Chocolate, Coca-Cola, and Fracturing Fluid: A Story of Unfettered Secrecy, Toxicology, and the Resulting Public Health Implications of Natural Gas Development

Brie D. Sherwin, J.D., Ph.D.*

As hydraulic fracturing has become the new darling of energy production and America’s hope for energy independence, health care professionals and related organizations, like the Nobel Peace Prize-winning Physicians for Social Responsibility, have expressed concern over the industry’s use of the trade secret exemption when it comes to fracturing fluids. Health care professionals are voicing concerns about how the secretive nature of trade secret protections and even current legislation (or lack thereof) are stifling their ability to treat patients complaining of symptoms associated with exposure to these chemicals. Without information on what is in the fluids and at what concentrations, toxicologists, epidemiologists, and physicians alike are wondering how exactly to characterize risk and properly treat those who are complaining of exposure-related health problems.

The nature of trade secret protection has always been broad and inclusive, protecting the proprietary nature of components and processes, thus allowing companies to have a competitive edge over competitors. Oil and gas companies invoke this protection, claiming that disclosure of even some of the names of the chemical components may hurt them competitively. Ironically, many companies, most notably soft drink giants, enjoy trade secret protection yet disclose the “secret ingredients” in their products. Should trade secret protection be treated as an unquestioned right that can simply be invoked even when there are far-reaching environmental concerns about public health? In that light, this Article will address the impact of the trade secret on a physician’s duty to treat patients when faced with limitations on information dissemination. This Article will also explore the fundamental nature of trade secret protection and whether misuse is occurring when companies claim trade secret protection of fracturing fluid products. Finally, this Article will review current regulatory loopholes in the reporting process and examine the question of whether there is an existing common law doctrine that addresses the misuse of this protection.

*Dr. Sherwin is an Assistant Professor of Law at Texas Tech University School of Law and an Adjunct Professor of Public Health at Texas Tech University Graduate School of Biomedical Sciences. She holds a J.D. and a Ph.D in Environmental Toxicology. She would like to thank Dr. Natalie Tarenko and Cassidy Woodard for their wonderful work.
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I. INTRODUCTION

“At what point does preliminary evidence of harm become definitive evidence of harm? When someone says, ‘We were not aware of the dangers of these chemicals back then’ whom do they mean by we?’

Sandra Steingraber, Living Downstream

Cathy Behr, an emergency room nurse in Durango, Colorado, thought that her hospital was simply being overly cautious when it shut down and evacuated the emergency room due to the overwhelming chemical smell coming from gas-patch worker, Clinton Marshall. He had entered the emergency room, seeking medical help because his clothes and boots were soaked through with Zeta-Flow, a chemical fracturing fluid, which was used at his worksite, a well located on the Southern Ute Indian Reservation.1 “I honestly thought the response was a little overkill, but good practice,” Behr

1 Sandra Steingraber, Living Downstream: An Ecologist’s Personal Investigation of Cancer and the Environment 9 (2d ed. 2010).

later commented.\textsuperscript{3} Regardless, Behr’s duty as a medical professional kicked in. Despite the fact that she did not know what the hospital was dealing with, she helped Marshall remove his boots and shower, all while breathing in the chemical fumes.\textsuperscript{4} At that point, Marshall was already complaining of nausea and headaches, symptoms of likely acute exposure.\textsuperscript{5} Minutes later, the hospital staff employed protective masks and gowns to shield the strong odor.\textsuperscript{6} Unfortunately for Behr, this did not happen until after she had been treating Marshall for about ten minutes.\textsuperscript{7} Behr lost her sense of smell and her vision blurred.\textsuperscript{8} Days later, Ms. Behr was hospitalized due to a number of organ failures.\textsuperscript{9} Three different doctors diagnosed her with acute chemical exposure; one called Weatherford International, the patient’s employer, to find out what chemicals were in Zeta-Flow.\textsuperscript{10} The rest of the story is foggy as to whether the doctors received the information in a timely manner, or at all. Weatherford later argued that it did provide Material Safety Data Sheets (MSDS) to the hospital,\textsuperscript{11} which detailed ingredients and health warnings,\textsuperscript{12} however, some emergency room doctors denied ever receiving them.\textsuperscript{13} Zeta-Flow, the fracturing fluid in question, contained methanol as well as two “proprietary ingredients” for which the chemical safety information was not provided.\textsuperscript{14} In the case of methanol, prolonged exposure could cause liver and kidney damage, lung irritation, dizziness, and vomiting—all symptoms experienced by Behr.\textsuperscript{15}

The company refused to provide the proprietary information, claiming trade secret protection.\textsuperscript{16} The oil and gas industry officials argued that forcing companies to reveal the information would force it to take its business outside

\textsuperscript{3} Moscou, \textit{supra} note 2.


\textsuperscript{6} Moscou, \textit{supra} note 2.

\textsuperscript{7} Id.

\textsuperscript{8} Greene, \textit{supra} note 4.

\textsuperscript{9} Tsou, \textit{supra} note 5.

\textsuperscript{10} Greene, \textit{supra} note 4.


\textsuperscript{12} Moscou, \textit{supra} note 2.


\textsuperscript{14} Moscou, \textit{supra} note 2.

\textsuperscript{15} Id.

\textsuperscript{16} Greene, \textit{supra} note 4.
of Colorado.\textsuperscript{17} One oil and gas executive likened it to asking the Coca-Cola company to disclose the formula for Coke.\textsuperscript{18}

The issue bubbled to a head\textsuperscript{19} in Colorado, where industry continued to state that being forced to reveal its proprietary secrets could prompt it to leave Colorado, taking its business with it.\textsuperscript{20} And Weatherford’s response regarding any health effects related to exposure to Zeta-Flow? “It’s got parameters that you need to work in, that you need to be mindful of when you’re using it. That’s sort of a given. I mean, if I ate too much chocolate, that could be hazardous to my health, too,” said Weatherford spokeswoman Christine McGee.\textsuperscript{21} Behr’s response? “Chocolate, huh? Let’s give those boots to her and have her take a couple of deep breaths.”\textsuperscript{22} Behr subsequently tried to tell her story before the Oil and Gas Conservation Commission of Colorado. The Commission denied her request by a 5–4 vote based on the industry’s objection that she had been added too late to the list of witnesses in order for them to prepare a rebuttal.\textsuperscript{23} Behr’s patient, Marshall, who was subsequently fired by Weatherford,\textsuperscript{24} later told the Durango Herald that he never experienced ill effects from the spill.\textsuperscript{25} Behr still suffers from breathing difficulties.

What, exactly, is in Zeta-Flow? Increasingly, health professionals and the general public want to know. The fracturing mix is just that—a mixture containing a number of ingredients, some of which are protected by trade secret. In fact, this product, produced by Weatherford International, already boasts patent protection for its “enhance[d] conductivity” and “fine[] control.”\textsuperscript{26} thereby increasing gas production.\textsuperscript{27} Additionally, due to what is known as the “Halliburton Loophole” in the Energy Policy Act of 2005,\textsuperscript{28} gas

\begin{footnotesize}
\begin{enumerate}
\item[17] \textit{Id.}
\item[18] \textit{Id.} Specifically, the story reported that the Halliburton executive testified, “It is much like asking Coca-Cola to disclose the formula of Coke.”
\item[19] Pun intended.
\item[20] Greene, supra note 4.
\item[21] \textit{Id.}
\item[22] \textit{Id.}
\item[23] \textit{Id.}
\item[24] Frankowski, supra note 11.
\item[25] \textit{Id.; see also} Moscou, supra note 2 (“Marshall, a 31-year-old Aztec, N.M. resident, spoke with the Durango Herald last month and says he doubts that ZetaFlow sickened Behr. ‘I’m not saying that nothing did happen to her,’ he told the newspaper. ‘I’m just saying . . . I didn’t have any of it on me. I did not take any chemical into that hospital. The Durango Fire and Rescue Authority did, however, confirm that they were called to aerate the ER.’” (alteration in original)).
\item[27] Kelly, supra note 2.
drilling and extraction (with the exception of diesel) is exempt from the Underground Injection Control (UIC) program of the Safe Drinking Water Act (SWDA).\footnote{The Safe Drinking Water Act (SDWA) of 1974 authorized the Underground Injection Control (UIC) program. Pub. L. No. 93-523, §§ 121–126, 88 Stat. 1660, 1674–80 (codified at 42 U.S.C. §§ 300h to 300h-5 (2012)).}

Zeta-Flow is just one of many chemicals used in the hydraulic fracturing process. And, as horizontal drilling technology advances and gas drilling exponentially increases, natural gas production continues to reach its highest level in decades.\footnote{U.S. HOUSE OF REPRESENTATIVES COMM. ON ENERGY & COMMERCE MINORITY STAFF, CHEMICALS USED IN HYDRAULIC FRAC TURING I (Apr. 2011) [hereinafter MINORITY STAFF REPORT], http://conservationco.org/admin/wp-content/uploads/2013/02/Final-Rebuttal-Exhibits.pdf-Adobe-Acrobat-Pro.pdf [https://perma.cc/9FB7-CZ38] (report for Representatives Henry A. Waxman, Edward J. Markey, and Diana DeGette). The report studied hydraulic fracturing products used by fourteen leading oil and gas companies.} In fact, according to estimates by the Energy Information Administration (EIA), as of 2010, the United States possesses enough natural gas reserves to supply energy to this country for the next 110 years.\footnote{Id.} As drilling has grown, so has public concern for what is in the fracturing fluids that are injected into the ground.

The House Committee on Energy and Commerce recently noted this concern in a 2011 study that documented the use of fracturing fluids in the United States between 2005 and 2009.\footnote{Id.} Over that four-year period, approximately 1.5 million gallons of carcinogenic\footnote{Id.} fracturing fluid components were injected into the ground in Colorado.\footnote{MINORITY STAFF REPORT, supra note 30.} Congress\footnote{Id.} and even state and local authorities have acknowledged inherent risks associated with the process, and some have even moved to ban it as of 2014.\footnote{Erica Orden & Lynn Cook, New York Moves to Ban Fracturing, WALL STREET J. (Dec. 18, 2014), http://www.wsj.com/articles/new-york-gov-andrew-cuomos-administration-moves-to-ban-fracking-1418839033 [https://perma.cc/6PE6-JLA3].} Yet

Congress amended the definition of “underground injection” in the Safe Drinking Water Act to exclude the injection of fluids or propping agents other than diesel fuels that were related to hydraulic fracturing operations related to oil, gas, or geothermal production activities.
attorneys who represent clients in the gas fracturing industry\textsuperscript{37} have recently advocated that “[t]here is no evidence that hydraulic fracturing contaminates groundwater.”\textsuperscript{38} This evidences the obvious tension between a call for transparency and claimed secrecy surrounding proprietary formulas and leads to the ultimate issue, which is that scientists and public health officials are now facing mountain-sized obstacles in scientific data collection, peer review, and peer-to-peer communication. All of which are crucial to the protection of public health. Meanwhile, companies associated with the gas fracturing process are using trade secret protection as well as newly enacted state legislation that include confidentiality provisions to protect proprietary hydraulic fracturing formulas. Therein lies the rub—whether the broad, inclusive nature of trade secret protection should automatically include hydraulic fracturing fluids and whether voluntary efforts to disclose provide enough information to protect public health.

II. HYDRAULIC FRACTURING

“Drill, baby, drill.”

Michael Steele, Maryland Lt. Governor, 2008\textsuperscript{39}

A. The History

According to recent estimates from the oil and gas industry, hydraulic fracturing has been used on more than one million wells in the United States,\textsuperscript{40} and a single well may be fractured anywhere from eight to forty times during its life.\textsuperscript{41} The United States has benefited from domestic opportunities and energy independence created by the advances in hydraulic fracturing.\textsuperscript{42}

\textsuperscript{37}Energy Litigation, Winstead PC, http://m.winstead.com/Practices/Energy-Law/Energy-Litigation [https://perma.cc/6PMX-EAB2] (The attorneys have stated, “Our client was sued in high profile cases in which landowners claimed that their water wells were contaminated as a result of the client’s hydraulic fracturing of natural gas wells in the area.”).


\textsuperscript{40}MARY TIEMANN & ADAM VANN, CONG. RESEARCH SERV., PUB. NO. R41760, HYDRAULIC FRACTURING AND SAFE DRINKING WATER ACT REGULATORY ISSUES 2 (2013).


\textsuperscript{42}Bernard D. Goldstein et al., The Role of Toxicological Science in Meeting the Challenges and Opportunities of Hydraulic Fracturing, 139 TOXICOLOGICAL SCI. 271, 271 (2014), http://toxsci.oxfordjournals.org/content/139/2/271.full.pdf [https://perma.cc/E3W3-L8BG].
Additionally, power generation as a direct result of natural gas provides the country an opportunity to reduce greenhouse gas emissions.\textsuperscript{43}

Although many think this technology is new, hydraulic fracturing is a process that surprisingly has been around since the 1860s when oil and gas owners had started using nitroglycerin in a process called “explosive fracturing.”\textsuperscript{44} It was later commercially developed in the 1940s to stimulate production in wells with declining productivity.\textsuperscript{45} The process made it possible to produce oil and natural gas in underground places where regular oil and gas drilling are ineffective.\textsuperscript{46} In 1947, the Stanolind Oil Company utilized this process, and a year later, a patent was issued, and Halliburton Oil Well and Cementing Company was given exclusive rights to use this technology.\textsuperscript{47}

Traditionally, hydraulic fracturing involved the use of more viscous materials like gelled crude oil and kerosene.\textsuperscript{48} In 1953, water, along with other chemicals, was introduced into the process, and this mixture has been continually refined over the years.\textsuperscript{49} The process has also become more complex and larger in scale. Early wells were much shallower—only a few hundred feet deep.\textsuperscript{50} The amount of fracturing fluids utilized during well production was much smaller as well, with a mere 750 gallons of fluid and 400 pounds of proppant used.\textsuperscript{51} Today, well drilling and extraction are vastly larger in comparison. As of 2011, reported estimates were that an average well ran 5,300 feet deep and that drilling the well used anywhere between 60,000 to 600,000 gallons of water, followed by an average of 4.5 million gallons of fluid mixed with thousands of pounds of sand.\textsuperscript{52}

\textsuperscript{43} Id.

