

Dusty Horwitt

A PDF OF THESE COMMENTS IS ATTACHED THAT INCLUDES FOOTNOTES

Written Comments by Partnership for Policy Integrity to the Delaware River Basin Commission
Concerning Special Regulations Regarding Natural Gas Development Activities
Submitted March 30, 2018

Thank you for the opportunity to provide comments on the Delaware River Basin Commission's proposed regulations that would prohibit high volume hydraulic fracturing in shale and other rock formations in the basin, set standards for the management in the basin of wastewater from fracking, and set standards for exports from the basin of freshwater for fracking.

Partnership for Policy Integrity is a nonprofit organization that focuses on energy and environmental policy. For the past three years, we have investigated the EPA's regulation of new chemicals used in drilling and fracking and published a major report about our findings in 2016 entitled Toxic Secrets. This fall, Marketplace on NPR broadcast a two-part story on our investigation. Also this fall, Elsevier published a textbook, Environmental Issues Concerning Hydraulic Fracturing, Vol. 1, that included a chapter on hydraulic fracturing chemical disclosure by our Senior Counsel, Dusty Horwitt. Horwitt has spent more than a decade researching oil and gas drilling and hydraulic fracturing. He has testified about drilling issues before several government bodies including four times before the New York City Council regarding the risks to the city's drinking water from high-volume hydraulic fracturing in the Delaware River Basin.

Based on our recent findings about the widespread use of secret and potentially harmful drilling and fracking chemicals, mounting evidence about additional risks, and significant data gaps, we support the Delaware River Basin Commission's proposal to prohibit high-volume hydraulic fracturing in the basin. Recent decisions and statements by New York State and the state of Maryland are consistent with this position. We also urge the commission to prohibit wastewater disposal, water withdrawals and other related activities. We are not convinced that the proposed protections for wastewater disposal or water withdrawals would be sufficient to protect drinking water quantity or quality in the basin.

The Delaware River Basin is a critically important watershed. Most significantly, it provides drinking water for more than 15 million people, including those who live in New York City and Philadelphia. To be sure, extracting natural gas from the basin through high-volume fracking would likely generate tax revenue and a modest number of jobs. However, the costs of contaminated drinking water alone would likely outweigh these benefits, particularly if the water were difficult or impossible to clean up. The likelihood of such a catastrophic scenario is unknown, but the risk is too great considering the large number of highly toxic and unknown chemicals associated with drilling and fracking. Allowing high-volume hydraulic fracturing and related activities in the basin amounts to a huge gamble with one of our nation's major drinking water supplies.

Background

Hydraulic fracturing typically involves the underground injection into oil and gas wells at high pressure of a mixture of water, sand, and chemicals. The fluid fractures underground rock formations, liberating trapped oil and/or natural gas. High volume hydraulic fracturing as defined by the commission involves the use of a combined total of 300,000 gallons or more of water in all

stages of well completion whether a well is vertical or horizontal. If allowed, fracking could occur in about 40 percent of the basin that is located in New York and Pennsylvania and sits above the Marcellus and Utica shales. As the commission notes, these formations are known to contain natural gas. West of the basin, drilling companies are extracting oil and natural gas from these formations using high-volume hydraulic fracturing, which combines directional (typically horizontal) drilling and hydraulic fracturing using large quantities of water. The commission states that it is unknown whether the Marcellus and Utica shales within the basin contain "commercially viable" natural gas. Because New York banned high-volume hydraulic fracturing (HVHF) in 2014 due to uncertainties about health impacts and whether such impacts could be reduced or prevented, drilling in these formations could currently occur only in Pennsylvania's portion of the basin, namely in Carbon, Lackawanna, Luzerne, Monroe, Pike, Schuylkill, Sullivan, and Wayne counties. The commission adds that "the South Newark basin formation, which underlies portions of Pennsylvania and New Jersey, may also contain oil and gas deposits capable of development by HVHF."

