

Toxic Secrets

**Companies Exploit Weak US Chemical Rules
To Hide Fracking Risks**



Dusty Horwitt
Partnership for Policy Integrity

April 7, 2016



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Executive Summary

Ever since fracking for gas and oil exploded across the landscape citizens have demanded to know the identity and toxicity of the chemical solutions injected underground that make fracking possible. After a decade of struggle, much of the information remains secret.

More than 17 million Americans in the contiguous 48 states live within one mile of an active oil or natural gas well.¹ This report tells the story of how the federal Toxic Substances Control Act (TSCA), the federal law governing the manufacture and use of fracking and drilling chemicals, allows widespread use of these chemicals with no health testing, and then denies citizens even the most basic information on their identity and use at thousands of natural gas and oil wells across the country.

Toxic Secrets is based on a first-ever review of EPA's health assessments and regulatory determinations for 105 fracking and drilling chemicals reviewed under TSCA's New Chemicals program between 2009 and 2014. Partnership for Policy Integrity (PFPI) received the records over the course of almost two years under a Freedom of Information Act (FOIA) request and separately obtained manufacturers' submissions for most of the 105 chemicals from EPA's public docket.

We found:

- Health studies were available in the public docket in only 2 percent of cases (2 of 99 cases). Companies claimed that they provided health testing data for 12 of 99 chemicals, but health data from 10 of the 12 were missing. In at least two of these 12 cases, companies claimed the studies as confidential. Submissions for six of the 105 chemicals were missing from EPA's public docket entirely.
- EPA requested health studies in only five cases, despite expressing health concerns in 88 cases, including irritation to skin, eyes and mucous membranes; lung effects; neurotoxicity; kidney toxicity; and developmental toxicity. Federal law does not mandate health testing before a fracking chemical is put into widespread use.
- EPA approved almost all of these chemicals for manufacture, and the agency subsequently received notice that 37 of 70 chemicals expected to be produced at higher volumes (more than 22,000 pounds to millions of pounds per year) were, in fact, manufactured. The agency approved all of the 33 chemicals companies expected to be produced at lower volumes (limited to 22,000 pounds per year or less). See link in footnote below for a full list of chemicals reviewed in this report.²

Citizens are prevented from learning about the identities and potential health impacts of chemicals by TSCA's broad "confidential business information" (CBI) provisions, which allow companies to keep basic information about a chemical hidden from the public.³

¹ Electronic mail from Seth Shonkoff, executive director of PSE Healthy Energy to Dusty Horwitt, Senior Counsel, Partnership for Policy Integrity (Mar. 21, 2016).

² Link to list of chemicals reviewed in this report: <http://www.pfpi.net/wp-content/uploads/2016/03/ToxicSecrets-Chemicals-List.pdf>.

³ The information is shared with EPA, however.

- For at least 59 of 70 high volume chemicals, companies asserted confidentiality claims for the chemical name, and for at least 52 out of 70 they claimed confidentiality for the Chemical Abstracts Services (CAS) numbers (unique identifiers for chemicals). Under TSCA, the EPA must protect these claims unless the Agency takes steps to challenge them; actions that the EPA has rarely taken.⁴ In at least 36 of the 70 cases, companies claimed as confidential the chemical’s trade or product name. In 64 of the 70 cases, companies claimed as confidential the expected production volume.
- Companies claimed exposure assumptions as confidential for at least 55 of 70 high volume chemicals. This is key, because the EPA assumes as a matter of policy that accidental releases such as leaks, spills, underground migration, or blowouts never occur.
- Companies claimed as confidential the chemical’s name and CAS number for 16 of 33 low volume chemicals.

People living near gas drilling sites have reported health problems consistent with at least some of the health concerns EPA scientists expressed over these chemicals, including skin conditions, upper respiratory symptoms and memory loss.⁵

TSCA does not require chemical companies or EPA to conduct any health, ecological or other testing prior to manufacture and use of the chemical. EPA is allowed to request that companies test chemicals for health effects or other purposes, but as a practical matter the agency does not use this authority to request human health data even in cases when regulators have health concerns. “Many new chemical notices lack the data necessary to fully characterize toxicity and risk to humans and the environment...” EPA wrote in a 2012 manual. “Due to the design of TSCA, it has become necessary to make chemical management decisions in the absence of measured data.”⁶ Due in part to this lack of health testing, in 2009, Congress’ investigative arm, the Government Accountability Office, placed EPA’s chemical review program on its list of federal government programs at highest risk of waste, fraud, abuse and mismanagement. The program was still on GAO’s list as of last year.⁷

In addition, under TSCA, chemical companies can extend confidentiality claims to information including a chemical’s name, production volume, how people might be exposed to the chemical,

⁴ U.S. Government Accountability Office. (2013). *EPA Has Increased Efforts to Assess and Control Chemicals but Could Strengthen Its Approach* (Publication No. GAO-13-249). 11, 24. Retrieved from <http://www.gao.gov/assets/150/147952.pdf>.

⁵ Rabinowitz, P. et al (2015). Proximity to natural gas wells and reported health status: results of a household survey in Washington County, Pennsylvania. *Environmental Health Perspectives*, 123, 21-26. doi: 10.1289/ehp.1307732 (finding greater incidence of skin and upper respiratory conditions in people living within one kilometer of natural gas wells than in those living farther away). Telephone interview with toxicologist David Brown, who has investigated health effects associated with natural gas drilling as a scientist with the Southwest Pennsylvania Environmental Health Project (Mar. 21, 2016) (reporting that throat irritation and respiratory effects and neurological effects including headaches and memory loss and are among the most commonly reported health effects in southwestern Pennsylvania).

⁶ U.S. Environmental Protection Agency. (2012). *Sustainable Futures / P2 Framework Manual*. 1-2. Retrieved from <http://www.epa.gov/oppt/sf/pubs/sf-p2-manual.html>.

⁷ U.S. Government Accountability Office. (2009). *High-Risk Series: An Update* (Publication No. GAO-09-271). 22-24. Retrieved from <http://www.gao.gov/assets/290/284961.pdf>. U.S. Government Accountability Office. (2015). *High-Risk Series: An Update* (Publication No. GAO-15-290). 280-286. Retrieved from <http://www.gao.gov/assets/670/668415.pdf>.

and even the manufacturing company's own name. Often, the companies claim health and safety data to be CBI even when TSCA does not allow them to do so. EPA must protect these claims unless the Agency takes steps to challenge them and make the information public, actions that EPA has rarely taken.⁸ Such confidentiality makes it extremely difficult for citizens to obtain meaningful information on fracking and drilling chemicals.

An equally significant concern is that when assessing drilling and fracking chemicals, EPA does not consider the risk of accidental releases or inadvertent exposures, including leaks, spills and underground migration of fluids or fugitive air releases. This practice contradicts a growing body of evidence, including data collected by EPA itself and public statements by drilling companies, that leaks, spills, blowouts and underground migration are inherent or likely in oil and natural gas extraction.⁹ See link in footnote below for a list of evidence that leaks, spills and other unintentional releases are common in oil and natural gas drilling.¹⁰

This “no accidental exposure” assumption is critical, because it means that as a general rule, fracking and drilling chemicals are likely to be considered safe because risk is assessed as the product of exposure and toxicity. Therefore, little or no exposure equals little or no risk - regardless of what toxicity or health studies might reveal about a chemical's dangers (in the unlikely event that someone conducted the relevant studies).

EPA has stated that it takes into consideration companies' assumptions about how people might be exposed to chemicals. However, it is uncertain the degree to which this occurs. Companies claimed exposure assumptions as confidential in at least 55 of 70 high volume cases. For only two out of 105 chemicals did records show that a company admitted that its chemical could leak, spill or migrate underground.

In these two cases, the manufacturer, E.I. Dupont Nemours and Company, said that a very small concentration of a compound caused by the breakdown of its chemical would be expected to migrate into groundwater. The company indicated that there would be monitoring of groundwater near where the chemical would be used, but did not say who would perform such testing.¹¹ EPA officials said that the agency does not track where chemicals are used and lacked the staff to test water supplies near oil and gas wells. Without such testing, it is unclear how EPA could know whether its exposure assumptions are accurate and whether the public is being protected. Over the course of our investigation, EPA generally declined to answer questions about the chemical records including questions about the agency's exposure assumptions for chemicals the agency allowed to be manufactured despite serious human health concerns.

⁸ Government Accountability Office. (2013, March). *EPA Has Increased Efforts to Assess and Control Chemicals but Could Strengthen Its Approach*. 11, 24. Retrieved from <http://www.gao.gov/assets/660/653276.pdf> (reporting that prior to 2009, EPA did not often challenge confidentiality claims though the agency has taken some steps to do so since then).

⁹ See, e.g., U.S. Environmental Protection Agency. (2015). *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources [hereinafter EPA Draft Report]*. (EPA/600/R-15/047a). 5-42, 5-43. Retrieved from <http://www.epa.gov/hfstudy/review-state-and-industry-spill-data-characterization-hydraulic-fracturing-related-spills-1>.

¹⁰ Link to list of documented accidental releases in oil and gas drilling, 1980-2015: <http://www.pfpi.net/wp-content/uploads/2016/03/ToxicSecrets-Leaks-and-Spills.pdf>.

¹¹ U.S. Environmental Protection Agency. *Record numbers P-11-0092 and P-11-0093*. 64.

Recommendations

Congress is currently moving to amend TSCA. Bills have passed both the House and Senate, and the two houses are trying to reconcile their differences. Yet unless the bills are amended, neither would remedy the three major problems that we identified during our investigation of fracking and drilling chemicals: lack of mandatory health testing, broad confidentiality provisions that are biased toward industry secrecy, and unrealistic exposure assumptions that chemicals are not accidentally released.

TSCA must be amended to provide the public with meaningful information and health protections from fracking and drilling. Without addressing these issues, reformers will leave behind millions of people across the country who seek simply to verify the identity and safety of the chemicals used to frack and drill for oil and gas in their communities.

The House and Senate versions of TSCA should be revised to:

1. Require that manufacturers conduct health testing before chemicals can be manufactured.
2. Require companies to publicly disclose the identities and Chemical Abstracts Service numbers of chemicals that are manufactured commercially, and identify oil and gas wells in which the chemicals are used.
3. Remove confidentiality provisions so that EPA can publicly disclose risk assessments and regulatory determinations for new chemicals as well as those already on the market or allowed for use under TSCA. EPA might not be able to disclose these assessments and regulatory determinations in some cases due to confidentiality claims.
4. Require that end users disclose where drilling and fracking chemicals are used.
5. Both the Senate and House bills require EPA to assess risks posed by a chemical according to its intended “conditions of use” or the “reasonably foreseeable” conditions under which the chemical will be manufactured, used or disposed of.¹² Congress should clarify that in the context of drilling and fracking chemicals, it is “reasonably foreseeable” that the chemicals will leak, spill, migrate underground and become airborne as a function of their normal and intended use. Both bills should require that EPA develop its own reasonably anticipated exposures for fracking and drilling chemicals that include these common releases.
6. Require third party monitoring for chemical releases in air, water and soil. This should be paid for by chemical manufacturers and users, with routine audits by the EPA or an appropriate federal agency.

¹² S. 697 §§ 3,6; H.R. 2576 §§ 2, 4 (b).