\textsuperscript{45} TIEMANN & VANN, supra note 40, at 1.


\textsuperscript{47} Curtis, supra note 41.


\textsuperscript{49} Curtis, supra note 41.

\textsuperscript{50} Hines, supra note 48.

\textsuperscript{51} Id.; see also Carl T. Montgomery & Michael B. Smith, \textit{Hydraulic Fracturing: History of an Enduring Technology}, J. PETROLEUM TECH., Dec. 2010, at 26, 28 (discussing the history of hydraulic fracturing).

\textsuperscript{52} Hines, supra note 48. These figures were reported by Chesapeake Energy in 2011 on its website, but are no longer available to the public.
B. The Drilling and Extraction Process

Conventional gas wells are created by the process of vertical drilling, or drilling that goes straight down, often thousands of feet, until the drill reaches a pocket of gas. More commonly, the technique of horizontal drilling has been utilized to extract energy from a source that runs horizontally. These types of wells are typically more complicated to drill, but also more advantageous and profitable because the driller is able to access natural gas around the entire horizontally drilled section as opposed to a pocket surrounding a vertical well.

Normal gas operations that do not require hydrofracturing technology are able to simply drill and extract gas from “solid rock” when it is more permeable, allowing gas to move through pore spaces of the rock. However, some oil and gas formations have low permeability or pore spaces that have low interconnectivity, making it difficult for the gas to travel through the formation. To create or enlarge pathways or fractures, the operator will drill a well, then a hired “service company” employs a high-pressure pump to push a water-based fracturing fluid down the well with increasing rate and pressure directly into the formation to create enough pressure to crack or fracture the rock. But, before the fracturing fluid is injected, the well must be fully constructed, using a design that is often dependent upon the geology of the particular region. The borehole diameter is usually a few inches larger that the diameter of the steel casing that it surrounds, so that the cement and/or other sealants can be inserted outside of the casing to seal the gap between the pipe and the rock. Cement grout is then pumped down through the center of the casing until it is pushed out through the bottom of the casing. Proper cement placement is dependent on the proper centering of the casing within the borehole, to ensure even thickness, and to adjust to whether any irregularities exist in the wellbore.

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55 Id.
56 Id., supra note 44, at 401.
57 Id.
58 Id. at 402.
60 Id.
61 Id. at 147–48.
62 Id. at 148.
Along with the fracturing fluids, sands or some additional propping agent or “proppant” are then pumped into the new fracture so that the fracture remains open, allowing the gas to flow freely out of the formation and into the well. Any remaining water and fracturing fluid must be then be pumped out of the well and back to the surface in order to allow maximum oil and gas production. This “flowback” and any other “produced water” that results from the fracturing is typically treated and then pumped back to the surface where it is either then disposed of through deep well injection or treated and discharged to surface waters. The flowback can also be recycled or stored in an open pond.

The flowback contains the fracturing fluid and possible other contaminants, including salts, metals, and radioactive chemicals that naturally occur deep underground.

C. Fugitive Gas Contamination and New Evidence of Faulty Well Construction

Possible contamination from flowback is not the only concern that has recently plagued public health professionals. The other chief concern is migration of methane into wells near drill sites. Shale gas is ninety percent methane, and methane is not regulated as a water contaminant by the EPA or by any state. The migration of methane to nearby drinking water wells has been a concern and has been subject to much debate and to civil litigation. Although methane is not known to affect the odor, taste, or potability of water, it is an inhalational hazard, and it is an explosion hazard when it moves from water to air in confined spaces. The immediate concern associated with methane is in being able to ventilate a well head when dissolved methane in water exists within the well head in concentrations greater than twenty-eight milligrams per liter.

64 TIEMANN & VANN, supra note 40, at 1.
65 Id.
68 Id. at 2.
69 See King et al., supra note 38, at 344–50.
70 JACKSON ET AL., supra note 67, at 3.
71 Id.
Although there have been recent contentions that “hydraulic fracturing is safe and does not threaten the environment or public health,” based on a 2011 Duke study that found no contamination of drinking water with saline brine or fracturing fluid,\textsuperscript{72} a closer examination of the study reveals that the authors were still concerned over their findings: “Our results show evidence for methane contamination of shallow drinking-water systems in at least three areas of the region and suggest important environmental risks accompanying shale-gas exploration worldwide.”\textsuperscript{73} Of note in the 2011 Duke study is the scientists’ final comments on the state of regulations and transparency as it relates to science:

Compared to other forms of fossil-fuel extraction, hydraulic fracturing is relatively poorly regulated at the federal level. Fracturing wastes are not regulated as a hazardous waste under the Resource Conservation and Recovery Act, fracturing wells are not covered under the Safe Drinking Water Act, and only recently has the Environmental Protection Agency asked fracturing firms to voluntarily report a list of the constituents in the fracturing fluids based on the Emergency Planning and Community Right-to-Know Act. More research is also needed on the mechanism of methane contamination, the potential health consequences of methane, and establishment of baseline methane data in other locations. We believe that systematic and independent data on groundwater quality . . . should be made available for public analysis, recognizing the privacy concerns that accompany this issue. Such baseline data would improve environmental safety, scientific knowledge, and public confidence. Similarly, long-term monitoring of groundwater and surface methane emissions during and after extraction would clarify the extent of problems and help identify the mechanisms behind them. Greater stewardship, knowledge, and—possibly—regulation are needed to ensure the sustainable future of shale-gas extraction.\textsuperscript{74}

Evidence like this has led to more studies utilizing new technologies in contamination detection. A recent peer-reviewed study, published in 2014, utilized noble gas isotopes and hydrocarbon data to link several gas contamination clusters to gas leakage in intermediate-depth strata due to failures in faulty gas casing, cementing issues, and underground gas well

\textsuperscript{72} King et al., supra note 38, at 353.


\textsuperscript{74} Id. at 8175–76.
failure—not hydraulic fracturing.  Still, this process is linked to the high pressured drilling and fracturing that can occur during the process. In the study, scientists collected data from 133 wells in Pennsylvania and Texas where they linked clusters of well contamination to integrity problems. Using noble gas and hydrocarbon tracers, they were able to research whether the high methane levels migrated as a free gas or as a result of being dissolved in water. The results indicated that fugitive methane gas contamination did occur due to well integrity. The authors concluded that “[f]uture work should evaluate whether the large volumes of water and high pressures required for horizontal drilling and hydraulic fracturing influence well integrity.”

D. Hydraulic Fracturing Fluid—Blenders, Crude Oil, and Benzene

One of my law students very recently told me of a demonstration by a guest speaker during class who was there to talk about ingredients in hydraulic fracturing fluid. This speaker brought a blender, along with common household items, like cleaners and pool supplies that performed a similar function to these surfactant components of fluids. Of course, there were “other ingredients” that were not included for “the sake of simplicity (and possibly safety)” however, my student remained skeptical that a demonstration that was the equivalent of a comparison to Coca-Cola or chocolate did not quite reveal the entire story.

The “everything” in fluids ranges from dozens to hundreds of chemicals that can be used as additives in fracturing fluid, many of which no doubt serve an important function and purpose. FracFocus provides a chart of the chemicals that are “used most often,” along with their purpose and result. Some additives eliminate bacteria; others prevent corrosion or maintain fluid viscosity. However, absent from this chart are the chemicals of concern and their established toxicities and health effects. Arguably, this is the critical information that the public, as well as public health officials, is demanding. Yet it seems to be discoverable only if the user understands CAS (Chemical


76 Id. at 14077.

77 Id. at 14076. The authors note that “noble gases can help differentiate between natural geological migration of hydrocarbon gases and anthropogenic (or man-made) contamination.” Id. at 14077.

78 Id. at 14077.

79 Id. at 14081.


81 Id.

82 Id.

83 Id.
Abstracts Service) numbers assigned to chemicals and then works to plug that information into links to other sites.\textsuperscript{84}

Other groups, including lawmakers, are taking notice and have begun to try to uncover the multitude of components that make up some of the varied and listed additives in hydraulic fracturing fluid. The following is a summary of what they have found.

1. Carcinogens

The process of hydraulic fracturing uses a diverse range of chemicals that have heightened public concern.\textsuperscript{85} This concern continues to increase considering the increased amount of activity by the industry.\textsuperscript{86} As of 2013, according to a survey by the National Research Council, the most common public concerns included groundwater contamination, air pollution, inadequate regulations, and potential health impacts.\textsuperscript{87}

Between 2005 and 2009, hydraulic fracturing companies used approximately ninety-five products that contained thirteen known carcinogens, including benzene, naphthalene, and acrylamide.\textsuperscript{88} Overall, 10.2 million gallons that were injected into the ground contained at least one carcinogen.\textsuperscript{89} Texas, Oklahoma, and Colorado reported the highest volumes of these fluids that contained a carcinogen, with Texas leading the pack with 3,877,273 gallons (fluid volume) of hydraulic fracturing fluids that were injected between 2005 and 2009.\textsuperscript{90} Those statistics are more than five years old, which leads to the conclusion that many more millions of gallons of the same fluid have been injected since the report was issued.

Indeed, more recent data has confirmed that these chemicals are still being utilized in large quantities in the hydraulic fracturing process.\textsuperscript{91} In fact, one Texas operator reported injecting 532,561 gallons of petroleum crude oil

\textsuperscript{84} Id.
\textsuperscript{85} Goldstein et al., supra note 42, at 271.
\textsuperscript{86} Id.
\textsuperscript{87} Id.; see also Thomas Webler et al., Concerns about shale gas risks among interested and affected parties, http://sites.nationalacademies.org/cs/groups/dbassesite/documents/webpage/dbasse_083406.pdf [https://perma.cc/C5FS-QYM2] (explaining the most common public concerns of hydraulic fracturing).
\textsuperscript{88} MINORITY STAFF REPORT, supra note 30, at 9.
\textsuperscript{89} Id.
\textsuperscript{90} Id. Table 4 in the report also illustrates that the amount of fluids injected in Texas (3,877,273 gallons) more than doubled the second highest state, which was Colorado at 1,544,388 gallons of injected hydraulic fracturing fluids containing at least one carcinogen.
containing benzene into a well in Dimmit County, Texas. A Material Safety Data Sheet (MSDS) for the particular crude oil instructs users to “Keep out of all bodies of water and sewage drainage systems.”

2. Chemicals Regulated by the Safe Drinking Water Act

During the same time period, these companies used an estimated sixty-seven fracturing fluid products that contained at least one of eight chemicals regulated under the Safe Drinking Water Act (SDWA) because of their capacity to have an adverse effect on human health or because they could appear in public drinking water at levels that are of public health concern.

With a reported 9,474,631 gallons, Texas was the leader among states with the highest amount of injected fracturing fluids that contained a SDWA-regulated chemical between 2005 and 2009. Of note is the fact that the next highest state was New Mexico at only 1,157,721 gallons of injected hydraulic fluids with one of these noted chemicals. Of those SWDA-regulated chemicals, a majority were “BTEX” compounds (benzene, toluene, ethylbenzene, and xylene), which appeared in sixty hydraulic fracturing products. The Department of Health and Human Services (HHS) as well as the International Agency for Research on Cancer (IARC) have determined that benzene is a carcinogen and that chronic exposure to any of the other BTEX constituents can also damage the central nervous system, kidneys, and liver.

One of the other particular additives, 2-butoxyethanol (2-BE), listed as a commonly used foaming agent or surfactant, was recently discovered by the EPA in a groundwater investigation associated with hydraulic fracturing in Pavillion, Wyoming. The compound 2-BE can cause damage to the spleen, hepatic function, and birth defects.

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92 Find a Well, FracFocus: Chemical Disclosure Registry, http://www.fracfocusdata.org/DisclosureSearch/StandardSearch.aspx [https://perma.cc/MH6B-R2SP] (referencing well API # 42-127-35771); see also Environmental Integrity Project, supra note 91 (explaining the amount of petroleum crude oil containing benzene injected into the well).

93 Marathon Oil, Material Safety Data Sheet (MSDS) for 8002-05-09, at 9 (2010).

94 Minority Staff Report, supra note 30, at 9.

95 Id. at 10.

96 Id.

97 Id.


liver, and bone marrow, as well as hemolysis (or the destruction of red blood cells).\textsuperscript{101}

3. Air Pollutants

Under the Clean Air Act,\textsuperscript{102} the EPA is given authority to regulate hazardous air pollutants that could cause cancer or other serious health problems, including reproductive or birth defects.\textsuperscript{103} Between the years of 2005 and 2009, the industry reported to the House Committee on Energy and Commerce that it used 595 fracturing products containing twenty-four different hazardous air pollutants.\textsuperscript{104} The report indicates that hazardous pollutants such as lead,\textsuperscript{105} hydrogen fluoride,\textsuperscript{106} methanol,\textsuperscript{107} formaldehyde,\textsuperscript{108} hydrogen chloride,\textsuperscript{109} and ethylene glycol\textsuperscript{110} were among the ingredients listed in the fracturing fluids.\textsuperscript{111}


\textsuperscript{103} See MINORITY STAFF REPORT, supra note 30, at 11.