The Commission's Ban on High-Volume Hydraulic Fracturing is Justified – and There is an Even Stronger Case to be Made

The commission makes a compelling case for banning high volume hydraulic fracturing in the basin. Among the reasons provided include the need to acquire large amounts of water for fracturing – 6.5 million gallons per well or more – most of which will be injected underground and not returned to the basin's usable ground or surface water. Such consumptive use of water may adversely affect water quantity, "particularly during periods of low precipitation or drought." The commission cited the potential for spills of chemicals added to fracturing fluid and noted that some of the chemicals' identities are withheld from the public by drilling companies as confidential business information. Such spills can contaminate surface and ground water. Cracks in wells' protective steel casing or cement create a risk that gas or fluids inside the well can leech into nearby ground- and surface water. Disposal of significant quantities of wastewater creates more contamination risks because scientists have found high levels of total dissolved solids and toxic substances in wastewater from the Marcellus shale including carcinogenic benzene and radium. "Because produced water contains high TDS and dissolved inorganic constituents that most publicly owned treatment works and other municipal wastewater treatment facilities are not designed to remove," the commission wrote, "these constituents can be discharged from such facilities; can disrupt treatment processes, for example by inhibiting biological treatment, can accumulate in biosolids (sewage sludge), limiting their beneficial use; and can facilitate the formation of harmful disinfection byproducts." The commission noted that EPA finalized a rule in 2016 that would prohibit publicly owned treatment works from receiving untreated wastewater from "unconventional" formations such as the Marcellus and Utica shales. However, the commission notes that the rule does not extend to commercially owned treatment works that could treat wastewater from the shale formations nor does it extend to discharge of wastewater to publicly owned treatment works after the wastewater has been partially treated at centralized waste treatment facilities. On top of these risks, the commission cites many uncertainties about the impact of hydraulic fracturing on drinking water identified in major reports by the U.S. Environmental Protection Agency and the State of New York.

Partnership for Policy Integrity believes that the case for a ban on fracking in the basin is even stronger based in part on the extensive use of confidential chemicals in drilling and fracking, some of which may be harmful to human health. The commission notes that regarding chemical identities, "in some cases, chemical information is considered Confidential Business information and not disclosed by the fracturing operator (*italics added*)." However, the use of confidential chemicals is

extensive. Drilling companies are required by many oil and gas producing states, including Pennsylvania, to publicly disclose chemicals used in hydraulic fracturing. Most or all of these states allow companies to withhold chemical identities as confidential. Drilling companies are required to make many of these disclosures available to the public through FracFocus, a nongovernmental organization that is the nation's largest repository for well-by-well hydraulic fracturing chemical disclosure data. For example, Pennsylvania requires fracking chemical disclosures to be made to FracFocus for unconventional wells, the type that would be drilled in the Delaware River Basin if high-volume hydraulic fracturing were allowed. EPA analyzed more than 39,000 FracFocus disclosures made between 2011 and 2013 and found that operators withheld the identities of 11 percent of the chemicals disclosed and at least one chemical identity on more than 70 percent of well-by-well disclosures. In a study published in 2015, two Harvard researchers analyzed FracFocus disclosures made between 2013 and 2015 for more than 53,000 wells and found that well operators withheld 16.5 percent of all the Chemical Abstracts Service numbers submitted and withheld at least one chemical identity on 92.3 percent of the well-by-well disclosures. Chemical Abstracts Service numbers, or CAS numbers, are considered the most precise way to identify chemicals because each chemical has only one, whereas chemicals can have multiple names or trade names.

Pennsylvania-based FracTracker Alliance recently found similar results when the organization worked with Partnership for Policy Integrity to analyze data from FracFocus for Pennsylvania. The data showed that between 2013 and 2017, hydraulic fracturing injections for 3,702 of 4,525 wells reported to FracFocus from Pennsylvania or almost 82 percent, contained at least one confidential chemical. Drilling companies injected a total of 19,306 confidential chemicals in the 3,702 wells or an average of about five confidential chemicals per well. Some wells received injections of far more confidential chemicals. In Susquehanna County, directly adjacent to the Delaware River Basin, drilling companies injected 16 confidential chemicals per well into three different wells and injected 14 confidential chemicals per well into at least two additional wells. In total, drilling companies injected 3,703 confidential chemicals into 649 wells in Susquehanna County, the second highest county-wide totals in the state.