I. Concern Over Chemicals Used in Drilling and Fracking

Since as early as 1987, when the EPA submitted a detailed report to Congress about impacts of wastes from oil and natural gas drilling and fracking, regulators, media outlets and others have documented pollution from these operations in thousands of cases, including pollution associated with the use of chemicals. The EPA's 1987 report documented 61 cases of contamination of groundwater, surface water and soil in 14 states from a variety of substances including drilling muds (chemical substances used to drill wells), fracking fluid, and wastewater that emerges from wells.¹³ In 2004, the nonprofit organization, Earthworks, found that since the New Mexico Environmental Bureau's inception in the mid-1980's, oil and gas waste pits (typically containing fluids and solids from the drilling process) had contaminated soil and water in New Mexico in more than 6,700 cases; 557 of those cases resulted in the contamination of groundwater.¹⁴ Figures from the state of Colorado showed that from 2007 to 2012, there were 2,078 oil and gas spills and slow releases statewide with 17 percent of them resulting in groundwater contamination.¹⁵ Last year, EPA released a draft study on hydraulic fracturing's effects on drinking water and found that hydraulic fracturing activities had contaminated ground and surface water supplies through spills, discharge of treated hydraulic fracturing wastewater, underground migration of fluids, and direct injection of hydraulic fracturing fluids into drinking water resources.¹⁶

At the same time, EPA and others have highlighted the lack of evidence that prevents scientists, regulators and the general public from understanding the frequency and severity of contamination from drilling and fracking including the impacts of chemicals used. In its 1987 report to Congress, EPA stated that while the report's authors tried to include case studies representative of various types of oil and natural gas-related pollution, the agency was unable to develop a statistically representative record of damages because state records were incomplete or dispersed among several offices; claims of pollution against oil and gas operators were often settled out of court and the settlements were sealed; and often, oil and gas activity occurred in remote locations where it was unlikely that pollution would be observed.¹⁷ In its 2015 draft study of hydraulic fracturing's impact on drinking water, EPA repeatedly emphasized that data is limited, thus it is impossible to make broad conclusions about the frequency and severity of

¹³ U.S. Environmental Protection Agency. (1987). *Report to Congress: Management of wastes from the exploration, development, and production of crude oil, natural gas, and geothermal energy* (Report No. EPA/530-SW-88-003). Chapter 4. Retrieved from <http://www3.epa.gov/epawaste/nonhaz/industrial/special/oil/530sw88003a.pdf>.

¹⁴ Sumi, L. (2004). *Pit pollution: Backgrounder on the issues, with a New Mexico case study*. Washington, DC: Earthworks: Oil and Gas Accountability Project. 1, 19. Retrieved from https://www.earthworksaction.org/library/detail/pit_pollution#.VpKOaja5ekN.

¹⁵ Finley, B. (2012, December 9). Drilling spills reaching Colorado groundwater; state mulls test rules. *The Denver Post*. Retrieved from http://www.denverpost.com/environment/ci_22154751/drilling-spills-reaching-colorado-groundwater-state-mulls-test#ixzz2EihHU2fg.

¹⁶ U.S. Environmental Protection Agency. (2015). *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources [hereinafter EPA Draft Report]*. (EPA/600/R-15/047a). ES-23. Retrieved from <http://www.epa.gov/hfstudy/review-state-and-industry-spill-data-characterization-hydraulic-fracturing-related-spills-1>.

¹⁷ U.S. Environmental Protection Agency. (1987). *Report to Congress: Management of wastes from the exploration, development, and production of crude oil, natural gas, and geothermal energy* (Report No. EPA/530-SW-88-003). Chapter 4, 4-10, 4-11. Retrieved from <http://www3.epa.gov/epawaste/nonhaz/industrial/special/oil/530sw88003a.pdf>.

water pollution. Some of the missing data related to chemicals used in the fracking process. “Across the industrial landscape, thousands of chemicals are used commercially that lack toxicity data (Judson et al., 2009),” EPA reported. “Similarly, major knowledge gaps exist regarding the toxicity of most chemicals used in hydraulic fracturing fluids or detected in flowback/produced water, impeding the assessment of human health risks associated with drinking water resources affected by hydraulic fracturing.”¹⁸

Communities across the nation have become increasingly concerned about drilling and fracking activities, particularly as the rate and intensity of drilling increased over the past 15 years. Much of the concern has focused on the risks posed by the chemicals used in the fracturing process and the lack of transparency concerning chemical identities and impacts. Some governments have acted to place moratoriums or bans on drilling or fracking, at least until more information can be gathered about the risks. In the highest-profile decision on the issue, New York state banned high-volume hydraulic fracturing in December 2014. In making the decision, the New York Health Department wrote that “the current scientific information is insufficient. Furthermore, it is clear from the existing literature and experience that [high-volume hydraulic fracturing] activity has resulted in environmental impacts that are potentially adverse to public health. Until the science provides sufficient information to determine the level of risk to public health from [high-volume hydraulic fracturing] and whether the risks can be adequately managed, [high-volume hydraulic fracturing] should not proceed in New York state.”¹⁹

II. Rationale for This Report

In order to better understand the risks that drilling and fracking chemicals pose to the public and to determine whether EPA is effectively regulating these chemicals, Partnership for Policy Integrity’s Senior Counsel, Dusty Horwitt, along with colleagues at Earthworks filed a Freedom of Information Act request with EPA in March 2014. The request sought EPA’s health assessments and regulatory determinations for drilling and fracking chemicals reviewed under Section 5 of the Toxic Substances Control Act. Despite significant public attention to drilling and fracking, very few people knew that EPA had been assessing and regulating chemicals used in the process.

III. What Documents Were Received

We received a variety of documents created by EPA under the Toxic Substances Control Act. Congress enacted TSCA in 1976 to give EPA the power to gather more information about chemicals and to regulate those that EPA believes pose an unreasonable risk to health or the environment. Section 5 of TSCA sets standards for regulation of new chemicals or existing chemicals proposed to be used or manufactured in new ways before the chemicals reach the marketplace.

¹⁸ Id. at 9-35.

¹⁹ New York State Department of Health. (2014). *A Public Health Review of High Volume Hydraulic Fracturing for Shale Development*. 12. Retrieved from http://www.health.ny.gov/press/reports/docs/high_volume_hydraulic_fracturing.pdf.

Under this section, implemented by EPA's New Chemicals program, companies generally must notify EPA at least 90 days before manufacturing or importing one of these new or repurposed chemicals. Under TSCA, manufacture includes importation. The notice companies must send is called a premanufacture notice. EPA has 90 days to assess the chemical for risks and decide whether and how to regulate it.²⁰ EPA assesses the chemicals for health, environmental and other concerns such as how persistent the chemical is likely to be in the environment. Because the information provided in the notice is usually sparse, the agency typically uses models or predictions to assess exposure. The agency then conducts a screening level risk assessment and makes a regulatory determination.²¹ These determinations include dropping the chemical from further review at some point during the 90-day period, meaning that the agency allows the chemical to be manufactured without regulation. When EPA decides to regulate a chemical, the agency can issue Significant New Use Rules under which EPA places limits on a chemical's use for any company that might manufacture it. Alternatively, EPA may negotiate consent orders with companies that submit the premanufacture notice, placing limits on a chemical's use, often including required testing, for the submitting company only. EPA can also ban the use of chemicals or ban them pending tests that would enable the agency to better evaluate risks to health or the environment.²² Once a chemical is allowed to be manufactured, and if the company that submitted the premanufacture notice decides to manufacture the chemical commercially, the company must generally provide EPA with a Notice of Commencement within 30 calendar days of when the substance is first manufactured. This notice generally has the effect of adding the chemical to EPA's TSCA Chemical Substances Control Inventory, a list of all existing (as opposed to new) chemical substances manufactured or processed in the U.S. for uses under TSCA such as oil and gas drilling.²³ Once a chemical is added to the inventory, companies other than the submitter may manufacture it, subject to any applicable regulations, without submitting their own notice.

A few exemptions apply, at least two of which are relevant to this report. If companies want to manufacture a chemical at a level of 10,000 kilograms or less per year, they may submit a low-volume exemption notice at least 30 days prior to manufacture instead of a premanufacture notice. Companies might select this option because review is faster (30 days versus 90 days) and if EPA allows the chemical to be manufactured and the chemical is, in fact, manufactured, it is not added to the inventory.²⁴ This means that other companies cannot manufacture the chemical

²⁰ U.S. Government Accountability Office. (2013). *EPA Has Increased Efforts to Assess and Control Chemicals but Could Strengthen Its Approach* (Publication No. GAO-13-249). 1, 8-9. Retrieved from <http://www.gao.gov/assets/150/147952.pdf>.

²¹ U.S. Environmental Protection Agency. (1997). *Chemistry Assistance Manual*. 44. Retrieved from <https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca/chemistry-assistance-manual>.

²² U.S. Environmental Protection Agency. (1997). *Chemistry Assistance Manual*. Retrieved from <https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca/chemistry-assistance-manual>. 37. U.S. Environmental Protection Agency (2016). *EPA Actions to Reduce Risk for New Chemicals Under TSCA*. Retrieved from <https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca/epa-actions-reduce-risk-new#section%205>.

²³ U.S. Environmental Protection Agency. (2016). *About the TSCA Chemical Substance Inventory*. Retrieved from <https://www.epa.gov/tsca-inventory/about-tsca-chemical-substance-inventory>.

²⁴ U.S. Environmental Protection Agency. (2016). *Low Volume Exemption for New Chemical Review Under TSCA*. Retrieved from <https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca/low-volume-exemption-new-chemical>.

– a competitive advantage for the submitter. Those who submit low-volume exemption notices are generally bound to the information in the notice regarding use, exposure and production volume.²⁵ In contrast, those who submit premanufacture notices can, unless otherwise regulated, manufacture or use their chemicals in different ways and at different volumes than those stated in the notice after EPA allows their chemical to be manufactured commercially.²⁶

A third relevant category of records are test market exemption applications. If companies want to test market a new chemical, they may submit a test market exemption application under which EPA has 45 days to assess and regulate the chemical. Among other things, the applicant must state the maximum quantity of the chemical that will be manufactured for test market purposes and the maximum number of people who may receive the chemical during test marketing.²⁷

In response to our Freedom of Information Act request, we received EPA’s health and ecological assessments and regulatory determinations for all three types of submissions: premanufacture notices (70 chemicals), low-volume exemption notices (33 chemicals) and test market exemption applications (two chemicals). EPA included with this information notes on whether companies had submitted notices of commencement for the chemicals. Separately, we obtained from EPA’s docket center companies’ premanufacture notices, low-volume exemption notices and test market exemption notices.

Chemicals in the documents include – but are not limited to – those used in hydraulic fracturing, the process in which companies typically inject into wells at high pressure a mixture of up to millions of gallons of water, sand and chemicals designed to fracture underground formations and liberate trapped oil or natural gas. The records also cover chemicals used generally to extract oil and natural gas including chemicals used to drill wells, a phase of energy extraction that necessarily precedes fracking. Companies frequently bore directly through groundwater during drilling. Only after drilling do they insert steel casing and cement to protect groundwater from migration of toxics. Therefore, if toxic chemicals are used during the drilling phase, the risk of groundwater contamination is likely to be high.

We received a few exposure documents from EPA staff. Receiving all the documents was not a quick process, as this timeline illustrates.

Timeline

March 17, 2014

Earthworks, where Partnership for Policy Integrity’s Senior Counsel Dusty Horwitt formerly worked, files a request under the Freedom of Information Act for EPA’s health assessments and regulatory determinations under the agency’s New Chemicals program for chemicals used in hydraulic fracturing, acid fracturing, drilling muds and drilling lubricants. Earthworks asks EPA

²⁵ Id.

