflicts severe emotional distress in a manner so unusual that the victim has no other recognized theory of redress."\textsuperscript{519} "Where the gravamen of a plaintiff's complaint is really another tort, intentional infliction of emotional distress should not be available."\textsuperscript{520} Accordingly, this theory should rarely apply to the claims asserted above.

Fraud by nondisclosure, or fraudulent concealment, is a subcategory of common-law fraud.\textsuperscript{521} Fraud based on nondisclosure requires a threshold showing of grounds giving rise to a duty to speak on the part of the silent party, such as the existence of a confidential or fiduciary

\textsuperscript{512} Mieth v. Ranchquest, Inc., 177 S.W.3d 296, 305 (Tex. App.—Houston [1st Dist.] 2005, no pet.) (citing Carter v. William Sommerville & Son, Inc., 584 S.W.2d 274, 278 (Tex. 1979)).

513. \textit{Id.}


520. \textit{Id.}

relationship. In federal court, to plead fraud with particularity, a plaintiff must include "the time, place and contents of the false representations, as well as the identity of the person making the misrepresentation and what that person obtained thereby." 523

C. Key Defenses

There are several key defenses available in response to claims of alleged contamination caused by hydraulic fracturing activities. For the most part, these are the same defenses that have historically been utilized in environmental pollution cases in Texas, which are described below.

1. Surface Estate Owner and Neighboring Property Owner

The duties owed by an oil and gas operator to the surface estate owner are much narrower than those owed to a neighboring property owner. When the mineral and surface estates are severed, the mineral estate is the dominant estate. 524 The execution of a mineral lease typically not only sever the minerals from the surface but also creates dominant and servient estates. 525 The entity that owns the minerals enjoys the dominant estate. 526 Ownership of the dominant estate carries with it the right to enter and extract the minerals and "all other such incidents thereto as are necessary to be used for getting and enjoying" the minerals. 527 Incident to the right to extract is the right to explore. 528 If in pursuing these rights, the servient estate is susceptible to use in only one manner, then the owner of the dominant estate may pursue that use irrespective of whether it results in damage to the surface. 529 In other words, if particular damage to the surface estate cannot reasonably be avoided in legitimately pursuing the rights of the dominant estate, the owner of the dominant estate is not liable for the damage. 530

Thus, the mere fact of damage to the surface does not evince unreasonable conduct. 531 Instead, it is incumbent upon the surface owner

527. Id.
528. Id.
529. Id.; Getty Oil Co. v. Jones, 470 S.W.2d 618, 622 (Tex. 1971).
530. Haupt, Inc., 854 S.W.2d at 911; Getty Oil Co., 470 S.W.2d at 622.
531. See Ball v. Dillard, 602 S.W.2d 521, 523 (Tex. 1980).
to establish that the dominant estate owner failed to use reasonable care in pursuing its rights or that the rights could have been pursued through reasonable alternate means sufficient to achieve the goal desired but without the damage.532 Accordingly, the servient estate owner must prove that its opponent failed to act reasonably given the correlative rights and liabilities involved.533 However, these same standards are not applicable to neighboring property owners who also claim that their property has been impacted by an oil and gas operator. Accordingly, the status of the plaintiff could widely determine the duties owed to him.

2. Temporary and Permanent Injury

Temporary versus permanent injury is always one of the more significant issues in oilfield pollution cases. In addition to actually trying to determine the nature of the injury complained of, there are strategic considerations associated with choosing whether the injury is temporary, permanent, or both . . . 534

"The difference between temporary and permanent injury is significant, primarily as it relates to the" appropriate measure of damages as well as the "affirmative defense of the statute of limitations."535

a. Measure of Damages

Permanent damage results from activity that is of such a character and that exists under such circumstances "that it will be presumed to continue indefinitely."536 Permanent injuries are those that are "constant and continuous, not intermittent or recurrent."537 The proper measure of damages for permanent injury to the land is the diminution in the value of the land.538 Temporary injuries are intermittent, sporadic, or recurrent injuries to land that are "contingent upon some irregular force, such as rain."539 When an injury to land is temporary and can be remediated at reasonable expense, the proper measure of damages is the cost of restoration to its condition immediately preceding the injury.540 However, when the cost of restoration exceeds the

532. Haupt, Inc., 854 S.W.2d at 911.
533. Id.
534. Keffer, supra note 509, at 532.
535. Id.
537. Id.
539. Bayouth, 671 S.W.2d at 868.
540. Kraft, 565 S.W.2d at 227.
diminution in fair market value, the diminution in fair market value is the cap on the measure of damages.\textsuperscript{541}