FracTracker found that more than 99 percent of the wells for which fracking chemical disclosure information was reported to FracFocus from Pennsylvania were unconventional wells, according to a comparison between API numbers reported to FracFocus and those reported to the Pennsylvania Department of Environmental Protection. API numbers are unique numeric identifiers assigned to each well by the American Petroleum Institute. These figures suggest that if high-volume hydraulic fracturing were allowed in the Delaware River Basin, drilling companies would extensively use confidential chemicals including multiple confidential chemicals per well.

It is unacceptable to expose drinking water for 15 million people to such unknown chemicals, especially when EPA has found that fracking chemicals are involved in six of seven steps in the hydraulic fracturing process that EPA concluded are "more likely than others to result in more frequent or more severe impacts" to drinking water. These steps include:

- Spills during the management of hydraulic fracturing fluids and chemicals or produced water that result in large volumes or high concentrations of chemicals reaching groundwater resources;
- Injection of hydraulic fracturing fluids into wells with inadequate mechanical integrity, allowing gases or liquids to move to groundwater resources;
- Injection of hydraulic fracturing fluids directly into groundwater resources;
- Discharge of inadequately treated hydraulic fracturing wastewater to surface water resources; and
- Disposal or storage of hydraulic fracturing wastewater in unlined pits, resulting in contamination

of groundwater resources.

EPA reported that fracking wastewater contains both the chemicals injected in the fracking fluid and naturally occurring constituents from the drilling formation, so confidential chemicals would be a concern both in fracking fluid and wastewater. EPA commented that "when chemicals are claimed as CBI [confidential business information], there is no public means of accessing information on these chemicals. Furthermore, many of the chemicals and chemical mixtures disclosed, or those detected in produced water, lack information on properties affecting their movement, persistence, and toxicity in the environment should they be spilled." These data gaps would leave citizens, scientists, and regulators in the basin guessing as to what pollution or health impacts might result from high-volume hydraulic fracturing.

In 10-K forms required to be filed with the U.S. Securities and Exchange Commission, drilling companies have disclosed to investors that releases of fluids and water contamination are among the most serious risks facing their businesses. "Oil and natural gas operations are subject to many risks, including well blowouts, cratering, explosions, pipe failures, fires, formations with abnormal pressures, uncontrollable flows of oil, natural gas, brine or well fluids, oil spills, severe weather, natural disasters, groundwater contamination and other environmental hazards and risks (*italics added*)," Oklahoma City-based Chesapeake Energy Corp. recently reported in its 10-K form. "Natural gas, NGLs [natural gas liquids] and oil operations are subject to many risks, including...uncontrollable flows of oil, natural gas or well fluids, fires, pipe or cement failures, pipeline ruptures or spills, vandalism, pollution, releases of toxic gases, adverse weather conditions or natural disasters, and other environmental hazards and risks (*italics added*)," Fort Worth, Texas-based Range Resources Corp. wrote in its 10-K form." Chesapeake noted that its insurance "may not be adequate to cover all losses or exposure to liability" from environmental damages while Range commented that the company "may not be fully covered" by insurance for such damages. These disclosures offer additional evidence that chemicals from hydraulic fracturing would expose the basin to serious pollution and that taxpayers may be largely responsible for cleanup costs.