²⁶ U.S. Government Accountability Office. (2013). *EPA Has Increased Efforts to Assess and Control Chemicals but Could Strengthen Its Approach* (Publication No. GAO-13-249). 9, FN10. Retrieved from <http://www.gao.gov/assets/660/653276.pdf>.

²⁷ 40 CFR § 720.38.

for a “fee waiver,” meaning that Earthworks asked EPA not to charge for producing the documents because of the significant public interest in making the documents available.

April 9, 2014

EPA denies Earthworks’ request for a fee waiver, potentially requiring the organization to pay thousands of dollars to acquire the records. EPA writes that the reason for its denial was that “you have not expressed a specific intent to disseminate the information to the general public.”

May 7, 2014

Earthworks appeals the denial of its fee waiver, arguing that in its original request, the organization had stated that “after obtaining and analyzing the records sought by this FOIA request, Earthworks intends to incorporate the information the records contain into a report and to disseminate the information to media outlets, public officials and the general public. We will publicize this information in the same fashion as our previous research, which has received wide coverage from local, regional, and national media....”

June 26, 2014

EPA grants Earthworks’ request for a fee waiver for records from 2000 to the present.

July 23, 2014

After discussions with EPA staff, Earthworks asks that the EPA begin its response to the Freedom of Information Act request by providing health assessment and regulatory determination records filed beginning in September 2009, the date when EPA began keeping these documents electronically. These records are easier for EPA to access, EPA officials said. Earthworks also requests that the documents be limited to those in which chemical companies disclosed the proposed use of their chemical (e.g. “corrosion inhibitor for use in drilling applications”) or withheld the use of the chemical as confidential but disclosed a generic or general use that was relevant to Earthworks’ request (e.g. “additive for oil industry”). Earthworks decided at the time not to request records since September 2009 in which the chemical industry claimed the use of chemicals as confidential and did not provide a relevant generic use. EPA officials estimated that there were 200 records created since September 2009 and that about 40 percent of them fell into this category. Seeking these records, they said, would require a potentially lengthy review process involving the chemical companies and EPA’s Office of General Counsel. After this review, there would be no guarantee that EPA would release the records.²⁸ (This particular confidentiality issue poses a significant challenge for citizens trying to learn about EPA’s review of drilling and fracking chemicals. See discussion below.) At EPA’s suggestion, Earthworks requested that EPA deliver the records in batches of 20 after the agency “sanitized” or redacted confidential information from the records. Earthworks would review the records and confirm that the organization wanted additional records before making its next request.

²⁸ Telephone call with Greg Schweer, Chief New Chemicals Management Branch, Office of Pollution Prevention and Toxics and Jessica Barkas, EPA Attorney (July 17, 2014). (The EPA officials estimated that there were 200 chemical records between September 2009 and March 2014 and that 40 percent of them might be inaccessible due to confidentiality claims.)

August 28, 2014

EPA sends Earthworks health and ecological assessments and regulatory records on 20 chemicals covering 414 pages.

October 15, 2014

Earthworks requests the next 20 documents.

October 30, 2014

Partnership for Policy Integrity, in conjunction with Earthworks, files a companion FOIA request seeking the same documents that Earthworks requested.

December 11, 2014

EPA sends Earthworks and Partnership for Policy Integrity records on an additional 20 chemicals covering 308 pages.

January 26, 2015

Earthworks and Partnership for Policy Integrity request the remainder of the documents to be delivered on a rolling basis in groups of 20.

April 14, 2015

EPA sends Earthworks and Partnership for Policy Integrity records on an additional 30 chemicals covering 470 pages.

July 14, 2015

EPA sends Earthworks and Partnership for Policy Integrity records on 22 additional chemicals covering 234 pages.

July-August 2015

Partnership for Policy Integrity requests and receives from EPA's Docket Center premanufacture notices and low-volume exemption notices on 16 selected chemicals. These documents form the basis for EPA's health and ecological assessments and regulatory determinations for these chemicals. The documents can include chemical names, generic names and trade names that can help locate the chemicals.

July-August 2015

Partnership for Policy Integrity requests and receives from EPA documents that detail the exposure assumptions that EPA uses to assess the chemicals. EPA uses its own exposure scenarios and considers details submitted by chemical companies about how people and the environment are likely to be exposed.

January 5, 2016

EPA sends Earthworks the final installment of health and ecological assessments and regulatory determinations on 13 additional chemicals covering 146 pages.

January-February 2016

Partnership for Policy Integrity requests and receives from EPA's docket center thousands of pages of the remaining premanufacture notices, low-volume exemption notices and test market applications that chemical companies submitted to EPA enabling the agency to conduct its health and ecological assessments and regulatory determinations.

In total, we received EPA's health and ecological assessments and regulatory determinations for 105 chemicals used in drilling and fracking. Agency officials told us that there may be an additional 400 chemicals that the agency reviewed prior to September 2009 that we have not yet received.²⁹ Nor have we received records on dozens of chemicals reviewed since September 2009 for which companies have claimed the use as confidential without providing a generic use relevant to our FOIA request. In its recent draft report on fracking and drinking water, EPA identified "1,173 chemicals used or detected in the hydraulic fracturing water cycle."³⁰ Therefore, EPA may have assessed and regulated a significant percentage of these chemicals.

IV. Results of the Investigation

Our investigation concluded that the public should be concerned with the EPA's assessment and regulation of fracking and drilling chemicals for three main reasons: lack of health testing data, sweeping confidentiality claims and unrealistic exposure assumptions.

A. Lack of Health and Environmental Testing

A significant shortcoming of EPA's regulation of drilling and fracking chemicals is the lack of health testing that could demonstrate whether a chemical might be toxic to people. The Toxic Substances Control Act does not require companies to submit any testing data to EPA – whether for human health or other risks – nor does it require the agency to request it.³¹

Human health testing is typically conducted by exposing animals to chemicals. In a 1997 manual, EPA noted that "for most chemical substances, toxicity data are almost always derived

²⁹ Meeting with Greg Schweer et al., Chief New Chemicals Management Branch, Office of Pollution Prevention and Toxics, Dusty Horwitt, Senior Counsel, Partnership for Policy Integrity, Aaron Mintzes, Policy Advocate, Earthworks (February 10, 2016).

³⁰ U.S. Environmental Protection Agency. (2015). *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources [hereinafter EPA Draft Report]*. (EPA/600/R-15/047a). 9-39. Retrieved from <http://www.epa.gov/hfstudy/review-state-and-industry-spill-data-characterization-hydraulic-fracturing-related-spills-1>.

³¹ Toxic Substances Control Act § 5(d) and (e) (codified at 15 USC § 2604 (d) and (e)).

from animal studies. It is the policy of the EPA to assume that chemicals that are capable of causing toxic effects in animals will cause the same toxic effects in humans.”³²

Health studies were available in the public docket in only 2 percent of cases (2 of 99 cases). Companies claimed that they provided health testing data for 12 of 99 chemicals, but health data from 10 of the 12 were missing. In at least two of these 12 cases, companies claimed the studies as confidential. Submissions for six of the 105 chemicals were missing from EPA's public docket entirely.

EPA requested health studies in only five cases, despite expressing health concerns in 88 cases, including irritation to skin, eyes and mucous membranes; lung effects; neurotoxicity; kidney toxicity; and developmental toxicity.

Despite the lack of health testing information, EPA allowed almost all of the chemicals to be manufactured commercially. The agency subsequently received notice that 37 of 70 chemicals submitted under premanufacture notices were, in fact, manufactured commercially. The agency approved for commercial manufacture all of the 33 chemicals companies submitted under low-volume exemption notices under which manufacturers do not need to inform EPA prior to manufacturing. EPA denied the use of only two of the 105 chemicals, one for human health and ecotoxicity concerns³³ and the other for acute and chronic ecotoxicity risks.³⁴ In five other cases, companies withdrew premanufacture notices after EPA regulators expressed concern about ecotoxicity,³⁵ human health and ecotoxicity³⁶ and ecotoxicity and environmental fate.³⁷ EPA appeared to allow the 98 other chemicals to be manufactured; in most of these cases, the companies neither provided nor were asked to provide health testing data.

EPA dropped 36 of 70 premanufacture notices from further review and in most of these cases, appeared to issue no regulations on the chemicals' use. When EPA did regulate the chemicals including with requests for testing and, in some cases, requirements that workers wear special protective equipment, the agency did not require setbacks, or areas near water, homes, schools or other sensitive locations where the chemicals could not be used. In at least six cases, EPA negotiated consent orders with manufacturers that set limits on concentrations of the chemicals that could be found in surface water. But the agency made clear that these concentrations could be estimated by the manufacturer and would not have to be measured.³⁸

People living near well sites have reported health problems consistent with at least some of EPA's health concerns.³⁹ A study of 492 people in 180 randomly selected homes in Washington

³² U.S. Environmental Protection Agency. (1997). *Chemistry Assistance Manual for Premanufacture Notice Submitters*. (EPA-744-R-97-003). 28. Retrieved from <http://www.epa.gov/oppt/newchemicals/pubs/chem-pmn/>.

³³ U.S. Environmental Protection Agency. Record Number T-11-0012.

³⁴ U.S. Environmental Protection Agency. Record Number T-13-0091.

³⁵ U.S. Environmental Protection Agency. Record Numbers P-12-0139, P-13-0125 and P-13-0126.

³⁶ U.S. Environmental Protection Agency. Record Number P-13-0687.

³⁷ U.S. Environmental Protection Agency. Record Number P-14-0534.

³⁸ See Consent orders for EPA record numbers P-09-0447, P-09-0448, P-10-0486, P-10-0487, P-12-0116, P-13-0568.

³⁹ Rabinowitz, P. et al (2015). Proximity to natural gas wells and reported health status: results of a household survey in Washington County, Pennsylvania. *Environmental Health Perspectives*, 123, 21-26. doi:

County, Pennsylvania found that people living within a kilometer of well sites had more reported health symptoms per person including skin conditions and upper respiratory symptoms than those living more than two kilometers away.⁴⁰ A survey of 108 residents in 14 Pennsylvania counties similarly found that those living near well sites reported higher rates of impaired health including throat irritation, forgetfulness and frequent nosebleeds.⁴¹ In 2014 in Dallas, Tex., Bob and Lisa Parr won a nearly \$3-million-dollar jury award against a drilling company based on claims that the company's drilling operations harmed their health. Lisa Parr's symptoms included headaches, a rash and disorientation. Her husband experienced memory problems. Their daughter, then in first grade, suffered terrible nosebleeds at night and would wake up covered in blood.⁴² According to calculations of the energy science and policy institute, PSE Healthy Energy, more than 17 million Americans in the contiguous 48 states live within one mile of an active oil or natural gas well,⁴³ suggesting significant potential for exposure.

EPA can request or require that chemical manufacturers produce test data,⁴⁴ but in 2009, the Government Accountability Office found that "the agency does not often use this authority."⁴⁵ Our findings track this conclusion. Because the EPA rarely receives health or other testing information about chemicals, the agency assesses and regulates new chemicals largely by comparing them to existing chemicals with similar chemical structures for which health and other testing data are available.⁴⁶ The EPA then extrapolates from these findings and exposure information to make a screening level risk assessment and regulatory determination.⁴⁷

The EPA has acknowledged shortcomings with the practice of making regulatory determinations without test data, and others have criticized the practice. "TSCA does not *require* that the submitter conduct specific tests or conduct additional tests (*italics in original*)...." EPA wrote in a 2012 manual. "As a result, many new chemical notices lack the data necessary to fully

10.1289/ehp.1307732. Retrieved from <http://ehp.niehs.nih.gov/1307732/> (finding greater incidence of skin and upper respiratory conditions in people living within one kilometer of natural gas wells than in those living farther away). Telephone interview with toxicologist David Brown, who has investigated health effects associated with natural gas drilling as a consultant to the Southwest Pennsylvania Environmental Health Project (Mar. 21, 2016) (reporting that throat irritation and respiratory effects and neurological effects including headaches and memory loss, are among the most commonly reported health effects).