\textsuperscript{104} See id.

\textsuperscript{105} AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY, LEAD—ToxFAQs 1 (Aug. 2007), http://www.atsdr.cdc.gov/toxFAQs/toxfacts13.pdf [https://perma.cc/CS98-773T]. According to the ATSDR, lead is a particularly hazardous air pollutant in that it is a heavy metal that is persistent in the environment and is known to be a neurotoxicant that is particularly harmful to children. The 2011 House Committee Report indicates that one of the companies used 780 gallons of a product containing lead between 2005 and 2009. MINORITY STAFF REPORT, supra note 30, at 11.

\textsuperscript{106} AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY, HYDROGEN FLUORIDE (HF) 1–2 (Oct. 2014), http://www.atsdr.cdc.gov/mhlmi/mmg11.pdf [https://perma.cc/9VFX-UC78]. The ATSDR states that hydrogen fluoride is an industrial agent often used as a rust inhibitor with a strong irritating odor that is discernable at concentrations of about 0.04 ppm, which is considerably less than the OSHA Permissible Exposure Limit (PEL) of 3 ppm.

\textsuperscript{107} Technology Transfer Network—Air Toxics Website: Methanol, U.S. EPA, http://www.epa.gov/airtoxics/hlthef/methanol.html [https://perma.cc/X6FY-NJ52]. According to the EPA, methanol is commonly used as a solvent. Inhalation of methanol can cause a range of symptoms from dizziness, nausea, and blurred vision to neurological damage resulting from acute exposure.

\textsuperscript{108} AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY, FORMALDEHYDE—ToxFAQs (May 2013), http://www.atsdr.cdc.gov/toxFAQs/toxfacts111.pdf [https://perma.cc/E3GE-NNF4]. The ATSDR states that Department of Health and Human Services (HHS) has determined that formaldehyde is a known human carcinogen based on human and animal inhalation studies.

\textsuperscript{109} AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY, HYDROGEN CHLORIDE—ToxFAQs 1–2 (Apr. 2002), http://www.atsdr.cdc.gov/toxFAQs/toxfacts173.pdf [https://perma.cc/FG2C-VSGH]. Hydrogen chloride is listed as a corrosive gas that is a tissue
III. SPLINTERED ENVIRONMENTAL REGULATORY STRUCTURE BECOMES MORE FRACUTRED

“If you have traveled in the remote part of the Deep South, I am sure you have seen the architecture of Tobacco Road—shacks built of whatever materials were available at the time, often by a series of owners. Maybe the roof is corrugated tin, but one wall is made from a billboard and the door step is a cinder block. No part matches any other part, . . . and there comes a point where it is easier to tack a new board over a gap that appears than to redesign the entire structure.”

Former Senate committee staffer, Ronald Outen, comparing the structure of environmental law to the architecture of Tobacco Road, 1987.\textsuperscript{112}

A. Removing What Little Federal Environmental Protection Existed

The absence of federal statutes that actually regulate the fracturing process is somewhat surprising and is due to the exemptions provided by Congress across the board when it comes to environmental regulation. Hydraulic fracturing has not only been exempted from the Safe Drinking Water Act (SDWA),\textsuperscript{113} but also the Resource Conservation Recovery Act (RCRA),\textsuperscript{114} and the Emergency Planning and Community Right-to-Know Act (EPCRA).\textsuperscript{115} Although limited power remains in federal hands, the EPA can regulate flowback fluids and subsequent disposal of these fluids into

irritant which can irritate the throat and even cause reactive airways dysfunction syndrome (RADS) when exposure occurs at higher levels.

\textsuperscript{110} AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY, ETHYLENE GLYCOL—ToxFaqs 1 (June 2015), http://www.atdr.cdc.gov/toxfaqs/tfacts96.pdf [https://perma.cc/9JL6-JMPF]. Ethylene glycol is an odorless synthetic liquid (with a sweet taste) that absorbs water. It is listed as a development and kidney toxicant.

\textsuperscript{111} MINORITY STAFF REPORT, supra note 30, at 11.

\textsuperscript{112} Ronald B. Outen, Environmental Pollution Laws and the Architecture of Tobacco Road, in MULTIMEDIA APPROACHES TO POLLUTION CONTROL: A SYMPOSIUM PROCEEDINGS 139, 139 (1987); see also RICHARD J. LAZARUS, THE MAKING OF ENVIRONMENTAL LAW 169 (2004).


surfacewater under the National Pollutant Discharge Elimination System (NPDES) under the Clean Water Act (CWA).  

This issue of how hydraulic fracturing should be regulated was considered over thirty years ago, when the amendments to RCRA specifically exempted oil and natural gas exploration and production wastes such as drilling fluids and produced waters, even though it left open the possibility of regulation of wastes through other federal or state regulatory mechanisms. Unfortunately, since then, there has not been a federal regulatory scheme that has addressed the potential environmental and health impacts of this process. It could be due to the very nature of environmental law, as it has notably been described by Harvard University’s Howard and Katherine Aibel Professor of Law, Richard Lazarus: a “crazy patchwork quilt of statutory provisions only loosely falling under the common rubric of environmental law.” With such “hobnailed” federal regulations that operate in an uncoordinated manner, largely based on one particular environmental media, it logically follows that sweeping federal regulation of hydraulic fracturing that affects air, soil, water, and possible food sources would be difficult given the regulatory structure.

Part C of the SDWA had been one of the few ways that the federal regulatory structure has been able to touch the issue of hydraulic fracturing. The SDWA is concerned with protecting underground sources of drinking water from contamination by regulating and restricting underground injections like those utilized in hydraulic fracturing. A state does have the right to regulate underground injections within its own borders, provided that it submits an Underground Injection Control (UIC) proposal to the EPA that the Agency deems to meet its minimum requirements.

All of this changed in 2005, during the President George W. Bush administration, when the Energy Policy Act of 2005 effectively removed the SDWA’s regulation of hydraulic fracturing fluids, other than diesel, and stripped the EPA of the right to invalidate a state’s UIC proposal even when the state failed to properly regulate hydraulic fracturing. The components of diesel, often referred to as “BTEX” (or benzene, toluene, ethylene and xylene), are toxic and regulated under the SDWA primarily because they are cancer-

\footnotesize{\textsuperscript{116} Morgan, \textit{supra} note 115, at 94–95; see also \textit{Natural Gas Extraction—Hydraulic Fracturing}, U.S. EPA, http://www.epa.gov/hydraulicfracturing [https://perma.cc/YAC3-U97R].}

\footnotesize{\textsuperscript{117} 42 U.S.C. § 6921(b)(2)(A).}

\footnotesize{\textsuperscript{118} \textit{Lazarus}, \textit{supra} note 112, at 169.}

\footnotesize{\textsuperscript{119} \textit{See id. at 170.}}

\footnotesize{\textsuperscript{120} 42 U.S.C. §§ 300h to 300h-8.}

\footnotesize{\textsuperscript{121} \textit{See id.; see also Jason Obold, Leading by Example: The Fracturing Responsibility and Awareness of Chemicals Act of 2011 as a Catalyst for International Drilling Reform}, 23 COLO. J. INT’L ENVTL. L. & POL’Y 473, 482–83 (2012).}

\footnotesize{\textsuperscript{122} 42 U.S.C. § 300h-1.}

\footnotesize{\textsuperscript{123} Obold, \textit{supra} note 121, at 484.}
causing compounds.124 Because of this narrowly tailored exemption, those associated with the fracturing job are allowed to inject other petroleum products that still contain these components.125

Further the Emergency Planning and Community Right-to-Know Act (EPCRA) governs chemical disclosure requirements and makes chemical releases and chemical storage public.126 This approach in regulating toxins is unique in that the aim is to provide the public with information regarding a company’s inventory and use of toxic chemicals that allows the public to make related market choices that could potentially affect the company.127 The power is in the availability of the information. Arguably, when armed with the information about a particular company’s toxic chemical releases, the public can then pressure a company to change its practices.128 Under EPCRA, any company that releases more than a specific threshold amount of a chemical that is listed on the EPA’s toxic list of hazardous substances must report the releases to both the EPA and the state.129 This data is then compiled and transferred by the EPA to the Toxics Release Inventory (TRI), which is available to the public online.130 The catch is that the EPA has never used its authority to specifically include the oil and gas extraction facilities.131

This lack of federal authority over hydraulic fracturing has undoubtedly led to inconsistent and inadequate state regulatory structures. With little to no federal oversight, the job now primarily falls upon states to monitor what and how much of it is going into the ground near precious drinking water sources. And, the “what” still remains largely unknown. Without the mandatory disclosure power of EPCRA132 or the federal oversight under the SDWA, what is going into the ground remains hazy with trade secret protections in effect. And with the voluntary disclosure website, FracFocus,133 being one of the few

125 ENVTL. INTEGRITY PROJECT, supra note 91, at 1.
126 42 U.S.C. §§ 11004–11049 (2012). The Emergency Planning and Community Right-to-Know Act (EPCRA) was passed by Congress in response to concerns regarding the environmental and safety hazards posed by the storage and handling of toxic chemicals.
127 JAMES SALZMAN & BARTON H. THOMPSON, JR., ENVIRONMENTAL LAW AND POLICY 183 (2d ed. 2007).
128 Id.
129 Id.
131 See id. § 11023(b)(1)(A) (where the TRI reporting requirements do not include SIC Code 13 titled “Oil and Gas Extraction”).
133 FracFocus is the national hydraulic fracturing chemical registry that is managed by the Ground Water Protection Council (a non-profit whose members consist of state groundwater regulatory agencies) and Interstate Oil and Gas Compact Commission (a semi-governmental group comprised of appointees selected by governors of approximately thirty-eight oil and gas producing states which advocates for a “states first” approach to
centralized, publicly available resources that provide a piecemeal picture, the public, scientists, and health care providers are still struggling to adequately discover what chemicals are used.

This dismantling has also spilled over into federal research dollars allocated for the study of how hydraulic fracturing fluids may affect human health.134 In 2011, Congress allocated money to the U.S. EPA’s Office of Research and Development to study the possibility of groundwater contamination associated with hydraulic fracturing.135 This appropriation did not authorize studies of potential toxicity to the environment or the public.136

B. Voluntary “Disclosure”

FracFocus was created to provide factual information about the chemicals used in association with fracturing operations and allow operators the chance to quell public outcry by voluntarily disclosing this information.137 As of February 2015, the website reports that there are a total of 93,125 well sites registered;138 however, its own estimates are that as many as 35,000 wells are fractured each year with the fracturing process being historically used in over one million wells.139 With utilization of hydraulic fracturing being performed


135 Id. at 485–86.

136 Id. at 486. The authors also note that it is curious why the U.S. EPA has not utilized other funding for toxicity studies.


138 FracFocus, supra note 91.

on a “massive scale” starting around 2003,\(^{140}\) that arguably leaves quite a few wells unaccounted for.\(^{141}\)

Interestingly enough, FracFocus references EPCRA when discussing chemicals and public disclosure.\(^{142}\) Specifically, it states:

The community right-to-know provisions of EPCRA are the most relevant part of the law for shale gas producers. These provisions help increase the public’s knowledge and access to information on chemicals at individual facilities, along with their uses and potential releases into the environment. Under Sections 311 and 312 of EPCRA, facilities manufacturing, processing, or storing designated hazardous chemicals must make Material Safety Data Sheets (MSDS), describing the properties and health effects of these chemicals, available to state and local officials and local fire departments. Facilities must also provide state and local officials and local fire departments with inventories of all on-site chemicals for which MSDS exist. Information about chemical inventories at facilities and MSDS must be available to the public.\(^{143}\)

Ingredients on an MSDS sheet are subject to trade secret exemptions claimed by the chemical manufacturer, importer, or employer under 29 C.F.R. 1910.1200(i).\(^{144}\) A random “find a well” search on the website that yields a “Hydraulic Fracturing Fluid Product Component Information Disclosure” sheet shows where multiple components are still listed as “proprietary” under the Chemical Abstract Service (CAS) number, which, when given, allows a user to find the chemical even if the chemical goes by several names.\(^{145}\)


\(^{141}\) FracFocus, supra note 91. The FracFocus website contains only disclosures for wells fracked after January 1, 2011. About Us, FracFocus, supra note 133. With an estimated rate of 35,000 wells per year over the past twelve years, a rough approximation of active wells could be upwards of 420,000 wells, 93,125 (or 22%) of which are registered. FracFocus, supra note 91.


\(^{143}\) Id.