Other information from the EPA suggests that fracking chemicals are likely to be harmful. Through a Freedom of Information Act request, PFPI has conducted a four-year investigation of EPA's health and environmental assessments of new chemicals proposed for use in drilling and fracking under the Toxic Substances Control Act. In 2016, we published some of our conclusions in Toxic Secrets referenced above and have continued to receive documents from EPA that raise concerns about human health risks. EPA records show that between 2003 and 2014, the agency reviewed 126 new drilling and fracking chemicals. EPA identified health concerns for 109 of the chemicals. The agency approved 62 of the chemicals for commercial use that evidence shows or suggests were later used commercially in oil and gas wells despite concerns that the chemicals might harm human health. The agency's health concerns ranged from "irritation to the eye, skin, and mucous membranes" to kidney toxicity, liver toxicity, neurotoxicity, and developmental toxicity. Chemical manufacturers invoked confidentiality claims (allowed under federal law) for 41 of the 62 chemicals that shielded from the public (but not from EPA) the chemicals' specific identities. Using the available data about these chemicals, PFPI searched FracFocus and the other leading fracking chemical disclosure database maintained by the state of California. PFPI was able to document only two of the 41 chemicals as being used in specific oil and gas wells. It is possible that some of these chemicals were used in wells in Pennsylvania and could be used in wells in the Delaware River Basin. However, it is impossible to know whether the same chemicals declared confidential at the state level in FracFocus are the same chemicals declared confidential at the federal level during

EPA's review process. In November 2017, a group of more than 100 first responders, health professionals and scientists wrote to EPA requesting that the agency reveal the chemical identities of the 41 chemicals referenced above. The Toxic Substances Control Act requires that confidential chemical identities "shall be disclosed if the Administrator determines that disclosure is necessary to protect health or the environment against an unreasonable risk of injury to health or the environment." As of this week, EPA had not responded to the request beyond an acknowledgment that it was received.

Another major problem facing regulators and citizens concerning drilling and fracking chemicals is that the chemicals' toxicities are often unknown. In its national study of fracking and drinking water, EPA identified 1,606 chemicals in fracking fluid or drilling wastewater including 1,084 identified in fracking fluid and 599 identified in wastewater. Yet only 173 of the chemicals had toxicity values from sources that met EPA's standards for conducting risk assessments. "This missing information represents a significant data gap that makes it difficult to fully understand the severity of potential impacts on drinking water resources," the agency wrote. For the 173 chemicals that had significant toxicity data, EPA found that "health effects associated with chronic oral exposure to these chemicals include carcinogenicity, neurotoxicity, immune system effects, changes in body weight, changes in blood chemistry, liver and kidney toxicity, and reproductive and developmental toxicity."

EPA did not mention that the agency's own failure to request health testing for new chemicals proposed for oil and gas drilling and regulated by EPA contributed to the lack of information about chemical risks. From 2009 and 2017, the GAO consistently included EPA's chemical review program on a list of federal government programs at highest risk of waste, fraud, abuse, and mismanagement partly because of the lack of health testing data used to regulate chemicals. The GAO issues the list every two years at the beginning of each new Congress. In our investigation of EPA's regulation of new chemicals proposed for use in drilling and fracking, we found that manufacturers said they submitted health testing data for only 21 of 126 chemicals and in only six of those cases were the data clearly available in the public record. EPA asked for health testing data for only 10 chemicals, and in only five of those cases were the data present in the public record and relevant to the agency's health concerns. This record gives us little confidence that EPA will soon act to identify and protect the public from risks associated with drilling and fracking chemicals.

Other authorities have banned fracking due to the significant risks and uncertainties involved. As mentioned previously, in 2014, New York State banned high-volume hydraulic fracturing citing uncertainties about harms and how to prevent them. In 2016, Maryland Gov. Larry Hogan signed a ban on hydraulic fracturing passed by the state legislature, concluding "that possible environmental risks of fracking outweigh any potential benefit." The Delaware River Basin Commission is wise to take similar action. Allowing high-volume fracking activities in the basin would amount to a huge gamble with people's health.

The Commission Should Also Prohibit Wastewater Importation Into the Basin

The Commission has proposed to allow the treatment and discharge of fracking wastewater in the basin if it is treated at a centralized waste treatment facility (CWT) and meets other standards. Among the most important of these other requirements are that the project sponsor who wishes to treat and discharge the wastewater conduct an "analysis, characterization and quantification of all pollutants of concern" as defined in an EPA technical document. The sponsor must also show that "the acute and chronic toxicity of the waste, measured as Whole Effluent Toxicity (WET), have been evaluated."