⁴⁰ Rabinowitz, P. et al. (2015). Proximity to natural gas wells and reported health status: results of a household survey in Washington County, Pennsylvania. *Environmental Health Perspectives*, 123, 21-26. doi: 10.1289/ehp.1307732. Retrieved from <http://ehp.niehs.nih.gov/1307732/>.

⁴¹ Steinzor, N. et al. (2013). Investigating Links Between Shale Gas Development and Health Impacts Through a Community Survey Project in Pennsylvania. *New Solutions*. 23(1) 55-83. Retrieved from <http://new.sagepub.com/content/23/1/55.long>.

⁴² Deam, J. (2014, April 23). Jury Awards Texas Family Nearly \$3 Million in Fracking Case. *Los Angeles Times*. Retrieved from <http://www.latimes.com/nation/la-na-fracking-lawsuit-20140424-story.html>.

⁴³ Electronic mail from Seth Shonkoff, executive director of PSE Healthy Energy to Dusty Horwitt, Senior Counsel, Partnership for Policy Integrity (Mar. 21, 2016).

⁴⁴ Toxic Substances Control Act, § 5(e) (codified at 15 USC 2604 (e)).

⁴⁵ U.S. Government Accountability Office. (2009). *High-Risk Series: An Update* (Publication No. GAO-09-271). 23. Retrieved from <http://www.gao.gov/assets/290/284961.pdf>.

⁴⁶ U.S. Environmental Protection Agency. (2012). *Sustainable Futures / P2 Framework Manual*. 1-3, 4-1. Retrieved from <http://www.epa.gov/oppt/sf/pubs/sf-p2-manual.html>.

⁴⁷ U.S. Environmental Protection Agency. (2012). *Sustainable Futures / P2 Framework Manual*. 1-3. Retrieved from <http://www.epa.gov/oppt/sf/pubs/sf-p2-manual.html>. U.S. Environmental Protection Agency. (1997). *Chemistry Assistance Manual*. 44. Retrieved from <https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca/chemistry-assistance-manual>.

characterize toxicity and risk to humans and the environment. . . . Due to the design of TSCA, it has become necessary to make chemical management decisions in the absence of measured data.”⁴⁸ (EPA neglected to emphasize that the agency has the discretion to seek test data.) In 2009, the Government Accountability Office placed EPA’s chemical review program on its list of federal government programs at highest risk of waste, fraud, abuse and mismanagement in part because the agency reviews new chemicals without health and safety data. “Without greater attention to EPA’s efforts to assess toxic chemicals,” the GAO concluded, “the nation lacks assurance that human health and the environment are adequately protected.” As of last year, the program was still on GAO’s list.⁴⁹ Daniel Teitelbaum, a doctor and toxicologist based in Denver, Colorado who has testified before Congress on health risks from oil and natural gas drilling, noted that if EPA reviewed the chemical benzene without health testing data and had available health testing data on the chemical toluene, the agency might conclude that benzene would have similar health effects because it has a chemical structure similar to toluene’s. However, benzene is a carcinogen while toluene is not, and benzene is 200 times more toxic in drinking water.⁵⁰ So comparisons based on chemical structure can be flawed, he said.⁵¹

B. Confidentiality

TSCA’s confidentiality provisions mean that the public is likely to know even less about chemical risks. Companies can generally require EPA to withhold from the public virtually any piece of information including a chemical’s name, production volume, how people might be exposed to the chemical and even the manufacturing company’s own name. EPA can take steps to challenge the claims but has rarely done so though the agency has increased its efforts in recent years.⁵² These confidentiality provisions mean that chemical and drilling companies have as many as three levels of legal mechanisms to hide information from the public: one under TSCA, another under various state laws that allow companies to withhold fracking chemical identities despite general requirements to disclose the information⁵³ and perhaps a third under FracFocus, a drilling industry repository of fracking chemical disclosure to which chemical reporting is sometimes mandatory and sometimes voluntary depending on applicable state law.⁵⁴

⁴⁸ U.S. Environmental Protection Agency. (2012). *Sustainable Futures / P2 Framework Manual*. 1-2. Retrieved from <http://www.epa.gov/oppt/sf/pubs/sf-p2-manual.html>.

⁴⁹ U.S. Government Accountability Office. (2009). *High-Risk Series: An Update* (Publication No. GAO-09-271). 22-24. Retrieved from <http://www.gao.gov/assets/290/284961.pdf>. U.S. Government Accountability Office. (2015). *High-Risk Series: An Update* (Publication No. GAO-15-290). 280-286. Retrieved from <http://www.gao.gov/assets/670/668415.pdf>.

⁵⁰ U.S. Environmental Protection Agency. (2016). *Table of Regulated Drinking Water Contaminants*. Retrieved from <http://www.epa.gov/your-drinking-water/table-regulated-drinking-water-contaminants>.

⁵¹ Telephone interview with Dr. Daniel Teitelbaum (July 8, 2015).

⁵² Government Accountability Office. (2013, March). *EPA Has Increased Efforts to Assess and Control Chemicals but Could Strengthen Its Approach*. 28-29. Retrieved from <http://www.gao.gov/assets/660/653276.pdf>.

⁵³ See, e.g., Detrow, S. (2012, June 7). Fracking Disclosure: Colorado’s Compromise is Pennsylvania’s Controversy. *State Impact* (reporting that all states with fracking chemical disclosure laws allowed companies to withhold proprietary information as confidential).

⁵⁴ Konschnik, K. et al. (2013, April 23). *Legal Fractures in Chemical Disclosure Laws*. Harvard Law School, Environmental Law Program Policy Initiative. 3. FracFocus, *About Us*. Retrieved from <http://fracfocus.org/welcome>.

If companies voluntarily submitted chemicals to FracFocus, they could decide on their own to withhold chemical identities as confidential.⁵⁵

We found that companies withheld the chemical name as confidential for at least 59 of 70 chemicals submitted under premanufacture notices and likely to be produced at higher volumes. Companies withheld Chemical Abstracts Services (CAS) numbers (unique identifiers for chemicals) as confidential for at least 52 of 70 of these chemicals. In at least 36 of the 70 cases, companies withheld as confidential the chemical's trade or product name. In 64 of the 70 cases, companies withheld the expected production volume. Chemical manufacturers' exposure assumptions related to the use of their chemicals were confidential in at least 55 of 70 high volume cases.

Companies withheld the chemical's name and CAS number for 16 of 33 low volume chemicals. The amount of information claimed confidential might have been even greater because some of the premanufacture notices submitted by companies were missing from the public docket.⁵⁶ In other cases, premanufacture notices were available, but some information was missing from the documents and may have been confidential.⁵⁷

There are a few exceptions to confidentiality that can potentially help the public, but these are limited. If companies withhold the name or use of their chemical as confidential, they are required to provide a generic name⁵⁸ or generic use⁵⁹ so that the public can know something about the chemical. Even though the terms are generally supposed to be only as generic as necessary to protect the confidential name or use of the product, the terms are sometimes vague. Three chemicals' generic names, for example, were "quaternary ammonium compound"⁶⁰ while another three had the generic name of "tertiary ammonium compound."⁶¹ The generic use for one chemical was "component in drilling fluid,"⁶² while the generic use for three others was "drilling fluid component."⁶³

Perhaps the larger problem with generic terms is the situation discussed earlier: if companies withhold the chemical's use as confidential and then provide a generic use that does not match the chemical use specified in a Freedom of Information Act request such as "drilling and fracking," EPA may be prohibited from disclosing the agency's health assessments and regulatory determinations at all because doing so would effectively be admitting that the chemical was used for drilling and fracking – a use that the manufacturer withheld as confidential. When we told EPA that the agency could redact the chemical's name or EPA

⁵⁵ Kohnschnik, K. et al. (2013, April 23). *Legal Fractures in Chemical Disclosure Laws*. Harvard Law School, Environmental Law Program Policy Initiative. 8.

⁵⁶ The premanufacture notices for EPA record numbers P-10-0571, P-11-0035, P-11-0036, P-11-0037, P-11-0615, and P-13-0126 were missing from EPA's Docket Center. Electronic mail from Docket-Customer Service to Dusty Horwitt, Senior Counsel, Partnership for Policy Integrity (Feb. 25, 2016).

⁵⁷ See, e.g., U.S. Environmental Protection Agency record number P-09-0205 in which the manufacturer said it submitted health data, but the data were not in the record and may have been withheld as confidential.

⁵⁸ 40 CFR § 720.85 (a)(2) and (a)(3).

⁵⁹ 40 CFR § 720.87.

⁶⁰ U.S. Environmental Protection Agency record numbers P-09-0205, P-09-0211, P-12-0072.

⁶¹ U.S. Environmental Protection Agency record numbers P-11-0110, P-11-0158, P-13-0131.

⁶² U.S. Environmental Protection Agency record number P-12-0437.

⁶³ U.S. Environmental Protection Agency record numbers P-13-0025, P-13-0026, P-13-0027.

tracking number in these cases so that we would see only EPA's health assessment and regulatory determination, we were told that the agency still might not be able to release the records because releasing them might provide bits of information that would enable competing chemical companies to determine that a particular chemical was used for drilling or fracking. Piecing together non-confidential pieces of information to create a picture of a confidential chemical is known as the "mosaic effect" an EPA attorney told us. EPA officials estimated that there were a total of 200 health assessments and regulatory determinations made between September 2009 and March 2014 subject to our Freedom of Information Act request. An estimated 40 percent of these records might be unavailable due to confidentiality claims regarding the chemicals' use, they said.⁶⁴

One of the only pieces of information that companies generally cannot require EPA to protect as confidential is health and safety data such as the health study a company might submit on a rare occasion. Often, however, the companies still claim health and safety data to be confidential. The GAO has found that EPA has taken steps to make such information public more often since 2009 and has begun to review and challenge other confidentiality claims including those related to chemical identity as part of a broader effort to increase public access to information.⁶⁵ However, in 10 of the 12 records in our investigation in which companies said that they submitted health data to EPA, these data were missing from the record, and in at least two of the 10 cases, they were claimed confidential.⁶⁶

In addition, the EPA administrator must make confidential information public if she "determines it is necessary to protect health or the environment against an unreasonable risk of injury to health or the environment."⁶⁷ It is unclear how valuable this provision might be. On the one hand, it provides some authority for the administrator to make information public to address serious chemical risks. On the other hand, it might be difficult to know whether a particular chemical is the cause of health or environmental problems if confidentiality claims, lack of tracking and lack of health testing prevent people from knowing where a chemical is being used or what its health effects are likely to be.

To determine whether we could find where chemicals reviewed by EPA had been used, Partnership for Policy Integrity selected seven chemicals submitted under premanufacture notices that were manufactured commercially and two low-volume chemicals that were approved and potentially manufactured. In all nine cases, EPA regulators expressed health concerns. See the list of nine chemicals below in the "case studies" section. We asked EPA how we could find where the chemicals were used. EPA responded that we could look for the chemicals in a database compiled under EPA's chemical data reporting rule.⁶⁸ We were unable to find any of

⁶⁴ Telephone calls with Greg Schweer, Chief New Chemicals Management Branch, Office of Pollution Prevention and Toxics et al. (April 17, 2014 and July 17, 2014).