\(^{145}\) A “find a well” search was performed on February 27, 2015, for a well in Lubbock County, Texas. Find a Well, FracFocus: Chemical Disclosure Registry, http://www.fracfocusdata.org/DisclosureSearch/ [https://perma.cc/K6CP-VLZ7]. The first well listed, API# 42-303-31571-00-00, Idalou Unit 2202H was selected. This well is a relatively small well by comparison to others. (Well API # 42-127-35771-00-00 in Dimmitt, Texas utilized over one million gallons of non-water base fluid.) Here, a total of 36,606 gallons of non-water base fluid was injected. Approximately 65% (by mass) of the hydraulic fracturing fluid (HF) water, 21% (7,687 gallons/max. vol. of ingredient) of the HF fluid “hydrocarbons,” 3% (1,098 gallons/max. vol. of ingredient) of 36% hydrochloric acid, and 9% silicon dioxide comprised the major components. A total of four proprietary ingredients made up .018% (658 gallons/max. vol. of ingredients) of this particular HF fluid: Alcohol Ethoxylate Surfactants (corrosion inhibitor), n-olefins (corrosion inhibitor),
Additionally, the information disclosure sheets’ failure to provide an explanation for standard industry measurements still makes the consumer or average member of the public go through several calculations to find the actual gallon amount of each chemical injected into each well.146 What is perhaps more concerning is the inability of the website to link the consumer to health information that is standardized in most MSDS sheets.147 Although CAS numbers are provided for the nonproprietary ingredients, a user must look up each chemical by CAS number on a separate website to access particular subcomponents of an ingredient listed and the associated health and safety information.148 Even the most experienced health care professional or scientist would still have to expend both time and effort not only to find the information, but also to translate the material into something that is ascertainable in order to determine risk.

IV. THE TOXICOLOGY AND POTENTIAL IMPACT OF GAS DRILLING ON ENVIRONMENTAL & HUMAN HEALTH

“We are accustomed to look for the gross and immediate effect and to ignore all else. Unless this appears promptly and in such obvious form that it cannot be ignored, we deny the existence of hazard.”

Rachel Carson, Silent Spring149

A. The Important Role of Toxicology in Assessing Impacts

There are two things that toxicologists and lawmakers know for sure. First, there are a broad variety of both chemical and physical agents involved in gas production and resulting hydraulic fracturing.150 Because the oil and gas industry continues to expand and because of the resulting concerns about its

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146 Id.
147 Id.
148 An additional general internet search of “hydrocarbons” listed in Well API# 42-303-31571-00-00 in Lubbock County, CAS # 8002-05-09 was performed on February 27, 2015. The MSDS sheet lists this ingredient as sweet crude oil, containing benzene, ethylbenzene, naphthalene, n-hexane, and hydrogen sulfide. It is listed as being toxic to organs and carcinogenic. In particular, it states “Hydrogen Sulfide is highly toxic and may be fatal if inhaled. . . . This product contains benzene which may cause leukemia (AML—acute myelogenous leukemia). May cause MDS (myelodysplastic syndrome).” SHELL TRADING INT’L LTD., SAFETY DATA SHEET (May 2013), http://www.shell.com/business-customers/trading-and-supply/trading/trading-material-safety-data-sheets/_jcr_content/par/expandablelist/expandablesection/file/1447426849189/844e732a2346190209000d15102e8bd5/crude-cruce-oil-stil-en-less-than-0-5-percent-sulphur.pdf [https://perma.cc/XCR5-P6QM].
149 RACHEL CARSON, SILENT SPRING 190 (1962).
150 Goldstein et al., supra note 42, at 271.
effect on workers, the ecosystem, and surrounding communities, a collaborative toxicological assessment is necessary. The drilling process involves chemical mixtures, and toxicologists have noted that data or information associated with these mixtures is “essential for developing a reliable assessment of the potential risks to the environment and to human health.” Both public health professionals and policymakers are interested in ensuring that hydraulic fracturing is occurring in a manner that not only maximizes domestic benefits, but also minimizes risks to public health.

Environmental toxicology plays an integral role in the assessment of risk to human and environmental health. The basic tenet of toxicology is that every substance released into the environment has the potential to be toxic. And, all chemicals do not possess equal toxicity; some compounds have significant effects at tiny doses and other compounds are only toxic in significant or very high doses.

Of course, the field of toxicology takes into account more than just a potential dose, but also assesses length and duration of exposure as well as chemical fate or movement through air, water, and soil. Additionally, toxicologists must concern themselves with how chemicals react with one another—particularly when dealing with mixtures of chemicals—and whether biodegradation of particular chemicals can lead to a more dangerous byproduct or metabolite. And, it is only when toxicologists have gathered all of the necessary information that they are able to perform an adequate risk assessment. A true risk assessment process requires four steps: (1) identification of hazard (or chemicals constituting a hazard), (2) a dose-response assessment (often utilizing clinical, epidemiological, toxicologic, or other pertinent environmental data), (3) an exposure assessment, and (4) risk

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151 Id.
152 Id. Toxicologists also note that in addition to the data, a toxicological assessment should take into account the different geologies in new areas subject to fracturing, as well as evolving industrial practices that could alter the chemical and physical nature of the chemicals being used.
153 Id.
154 Jason R. Richardson & Gary W. Miller, Toxicology, in ENVIRONMENTAL HEALTH: FROM GLOBAL TO LOCAL 49, 51–52 (Howard Frumkin ed., 2d ed. 2010). This tenet is attributed to Paracelsus, the “father of toxicology,” who was the first to articulate this concept by stating: “The dose makes the poison.”
155 Id.
157 Id. at 56–57. Dr. Friis explains that combined effects of chemicals on an organism may be additive (combination of two chemicals produces an effect equal to individual effects added together), synergistic (a combined effect is greater than the sum of the individual effects), potentiation (when one nontoxic chemical causes another chemical to become more toxic), and coagulative (when several agents with no known toxic effects interact to produce a toxic effect).
158 Id. at 58.
characterization. This process relies upon initial risk research, which identifies situations associated with releases of hazards that might result in harm to the environment or human health. Without it, risk assessment is limited and lacking.

Recent estimates indicate that more than 1,000 chemicals have been used in the hydraulic fracturing process. Chemical additives in fracturing fluid are used for a wide range of purposes. Although these chemicals often make up less than 0.5% of the fracture fluid, a significant amount of water containing the fluid is being injected into the ground during the process. Although the percentage seems slight, the chemical total can be as much as 40,000 gallons of chemicals per well. The total amount of the chemical injected, the geological structure, and the actual chemical identity are critical in understanding the pathways and levels of exposure, which, in turn, will facilitate an accurate assessment of possible risks to human health. As recently as 2014, researchers have acknowledged the lack of available data on individual chemicals and chemical mixtures that are included in the fracturing fluid mix used for injection or later recovered as spent fluids. More importantly, they emphasize that assessment of potential risks for the public has been hindered because of trade secret protection of proprietary chemicals.

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159 Id. at 59–60.
160 See id. at 59.
161 Goldstein et al., supra note 42, at 273. Part of the reason for such a large number of chemicals in use is that not all chemical functions or mixtures are needed for every fracturing event. Chemicals are adjusted based on many factors and there are a limited number that are thought to be routinely used.
162 U.S. DEP’T OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER 62–63 (Apr. 2009), http://energy.gov/sites/prod/files/2013/03/f0/ShaleGasPrimer_Online_4-2009.pdf [https://perma.cc/CG32-6R6L]. The DOE classifies chemical additives into various categories, depending on their purpose. The additive classifications include: acids (helps dissolve minerals and initiate cracks), biocides (eliminates bacteria in the water that can cause corrosion), breakers (delays breakdown in polymer chains), corrosion inhibitors (preventing corrosion of pipes), crosslinkers (maintains viscosity or thickness of fluid as the temperature increases), friction reducers (minimizes friction between fluid and pipes), gelling agents (thickens water in order to suspend sand or the proppant), iron control agents (typically a citric acid that prevents precipitation of metal oxides naturally found in soils), pH adjusters (maintains effectiveness of other components), scale inhibitors (prevents deposits in pipes), and solvents and surfactants (increase viscosity of fluids).
163 Id. at 64. The DOE estimates that anywhere between 2.7 and 3.88 million gallons of water are used for drilling and fracturing a single well.
165 Goldstein et al., supra note 42, at 279.
166 Id. at 272.
or, at best, because these chemicals are given a general label as a chemical class.\textsuperscript{167}

Toxicologists are slowly making progress with analysis of potential contamination scenarios, but acknowledge that the process is hindered by lack of information from even the most robust databases.\textsuperscript{168} Recent analysis has focused on several contaminants of concern that have been identified as possible ingredients in fracturing fluids, particularly petroleum distillate contamination associated with surface spills\textsuperscript{169} and chemical fate and toxicity associated with biocides in hydraulic fracturing fluids.\textsuperscript{170} The analyses generally conclude that there is a risk present through surface spills as a potential route of groundwater contamination\textsuperscript{171} and increased toxicity after biodegradation.\textsuperscript{172} Therefore, there are identified risks associated with drilling activities and hydraulic fracturing fluids. Without an improved disclosure and reporting mechanism for hazardous chemicals associated with the process, risk management and a resulting developed policy that will promote safe and efficient hydraulic fracturing while protecting public health is hindered.

The interface of science and health policy is clearly premised upon a process—one that includes: (1) hypothesis; (2) scientific data in the form of environmental, observational, and experimental data; (3) a synthesizing process that involves modeling and risk assessment, and from that; (4) a decision-making process that leads to policymaking.\textsuperscript{173} The decision-making process balances costs, ethics, and politics with strength of scientific evidence and uncertainty.\textsuperscript{174} Without this balance of interests, the decision-making process is, in effect, flawed and incomplete. Limiting disclosure not only through trade secret protection, but also by hindering scientific discourse through confidentiality agreements, cannot lead to the robust scientific inquiry and discourse that is deserved and should be required.

\textsuperscript{167} Id.

\textsuperscript{168} Sherilyn A. Gross et al., \textit{Analysis of BTEX Groundwater Concentrations from Surface Spills Associated with Hydraulic Fracturing Operations}, 63 J. AIR & WASTEWATER MGMT. ASS’N 424, 426 (2013).

\textsuperscript{169} Id. at 425.

\textsuperscript{170} Genevieve A. Kahrilas et al., \textit{Biocides in Hydraulic Fracturing Fluids: A Critical Review of Their Usage, Mobility, Degradation, and Toxicity}, 49 ENVTL. SCI. & TECH. 16 (2014).

\textsuperscript{171} Gross et al., \textit{supra} note 168, at 424.

\textsuperscript{172} Kahrilas et al., \textit{supra} note 170, at 24.


\textsuperscript{174} Id.
B. Concerns About Exposure and Dose

“All substances are poisons; there is none which is not a poison. The right dose differentiates poison from a remedy.”\textsuperscript{175} This fundamental tenet in toxicology underlies the essential analysis of the dose-response relationship, which describes the response of an individual organism or population.\textsuperscript{176} Critical to assessing whether a particular outcome (symptoms or illness) is related to toxic exposure is knowledge of the toxic chemical involved as well as potential concentrations of release into the environment. This fundamental information would include both the identities of chemical constituents used in fracturing fluid as well as the concentrations used.\textsuperscript{177} Unfortunately, both the federal and state regulatory structures have provided piecemeal information and oversight, at best.

In terms of human toxicological threats, ingestion of contaminated drinking water is one of the primary concerns associated with hydraulic fracturing because of organic compounds and metals from the formation.\textsuperscript{178} Even at low concentrations, these contaminants pose a risk due to long-term or chronic exposure.\textsuperscript{179} Studies have documented the effects of low-dose exposures on the endocrine system, and others have noted that over 100 known or suspected endocrine-disrupting chemicals could potentially be a part of natural gas extraction processes.\textsuperscript{180} Health outcomes that have been reported in the scientific literature as associated with acute or short-term exposure include respiratory tract symptoms, headaches, vomiting, diarrhea, nosebleeds, and rashes.\textsuperscript{181} Scientists have repeatedly noted the scarcity of reporting on toxicological and epidemiological evidence documenting human exposure to chemicals associated with natural gas production and any associated health effects, particularly in relation to long-term impacts.\textsuperscript{182} As recently as January 2016, scientists from the Yale School of Public Health, concerned about the reproductive and developmental toxicity of these

\textsuperscript{175} Casarett & Doull’s Toxiciology: The Basic Science of Poisons 4–5 (Curtis D. Klaassen ed., 8th ed. 2013). The phrase, also known as “the dose makes the poison,” was spoken by Paracelsus, a 16th century physician-alchemist whose views remain an integral part of the structure of modern toxicology.
\textsuperscript{176} Id.
\textsuperscript{177} Matthew McFeeley, Falling Through the Cracks: Public Information and the Patchwork of Hydraulic Fracturing Disclosure Laws, 38 Vt. L. Rev. 849, 876 (2014).
\textsuperscript{178} Werner et al., supra note 66, at 1131.
\textsuperscript{179} Id.
\textsuperscript{180} Id.
\textsuperscript{181} Id. at 1128–29. Werner also notes that short term exposure is really the only available data due to the recent rapid expansion of gas drilling and the lack of long term studies.
compounds, called attention to the gaps in knowledge of toxicities of the thousands of chemicals utilized in hydraulic fracturing which further highlights the need of scientists to understand the potential adverse effects associated with these compounds.¹⁸³

V. TRADE SECRET PROTECTION & PUBLIC HEALTH

“How many legs does a dog have, if you call the tail a leg? Four. Calling a tail a leg doesn’t make it a leg.”