Based on the information we have presented previously about confidential chemicals and missing toxicity data, we are skeptical that operators could effectively meet these standards. Part of our concern is that wastewater is likely to contain confidential chemicals that may not appear in EPA's technical document. Therefore, it seems possible that an operator could conduct an analysis of "all pollutants of concern" but fail to analyze confidential chemicals that are not listed in EPA's document – chemicals that might be harmful. In its national study of fracking and drinking water, EPA concluded about centralized waste treatment facilities that "the effectiveness of treatment cannot be evaluated for constituents for which the wastewater has not been tested. This makes it challenging to know the degree to which effluent from a CWT is protective of public health." We are also skeptical that operators would be able to measure the acute and chronic toxicity of the waste when EPA has found toxicity values to be lacking for more than 1,400 chemicals found in fracking fluid or wastewater.

In its national study, EPA identified several additional concerns with centralized waste treatment facilities:

Historically, CWTs have not included processes to treat for constituents that are difficult to remove, such as the high concentrations of TDS found in wastewater from unconventional reservoirs. As a result, impacts on drinking water resources have included increased suspended solids and chloride concentrations downstream of discharging facilities that were accepting hydraulic fracturing wastewater...and elevated bromide concentrations and radium concentrations in CWT effluent....Even if wastewater could be effectively treated, EPA has found that "spills and leaks can occur in pits or impoundments associated with the storage of treated wastewater at CWTs....Wastewater being transported by truck or pipeline to and from a CWT can also present a vulnerability for spills or leaks...."

The EPA added that "even an efficient treatment process may not be able to reduce the concentrations of some constituents to levels that allow for discharge to a drinking water resource if influent concentrations are so high that they exceed the capabilities of the treatment technology(ies) to meet those discharge limits." The agency stated, too, that "relatively few studies describe the ability of individual treatment processes to remove constituents from hydraulic fracturing wastewater." In light of all the uncertainties and risks, the commissions should prohibit or place a moratorium on fracking wastewater importation and discharge.

The Commission Should Prohibit Water Withdrawals for Fracking

The commission has already expressed concern that water withdrawals for fracking "may adversely affect aquatic ecosystems and river channel and riparian resources downstream, including wetlands, and may diminish the quantity of water stored in an aquifer or a stream's capacity to assimilate pollutants." The commission continued: "Because HVHF operations may significantly increase the volume of water withdrawn in a localized area, they may ultimately upset the balance between the demand on water resources and the availability of those resources for uses protected by the Commission's comprehensive plan, particularly during periods of low precipitation or drought." In addition, the EPA and Susquehanna River Basin Commission have found that 90 and 96 percent of the water used for hydraulic fracturing, respectively, is permanently removed from the water cycle. In contrast, the commission found that 90 percent of water withdrawn from the basin for domestic and commercial uses is returned to the basin. Therefore, water withdrawals for hydraulic fracturing are likely to have a particularly adverse effect on water quantity in the basin, especially during times of drought.

In addition, evidence shows that the amount of water used to fracture wells near the basin could be significantly higher than the highest nearby average per-well water use reported by the commission, 6.5 million gallons for wells drilled in the Susquehanna River Basin. Such higher water use would be consistent with the commission's observation that "advances in horizontal drilling technology are leading to longer drill paths and the need for more fracturing fluid volumes for each path." FracTracker analyzed FracFocus data and showed that the average water use for each unconventional well fractured in Pennsylvania in 2017 was 11.6 million gallons. This figure may represent a significant increase in water consumption even over the course of a year or two. Data from a report in March 2016 by IHS Global Inc. commissioned by the U.S. Energy Information Administration shows that drilling companies were using nearly 8.35 million gallons of water to fracture a typical well in an area of the Marcellus shale known as the "Super Core" located just west of the basin in Pennsylvania. Companies were using 3.7 million gallons in another nearby area known as the "Northeast Core." In the "Periphery" area located across a swath of central Pennsylvania, drilling companies were fracturing typical wells with 10.19 million gallons of fluid, IHS found. And in areas of southwest Pennsylvania, drilling companies were using more than eight million gallons of water per well. These figures suggest that if drilling companies withdrew water from the basin for fracking, the withdrawals might be far greater than currently anticipated.