⁶⁵ Government Accountability Office. (2013, March). *EPA Has Increased Efforts to Assess and Control Chemicals but Could Strengthen Its Approach*. 11, 24. Retrieved from <http://www.gao.gov/assets/660/653276.pdf>.

⁶⁶ EPA record numbers P-09-0205, P-09-0211, P-10-0050, P-11-0092, P-11-0093, P-13-0025, P-13-0026, P-13-0027, P-13-0568, P-13-0624, P-14-0007, T-11-0012.

⁶⁷ Toxic Substances Control Act § 14 (a)(3) (codified at 15 USC § 2613 (a)(3)).

⁶⁸ U.S. Environmental Protection Agency (2016). *Chemical Data Reporting Under the Toxic Substances Control Act*. Retrieved from <https://www.epa.gov/chemical-data-reporting>.

the nine chemicals in EPA's database and asked EPA officials to help with the search but did not receive a response.⁶⁹

EPA also suggested we consult FracFocus, an online database made available in 2011 and managed by the Ground Water Protection Council and Interstate Oil and Gas Compact Commission. FracFocus is the most comprehensive source of information regarding what chemicals drilling companies inject into oil and gas wells during hydraulic fracturing.⁷⁰ Well operators – and in some cases, the service companies that perform fracturing operations – upload information to FracFocus regarding chemicals injected into particular wells.⁷¹ These disclosures (except for chemical names withheld as confidential) are sometimes voluntary and in other cases required by state law.⁷²

To find the information in FracFocus, we provided the list of nine chemicals and their available identifying information to Kate Konschnik, a senior lecturer at Harvard Law School, and Archana Dayalu, a graduate student (and database expert) in Harvard's Department of Earth and Planetary Sciences who have intensively studied FracFocus. The chemicals' available identifying information varied due to confidentiality claims. In three cases, companies provided more information including specific chemical names, Chemical Abstracts Service numbers and product names such as "PPH, Technical Grade."⁷³ Konschnik and Dayalu were able to locate wells in which two of these three chemicals had been used.⁷⁴ In the six other cases, companies generally withheld specific chemical names, CAS numbers, product names, the specific use and even their own company name⁷⁵ except in one case in which a company provided a product name.⁷⁶ Konschnik and Dayalu were able to locate wells where three of these six chemicals were injected.⁷⁷ Therefore, in a total of four of the nine cases, Konschnik and Dayalu could not locate where the chemicals had been used.⁷⁸

⁶⁹ Electronic mail from Dusty Horwitt, Senior Counsel at Partnership for Policy Integrity to Greg Schweer, Chief New Chemicals Management Branch, Office of Pollution Prevention and Toxics (Feb. 24, 2016) (on file with Partnership for Policy Integrity).

⁷⁰ Electronic mail from Greg Schweer, Chief New Chemicals Management Branch, Office of Pollution Prevention and Toxics, to Dusty Horwitt, Senior Counsel at Partnership for Policy Integrity (Feb. 1, 2016) (on file with Partnership for Policy Integrity). Katherine Konschnik, a senior lecturer at Harvard University Law School, and Archana Dayalu, a graduate student in Harvard's Department of Earth and Planetary Sciences, have called FracFocus "the most comprehensive dataset on fracturing chemicals in the United States." Katherine Konschnik and Archana Dayalu (2016). Hydraulic fracturing chemicals reporting: Analysis of available data and recommendations for policymakers. *Energy Policy*, 88, 504-514.

⁷¹ Katherine Konschnik and Archana Dayalu (2016). Hydraulic fracturing chemicals reporting: Analysis of available data and recommendations for policymakers. *Energy Policy*, 88, 504-514.

⁷² FracFocus (2016). Katherine Konschnik and Archana Dayalu (2016). Hydraulic fracturing chemicals reporting: Analysis of available data and recommendations for policymakers. *Energy Policy*, 88, 504-514.

⁷³ U.S. Environmental Protection Agency. Record numbers P-09-0045 (PPH, Technical Grade), L-12-0007, L-12-0010.

⁷⁴ Konschnik and Dayalu were able to locate wells in which chemicals were used that are identified by U.S. Environmental Protection Agency record numbers L-12-0007 and L-12-0010.

⁷⁵ U.S. Environmental Protection Agency. Record numbers P-09-0085, P-09-0205, P-09-0448, P-10-0050 and P-13-0369.

⁷⁶ U.S. Environmental Protection Agency. Record numbers P-12-0072.

⁷⁷ Konschnik and Dayalu were able to locate wells in which chemicals were used that are identified by U.S. Environmental Protection Agency record numbers P-09-0085, P-09-0448, P-12-0072.

⁷⁸ Konschnik and Dayalu were not able to locate wells in which chemicals were used that are identified by U.S. Environmental Protection Agency record numbers P-09-0045, P-09-0205, P-10-0050, and P-13-0369. In

It is unclear why the four chemicals did not appear in FracFocus. Confidentiality under TSCA may have played a role. In three of the four cases, companies withheld the chemicals' specific names under TSCA. Even if these chemicals were listed by name in FracFocus, Konschnik and Dayalu would not have known what specific name to search for.

FracFocus also has several shortcomings that may have contributed to the inability to locate where some of chemicals reviewed and regulated by EPA were used.

- Companies that operate oil and gas wells withhold many chemical names as confidential in their reporting to FracFocus. Konschnik and Dayalu reported that 92 percent of forms associated with individual wells in a period encompassing 2012 and 2013 included at least one withheld ingredient.⁷⁹ It is unknown whether in any given case this decision stems from confidentiality claims under TSCA or reflects an independent decision to claim information as confidential. In any event, chemicals claimed as confidential in FracFocus do not appear in the database and might frustrate efforts to locate chemicals reviewed by EPA.
- FracFocus began operating in April 2011 and receiving disclosures as early as January of that year.⁸⁰ Yet some of the EPA's chemicals that we reviewed were allowed to be manufactured as early as 2009, so it is possible that the chemicals were used for hydraulic fracturing before companies began making disclosures to FracFocus.
- Companies do not disclose hydraulic fracturing chemicals on FracFocus for every well that is fractured. Bloomberg reported that between April and December of 2011, companies failed to report thousands of their wells in eight states as hydraulically fractured. It is unclear whether these missing wells have been added to the database. According to FracFocus, twenty-nine states required disclosure of hydraulic fracturing chemicals as of April 2015. However, only twenty-three of them were using FracFocus as a repository for information. Some of the states that were not using FracFocus include those that have had significant drilling activity: Arkansas, New Mexico and Wyoming. Therefore, companies in those states uploading information to FracFocus are doing so on a purely voluntary basis.

December 2015, we also provided the list of nine chemicals to David Darling, an information technology expert based in Arkansas who has spent several years trying to make FracFocus easier for the public to use. He was able to find several chemicals in FracFocus that might have been the same as those reviewed by EPA but could not definitively locate where the chemicals were used. In November 2015, we provided the list of chemicals to Tasha Stoiber, a staff scientist in Environmental Working Group's California office, who attempted to locate the chemicals in California's oil and gas drilling disclosure database. Stoiber was able to find wells in which chemicals L-12-0007 and L-12-0010 were used but could not definitively determine if the other chemicals were used in California. We wrote to Dow Chemical, the manufacturer of chemical P-09-0045, and asked where the chemical was used. Dow responded that "at this time, we do not list any trade products currently being sold into the oil, gas, or hydraulic fracturing industries." Letter from Dow Chemical Company to Dusty Horwitt, Senior Counsel, Partnership for Policy Integrity (February 8, 2016) (on file with Partnership for Policy Integrity). We also wrote to Ecolab, the manufacturer of chemicals P-09-0085 and P-12-0072, and asked where the chemicals were used but the company did not respond. Electronic mails from Dusty Horwitt, Senior Counsel, Partnership for Policy Integrity to Roman Blahoski, Director Global Communications, Ecolab (Jan. 25, 2016) (on file with Partnership for Policy Integrity).

⁷⁹ Katherine Konschnik and Archana Dayalu (2016). Hydraulic fracturing chemicals reporting: Analysis of available data and recommendations for policymakers. *Energy Policy*, 88, 504-514.

⁸⁰ FracFocus. (2015, April 11). About Us. Retrieved March 14, 2016 at <http://fracfocus.org/welcome>.

- FracFocus includes listings only for chemicals used in hydraulic fracturing, not in the drilling process that precedes fracturing. Some of the chemicals assessed and regulated by EPA under TSCA, including at least one chemical that Konschnik and Dayalu were unable to locate in FracFocus,⁸¹ appear to be used in drilling and would not be likely to show up on FracFocus. Drilling chemicals may pose greater risks than fracking chemicals because they are used before companies install steel casing and cement in wells. The casing and cement are designed to seal off wells from underground water supplies. If companies bore through underground water supplies during drilling – a common occurrence – and are using drilling chemicals, the chemicals could directly infiltrate aquifers.

Because of the inherent risks involved in drilling and fracking, the public must know what chemicals are being used in wells and what their health effects are. TSCA, state disclosure rules, and FracFocus enable companies to hide the identities of at least some chemicals injected underground, frustrating the public’s ability to protect ourselves. Congress should develop a disclosure system in which EPA requires that each chemical injected underground in fracking or drilling is disclosed by CAS number and that health testing data for each of these chemicals is publicly available.

C. EPA Assumes: No Leaks, No Spills, No Underground Migration

A third major problem with EPA’s assessments of drilling and fracking chemicals is that the agency generally does not consider the risk of accidental releases or inadvertent exposures, including leaks, spills and underground migration of fluids.

This practice contradicts a growing body of evidence, including data collected by EPA itself and public statements by drilling companies, that leaks, spills, underground migration of fluids, and blowouts (uncontrolled releases of fluids or gasses) are inherent or likely in oil and natural gas extraction. See the link in the footnote below for a list of evidence that leaks, spills, underground migration of fluids, and blowouts are common in oil and natural gas drilling.⁸² This “no accidental exposure” assumption is critical, because risk is assessed as the product of exposure and toxicity and if little or no exposure is expected to occur, then EPA is likely to consider fracking and drilling chemicals safe regardless of what toxicity or health studies might reveal about the chemicals’ dangers.

EPA has said that it also considers companies’ assumptions about how people might be exposed to chemicals. However, it is difficult to know what these assumptions are and how they are incorporated into EPA’s exposure assessments. For the records we received, manufacturers’ exposure assumptions were claimed confidential in at least 55 of 70 high volume cases. For only two out of 105 chemicals did records show that a company admitted that its chemical would leak, spill or migrate underground.

⁸¹ U.S. Environmental Protection Agency record number P-09-0045.

⁸² Link to list of documented accidental releases in oil and gas drilling, 1980-2015: <http://www.pfpi.net/wp-content/uploads/2016/03/ToxicSecrets-Leaks-and-Spills.pdf>.

In these two cases, the manufacturer, E.I. Dupont Nemours and Company, said that a very small concentration of a compound caused by the breakdown of its chemical would be expected to migrate into groundwater. The company indicated that there would be monitoring of groundwater near where the chemical would be used but did not say who would perform such testing. EPA officials said that the agency does not track where chemicals are used and lacked the staff to test water supplies near oil and gas wells. Without such testing, it is unclear how EPA could know whether its exposure assumptions are accurate and whether the public is being protected. EPA declined to answer our questions about its exposure assumptions in the cases of nine chemicals the agency allowed to be manufactured despite human health concerns.