Abraham Lincoln, former U.S. President¹⁸⁴

The fundamental purpose of trade secret law is to protect information that can be considered a trade secret.¹⁸⁵ The law is typically interpreted broadly so as to favor the protection of information. However, trade secret protection, in its essence, is for the advantage of the public, meant to encourage innovation and commercial enterprise.¹⁸⁶ Therefore, it seems ironic that the concept of “public good,” from an economic perspective, can be inherently assumed in trade secret analysis, yet this fundamental good does not receive any comparable analysis when it comes to public health. Over the past five years, the Obama administration has set up a task force within the FDA to provide additional transparency regarding agency decisions and possible related secret information about drugs and devices associated with these decisions.¹⁸⁷ Certainly some types of information, if protected by trade secret, could harm the public. This thought has extended to matters that affect the public through potential environmental consequences; however, there still exists a trade secret exemption.¹⁸⁸ Even though companies are required to disclose new chemicals to the federal government that they plan to use under the Toxic Substances Control Act (TSCA), most new notices filed with the government claim

¹⁸⁶ Id. at 1270; see also Peabody v. Norfolk, 98 Mass. 452, 456 (1868).
¹⁸⁸ Rowe, supra note 187, at 796.
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cy. This use of a trade secret exemption leads to “not knowing” potential dangers of chemicals or even to which chemicals the public is being exposed, arguably interfering with a public health official’s duty to treat and the resulting well-being of the public.

Because of the Uniform Trade Secrets Act’s (UTSA) very broad definition of a trade secret, almost anything that has competitive value to a company can be a trade secret, provided, of course, that it remains a secret. In other words, the value lies in its keeping its formula secret. Once that secrecy is lost to competitors through disclosure, the argument is that damage has been done and a company cannot be compensated by monetary damages.

A. The Definition of a Formula

There is a big difference between aldehyde, which gives cilantro its fragrance, and formaldehyde, a cancer-causing additive to fracturing fluids. Fracturing fluid typically contains up to ninety-nine percent water and sand, however the millions of gallons of water are mixed with tens of thousands of gallons of chemicals. These additives can range from antifreeze to various carcinogens, including benzene and lead. Because these chemicals are pumped under tremendous pressure down wells, there is increasing public concern about what exactly is being pumped into the ground. In fact, Mike Freeman, an attorney representing Earth Justice, an environmental law group involved in a battle over disclosure in Colorado in 2011, recently relayed this sentiment to the Denver Post: “You’d want to know if they’re putting an herb or a poison down an oil well near your house.” So, if anywhere from ten to hundreds of chemicals are in fracturing fluid, why so many and what are they? According to a 2011 Congressional Committee report, over 750 million gallons of fracturing chemicals were injected into

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189 Id. at 795–96; see also Lyndsey Layton, Use of Potentially Harmful Chemicals Kept Secret Under Law, WASH. POST (Jan. 4, 2010), http://www.washingtonpost.com/wp-dyn/content/article/2010/01/03/AR2010010302110.html [https://perma.cc/6343-MGTW].
191 Rowe, supra note 187, at 800–01.
192 Jaffe, supra note 164.
195 Id.
196 jaffe, supra note 164.
197 Id.
198 MINORITY STAFF REPORT, supra note 30, at 1. The report studied hydraulic fracturing products used by fourteen leading oil and gas companies. Id.
the ground between 2005 and 2009. In this process, the companies used more than 2,500 hydraulic fracturing products that contained 750 different chemical and nonchemical components. The complexity of the fluids is evident, to the point that many companies were unable to even identify some of the chemicals they were using in the fracturing process. Many of the fracturing fluids contained chemicals that were listed as “proprietary” or “trade secret”; however, when asked about these proprietary components, in many instances, oil and gas service companies could not identify the chemicals.

B. Balancing a Public Interest in Health and Safety with Trade Secret Protection

It is not uncommon for companies to refuse to provide trade secret information to federal or state governments when they are not required to do so. The Supreme Court has confirmed that a property right exists in trade secret information in that it possesses many of the characteristics of tangible property. In *Ruckelshaus v. Monsanto*, the Court was faced with deciding whether Monsanto had a property interest in the health and safety information associated with its registration application for a pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Monsanto argued that the EPA’s disclosure to the public of the health, safety, and environmental impacts of its product was an unconstitutional taking of its property. During a specific five-year period, the statute did promise that trade secret data disclosed to the EPA would not be used in assessing applications. The Court ruled that it was during that five-year period that Monsanto had an expectation that its proprietary information would not be used or disclosed to the public. But the Court never restricted or prohibited the EPA’s use and disclosure of that data during that five-year period for purposes of public health and safety; it only stated that the use during that period did constitute a taking for “public purpose” and entitled Monsanto to compensation. It implicitly acknowledged that public accessibility to health and safety data associated

200 MINORITY STAFF REPORT, *supra* note 30, at 1.
201 *id.* at 2.
202 *id.*
204 *id.* at 1000.
205 *id.* at 998–99.
207 *Ruckelshaus*, 467 U.S. at 1011.
208 See *id.*
with a pesticide that contained proprietary ingredients was more compelling than Monsanto’s commercial interests in nondisclosure, with the exception of the government’s promise not to utilize this information over a five-year period. Perhaps the invocation of trade secret protection by a company does not mean that the federal or state government should take a “hands off” approach, assuming that trade secret claims do not entitle the public to access information that is integral to environmental risk assessment. Instead, governments should require both a burden-shifting and a balancing approach, which involves an acknowledgement of legitimate public safety concerns.

C. Mandatory Disclosure for Products Meant for Human Consumption

Everyone has heard of the heroic measures instituted by Coca-Cola to carefully guard its secret formula. And most of that effort is due to its enormous sales of its products both domestically and internationally. The value of a secret formula is questionable when by law its producer is required to disclose its ingredients on the can. The U.S. Food and Drug Administration (FDA) is the oldest federal agency charged with consumer protection. Tobacco has made the same argument, but these companies are now required by law to provide “detailed disclosure of [the] ingredients, nicotine and harmful smoke constituents’ found in their products, allowing the FDA to better determine how to educate the public and reduce the harm caused by tobacco products.” The FDA has the power to regulate both of these products because they are indelibly linked to human health. The purpose of this type of disclosure is to allow consumers to make informed choices about products that they purchase and consume or utilize. Of course, consumers make a voluntary choice purchasing products, like Coca-Cola, designed for human use and consumption. They choose to ingest or inhale the products. Perhaps the same idea should apply to products that contain toxic ingredients that humans are involuntarily exposed to through ingestion and inhalation.

209 Samuelson, supra note 206, at 809.
211 See id. The article notes that Coca-Cola has a market capitalization of more than $100 billion. Id.
VI. PROTECTION OF PUBLIC HEALTH IN AN ERA OF UNFETTERED TRADE SECRECY

“The determinants of health are beyond the capacity of any one practitioner or discipline to manage... We must collaborate to survive, as disciplines and as professionals attempting to help our communities and each other.”

Institute of Medicine, 1999215

No single ethical rule encompasses the doctor–patient relationship; however, the “therapeutic alliance” between a health care practitioner and his or her patient is the cornerstone of the Hippocratic Oath.216 The virtues of truth-telling, confidentiality, and beneficence are dependent upon the fact that “physicians have recognized that the health and well being of patients depends upon a collaborative effort between physician and patient.”217 This relationship has been described through the lens of the law in many forms, such as contractual and even as a partnership.218

Increasingly, medical professionals are expressing concern that lawmakers are interfering with the relationship between health care providers and their patients.219 “We... find this trend alarming and believe that legislators should abide by principles that put patients’ best interests first. Critical to achieving this goal is respect for the importance of scientific evidence, patient autonomy, and the patient–physician relationship.”220 The physicians referred to several types of “inappropriate legislation” including laws limiting information that a physician can disclose to patients or to consultants in patient care.221 The 2012 commentary referenced four particular states’ laws (Pennsylvania, Ohio, Colorado, and Texas) that address limited disclosure of information related to fracturing chemicals, which they commented could be more attributed to

216 Susan Fox Buchanan, Medical Ethics at the Millennium: A Brief Retrospective, Colo. L. W., June 1997, at 144.
218 See Buchanan, supra note 216, at 141. See generally Timothy E. Quill, Partnerships in Patient Care: A Contractual Approach, 98 Annals Internal Med. 228 (1983).
220 Id. The executive staff of the leadership of five professional societies representing a majority of U.S. physicians authored this commentary. The professional societies included: The American Academy of Pediatrics, the American Academy of Family Physicians, the American College of Obstetricians and Gynecologists, the American College of Physicians, and the American College of Surgeons. Id. at 1559.
221 Id. at 1558.
politics than to protecting public health.\footnote{222}{Id.} Ultimately, the physicians felt that any legislation that could dictate or limit what physicians discuss with patients undermines the patient–physician relationship.\footnote{223}{Id.} “Physicians must have the ability and freedom to speak to their patients freely and confidentially, to provide patients with factual information relevant to their health, to fully answer their patients’ questions, and to advise them on the course of best care without the fear of penalty.”\footnote{224}{Id.}

Weinberger et al.’s essay was recently analyzed by Janet L. Dogin in the context of social and legal parameters in a variety of settings; she concludes that laws controlling physician speech for purposes unrelated to health care or public welfare are “almost always a harmful usurpation of states’ legislative powers.”\footnote{225}{Id.} When limits are placed on the free flow of information between a physician and a patient that is critical to care and treatment of the patient, the trust or bond between doctor and patient is weakened.\footnote{226}{Id.} Therefore, it stands that physicians, and arguably patients, should have access to chemical information that may have a considerable detrimental effect on public health, safety, and welfare.\footnote{227}{Id.}

A. Limiting Access to Information Constrains a Public Health Practitioner’s Ability to Effectively Evaluate and Communicate Environmental Risk

For public health practitioners, risk communication is central to their practice.\footnote{228}{Id.} According to the Centers for Disease Control and Prevention (CDC), an integral part of public health services is focused on a practitioner’s ability to do the following: (1) “[d]iagnose and investigate health problems and health hazards in the community;” and (2) “[i]nform, educate, and empower people about health issues.”\footnote{229}{Id.} Risk communication occurs through a two-way exchange about threats to environmental health and safety, the goal of which is to enhance knowledge about an issue and influence attitudes and informed decision-making.\footnote{230}{Id.} The result of effective risk communication is an informed public—a public that is involved, cooperative, collaborative, and
appropriately concerned about the risk.\textsuperscript{231} Without effective risk communication, the public’s risk perception can provoke high emotional responses in the form of outrage or fear.\textsuperscript{232}

Uncertainty and controllability are two risk factors that certainly play a major role in the public perception of risks associated with hydraulic fracturing operations.\textsuperscript{233} Risks associated with activities that are imposed upon the public or are otherwise involuntary (e.g., unintended chemical exposure) are judged by the public to be greater than risks that are under the control of an individual.\textsuperscript{234} Similarly, risks that are associated with uncertainty, or lack of access to accurate information, are also judged by the public to be greater than risks that are supported by science.\textsuperscript{235} The combination of these risk factors also leads to a lack of trust in individuals, institutions, or organizations.\textsuperscript{236}

“Only when trust has been established can other risk communication goals, such as consensus building and dialogue, be achieved.”\textsuperscript{237} Placing restrictions on public health practitioners through trade secret protection and additional regulatory hurdles undermines not only what could be essential treatment, but also the development of risk communication that extends beyond a patient visit to a doctor’s office. These restrictions matter because the role of the medical profession often extends far beyond the single patient in matters of community health and treatment. This extension beyond the “doctor’s office” has been adopted by numerous medical organizations that see the “precautionary principle” as fundamental in approaching community health risks that are inextricably linked with scientific uncertainty.\textsuperscript{238} The American Nurse’s Association (ANA) has adopted a proactive stance on environmental health issues, stating that “when an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.”\textsuperscript{239}

Without an exchange of information between the oil and gas industry, toxicologists, epidemiologists, and health care practitioners, effective treatment of patients and accurate communication of risks associated with industry practices within a community are lost. Practitioners require more information about what is going into the ground as well as potential exposure scenarios and associated risk assessments. Because the scientific community is

\textsuperscript{231} Id.
\textsuperscript{232} Id. at 1101.
\textsuperscript{233} See id. at 1102–03.
\textsuperscript{234} Id. at 1102.
\textsuperscript{235} See id. at 1103.
\textsuperscript{236} Covello, supra note 228, at 1102.
\textsuperscript{237} Id. at 1106.
\textsuperscript{238} Lori S. Lauver, Environmental Health Advocacy: An Overview of Natural Gas Drilling in Northeast Pennsylvania and Implications for Pediatric Nursing, 27 J. PEDIATRIC NURSING 383, 386 (2012).
working with piecemeal disclosures and confidentiality agreements, the true risks associated with hydraulic fracturing are unknown. And, even those with an expertise in environmental public health are being shut out of the conversation at a higher level.