We understand that water withdrawals from the basin are discouraged, and that any proposed withdrawals would be carefully evaluated. However, the drilling industry's demand for water is growing, and any withdrawals are likely to mean a permanent removal of water from a basin that 15 million people depend on for drinking water. The commission has identified risks to water quantity should such withdrawals occur. We therefore encourage the commission to prohibit or place a moratorium on such withdrawals.

Conclusion

For the stated reasons, we support the commission's proposal to ban high-volume hydraulic fracturing and believe that the commission should prohibit or place a moratorium on fracking wastewater disposal and water withdrawals for fracking. We are happy to answer any questions that you might have and appreciate the opportunity to provide comments.

Sincerely,

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Based on our recent findings about the widespread use of secret and potentially harmful drilling and fracking chemicals, mounting evidence about additional risks, and significant data gaps, we support the Delaware River Basin Commission's proposal to prohibit high-volume hydraulic fracturing in the basin. Recent decisions and statements by New York State and the state of Maryland are consistent with this position. We also urge the commission to prohibit wastewater disposal, water withdrawals and other related activities. We are not convinced that the proposed protections for wastewater disposal or water withdrawals would be sufficient to protect drinking water quantity or quality in the basin.

The Delaware River Basin is a critically important watershed. Most significantly, it provides drinking water for more than 15 million people, including those who live in New York City and

¹ Dusty Horwitt. *Toxic Secrets*. Partnership for Policy Integrity. See http://www.pfpi.net/wpcontent/uploads/2016/04/PFPI_ToxicSecrets_4-7-2016.pdf.

² Scott Tong. Documents Show Undisclosed EPA Health Concerns on Fracking Chemicals. *Marketplace* (Nov. 14, 2017). See <https://www.marketplace.org/2017/11/14/world/documents-show-undisclosed-epa-health-concerns-fracking-chemicals-0>. Scott Tong. "The Public Has a Right to Know": Fracking Companies Don't Have to Disclose Chemicals Linked to Health Concerns." *Marketplace* (Nov. 15, 2017). See <https://www.marketplace.org/2017/11/15/sustainability/epas-legalized-suppression-fracking-chemical-secrets>.

³ Kevin A. Schug and Zachariah L. Hildenbrand. *Environmental Issues Concerning Hydraulic Fracturing, Vol. 1*. Accessed at <https://www.elsevier.com/books/environmental-issues-concerning-hydraulic-fracturing/schug/978-0-12-812802-2>.

Philadelphia.⁴ To be sure, extracting natural gas from the basin through high-volume fracking would likely generate tax revenue and a modest number of jobs. However, the costs of contaminated drinking water alone would likely outweigh these benefits, particularly if the water were difficult or impossible to clean up. The likelihood of such a catastrophic scenario is unknown, but the risk is too great considering the large number of highly toxic and unknown chemicals associated with drilling and fracking. Allowing high-volume hydraulic fracturing and related activities in the basin amounts to a huge gamble with one of our nation's major drinking water supplies.

Background

Hydraulic fracturing typically involves the underground injection into oil and gas wells at high pressure of a mixture of water, sand, and chemicals. The fluid fractures underground rock formations, liberating trapped oil and/or natural gas. High volume hydraulic fracturing as defined by the commission involves the use of a combined total of 300,000 gallons or more of water in all stages of well completion whether a well is vertical or horizontal.⁵ If allowed, fracking could occur in about 40 percent of the basin that is located in New York and Pennsylvania and sits above the Marcellus and Utica shales. As the commission notes, these formations are known to contain natural gas. West of the basin, drilling companies are extracting oil and natural gas from these formations using high-volume hydraulic fracturing, which combines directional (typically horizontal) drilling and hydraulic fracturing using large quantities of water. The commission states that it is unknown whether the Marcellus and Utica shales within the basin contain "commercially viable" natural gas.⁶ Because New York banned high-volume hydraulic fracturing (HVHF) in 2014 due to uncertainties about health impacts and whether such impacts could be reduced or prevented,⁷ drilling in these formations could currently occur only in Pennsylvania's portion of the basin, namely in Carbon, Lackawanna, Luzerne, Monroe, Pike, Schuylkill, Sullivan, and Wayne counties.⁸ The commission adds that "the South Newark basin formation, which underlies portions of Pennsylvania and New Jersey, may also contain oil and gas deposits capable of development by HVHF."⁹