EPA's exposure assumptions dating to the 1990s do not account for leaks, spills, underground migration or, in most cases, air emissions of drilling or fracking chemicals. Since March 19, 2012, EPA has relied on an Emission Scenario Document published by the Organization for Economic Cooperation and Development (OECD) for making assumptions about exposure to chemicals used in oil and gas production, which the document states is the phase that comes after drilling the well.⁸³ The OECD as it is known, is an intergovernmental organization with representatives from 34 industrialized nations in North and South America, Europe and the Asia and Pacific region that seeks "to co-ordinate and harmonize policies, discuss issues of mutual concern, and work together to respond to international problems."⁸⁴ EPA took the lead in developing the document but received and incorporated comments on drafts from the Netherlands National Institute for Public Health and the Environment, United Kingdom's Environment Agency and Environment Canada.⁸⁵ Therefore, it is likely that other nations rely on the same exposure assumptions.

The document shows that EPA assumes only intentional and/or controlled releases of chemicals:

- from residues when chemical containers are cleaned (the residues are assumed to be disposed of in landfills, incinerators or released to water, likely through wastewater treatment plants),⁸⁶
- from cleaning of residues found on the bottom of tanks in which oil and water are stored when they emerge from wells (these wastes are disposed of in several ways, including distribution on land, landfills, and surface water discharge,⁸⁷
- from the incineration of chemical residues in oil, when oil is turned into valuable products under high heat at refineries,⁸⁸
- in wastewater that emerges from the well. This wastewater is either reinjected into active wells to facilitate energy production, injected into disposal wells, treated and released to surface water, used for irrigation, or sent to evaporation or percolation ponds.⁸⁹ Unless a

⁸³ Organization for Economic Cooperation and Development, Emission Scenario Document on Chemicals Used in Oil Well Production (Mar. 19, 2012). Accessed online October 14, 2015 at <http://www.oecd-ilibrary.org/content/book/9789264220966-en>.

⁸⁴ Id. at 6.

⁸⁵ Id. at 8, 10.

⁸⁶ Id. at 32-34.

⁸⁷ Id. at 34-35.

⁸⁸ Id. at 35-38.

⁸⁹ Id. at 38-39.

company states differently, the percentage of wastewater disposed of through various routes apparently is assumed to be the same for each well (e.g., for on-shore wells, 57 percent is reinjected to stimulate energy production, 36 percent is injected for disposal, four percent is used for irrigation, two percent is sent to evaporation or percolation ponds, one percent is treated and discharged),⁹⁰

- released to land when wastewater containing the chemical is used for irrigation or sent to an evaporation or percolation pond.⁹¹

There is nothing in the document about any unplanned or uncontrolled releases, whether leaks, spills, air emissions from blowouts, underground migration during oil and gas production or underground migration during disposal. The document states that most oil and gas production chemicals are not expected to volatilize and that “fugitive air releases and inhalation exposures are expected to be negligible.”⁹² The assumption appears to be that drilling operations are essentially accident-free.

Older EPA emission scenario documents for chemicals used in oil well treatment;⁹³ drilling oil and natural gas wells;⁹⁴ and steam stimulation, steam flooding, and polymer/surfactant flooding, which are types of oil well stimulation,⁹⁵ lack any references to uncontrolled or unplanned releases of chemicals except for a 1994 document that says “several of the surfactants such as alcohol ethoxylates and alkyl phenol ethoxylates, as well as organic in situ crosslinkers such as formaldehyde, are sufficiently volatile to result in air emissions from their use.” The same documents says, however, that “releases to water are assumed to be negligible.”⁹⁶

Disclosures by oil and gas drilling companies to the U.S. Securities and Exchange Commission tell a much different story about the frequency of accidental releases. In annual 10-K forms, companies are required to inform investors about the most serious risks facing their businesses. Oil and gas drilling companies routinely name leaks, spills, and blowouts as among these risks.

- Chesapeake Energy Corp. stated that “oil and natural gas operations are subject to many risks, including well blowouts, cratering and explosions, pipe failures, fires, formations with abnormal pressures, uncontrollable flows of oil, natural gas, brine or well fluids, severe weather, natural disasters, groundwater contamination and other environmental hazards and risks.”⁹⁷
- Noble Energy reported that “our operations are subject to hazards and risks inherent in the drilling, production and transportation of crude oil, natural gas and NGLs, including...pipeline ruptures and spills...fires, explosions, blowouts and well cratering...

⁹⁰ Id. at 19, 38.

⁹¹ Id. at 40.

⁹² Id. at 9.

⁹³ U.S. Environmental Protection Agency. (1991). *New Chemical Scenario for Oil Well Treatment Chemicals*.

⁹⁴ U.S. Environmental Protection Agency. (1991). *New Chemical Scenario for Drilling Muds*.

⁹⁵ U.S. Environmental Protection Agency. (1994). *Generic Scenario: Application of Chemicals in Enhanced Oil Recovery Steam Stimulation, Steam Flooding, and Polymer/Surfactant Flooding, Final Draft*.

⁹⁶ Id at AN-4.

⁹⁷ U.S. Securities and Exchange Commission. (2015). *Chesapeake Energy Corporation Form 10-K*. 27. Retrieved from http://www.sec.gov/Archives/edgar/data/895126/000089512615000076/chk-20141231_10k.htm.

leaks or spills occurring during the transfer of hydrocarbons from an FPSO to an oil tanker...loss of product occurring as a result of transfer to a rail car or train derailment... release of pollutants...surface spillage of, or contamination of groundwater by, fluids used in operations.”⁹⁸

- Range Resources wrote that “our drilling and producing operations may be curtailed, delayed, or canceled as a result of a variety of factors, including...environmental hazards, such as natural gas leaks, oil spills, pipeline and tank ruptures, and unauthorized discharges of toxic gases...uncontrollable flows of oil, natural gas or well fluids.”⁹⁹
- Cabot Oil and Gas disclosed “a variety of hazards and risks that could cause substantial financial losses” including “well site blowouts, cratering and explosions...pipe or cement failures and casing collapses, which can release natural gas, oil, drilling fluids or hydraulic fracturing fluids...uncontrolled flows of natural gas, oil or well fluids... pipeline ruptures...handling and disposal of materials, including drilling fluids and hydraulic fracturing fluids.”¹⁰⁰

Evidence gathered by the EPA, itself, shows that these risks are not just hypothetical. In 2015, EPA’s Office of Research and Development released a draft study of hydraulic fracturing and drinking water which documented 457 fracking-related spills between 2006 and 2012 in eleven states. EPA identified the 457 spills from a larger dataset covering the same time period of 36,000 oil- and gas-related spills from a variety of sources.¹⁰¹ The agency found that 300 of the 457 spills reached some type of environmental receptor such as soil or water supplies and that most (291) reached soil. However, most data sources for the EPA’s study did not include water testing data and EPA did not determine how the spills affected ground or surface water.¹⁰² The agency excluded significant categories of spills from its study including those from drilling muds, transportation-related spills and spills during disposal of wastewater.¹⁰³ Nor did EPA include in its study the potential for groundwater contamination when drilling wastewater is injected underground for disposal¹⁰⁴ – a problem documented by the Government Accountability

⁹⁸ U.S. Securities and Exchange Commission. (2014). *Noble Energy Form 10-K*. 38. Retrieved from <http://www.sec.gov/Archives/edgar/data/72207/000007220715000007/nbl-20141231x10k.htm>.

⁹⁹ U.S. Securities and Exchange Commission. (2014). *Range Resources Form 10-K*. 22. Retrieved from http://www.sec.gov/Archives/edgar/data/315852/000156459015000899/rrc-10k_20141231.htm.

¹⁰⁰ U.S. Securities and Exchange Commission. (2014). *Cabot Oil and Gas Form 10-K*. 25. Retrieved from <http://www.sec.gov/Archives/edgar/data/858470/000162828015001120/cog-12312014x10k.htm>.

¹⁰¹ U.S. Environmental Protection Agency. (2015). *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources [hereinafter EPA Draft Report]*. (EPA/600/R-15/047a). 5-42, 5-43. Retrieved from <https://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=244651>.

¹⁰² U.S. Environmental Protection Agency. Review of State and Industry Spill Data: Characterization of Hydraulic Fracturing-Related Spills. 20. Retrieved from https://www.epa.gov/sites/production/files/2015-05/documents/hf_spills_report_final_5-12-15_508_km_sb.pdf.

¹⁰³ U.S. Environmental Protection Agency. (2015). *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources [hereinafter EPA Draft Report]*. (EPA/600/R-15/047a). 5-42. Retrieved from <http://www.epa.gov/hfstudy/review-state-and-industry-spill-data-characterization-hydraulic-fracturing-related-spills-1>.

¹⁰⁴ *Id.* at 8-20.

Office in 1989.¹⁰⁵ Therefore, EPA’s study likely significantly undercounted the number of leaks, spills and incidents of underground migration of drilling and fracking fluids.

Other recent examples of leaks, spills and underground migration include:

- In 2014, the Pennsylvania Department of Environmental Protection fined Range Resources \$4.15 million for contaminating soil and groundwater. Some of the violations include the release of flowback water from fracking wells, the failure to contain spills of recycled water and fracking fluids, and the failure to contain roughly 400 barrels of fracking fluids that were released into the ground and a nearby stream.¹⁰⁶
- In an analysis of state records, *Energy Wire* in 2013 documented “at least 7,662 spills, blowouts, leaks, and other mishaps in 2013 in 15 top states for onshore oil and gas activity,” amounting to a rise of over 17% in one year (up from 6,546 spills in states where comparisons could be made). Although most of these spills are small, the combined volume totals more than 26 million gallons¹⁰⁷ of oil, fracking fluid, and wastewater.¹⁰⁸
- April 29, 2010 – Colorado Oil and Gas Conservation Commission fined Occidental Petroleum Corporation a total of \$647,400 for the oil and gas contamination of spring waters in northwest Colorado. The Commission fined the drilling company \$257,400 for an incident at Rock Springs where a pit with a torn liner leaked drilling waste fluids into two nearby springs and \$390,000 for an incident near Cascade Canyon that also polluted neighboring springs with drilling waste fluid escaping from an unlined pit. Both cases were discovered in 2008. Benzene levels as high as 300 times the groundwater standard were reported in the contaminated springs following the Cascade Canyon incident.¹⁰⁹

A 1997 EPA Manual on the review of new chemicals states that “it is EPA’s policy to make conservative assumptions and use credible worst case scenarios in its evaluations” when the agency lacks testing data to evaluate a chemical’s risk.¹¹⁰ Similar conservative assumptions ought to apply to exposure risks by accounting for the likelihood of leaks, spills, underground migration, and air emissions of chemicals. EPA should develop representative data on the likelihood of such incidents and regulate chemicals accordingly. EPA officials told us that

¹⁰⁵U.S. General Accounting Office. (1989). *Drinking water safeguards are not preventing contamination from injected oil and gas wastes* (Publication No. GAO-RCED-89-97). Retrieved from <http://www.gao.gov/assets/150/147952.pdf>.

¹⁰⁶ Hopey, D. (2014, September 18). Range Resources to Pay \$4.15M Penalty. *Pittsburgh Post-Gazette*. Retrieved from <http://www.post-gazette.com/local/2014/09/18/dep-orders-range-resources-to-pay-4-million-fine/201409180293>.

¹⁰⁷ Marking the same volume of oil spilled from BP’s ruptured oil well in eleven days in the Gulf of Mexico in 2010.