B. No Voice on Key Advisory Committees

The Marcellus Shale, which extends under most of Pennsylvania and other states, including New York, West Virginia, Maryland, Ohio, Virginia, Kentucky, and Tennessee,\(^{240}\) is estimated to be the second largest natural gas field in the world.\(^{241}\) Consequently, rapid growth in hydrofracturing technology has triggered concern by the public about the potential environmental and health consequences tied to this process.\(^ {242}\) In response, President Obama and the governors of Maryland and Pennsylvania established commissions to provide advice about a broad range of drilling issues, including those that touched on public health.\(^ {243}\) President Obama’s Blueprint for a Secure Energy Future not only called on industry to be more transparent about fracturing chemicals, but also created a committee of independent experts to do the following:

To provide recommendations from a range of independent experts, the Secretary of Energy, in consultation with the EPA Administrator and Secretary of Interior, should task the Secretary of Energy Advisory Board (SEAB) with establishing a subcommittee to examine fracking issues. The subcommittee will be supported by DOE, EPA and DOI, and its membership will extend beyond SEAB members to include leaders from industry, the environmental community, and states. The subcommittee will work to identify, within 90 days, any immediate steps that can be taken to improve the safety and environmental performance of fracking and to develop, within six months, consensus recommended advice to the agencies on practices for shale extraction to ensure the protection of public health and the environment.\(^ {244}\)

Governors of both Pennsylvania and Maryland echoed the need for a focus on public safety.\(^ {245}\) In Pennsylvania, Governor Corbett’s executive order stated: “[T]he Commonwealth takes seriously its responsibility to ensure the

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\(^{240}\) U.S. DEPT OF ENERGY, supra note 162, at 21 exhibit 19.


\(^{242}\) See Goldstein et al., supra note 134, at 483.

\(^{243}\) Id.

\(^{244}\) THE WHITE HOUSE, BLUEPRINT FOR A SECURE ENERGY FUTURE 13 (Mar. 2011).

\(^{245}\) Goldstein et al., supra note 134, at 483.
development of natural gas in a manner that protects the environment and safeguards the health and welfare of its citizens.\textsuperscript{246}

Meanwhile, in Maryland, Governor O’Malley’s executive order also emphasized the importance of health and safety: “The Marcellus Shale Safe Drilling Initiative will assist State policymakers and regulators in determining whether and how gas production from the Marcellus Shale in Maryland can be accomplished without unacceptable risks of adverse impacts to public health, safety, the environment and natural resources.”\textsuperscript{247}

Notably, a 2012 article published in Environmental Health Perspectives documented the make-up and activities of these committees, as well as public concerns raised during their meetings with the public.\textsuperscript{248} The lead author, Dr. Bernard Goldstein, an environmental toxicologist and former Dean of the University of Pittsburgh School of Health,\textsuperscript{249} and his colleagues examined the extent to which these advisory committees were composed of individuals with expertise relevant to human environmental public health.\textsuperscript{250} They also attended several of these meetings and categorized public concerns to note and quantify how concerned the public was about environmental and public health related issues.\textsuperscript{251} Their evaluation of public concerns at the Federal Secretary of Energy Advisory Board (SEAB) meeting was significant in that there was a clear consensus of public concern.\textsuperscript{252} Of the fifty-nine citizens who voiced opposition to shale drilling at the meeting, forty-six (78%) were concerned about the negative effects of drilling on the environment.\textsuperscript{253} Concerns about the safety and/or regulation of the industry were expressed by forty-one citizens (69.5%), and thirty-seven (62.7%) expressed concerns about residents’ health.\textsuperscript{254} Thus, the concerns were clearly emphasized not only in the language of the executive orders, but also by the citizens.

\textsuperscript{247} Md. Exec. Order No. 01.01.2011.11 (June 6, 2011), http://mde.maryland.gov/programs/Land/mining/marcellus/Documents/01.01.2011.11.pdf [https://perma.cc/48B3-68ZS] (emphasis added); see also Goldstein et al., supra note 134, at 484.
\textsuperscript{248} See Goldstein et al., supra note 134, at 483.
\textsuperscript{249} According to the University of Pittsburg Medical Center, Dr. Goldstein is “an environmental toxicologist whose research interests have focused largely on the concept of biological markers in the field of risk assessment.” Bernard D. Goldstein, U. Pitt. Med. Ctr., http://www.upmc.com/media/experts/pages/bernard-d-goldstein.aspx [https://perma.cc/WZL9-DMHY].
\textsuperscript{250} Goldstein et al., supra note 134, at 483.
\textsuperscript{251} Id. at 484.
\textsuperscript{252} Id.
\textsuperscript{253} Id.
\textsuperscript{254} Id.
The study also examined the make-up of the committee—in other words, the background or experience of those appointed to the committees.\textsuperscript{255} The results regarding the lack of environmental public health or other health expertise\textsuperscript{256} were astonishing:

[All 51 members of the three advisory committees provided no evidence that any member had expertise in the human health aspects of environmental health or experience in health or health care. Based on the available information, we were unable to identify any public health personnel, physicians, nurses, pharmacists, dentists, or others with a health background on the three advisory committees.\textsuperscript{257}]

It was not just the study authors who noted the committee make-up—the citizens took note of it at the SEAB meeting, as well.\textsuperscript{258} Almost twenty-five percent of the citizens who opposed the drilling articulated concern about who was appointed to the committee, as well as their potential bias and lack of expertise that would allow the members to address the health and safety concerns.\textsuperscript{259} The study concluded that while the committees did have university-based expertise on the Federal SEAB committee, it was not particularly well represented on either Pennsylvania’s or Maryland’s committees.\textsuperscript{260} In particular, the study noted that “[n]one of the three committees includes members with academic expertise in health science or ecosystem sciences; that is, none of the five academic members has expertise in biological systems or human health.”\textsuperscript{261} This lack of scientific expertise in public health has not occurred because either state has a dearth of human and environmental health experts.\textsuperscript{262} Maryland has three and Pennsylvania has five accredited public health programs, four of which have formal departments in the field of environmental health.\textsuperscript{263}

C. First Amendment Restrictions on Physician–Patient Communications

In 2011, the U.S. Supreme Court, in \textit{Sorrell v. IMS Health, Inc.}, suggested that a higher standard of scrutiny is appropriate when it comes to regulation of

\textsuperscript{255} \textit{Id.}
\textsuperscript{256} Goldstein et al., \textit{supra} note 134, at 483–84. For the purposes of this study, the authors define having an “environmental public health expertise” to include “medical and health professionals who could be presumed to have some health background related to environmental health, however minimal (e.g., physicians, nurses, pharmacists, psychologists).” \textit{Id.}
\textsuperscript{257} \textit{Id.} at 484 (emphasis added).
\textsuperscript{258} \textit{Id.} at 485 tbl.1.
\textsuperscript{259} See \textit{id.}
\textsuperscript{260} See \textit{id.} at 485.
\textsuperscript{261} \textit{Id.}
\textsuperscript{262} Goldstein et al., \textit{supra} note 134, at 485.
\textsuperscript{263} \textit{Id.}
commercial speech that is speaker-targeted or content-based. It follows that if a law is aimed at restricting physician communications with patients, a higher standard of scrutiny would allow for more successful First Amendment challenges.

A few courts have since cited to Sorell in support of striking down state regulations thought to gag physician speech. In Wollschaeger v. Farmer, a federal district judge issued an injunction against a Florida law that would have prevented physicians from discussing gun ownership with patients. This issue was particularly relevant to general safety and welfare of Florida citizens as gun ownership has been debated as being tied to a public health issue. This decision suggests that courts could apply a stricter scrutiny standard in cases where a regulation targets or stifles physician–patient communication, meaning that the government would have to show a compelling state interest and, further, that the regulation is narrowly drawn to protect that interest. However, subsequent to the Sorell decision, states have attempted to narrowly draw regulations around the trade secret exemption, or in the case of Pennsylvania, require physicians to sign a confidentiality agreement that precludes their disclosing the information, possibly including disclosure to the patient.

D. State Laws Limiting Availability of Information to Health Care Professionals

Access to proprietary fracturing fluid components is difficult, even for health professionals and first responders. As evidenced by Cathy Behr’s story, time is of the essence when treating acute exposure scenarios, which typically occur more often in occupational scenarios. Although possible community chronic exposure may not necessitate the same urgency, the possible long-term consequences from the injection of millions of gallons of fracturing chemicals near various water sources present immediate concerns surrounding unknown long-term impacts on both the health of the community and the environment.

Several categorical obstacles in the state regulatory structures make it difficult for health care professionals to obtain the information. The first is state laws that provide no vehicle by which physicians can access the

266 Wollschaeger v. Farmer, 814 F. Supp. 2d 1367, 1384 (S.D. Fla. 2011); see also Swartz, supra note 265, at 107 n.35.
268 Swartz, supra note 265, at 125.
269 Dolgin, supra note 225, at 309.
270 Steingraber, supra note 1, at 1.
information. As of 2014, the ten states that did not provide access were Indiana, Louisiana, Michigan, Mississippi, New Mexico, North Dakota, Oklahoma, South Dakota, Utah, and Wyoming. The second involves a complicated system that requires a chain of requests be made by the regulator to the operator and so on, which could take days to weeks before it is put into the hands of the emergency responder or health care professional. And, to complicate matters, Tennessee even requires that the request must be submitted in writing. The third involves a disturbing movement toward adding an additional confidentiality requirement for physicians once they obtain the information requested.

E. Pennsylvania Law 13—An Example of an Alarming Trend of Stifling Physician Communication

In 2012, a law, known simply as Act 13, was passed by the Pennsylvania legislature and signed by Governor Tom Corbett. This act, like many state laws, detailed disclosure requirements regarding the chemicals used in fracturing. The striking difference from other laws, however, turned on two subsections that, when read together, banned physicians from discussing chemical information disclosed by the oil and gas industry with patients whose symptoms could be attributed to fracturing chemical exposure. That means that the new law would restrict doctors from telling anyone else—even other doctors—about what is in the various fracturing formulas. The purpose of the “Medical Gag Rule” was to provide a necessary layer of protection for trade secret exemptions claimed by the companies for proprietary information. Two particular provisions within Act 13 limit a physician’s

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271 McFeeley, supra note 177, at 897.
272 Id. at 897–99 tbl.6.
273 See MINORITY STAFF REPORT, supra note 30, at 12. When the House Committee requested that companies disclose the proprietary information, most companies stated that didn’t have the information about the products they purchased “off the shelf” from chemical suppliers. Id.
274 See McFeeley, supra note 177, at 897.
275 See id. at 898 & n.298.
277 Id. § 3201.
278 Dolgin, supra note 225, at 308.
281 See Phillips, supra note 279.
ability to obtain and communicate particular information with patients whom they feel have been exposed to chemicals associated with fracturing operations. Act 13 specifically protects trade secrets and proprietary information, which is curious considering that once trade secret protection is invoked, it is typically assumed as legitimate and rarely verified. Nevertheless, section 3222.1(b)(10) of Act 13 details the following disclosure “requirements” for the industry:

A vendor, service company or operator shall identify the specific identity and amount of any chemicals claimed to be a trade secret or confidential proprietary information to any health professional who requests the information in writing if the health professional executes a confidentiality agreement and provides a written statement of need for the information indicating all of the following:
(i) The information is needed for the purpose of diagnosis or treatment of an individual.
(ii) The individual being diagnosed or treated may have been exposed to a hazardous chemical.
(iii) Knowledge of information will assist in the diagnosis or treatment of an individual.

The subsequent language in section 3222.1(b)(11), however, provides for an exception to the written submission and signed confidentiality agreement in cases of medical emergencies where the health professional verbally agrees to the confidentiality terms, yet still may be required to submit a written statement of need.

If a health professional determines that a medical emergency exists and the specific identity and amount of any chemicals claimed to be a trade secret or confidential proprietary information are necessary for emergency treatment, the vendor, service provider or operator shall immediately disclose the information to the health professional upon a verbal acknowledgement by the health professional that the information may not be used for purposes other than the health needs asserted and that the health professional shall maintain the information as confidential. The vendor, service provider or operator may request, and the health professional shall provide upon request, a written statement of need and a confidentiality agreement from the health professional as soon as circumstances permit, in conformance with regulations promulgated under this chapter.

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283 See Hall, supra note 44, at 416.
285 Id. § 3222.1(b)(11).
In July 2014, the Pennsylvania Commonwealth Court addressed this very provision and upheld the “gag order” provision of Act 13. In fact, the opinion of a majority of the judges was that doctors “have nothing to worry about” with the law. In *Robinson Township v. Commonwealth*, Dr. Mehermeh Khan alleged that the new law violated the Pennsylvania Constitution because it restricted his right to disclose critical diagnostic information when dealing with an oil and gas company’s proprietary ingredients. He contended that the provision did not serve a legitimate state interest, essentially granted the companies special treatment, and restricted his ability to properly diagnose and treat his patients. The court disagreed, stating that the provisions “do not single out a particular member of either group for special treatment, and they reflect the balance struck by the General Assembly between the need to disclose confidential and proprietary information for medical treatment, the public’s interest in protecting these trade secrets, and the industry’s interest in protecting its proprietary information.” The court, however, made no mention of the public’s interest in the health, welfare, and safety of the communities. The court also pointed to the Act’s requirement that operators provide a “completion report” to the Department of Environmental Protection after the well is drilled, which would include a descriptive list of chemicals intentionally included in fluids and a maximum concentration as a percent of mass. And, the operators must provide the public with the same information within sixty days on FracFocus, which has already been criticized as still lacking transparency. What is not noted or considered by the majority in the opinion is the untenable and unrealistic process that a physician must go through before actually being able to treat a patient. Specifically, in an emergency situation similar to that of Cathy Behr’s, immediate access to information is key to treating the patient and to the health and safety of the medical personnel. There is no mention of the length of time and difficulty in accessing the information inherent in the information-requesting process as previously noted by the House Committee. In some cases, requests may have to travel from the oil and gas

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287 *Id.*

288 *Id.* at 1115–16.