⁴ Delaware River Basin Commission. Basic Information. See <http://www.state.nj.us/drbc/basin/>. Delaware River Basin Commission. Resolution directing the Executive Director to publish for public comment revised draft regulations regarding certain natural gas development activities in the Delaware River Basin (Sept. 11, 2017). Accessed at http://www.state.nj.us/drbc/library/documents/ResForMinutes_nat-gas_initiate-rulemkgDRAFT.pdf. City of Philadelphia. Drinking Water Treatment. See <http://www.phila.gov/water/wu/drinkingwater/treatment/Pages/default.aspx>.

⁵ Delaware River Basin Commission. Proposed new 18 CFR Part 440. See http://www.state.nj.us/drbc/meetings/proposed/notice_hydraulic-fracturing.html.

⁶ Delaware River Basin Commission. Proposed rule; notice of public hearing, at 4. See <http://www.state.nj.us/drbc/library/documents/HydraulicFracturing/RulemakingNotice113017.pdf>.

⁷ New York State Department of Health. A Public Health Review of High Volume Hydraulic Fracturing for Shale Gas Development (December 2014), at 2. See https://www.health.ny.gov/press/reports/docs/high_volume_hydraulic_fracturing.pdf.

⁸ Delaware River Basin Commission. Extent of Marcellus Shale Formation in the Delaware River Basin. See <http://www.state.nj.us/drbc/library/documents/maps/MarcellusShaleDRB.pdf>.

⁹ Id.

The Commission’s Ban on High-Volume Hydraulic Fracturing is Justified – and There is an Even Stronger Case to be Made

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Partnership for Policy Integrity believes that the case for a ban on fracking in the basin is even stronger based in part on the extensive use of confidential chemicals in drilling and fracking, some of which may be harmful to human health. The commission notes that regarding chemical identities, “in *some cases*, chemical information is considered Confidential Business information and not disclosed by the fracturing operator (*italics added*).”¹⁶ However, the use of confidential chemicals is extensive. Drilling companies are required by many oil and gas producing states, including Pennsylvania, to publicly disclose chemicals used in hydraulic fracturing. Most or all of these states allow companies to withhold chemical identities as confidential. Drilling

¹⁰ Id. at 6-7.

¹¹ Id. at 7-8.

¹² Id. at 8.

¹³ Id. at 9.

¹⁴ Id. at 9-10.

¹⁵ Id. at 11.

¹⁶ Id. at 7.

companies are required to make many of these disclosures available to the public through FracFocus, a nongovernmental organization that is the nation's largest repository for well-by-well hydraulic fracturing chemical disclosure data. For example, Pennsylvania requires fracking chemical disclosures to be made to FracFocus for unconventional wells, the type that would be drilled in the Delaware River Basin if high-volume hydraulic fracturing were allowed.¹⁷ EPA analyzed more than 39,000 FracFocus disclosures made between 2011 and 2013 and found that operators withheld the identities of 11 percent of the chemicals disclosed and at least one chemical identity on more than 70 percent of well-by-well disclosures.¹⁸ In a study published in 2015, two Harvard researchers analyzed FracFocus disclosures made between 2013 and 2015 for more than 53,000 wells and found that well operators withheld 16.5 percent of all the Chemical Abstracts Service numbers submitted and withheld at least one chemical identity on 92.3 percent of the well-by-well disclosures.¹⁹ Chemical Abstracts Service numbers, or CAS numbers, are considered the most precise way to identify chemicals because each chemical has only one, whereas chemicals can have multiple names or trade names.²⁰

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¹⁷ Dusty Horwitt. Hydraulic Fracturing Chemical Disclosure: Can the Public Know What's Going into Oil and Natural Gas Wells? Environmental Issues Concerning Hydraulic Fracturing, Vol. 1, (Kevin A. Schug and Zacariah Hildenbrand eds., 2017), at 76-98.