¹⁰⁸ Soraghan, M. (2014, May 12). Spills up 17 percent in U.S. in 2013. *Energy Wire*. Retrieved from <http://www.eenews.net/stories/1059999364>.

¹⁰⁹ Webb, D. (2010, April 29). Record fine, second one against Oxy approved. *Grand Junction Sentinel*. Retrieved from <http://www.gjsentinel.com/news/articles/record-fine-second-one-against-oxy-approved>.

¹¹⁰ U.S. Environmental Protection Agency. (1997). *Chemistry Assistance Manual for Premanufacture Notice Submitters*. (EPA-744-R-97-003). 45. Retried from <http://www.epa.gov/oppt/newchems/pubs/chem-pmn/>.

agency is currently working on a new emission scenario document for hydraulic fracturing that will include leaks and spills. It is unclear when it will be completed.¹¹¹

V. The New TSCA Does Not Fix Problems

Recent pieces of legislation that have passed the U.S. House of Representatives and U.S. Senate would amend TSCA to reform some elements of chemical review but would not fundamentally address problems with health testing, confidentiality or exposure assumptions in the law.

Regarding health testing, the bill that passed the U.S. Senate, the Frank R. Lautenberg Chemical Safety for the 21st Century Act, S. 697, makes it potentially easier for EPA to require health or other testing in part by allowing the agency to seek testing data if regulators determine more information is necessary to assess whether the chemical is likely or unlikely to meet a safety standard under which the chemical may not pose an unreasonable risk to the general population or vulnerable populations.¹¹² Current law requires EPA to show, among other things, that the chemical would present an unreasonable risk to health or the environment before the agency can request or require testing data – a burden that may be tougher for the agency to meet. However, the Senate bill does not *require* that companies conduct or collect such testing or that EPA request it – a similar problem with the current law. The bill that passed the House, the TSCA Modernization Act of 2015, H.R. 2576, slightly modifies the current law regarding testing of new chemicals by expanding EPA’s authority to issue orders for testing rather than engaging in a lengthier rulemaking.¹¹³ However, like the Senate bill, the House bill does not require that companies conduct or collect testing or that EPA request it.

Regarding confidentiality, both the House and Senate bills would modify current law, but neither bill would create an affirmative right for the public to obtain a variety of important information including the names of chemicals, their intended uses or the chemical manufacturer’s name. The Senate bill would require, among other things, that EPA make confidential information available to state and local governments and health professionals provided these representatives keep the information confidential.¹¹⁴ However, the EPA would not be required to make any of the information available to the public except for health and safety studies that the agency is required to make public under current law.¹¹⁵ The House bill would make fewer changes and would allow – not require – EPA to share confidential information with state and local governments. EPA would be required to share confidential information with health professionals but not first responders provided that the health professionals keep the information confidential.¹¹⁶ Therefore, in the House bill, too, there is no public right to know information claimed confidential except for health and safety studies that must already be made public.

¹¹¹ Electronic mail from Greg Schweer, Chief New Chemicals Management Branch, Office of Pollution Prevention and Toxics, to Dusty Horwitt, Senior Counsel at Partnership for Policy Integrity (July 14, 2015). Meeting with Greg Schweer et al., Chief New Chemicals Management Branch, Office of Pollution Prevention and Toxics, Dusty Horwitt, Senior Counsel, Partnership for Policy Integrity, Aaron Mintzes, Policy Advocate, Earthworks (February 10, 2016).

¹¹² S. 697, 114th Cong. § 3 (16) and § 7.

¹¹³ H.R. 2576 § .9.

¹¹⁴ Id. § 15 (e) (4) and (e)(5).

¹¹⁵ Id. § 15 (c).

¹¹⁶ H.R. 2576 § 6 (a) (5) and (a) (6).

Both the Senate and House bills require EPA to assess risks posed by a chemical according to the substance’s intended “conditions of use” or the “reasonably foreseeable” conditions under which the chemical will be manufactured, used or disposed of.¹¹⁷ Congress should clarify that in the context of drilling and fracking chemicals, it is “reasonably foreseeable” that the chemicals will leak, spill, migrate underground and become airborne as a function of their normal and intended use. Separately, EPA can, and should, develop its own assumptions concerning reasonably anticipated exposures for fracking and drilling chemicals. Under these assumptions, leaks, spills, underground migration and air emissions should be considered potential sources of exposure.

VI. Recommendations

Congress is currently moving to amend TSCA. Bills have passed both the House and Senate, and the two houses are trying to reconcile their differences. Yet unless the bills are amended, neither would remedy the three major problems that we identified during our investigation of fracking and drilling chemicals: lack of mandatory health testing, broad confidentiality provisions that are biased toward industry secrecy, and unrealistic exposure assumptions that chemicals are not accidentally released.

TSCA must be amended to provide the public with meaningful information and health protections from fracking and drilling. Without addressing these issues, reformers will leave behind millions of people across the country who seek simply to verify the identity and safety of the chemicals used to frack and drill for oil and gas in their communities.

The House and Senate versions of TSCA should be revised to:

1. Require that manufacturers conduct health testing before chemicals can be manufactured.
2. Require companies to publicly disclose the identities and Chemical Abstracts Service numbers of chemicals that are manufactured commercially, and identify oil and gas wells in which the chemicals are used.
3. Remove confidentiality provisions so that EPA can publicly disclose risk assessments and regulatory determinations for new chemicals as well as those already on the market or allowed for use under TSCA. EPA might not be able to disclose these assessments and regulatory determinations in some cases due to confidentiality claims.
4. Require that end users disclose where drilling and fracking chemicals are used.
5. Both the Senate and House bills require EPA to assess risks posed by a chemical according to its intended “conditions of use” or the “reasonably foreseeable” conditions under which the chemical will be manufactured, used or disposed of.¹¹⁸ Congress should clarify that in the context of drilling and fracking chemicals, it is “reasonably foreseeable” that the chemicals will

¹¹⁷ S. 697 §§ 3,6; H.R. 2576 §§ 2, 4 (b).

¹¹⁸ S. 697 §§ 3,6; H.R. 2576 §§ 2, 4 (b).

leak, spill, migrate underground and become airborne as a function of their normal and intended use. Both bills should require that EPA develop its own reasonably anticipated exposures for fracking and drilling chemicals that include these common releases.

6. Require third party monitoring for chemical releases in air, water and soil. This should be paid for by chemical manufacturers and users, with routine audits by the EPA or an appropriate federal agency.

VII. Appendix: Case Studies

Following are nine case studies regarding EPA's review of drilling and fracking chemicals. In eight of the cases, EPA regulators expressed health concerns about the chemicals but then allowed the chemicals to be manufactured without asking for health testing data. In one case, EPA identified a health concern, neurotoxicity, and then asked for health studies. But according to an independent toxicologist, the health studies did not address neurotoxicity. EPA received notice that the chemicals were being manufactured in seven cases; in two other cases involving low-volume chemicals for which companies do not have to provide notice of manufacture, evidence from FracFocus and California's well stimulation treatment database¹¹⁹ shows that the chemicals were injected into wells.

EPA Record Number: P-09-0045

Manufacturer: Dow Chemical Co.

Chemical Name: Propanol, 1(or 2) - (methyl-2-phenoxyethoxy) or dipropylene glycol phenyl ether or (Methyl-2-phenoxyethoxy)propanol or propanol, (methyl-2-phenoxyethoxy)

Company Submission: See the document through the link in the footnote below.¹²⁰ On October 31, 2008, Dow submitted a premanufacture notice for EPA's review. Dow did not include any health testing data. See "health effects data" box unchecked on p. 1 of notice document in footnote.

EPA Risk Assessment and Regulation: See the document through the link in the footnote below.¹²¹ In EPA's review of the chemical, regulators found among other health concerns that there was "uncertain concern for developmental toxicity." See p. 2 of the assessment document in footnote. Yet Dow did not submit any health testing data that could have shed light on these concerns, and EPA scientists did not ask Dow to conduct testing for developmental concerns or other health risks. The agency dropped the chemical from further review, allowing it to be manufactured. See p. 9 of the assessment document in the footnote. EPA declined to answer written questions about why the agency did not require human health testing and what exposure assumptions were used.

Did chemical appear in FracFocus? Harvard's Kate Konschnik and Archana Dayalu were unable to locate wells in which the chemical was used. In response to a request about where its chemical was being used, Dow sent Partnership for Policy Integrity a letter stating that "at this

¹¹⁹ California Department of Oil, Gas, and Geothermal Resources. (2016). *Well Stimulation Treatment Disclosures*. Retrieved from <http://www.conservation.ca.gov/dog/Pages/WellStimulationTreatmentDisclosure.aspx>.

¹²⁰ <http://www.pfpi.net/wp-content/uploads/2016/03/PropanolNotice.pdf>

¹²¹ <http://www.pfpi.net/wp-content/uploads/2016/03/PropanolAssessment.pdf>

time, we do not list any trade products currently being sold into the oil, gas, or hydraulic fracturing industries.”¹²²

EPA Record Number: P-09-0085

Manufacturer: Champion Technologies (now owned by Ecolab)

Chemical Name: Confidential

Generic Chemical Name: 1,3-propane diaminium-2-substituted, -hexaalkyl-, di halide

Company Submission: See the document through the link in the footnote below.¹²³ On November 25, 2008, Champion Technologies submitted a premanufacture notice for EPA’s review. The company did not include any health testing data. See “health effects data” box unchecked on p. 3 of the notice document in footnote.

EPA Risk Assessment and Regulation: See the document through link in footnote below.¹²⁴ In their review of the chemical, EPA regulators found that “there is concern for neurotoxicity,” and then approved the chemical for manufacture subject to a consent order in which the company agreed to abide by certain restrictions on manufacture and import of the chemical that were redacted as confidential until the company conducted certain tests. See pages 22-23 of the assessment document in footnote. The tests included two human health studies: combined repeated dose toxicity study with the reproductive/development toxicity screening test (OPPTS: 870.3650 or OECD 422) and acute oral toxicity study (OPPTS: 870.1100 or OECD 425). EPA also ordered several other tests including: bacterial reverse mutation test (OPPTS 870.5100), Ready Biodegradability (OPPTS 835.3100), Fish Early-Life Stage Toxicity Test (OPPTS 850.1400) and Daphnid Chronic Toxicity Test (OPPTS 850.1300). Dr. Daniel Teitelbaum, a doctor and toxicologist who has testified before Congress about the health effects of drilling and fracking chemicals said that “the chosen tests may provide useful information on general toxicological actions... If neurotoxicity is the question, doing these tests is unhelpful. They do not provide an iota of useful information on those concerns.”¹²⁵ EPA did not respond to several written questions about this record including a question seeking comment on Dr. Teitelbaum’s statement.

Did chemical appear in FracFocus? Harvard’s Kate Konschnik and Archana Dayalu found that the chemical was used in a total of 17 wells located in four counties in Texas: Brazos, Burleson, Milam and San Jacinto. Ecolab did not respond to an email asking where its chemical was used.¹²⁶

EPA Record Number: P-09-0205

Manufacturer: Confidential

¹²² Letter from Dow Chemical Company to Dusty Horwitt, Senior Counsel, Partnership for Policy Integrity (Feb. 8, 2016) (on file with Partnership for Policy Integrity).

¹²³ <http://www.pfpi.net/wp-content/uploads/2016/03/DiaminiumNotice.pdf>

¹²⁴ <http://www.pfpi.net/wp-content/uploads/2016/03/DiaminiumAssessment.pdf>

¹²⁵ Electronic mail from Dr. Daniel Teitelbaum to Dusty Horwitt, Senior Counsel, Partnership for Policy Integrity (February 4, 2016) (on file with Partnership for Policy Integrity).