289 *Id.* at 1116.

290 *Id.*

291 *Id.* at 1117.

292 *Id.* at 1117.

293 MINORITY STAFF REPORT, *supra* note 30, at 12. The Committee requested that the companies disclose the proprietary information and, although a few of the companies
operator to the chemical suppliers. 294 And then, there is the confidentiality agreement that the health care professionals must sign.

It is unclear whether doctors feel the same way as the Commonwealth Court—that nothing restricts them from accessing the information or even sharing it with colleagues. 295 Dr. Amy Pare, a doctor who treats patients who often inquire as to whether their symptoms are connected to gas drilling, says that the language on the required nondisclosure form is mysterious. 296 “I don’t think most physicians are well-versed in the legal system to know if they are within the boundaries of the law,” says Pare. “So you just avoid it, you don’t bring it up. I can’t think of any other word for it than intimidating. It’s intimidating for the doctor, and it’s intimidating for the patient.” 297

In the dissent, Judge McCullough echoed this concern about the ability of doctors to share information and adequately treat patients. 298

While the range and precise language of the confidentiality agreement is not known, it is a fair inference that a health professional will be unable to share the information in the peer-review setting, publish the clinical findings and proposed treatment plans in medical journals, or coordinate the outcome and treatment plans with other hospitals who later experience the same or a similar case. 299

The immediate detriment is a possible deterrent effect, preventing physicians from gaining access to critical information. The long-term consequences will be fewer scientific publications, lack of communication, and a fundamental interference with a physician’s ability to treat a patient.

VII. IMPLICATIONS OF LIMITING INFORMATION

“Problems cannot be solved at the same level of awareness that created them.”

Albert Einstein 300

On May 23, 2012, National Public Radio aired a story on its Morning Edition program about a rural Pennsylvania Care Clinic in southwestern Pennsylvania in the middle of rolling green hills and near a hydraulic

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294 Id.
295 Robinson Twp., 96 A.3d at 1117.
296 Colaneri & Phillips, supra note 286.
297 Id.
298 Robinson Twp., 96 A.3d at 1125.
299 Id.
fracturing tower. The report was not about the health care workers at this clinic treating a patient potentially exposed to a chemical associated with hydraulic fracturing; rather, it concerned strong gusts of unknown fumes wafting through the clinic. Workers described these fumes as something akin to nail polish remover. A nurse reported that some employees experienced nausea, vomiting, and even passing out. She describes what she experienced as a gust of fumes would hit the clinic: a metal taste on her tongue as it felt like it was enlarging, and feeling like there was not enough air to breathe until she passed out. Healthcare workers stopped coming in, and eventually, the clinic had to relocate. The health care professionals acknowledged that there were other possible sources for the gusts of fumes—there was a smelting plant down the road and coal mines nearby. However, the unknown was what bothered them.

A. Spinning Scientific Uncertainty into a Hollow Conclusion

Scientific uncertainty is inherent in the issue of hydraulic fracturing because of the lack of access to proprietary ingredients, past spills that have resulted in confidential settlements, and the inability of state environmental departments to release spill information to the public in a timely manner. When information is stifled, it is easy to claim that no problem exists.

The claim that there is no resulting contamination from hydraulic fracturing is misleading for several reasons. First, environmental risk assessment cannot be equated to a determination of factual causation in a court of law. Certainly, in proving liability, causation is an essential element, meaning that a landowner must provide sufficient evidence to satisfy causation. However, environmental risk assessment is premised upon obtaining accurate and complete information, including spill reports, reports of fractured well casings, chemical components, and concentrations in fracturing fluid. And, a lack of availability of information does not then lead to the conclusion that “X does not cause Y.” It is not uncommon for science to play “catch-up” with litigation. But it is particularly difficult for science to play a role in informing the public and adequately assessing risk when there are obstacles to obtaining that information.

302 Id.
303 Id.
304 Id.
305 Id.
306 Id.
307 Stein, supra note 301.
308 See King et al., supra note 38, at 350.
309 Id. at 344.
Over the past year, reports of unsafe drilling practices and documented spills have started to shed more light and have heightened public concern. The shift has seemed to include not only the possibility of methane migration to groundwater sources but also to contamination as a result of faulty construction and sanctioned dumping practices. Recently, both the Environmental Protection Agency (EPA) and the Department of Justice (DOJ) fined XTO Energy $2.3 million dollars for violating the Clean Water Act based on drilling operations at eight different sites that dumped sand, dirt, rocks, and “other material” into streams and wetlands while constructing well pads, associated pits, and roads in West Virginia.\(^\text{310}\) In 2013, the EPA fined XTO $100,000 for dumping between 6,300 and 57,373 gallons of frac water containing high levels of strontium, barium, chloride, and total dissolved solids into the Susquehanna River in Penn Township, Pennsylvania.\(^\text{311}\) According to the EPA, this water flowed continually for more than two months in 2010.\(^\text{312}\) Pennsylvania’s Attorney General also filed criminal charges against XTO in 2013, stemming from this incident, which was discovered when a Pennsylvania Department of Environmental Protection employee noticed an open valve at a wastewater storage tank during an inspection.\(^\text{313}\)

These stories, though not representative of all practices of oil and gas companies, highlight the need for increased oversight of the drilling process from the beginning. They also represent the undeniable fact that spills and careless practices are affecting the environment and raise considerable concerns about possible related human health concerns. These concerns necessitate a better window in the oil and gas practices that include disclosure of fracturing fluid components and timely disclosure of spills and accidents to the public.

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\(^{311}\) *Id.*

\(^{312}\) *Id.*

VIII. FACILITATING TRANSPARENCY: THERE IS NO ONE-SIDED SOLUTION TO VAGUE REGULATORY MECHANISMS AND OVERREACHING INTELLECTUAL PROPERTY RIGHTS

“Humankind has not woven the web of life. We are but one thread within it. Whatever we do to the web, we do to ourselves. All things are bound together. All things connect.”
Chief Seattle, 1854

A. Problems with Implementing Regulations that Curb Intellectual Property Overreach

It is possible for intellectual property law to overreach and provide “protection” for those claiming it above what it was intended to accomplish. Because the law generally favors sanctioning conduct that infringes upon intellectual property rights such as trade secret protection, it serves as a “thumb on the scale” in favor of industry and to the detriment of public health officials and scientists. Not only is this preference evident in common law, but it is mirrored in state regulations. In fact, most state laws defer to a claim of trade secret protection by enacting rules governing hydraulic fracturing that generally allow for a disclosure exception for proprietary ingredients in fracturing fluid for which the manufacturer is claiming trade secret protection. Public health officials are prevented from executing their ethical obligations to communicate with and treat patients because of information restrictions and litigation threats. Similarly, scientists who seek to study the effects of fracturing chemicals on the environment and human health through scientific research are limited by these same mechanisms.

In light of these public health concerns, the overuse of intellectual property protection should not be utilized in a way that exempts and shields a company from broader responsibility to the public. Further, trade secrecy should not be used to prohibit disclosure of information that could help scientists and health care professionals assess and communicate risks to the public and

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314 JUNE MACK MAFFIN, SOULISTRY—ARTISTRY OF THE SOUL: CREATIVE WAYS TO NURTURE YOUR SPIRITUALITY 23 (2011).
316 Id. at 884.
317 McFeeley, supra note 177, at 890. In his article, McFeeley reports that the only states that do not provide such trade secret exemption have such lenient rules governing reporting requirements that information about proprietary ingredients falling under a claimed trade secret protection is never required anyway. As of 2014, these states include: Alabama, Indiana, Michigan and Utah. Id. at 886 n.249.
318 See Rowe, supra note 315, at 877.
319 McFeeley, supra note 177, at 886.
environment that the claimant is, in fact, creating.\textsuperscript{320} Although both of these sentiments sound very compelling in theory, the problem remains with how to execute these ideas in a meaningful and realistic way. One possible suggestion is for state regulators to enact legislation that requires the appropriate state agency both to require factual support of an industry’s invocation of trade secret protection and to verify and approve each claim.\textsuperscript{321} Of the twenty-two states with hydraulic fracturing disclosure requirements, only four require factual justification to be provided when a manufacturer claims trade secret protection.\textsuperscript{322} And for states like Colorado that are confronted with that option, they are quick to express what are valid concerns about agency resources, including depletions in personnel and budget constraints.\textsuperscript{323} Once an agency is in possession of this information, concerns arise as to whether disclosures could occur, either inadvertently or through an information request under public records statutes.\textsuperscript{324}

Although critics often argue claims of trade secrecy are meritless,\textsuperscript{325} the fact remains that due to the complexity of the fluid components and the way that they are used, it is extremely difficult to for another company to steal the product.\textsuperscript{326} In fact, a United States Department of Energy panel recently called for full disclosure of the chemical constituents, stating, “[a] list of chemicals that includes the contributions from all the constituents added makes it extremely difficult to reverse engineer to determine which chemicals and in what proportions these chemicals are present in a particular additive or product with specific trade name.”\textsuperscript{327} This acknowledgment dismantles the arguments over the level of specificity and concentrations of hydraulic fracturing fluids that should be disclosed. Therefore, an ideal solution would include a mandatory disclosure of all chemical constituents and concentrations (regardless of the volume of water used in wells).

B. Balancing the Protection of Intellectual Ideas & “Public Interest”

Public policy exceptions exist in intellectual property protections. One such example is the doctrine of patent misuse, which originated as an affirmative defense to a claim of patent infringement, emerging from the

\textsuperscript{320} Id.
\textsuperscript{321} Id., supra note 44, at 416.
\textsuperscript{322} McFeeley, supra note 177, at 888. As of 2014, the states requiring factual justification are Arkansas, California, Illinois, and Wyoming. Id.
\textsuperscript{323} Id., supra note 44, at 416.
\textsuperscript{324} Id. at 417.
\textsuperscript{325} Id.
\textsuperscript{327} Id.
equitable defense doctrine of “unclean hands.” When asserting this defense, the defendant must generally show that the plaintiff broadened the “physical or temporal” nature of the patent to create an anticompetitive effect. This doctrine is employed when a plaintiff (patentee), who is otherwise entitled to a remedy, has acted so improperly in connection with the controversy that “the public interest in punishing the plaintiff outweighs the defendant’s tortious conduct.” The “public interest” in this case lies in “safeguarding competitive market opportunities.” Certainly, there is a public interest in safeguarding information that promotes innovation. However, safeguarding patent information, much like trade secret information, can arguably stifle innovation in the scientific community, limiting opportunities for toxicological and epidemiological studies of fracturing fluids.

There is also an argument that public interest includes not only business interests but also those meant to protect the health of society and the environment we live in. This interest is not only the foundation of the ethical duty to treat patients but also rooted in environmental procedural justice. The focus on process, the availability of information, and the opportunity to participate in the decision process are all essential to public health professionals and their patients. Specifically, the environmental movement advances several procedural arguments that are applicable here: (1) big companies exert disproportional influence on policymakers, and (2) those without power have been excluded from participating in decisions about environmental matters that could affect them. This criticism can be seen at both the legislative level and even in the more intimate setting of the doctor-patient relationship.

C. Case Studies for a Model Regulatory Structure

While many companies argue that if the chemical makeup of fracturing fluid was not protected by trade secret, it would be difficult to remain

329 Windsurfing Int’l, Inc., 782 F.2d at 1001.
332 See generally Rowe, supra note 315 (discussing how patents and intellectual property protections are contrary to the public interest).
334 Id.
competitive in the market, they have yet to explain how it would even be possible for another competitor to realistically reverse engineer the formula. In fact, legal documents from a 2011 Arkansas case describe the difficulty in even attempting to do so: “[T]hose who might use reverse-engineering would not be able to re-create and ascertain the exact composition and ratio of all compounds in [the] complex polymer structure without significant assistance and disclosure from the [commission].”


In 2010, Wyoming became the first state to require companies to disclose the proprietary ingredients associated with fracking operations. The rules required drillers to submit to the Wyoming Oil and Gas Conservation Commission (WOGCC) a complete list of the chemicals and concentrations they plan to use in their fracking operations for each well. In subsequent decisions, the WOGCC granted numerous exemptions based on trade secret claims by industry. In 2011, the WOGCC reportedly granted eleven companies exemptions based on trade secret protection for 146 of 148 chemicals used in the fracking process. In 2012, several public interest groups, including Earth Justice, filed suit against the WOGCC, claiming that the WOGCC should be required to reveal the chemical information that the Commission Supervisor exempted or redacted in his response to their request under the Wyoming Public Records Act (WPRA). In March 2013, the district court upheld the WOGCC’s decisions, stating that the WOGCC


340 Id.; see also 2013 Wyo. Sess. Laws 27, http://legisweb.state.wy.us/2013/Session%20Laws.pdf [https://perma.cc/HA7S-KXQ] (Ch. 4, § 1 requiring that the Commission Supervisor be a “qualified petroleum engineer or petroleum geologist with at least ten (10) years of experience in his respective field of expertise”).