\textbf{b. Statute of Limitations}

The statute of limitations for trespass, nuisance, and negligence for damages to land are governed by the two-year statute of limitations and are required to be brought within two years from the date of accrual.\textsuperscript{542} "An action for permanent damages to land accrues, for limitations purposes, upon the date of discovery of the first actionable injury"—not on the date the damages to the land are fully ascertainable.\textsuperscript{543} Thus, an action to recover damages for permanent injury accrues when injury first occurs or is discovered. On the other hand, a temporary injury claim accrues anew upon each injury.\textsuperscript{544} Accrual of limitations is a question of law for the court.\textsuperscript{545} The continuing tort doctrine, which is an exception to the statute of limitations, does not apply to claims where the damages arise from permanent injury to the land.\textsuperscript{546}

\textbf{c. Application}

Texas courts have generally considered contamination from oil and gas operations to be permanent injuries to the land. For instance, in \textit{Mieth v. Ranchquest, Inc.}, the Houston Court of Appeals held that the damage to property caused by discharge of drilling fluids, diesel fuel, oil, and saltwater during operations at oil and gas wells was permanent.\textsuperscript{547} In \textit{Hues v. Warren Petroleum Co.}, the same court determined that landowners sued an oil and gas company for permanent damages to their property based upon gas leaks and the disposal of brine, which had begun several years earlier.\textsuperscript{548} In \textit{Walton v. Phillips Petroleum Co.}, the El Paso Court of Appeals held that a landowner alleged permanent injuries by asserting that an oil company's salt-water pits caused migration of pollutants into his groundwater; at the time, the landowner's water was contaminated and had been for several years, and there was never a time where contamination was non-existent or


\textsuperscript{544} Id.

\textsuperscript{545} Id. at 437–38.

\textsuperscript{546} Mitchell Energy Corp., 958 S.W.2d at 443.

\textsuperscript{547} Mieth v. Ranchquest, Inc., 177 S.W.3d 296, 303 (Tex. App.—Houston [14th Dist.] 2005, no pet.).

significantly diminished due to changing conditions.\textsuperscript{549} Finally, in \textit{Mitchell Energy Corp. v. Bartlett}, the Fort Worth Court of Appeals determined that the injuries to the landowners' property were permanent based upon claims of groundwater contamination from the defendant's historic oil and gas operations.\textsuperscript{550}

3. Standing

Only the person whose primary legal right has been breached has standing to seek redress for an injury.\textsuperscript{551} In other words, a person has standing to sue only when he or she is personally aggrieved by an alleged wrong.\textsuperscript{552} "Without a breach of a legal right belonging to a plaintiff, that plaintiff has no standing to litigate."\textsuperscript{553} A plaintiff must have a cause of action for injury to the property in order to have standing.\textsuperscript{554} The cause of action for an injury to property belongs to the person owning the property at the time of the injury.\textsuperscript{555} Without an express assignment, the cause of action does not pass to a subsequent purchaser of the property; thus, he or she cannot recover for an injury committed before his or her purchase.\textsuperscript{556}

In \textit{Senn v. Texaco, Inc.}, the Eastland Court of Appeals regarded "the distinction between temporary and permanent injuries [a]s meaningless with respect to the issue of standing."\textsuperscript{557} The court found that "any injury to the land that the defendants might have caused, whether temporary or permanent, occurred prior to the Senns' purchase of the land," and the Senns therefore, "d[id] not own any causes of action for either type of injury that may have been caused by the defendants."\textsuperscript{558} Adopting the reasoning of the Eastland Court of Appeals decision in \textit{Senn}, the Tyler Court of Appeals held that, when the undisputed evidence "showed a continuing condition that already existed on the date of purchase" and no new injuries occurred after purchase of the property (or an assignment of a cause of action for the


\textsuperscript{550} Mitchell Energy Corp., 958 S.W.2d at 436.

\textsuperscript{551} Nobles v. Marcus, 533 S.W.2d 923, 927 (Tex. 1976).

\textsuperscript{552} Nootsie, Ltd. v. Williamson Cnty. Appraisal Dist., 925 S.W.2d 659, 661 (Tex. 1996).

\textsuperscript{553} Denman v. Citgo Pipeline Co., 123 S.W.3d 728, 732 (Tex. App.—Texarkana 2003, no pet.); Brunson v. Woolsey, 63 S.W.3d 583, 587 (Tex. App.—Fort Worth 2001, no pet.).

\textsuperscript{554} Denman, 123 S.W.3d at 732; see Nobles, 533 S.W.2d at 927.


\textsuperscript{556} Id.