¹²⁶ Electronic mail from Dusty Horwitt, Senior Counsel, Partnership for Policy Integrity to Roman Blahoski, Director Global Communications, Ecolab (Jan. 25, 2016) (on file with Partnership for Policy Integrity).

Chemical Name: Confidential

Generic Chemical Name: quaternary ammonium compound

Company Submission: See the document through the link in the footnote below.¹²⁷ On February 6, 2009, an unknown company submitted a premanufacture notice for EPA's review. The company said it included health testing data. See "health effects data" box checked on p. 1 of notice document in footnote. However, the data did not appear in the record, and pages 13 and 15 of the notice document indicate that the company might have declared the data confidential.

EPA Risk Assessment and Regulation: See the document through the link in the footnote below.¹²⁸ In their review of the chemical, EPA regulators found "concern for lung effects if respirable particles or droplets are inhaled," "concern for irritation," "uncertain concern for neurotoxicity," and "to the extent that [REDACTED] is released, there is concern for developmental toxicity and liver effects." See p. 2 of the assessment document in footnote. EPA dropped the chemical from further review, thus approving it for manufacture without asking for health testing. See p. 8 of the assessment document. EPA declined to answer written questions about why the agency did not require human health testing and what exposure assumptions were used.

Did chemical appear in FracFocus? Harvard's Kate Konschnik and Archana Dayalu were unable to locate wells in which P-09-0205 was used.

EPA Record Numbers: P-09-0447 and P-09-0448

Manufacturer: Confidential

Chemical Name: Confidential

Generic Chemical Name: sodium olefin sulfonate derivative

Company Submission: See the document through link in footnote below.¹²⁹ On June 24, 2009, an unknown company submitted a premanufacture notice for EPA's review. The company did not include any health testing data. See "health effects data" box unchecked on p. 1 of the notice document in footnote.

EPA Risk Assessment and Regulation: See the document for P-09-0448 through the link in the footnote below.¹³⁰ EPA regulators found "concern for lung effects through [REDACTED] if respirable [REDACTED] are inhaled and concern for irritation to all exposed tissues based on [REDACTED]" and "uncertain concern for developmental toxicity based on summary data provided in the submission for the analog, [REDACTED]." See p. 2 of the assessment document in the footnote. EPA regulated the chemical through a consent order signed on February 14, 2013 in which EPA required two tests for ecological toxicity. However, EPA did not require tests related to human health. See pp. 27-28 of the assessment document in footnote. EPA also placed limitations on use of the chemical including that "predictable and purposeful" releases to

¹²⁷ <http://www.pfpi.net/wp-content/uploads/2016/03/QuaternaryNotice1.pdf>

¹²⁸ <http://www.pfpi.net/wp-content/uploads/2016/03/QuaternaryAssessment1.pdf>

¹²⁹ <http://www.pfpi.net/wp-content/uploads/2016/03/OlefinNotice.pdf>

¹³⁰ <http://www.pfpi.net/wp-content/uploads/2016/03/OlefinAssessment.pdf>

water could not result in concentrations of the chemical in water above 10 parts per billion. According to EPA exposure documents and interviews with EPA officials, predictable and purposeful releases do not apply to unplanned leaks, spills, underground migration or fugitive air emissions of chemicals. In addition, EPA made clear that whether the chemical remains below this concentration in water is a determination that can be estimated by the manufacturer, not measured. See pp. 26-27 of the assessment document in footnote. EPA declined to answer several written questions about the records including why the agency did not require human health testing and what exposure assumptions were used. EPA received a notice that P-09-0448 had been manufactured but did not receive a similar notice for P-09-0447.

Did chemical appear in FracFocus? Harvard's Kate Konschnik and Archana Dayalu found that P-09-0448 was likely used in a total of eight wells in Alfalfa County, Oklahoma; Karnes County, Texas; Madison County, Texas; Martin County, Texas; and McMullen County, Texas.

EPA Record Number: P-10-0050

Manufacturer: Confidential

Chemical Name: Confidential

Generic Chemical Name: amine salts of fatty acids

Company Submission: See the document through link in footnote below.¹³¹ On November 9, 2009, an unknown company submitted a premanufacture notice for EPA's review. The company said it included health testing data. See "health effects data" box checked on p. 1 of the notice document in footnote. However, the data did not appear in the record, and page 14 of the notice document indicates that the company might have declared the data confidential.

EPA Risk Assessment and Regulation: See the document through the link in the footnote below.¹³² EPA regulators wrote that "concerns based on [REDACTED] are developmental toxicity...neurotoxicity and respiratory and dermal sensitization." The regulators also noted "concern for [REDACTED] effects on the lung; irritation to eye, skin (chronic), mucous membranes and lung based on [REDACTED] properties of the compounds." See p. 2 of the assessment document in the footnote. Nonetheless, the EPA dropped the chemical from further review, thus approving it for manufacture without asking for health testing. See p. 9 of the assessment document. EPA declined to answer written questions about why the agency did not require human health testing and what exposure assumptions were used.

Did chemical appear in FracFocus? Harvard's Kate Konschnik and Archana Dayalu were unable to find wells in which P-10-0050 was used.

EPA Record Number: P-12-0072

Manufacturer: CorsiTech (now owned by Ecolab)

Chemical Name: Confidential

Generic Chemical Name: quaternary ammonium compound

¹³¹ <http://www.pfpi.net/wp-content/uploads/2016/03/AmineNotice.pdf>

¹³² <http://www.pfpi.net/wp-content/uploads/2016/03/AmineAssessment.pdf>

Company Submission: See the document through link in footnote below.¹³³ On an unknown date, CorsiTech submitted a premanufacture notice for EPA’s review. The company did not include any health testing data. See “health effects data” box unchecked on p. 2 of the notice document in the footnote.

EPA Risk Assessment and Regulation: See the document through link in footnote below.¹³⁴ EPA regulators wrote that “concern based on the analogue [REDACTED] are developmental toxicity... kidney toxicity... blood toxicity... liver toxicity.” See p. 2 of the assessment document in the footnote. Nonetheless, the EPA dropped the chemical from further review, thus approving it for manufacture without asking for health testing. See p. 6 of the assessment document. EPA declined to answer written questions about why the agency did not require human health testing and what exposure assumptions were used.

Did chemical appear in FracFocus? Harvard’s Kate Konschnik and Archana Dayalu found that P-12-0072 was used in a total of 37 wells located in Kiowa County, Colo.; Lincoln County, Colo.; Grant County, Kansas; Stevens County, Kansas; Dawson County, Tex.; Glasscock County, Tex.; Martin County, Tex.; Midland County, Tex.; and Upton County, Tex. Ecolab did not respond to an email asking where its chemical was being used.¹³⁵

EPA Record Number: P-13-0369

Manufacturer: Confidential

Chemical Name: Confidential

Generic Chemical Name: polyphosphoric acids, esters with substituted amines, compounds with alkyl pyridines

Company Submission: See the document through the link in the footnote below.¹³⁶ On an unknown date, an unknown company submitted a premanufacture notice for EPA’s review. The company did not include any health testing data. See “health effects data” box unchecked on p. 1 of notice document in footnote.

EPA Risk Assessment and Regulation: See the document through the link in the footnote below.¹³⁷ EPA regulators expressed “concern for liver and kidney toxicity based on a NOEL [no observed effects level, or the level of exposure to the chemical below which no effects are observed] of 30 mg/kg for the analogue [REDACTED] with effects to the liver and kidney at higher doses [REDACTED].” See p. 2 of the assessment document in footnote. The EPA required the manufacturer to conduct ecological toxicity testing but stated that “no human health testing is desired.” See p. 9 of the assessment document. EPA declined to answer written questions about why the agency did not require human health testing and what exposure assumptions were used.

¹³³ <http://www.pfpi.net/wp-content/uploads/2016/03/QuaternaryNotice2.pdf>

¹³⁴ <http://www.pfpi.net/wp-content/uploads/2016/03/QuaternaryAssessment2.pdf>

¹³⁵ Electronic mail from Dusty Horwitt, Senior Counsel, Partnership for Policy Integrity to Roman Blahoski, Director Global Communications, Ecolab (Jan. 25, 2016) (on file with Partnership for Policy Integrity).

¹³⁶ <http://www.pfpi.net/wp-content/uploads/2016/03/SubstitutedAminesNotice.pdf>

¹³⁷ <http://www.pfpi.net/wp-content/uploads/2016/03/SubstitutedAminesAssessment.pdf>

Did chemical appear in FracFocus? Harvard’s Kate Konschnik and Archana Dayalu were unable to find wells in which P-13-0369 was used.

EPA Record Number: L-12-0007

Manufacturer: Johnson Matthey, Inc.

Chemical Name: toluene, 3,5-dibromo-

Company Submission: See the document through the link in the footnote below.¹³⁸ On an unknown date, Johnson Matthey, Inc., submitted a low-volume exemption notice for EPA’s review. The company did not include any health testing data. See “health effects data” box unchecked on p. 1 of the notice document in the footnote.

EPA Risk Assessment and Regulation: See the document through the link in the footnote below.¹³⁹ EPA regulators expressed “concern for mutagenicity, neurotoxicity, and liver effects for the aromatic bromines and uncertain concern for developmental toxicity based on small benzene compounds.” See p. 2 of the assessment document in footnote. Nonetheless, the EPA granted the company’s request to manufacture the chemical without asking for health testing. EPA declined to answer written questions about why the agency did not require human health testing and what exposure assumptions were used.

Did chemical appear in FracFocus? Harvard’s Kate Konschnik and Archana Dayalu found that L-12-0007 was used in one well in Moffat County, Colorado. In addition, Environmental Working Group’s Tasha Stoiber found that, according to California’s fracking chemical disclosure database, the chemical was used in a well in Kern County.

EPA Record Number: L-12-0010

Manufacturer: Tracerco

Chemical Name: benzene, 1,3,5-tribromo-2-methyl

Company Submission: See the document through the link in the footnote below.¹⁴⁰ On an unknown date, Tracerco submitted a low-volume exemption notice for EPA’s review. The company did not include any health testing data. See “health effects data” box unchecked on p. 1 of the notice document in the footnote.

EPA Risk Assessment and Regulation: See the document through the link in the footnote below.¹⁴¹ EPA regulators expressed “concern for mutagenicity, neurotoxicity, and liver effects for the aromatic bromines and uncertain concern for developmental toxicity based on small benzene compounds.” See p. 2 of the assessment document below. Nonetheless, the EPA did not ask for health testing and granted the company’s request to manufacture the chemical. See p. 9 of the assessment document. EPA declined to answer written questions about why the agency did not require human health testing and what exposure assumptions were used.

¹³⁸ <http://www.pfpi.net/wp-content/uploads/2016/03/TolueneNotice.pdf>

¹³⁹ <http://www.pfpi.net/wp-content/uploads/2016/03/TolueneAssessment.pdf>

¹⁴⁰ <http://www.pfpi.net/wp-content/uploads/2016/03/BenzeneNotice.pdf>

¹⁴¹ <http://www.pfpi.net/wp-content/uploads/2016/03/BenzeneAssessment.pdf>

Did chemical appear in FracFocus? Harvard's Kate Konschnik and Archana Dayalu found that L-12-0010 was used in two wells -- one in Huerfano County, Colorado and the other in Moffat County, Colorado. In addition, Environmental Working Group's Tasha Stoiber found that, according to California's well stimulation chemical disclosure database, the chemical was used in a well in Kern County.