341 Plagakis, supra note 339.
Supervisor had acted reasonably in its decision-making process.\textsuperscript{342} On appeal, the Supreme Court of Wyoming remanded the decision back down to the district court, refusing to decide whether the information was, in fact a trade secret.\textsuperscript{343} The Wyoming Supreme Court noted that “[t]he role of the district court [is] to examine [the disputed information]. . . and then make a judgment as to whether [the custodian] was correct in his conclusion.”\textsuperscript{344} The court then went on to note that there was nothing in the record to indicate what information the Supervisor relied upon and why he did so, meaning that the district court did not have a sufficient basis to determine whether he made the determination based on proper information or not.\textsuperscript{345} The court did, however, provide an opinion as to the correct definition of a “trade secret” under the WPRA.\textsuperscript{346} The court adopted the definition of “trade secret”\textsuperscript{347} under the Freedom of Information Act (FOIA) as the one most consistent with previous precedent issued by the court.\textsuperscript{348} Most importantly, this narrower definition of trade secret required that there be a “direct relationship between the trade secret and the productive process.”\textsuperscript{349} The court went on to say that this interpretation was consistent with the policy behind WPRA, which “is well settled as one of disclosure, not secrecy, as the legislature of this state has stressed the importance of making available to the public agency records.”\textsuperscript{350} In sum, the definition of trade secret provided by the Wyoming Supreme Court is one that acknowledges the importance of making information available to the public that must be the end product of innovation and is directly related to the productive process.\textsuperscript{351}


\textsuperscript{343} \textit{Id.} at 222.

\textsuperscript{344} \textit{Id.} at 230 (alterations in original) (citing Allsop v. Cheyenne Newspapers, Inc., 39 P.3d 1092, 1101 (Wyo. 2002)).

\textsuperscript{345} \textit{Id.}

\textsuperscript{346} \textit{Id.} at 233.

\textsuperscript{347} \textit{Id.} Under FOIA, a trade secret is “a secret, commercially valuable plan, formula, process, or device that is used for the making, preparing, compounding, or processing of trade commodities and that can be said to be the end product of either innovation or substantial effort.” \textit{Id.} (quoting Anderson v. Dep’t of Health & Human Servs., 907 F.2d 936, 943–44 (10th Cir. 1990)).


\textsuperscript{349} \textit{Powder River Basin Res. Council}, 320 P.3d at 233 (quoting \textit{Anderson}, 907 F.2d at 943–44).


\textsuperscript{351} \textit{Id.} “Accordingly, we hold that a trade secret under the WPRA is a secret, commercially valuable plan, formula, process, or device that is used for the making, preparing, compounding, or processing of trade commodities and that can be said to be the
In January 2015, the parties entered into a settlement agreement.\footnote{Joint Motion for Approval of Stipulated Settlement Agreement and Dismissal Order, \textit{Powder River Basin Res. Council}, 320 P.3d 222 (No. 94650-C), http://earthjustice.org/sites/default/files/files/Settlement%20Agreement%20Final%20Order.%20Wyoming%20Fracking%20Chemical%20Disclosure%20Case.pdf [http://perma.cc/74FV-BTHH].} The settlement requires the WOGCC to adopt new guidelines and that owners, operators, and oil and gas service companies resubmit Challenged Justifications and provide detailed information demonstrating why specific chemical identities qualify for the newly defined and narrower trade secrets exemption under Wyoming law.\footnote{Id.; see also Press Release, Earth Justice, Wyoming to Strengthen Fracking Chemical Disclosure in Response to Citizen Pressure (Jan. 26, 2015), http://earthjustice.org/news/press/2015/wyoming-to-strengthen-fracking-chemical-disclosure-in-response-to-citizen-pressure [https://perma.cc/H6AM-HJ2T] (stating the outline of the settlement agreement).} Earth Justice was pleased with the outcome, commenting that “[t]hese policies will ensure that the Oil and Gas Commission receives the information necessary to identify legitimate confidentiality claims and prevent companies from evading disclosure requirements based on weak, boilerplate assertions that the chemicals they use are trade secrets.”\footnote{Press Release, Earth Justice, \textit{supra} note 353.}

This case and settlement agreement demonstrate a more balanced approach to analyzing trade secret protection while recognizing the public importance of information disclosure. While the WOGCC set up a structure that allows for an evaluation of this information, the court held that internal procedures must be in place that allow for a substantive review of the trade secret claim, essentially shifting a burden to the oil and gas companies to justify trade secret protection. This recent court decision as well as the state regulatory structure should serve as a model to other states whose interests should be balanced in allowing drilling operations to continue with a keen interest in providing information to the public for the sake of public and environmental health.

2. \textit{Part II of Maryland’s 2014 Marcellus Safe Shale Drilling Study and Recommendations}

Another model approach provides more specifics in the overall safety assessment that states should be considering. In 2014, the Maryland Department of the Environment (MDE) and Maryland Department of Natural Resources (DNR) prepared the Marcellus Shale Safe Drilling Study Interim Final Best Practices in response to Maryland Governor O’Malley’s Executive
Order. The MDE and DNR were tasked with putting together an Advisory Commission to advise policymakers and regulators as to how and whether gas production can take place without unacceptable risks to public health, natural resources, and the environment. The interim report acknowledged that “[a]lthough accidents are relatively rare, exploration for and production of natural gas from the Marcellus Shale in nearby states have resulted in injuries, well blowouts, releases of fracturing fluids, releases of methane, spills, fires, forest fragmentation, damage to roads, and allegations of contamination of ground water and surface water.” The plan then proposes a permitting process which requires a Comprehensive Gas Development Plan that includes geological surveys; minimizes surface disturbance, forest fragmentation, and noise pollution; and allows for appropriate setbacks to minimize disturbances to environmentally sensitive areas and consideration of sensitive water sources. All of the information must be reviewed and approved by the public. The plan also goes on to address potential environmental concerns that can occur as a result of improper construction and protocol at the well site in order to minimize potential releases including the following: (1) closed loop drilling systems and “zero discharge” pads; (2) containment of stormwater; (3) storage of all liquids (including flowback), with the exception of freshwater, in watertight closed tanks inside secondary containment and not in open pits; and (4) fully lined well pad sites.

Part D of the report provides a robust set of chemical disclosure requirements. The section begins by acknowledging that “[t]he identity of chemical additives to drilling fluids and hydraulic fracturing fluids is of particular concern because these chemicals are used underground where, if appropriate precautions are not taken, the chemicals could enter underground sources of drinking water.” There is also an emphasis on receiving this information before the process begins instead of after well completion. The following is a summary of some of the key requirements: “The permittee will be required to provide a complete list... of chemical names, CAS numbers,

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356 Id., supra note 355, at 1.

357 Id.

358 Id. at 5.

359 Id. at 10–12.

360 Id. at 32.

361 Id. at 32.

362 Id., supra note 355, at 32–34.
and concentrations of every chemical constituent of every commercial chemical product brought to the site,” which will be made public unless a trade secret claim is made.\textsuperscript{365}

If a claim of trade secret is made, the claimant must substantiate and attest to the claim, although the MDE will not evaluate the claim.\textsuperscript{366} The claimant must also provide MDE with the “supplier’s or service company’s contact information, including the name of the company, an authorized representative, and a telephone number answered 24/7 by a person with the ability and authority to provide the trade secret information in accordance with the regulations.”\textsuperscript{367}

Additionally, the report addresses the specific concern of how health professionals may access and use the information:

[The claimant must provide] the trade secret to a health professional who states, orally or in writing, a need for the information to diagnose or treat a patient. The health professional may share that information with other persons as may be professionally necessary, including, but not limited to, the patient, other health professionals involved in the treatment of the patient, . . . the Centers for Disease Control, and other government public health agencies. Any recipient of the information disclosed under this regulation shall not use the information for purposes other than the health needs asserted in the request and shall otherwise maintain the information as confidential. Information so disclosed to a health professional shall in no way be construed as publicly available. The holder of the trade secret may request a confidentiality agreement from all health professionals to whom the information is disclosed as soon as circumstances permit, but disclosure may not be delayed in order to secure a confidentiality agreement.\textsuperscript{368}

Additionally, the report also allows for further scientific research and publication of this research to take place in the presence of trade secret:

Upon written request and statement of need for public health purposes, the person claiming the trade secret will disclose the chemical identity and percent composition to any health professional, toxicologist or epidemiologist who is employed in the field of public health, including such persons employed at academic institutions who conduct public health research. The recipient may share the information as professionally necessary. Any recipient of the information disclosed under this regulation shall not use the information for purposes other than the public health needs asserted in the request and shall otherwise maintain the information as confidential. Information so disclosed to a health professional, toxicologist or epidemiologist shall in no way be construed as publicly available. Disclosure

\textsuperscript{365} Id. at 32–33 (footnote omitted).
\textsuperscript{366} Id. at 33.
\textsuperscript{367} Id.
\textsuperscript{368} Md. Dep’t of the Env’t & Md. Dep’t of Nat. Res., supra note 355, at 33 (second emphasis added).
may be conditioned on the signing of a confidentiality agreement before disclosure. Publication of research results without revealing any trade secret information is not precluded. For example, provided the publication does not disclose the trade name of the commercial product subject to trade secret protection, or the identity of the manufacturer or distributor of the product, research that utilizes trade secret information may be published.\textsuperscript{369}

Although some of this language was edited in the final distribution draft of the report\textsuperscript{370} based on an inference that the Material Safety Data Sheets provide enough information, the interim report and recommendations got it right.

These recommendations go a long way in establishing a balance that allows for much-needed progress in the fields of toxicology and epidemiology, while allowing for health professionals to not only access the information in a timely manner at a centralized location, but also be clear as to how they can use the information and to whom they may disclose that information. This report provides a worthy model of considerations that states should strive to address; such considerations are clearly a public interest while striving to preserve proprietary information. The much-needed transparency and increased safety requirements also improve public relations between industry and communities by lessening scientific uncertainty and allowing for a certain amount of control, which in turn lessens perceived risks by the public.

Allowing those in the public health sector to share in and evaluate the information allows for accurate risk assessment and treatment of the public, as well as productive and valuable input by the community.

Concerns about the lack of information have been echoed by the Maryland legislature as recently as May 2015 with legislation that would ban the state from issuing permits for hydraulic fracturing until October 2017, requiring Maryland’s Department of the Environment to adopt regulations by October 2016.\textsuperscript{371} Governor Larry Hogan (R), who expressed strong support for hydraulic fracturing during his campaign neither signed it into law, nor vetoed the bill due to the strong “veto-proof” approval margins associated with the bill.\textsuperscript{372} Around the same time in Texas, Governor Greg Abbott signed into law a measure that effectively prevented local governments or municipalities in

\textsuperscript{369} Id. at 33–34 (second emphasis added).


\textsuperscript{371} Josh Hicks, Md. Fracking Moratorium to Become Law Without Hogan’s Signature, Wash. Post (May 29, 2015), http://www.washingtonpost.com/local/md-politics/md-fracking-moratorium-to-become-law-without-hogans-signature/2015/05/29/e1d10434-062e-11e5-a428-c984eb07744e_story.html [https://perma.cc/VJf6-8CU9]. The bill was passed a few months after a public poll of state residents. Fifty-six percent of the residents opposed fracking; compared to thirty-six percent who supported it. Id.

\textsuperscript{372} Id.
Texas from imposing fracking bans. Critics of the newly enacted Texas law expressed concern that it will prevent local governments from adopting measures to ensure the health and safety of the community. Meanwhile, the Obama administration recently unveiled the first major federal regulations for hydraulic fracturing on public lands. The regulations make two important advancements in advancing public health measures associated with hydraulic fracturing by (1) allowing government workers to inspect the concrete barriers that line fracking wells, and (2) requiring companies to publicly disclose chemicals used in the fracturing process within thirty days of completing the process, using FracFocus. Yet, even after the introduction of these regulations, a divide continues to exist as to whether the oversight of fracking should fall within the purview of a state or the federal government. In September 2015, a Wyoming judge blocked the implementation of the regulations, commenting that “[t]he fracking rule creates an overlapping federal regime, in the absence of congressional authority to do so, which interferes with the States’ sovereign interests in, and public policies related to, regulation of hydraulic fracturing.” This order delays implementation in any court hearing legal arguments on the case. While this challenge based on the assertion of “regulatory overreach” has momentarily succeeded in delaying additional oversight into the fracking process, questions remain as to whether efforts to require additional disclosure will provide information that will allow for the transparency that is necessary to accurately develop science and associated risk assessments necessary to protect the public.

IX. CONCLUSION

As evidenced by the various state laws and recently enacted federal regulations, disagreements remain as to the actual risk posed to the public. The solution is not a one-sided approach; nor is it an easy one. By providing much-needed transparency to governmental agencies and proactively engaging the

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374 Id.
376 Id.
378 Davenport, supra note 377.
379 Id.
380 See Davenport, supra note 375.
public health profession, industry can benefit through improved relationships that could foster trust. Disclosure of safety practices and chemical components that could materially affect environmental and human health would further develop science and allow industry to continue to safely harvest natural resources. When this need for further transparency is balanced with a claim of “trade secret protection,” the state and federal government can no longer summarily dismiss health and safety concerns and not engage in a dialogue about whether limiting chemical disclosure is appropriate in light of the environmental and public health concerns associated with substantial hydraulic fracturing that is occurring throughout the United States. In terms of what is at stake, a comparison to Coca-Cola may be a misplaced analogy that should be questioned and scrutinized.

“After all, the secret recipe for Coca-Cola has been considered one of the most closely guarded trade secrets in the world for more than 125 years, yet Coke still puts the ingredients on every can. If soft drink makers can do it, so can drillers.”\(^{381}\)

\(^{381}\) Kelly, supra note 2 (quoting Loren Steffy, a Forbes contributor).