\textsuperscript{558} Id.
prior injury), “the [plaintiff] had not been aggrieved and therefore had no standing.”

In *West v. Brenntag Southwest, Inc.*, the court ruled that it had to determine whether there was evidence of a new and distinct injury that occurred after the plaintiff acquired the property. The plaintiff argued that the contamination’s gradual leaking into the soil continued while he owned the property and that this fact was sufficient to show a new injury to support standing. The court disagreed, holding that the fact that the injury existed throughout the plaintiff’s ownership did not create a new injury to the land. The court found that the injury was continuous and lingering and, without an assignment, would not support standing to bring a suit for negligence or nuisance.

4. Causation

With respect to water pollution claims, plaintiffs will be required to show that contaminants from defendants’ hydraulic fracturing activities migrated into plaintiffs’ water wells and caused their injuries. “Causation cannot be established by mere guess or conjecture; it must be established by evidence of probative value.” In *Mitchell Energy Corp. v. Bartlett*, the plaintiff relied on testimony from a geochemist that specialized in “isotopic geochemistry” to establish that the contaminants in the plaintiff’s water wells came from the defendants’ oil and gas operations. However, the court held that the geochemist’s testimony provided no evidence of causation in light of the fact that the expert did not gather any evidence from other gas wells in the area and did not rule out other possibilities of the alleged contamination. In *FPL Farming, Ltd. v. Environmental Processing Systems*, the Beaumont Court of Appeals held that there was no evidence that the plaintiff suffered any injury caused by the defendant’s injections of waste into a wastewater injection well on its property as there was no evidence that the wastewater had migrated to the surface of the property or that the injection well was a danger to the drinking water.

561. Id. at 335.
562. Id. at 335–36.
563. Id.
565. Id. (citing McClure v. Allied Stores of Tex., Inc., 608 S.W.2d 901, 903 (Tex. 1980)).
566. Id.
567. Id. at 446–47.
In *Strudley v. Antero Resources, Corp.*., a court in Denver, Colorado entered a summary judgment, dismissing the plaintiffs' claim that stemmed from alleged injuries caused by hydraulic fracturing operations due to the lack of evidence on causation.\(^{569}\) In reaching its decision, the court relied on the fact that the Colorado Oil and Gas Conservation Commission ("COGCC") had conducted an investigation of the plaintiffs' well water and had concluded that the water supply was not affected by oil and gas operations in the vicinity.\(^{570}\) The court further considered the defendants' sworn testimony that their activities were conducted in compliance with applicable laws and regulations designed to protect human health and the environment, including those administered by the COGCC and the Colorado Department of Public Health and Environment ("CDPHE").\(^{571}\) In addition, the court considered evidence that both the defendants' air emission-control equipment at the wells and prevailing wind patterns made it unlikely that the plaintiffs or their property were exposed to harmful levels of chemicals from the defendants' activities.\(^{572}\)

In addition, plaintiffs might not be able to prove causation if contaminants are not present in concentrations above certain levels. In *Taco Cabana Inc. v. Exxon Corporation*, the purchaser of commercial property sued the former lessee of the prior owner for trespass, negligence per se, and other claims, alleging that the lessee failed to remediate the property it previously subleased as a gasoline station.\(^{573}\) The San Antonio Court of Appeals held that the plaintiff failed to establish causation as the evidence did not establish that the soil contained contaminants that exceeded state levels sufficient to trigger a duty to take corrective action.\(^{574}\) The court reasoned that "[t]o the extent that any common law duties regarding removal of contamination existed, such duties [had] been displaced by the Texas Water Code . . . because the Legislature [had] delegated to the TWC the task of determining appropriate cleanup standards."\(^{575}\) Both the Texas Administrative Code as well as the RRC's Field Guide provide guidance on maximum contaminant levels in drinking water resulting from oil and gas spills.\(^{576}\) Accordingly, this same argument could be made in the con-

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570. Id.
571. Id.
572. Id.
574. Id. at 780.
575. Id.
text of a claim of water pollution allegedly caused by hydraulic fracturing operations.

VIII. CLOSING

Due to the size of the potential natural gas reserves available, shale gas development utilizing hydraulic fracturing provides this nation with a realistic opportunity to finally reduce its dependence on foreign oil. However, to meet this nation’s future demands, the scale of exploration and production will have to drastically increase over the coming years. Such activities will undoubtedly impact the environment. Due to pressure from both environmental groups as well as the industry, current and future regulation on the federal, state, and local level will continue to play a key role in this area. However, it is important that all interested parties work together to solve the environmental concerns so that the benefits of shale gas development can be fully realized for generations to come.

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