¹⁸ U.S. Environmental Protection Agency. Hydraulic fracturing for oil and gas: impacts from the hydraulic fracturing water cycle on drinking water resources in the United States. Washington, DC: Office of Research and Development; 2016. EPA Report # 600/R-16/236F, at 5-20. See <https://www.epa.gov/hfstudy>. See, e.g., U.S. Environmental Protection Agency. Focus report for chemical number P-06-0676. Washington, DC: New Chemicals Program; 2006. [Hereinafter EPA Fracking & Drinking Water Study.]

¹⁹ Konschnik K, Dayalu A. Hydraulic fracturing chemicals reporting: analysis of available data and recommendations for policymakers. Energy Policy 2016; 88 :504 – 14.

²⁰ FracFocus. What chemicals are used. See <http://fracfocus.org/chemical-use/what-chemicals-are-used>; 2017.

²¹ Only Washington County had more wells drilled using at least one confidential chemical and more confidential chemicals injected.

²² FracTracker's analysis is on file with Partnership for Policy Integrity.

by the American Petroleum Institute.²³ These figures suggest that if high-volume hydraulic fracturing were allowed in the Delaware River Basin, drilling companies would extensively use confidential chemicals including multiple confidential chemicals per well.

It is unacceptable to expose drinking water for 15 million people to such unknown chemicals, especially when EPA has found that fracking chemicals are involved in six of seven steps in the hydraulic fracturing process that EPA concluded are “more likely than others to result in more frequent or more severe impacts” to drinking water.²⁴ These steps include:

- Spills during the management of hydraulic fracturing fluids and chemicals or produced water that result in large volumes or high concentrations of chemicals reaching groundwater resources;
- Injection of hydraulic fracturing fluids into wells with inadequate mechanical integrity, allowing gases or liquids to move to groundwater resources;
- Injection of hydraulic fracturing fluids directly into groundwater resources;
- Discharge of inadequately treated hydraulic fracturing wastewater to surface water resources; and
- Disposal or storage of hydraulic fracturing wastewater in unlined pits, resulting in contamination of groundwater resources.²⁵

EPA reported that fracking wastewater contains both the chemicals injected in the fracking fluid and naturally occurring constituents from the drilling formation, so confidential chemicals would be a concern both in fracking fluid and wastewater.²⁶ EPA commented that “when chemicals are claimed as CBI [confidential business information], there is no public means of accessing information on these chemicals. Furthermore, many of the chemicals and chemical mixtures disclosed, or those detected in produced water, lack information on properties affecting their movement, persistence, and toxicity in the environment should they be spilled.”²⁷ These data gaps would leave citizens, scientists, and regulators in the basin guessing as to what pollution or health impacts might result from high-volume hydraulic fracturing.

In 10-K forms required to be filed with the U.S. Securities and Exchange Commission, drilling companies have disclosed to investors that releases of fluids and water contamination are among the most serious risks facing their businesses. “Oil and natural gas operations are subject to many risks, including well blowouts, cratering, explosions,

²³ West Virginia Department of Environmental Protection. API number explanation (2017). See <http://www.dep.wv.gov/oil-and-gas/GI/Documents/API%20Number%20Explanation.pdf>.

²⁴ EPA Fracking & Drinking Water Study, at ES-3.

²⁵ Id.

²⁶ Id. at 8-11.

²⁷ U.S. Environmental Protection Agency. Hydraulic fracturing for oil and gas: impacts from the hydraulic fracturing water cycle on drinking water resources in the United States. Washington, DC: Office of Research and Development; 2016, at 10-25. EPA Report # 600/R-16/236F. See <https://www.epa.gov/hfstudy>.

pipe failures, fires, formations with abnormal pressures, uncontrollable flows of oil, natural gas, *brine or well fluids*, oil spills, severe weather, natural disasters, *groundwater contamination* and other environmental hazards and risks (italics added),” Oklahoma City-based Chesapeake Energy Corp. recently reported in its 10-K form.²⁸ “Natural gas, NGLs [natural gas liquids] and oil operations are subject to many risks, including...uncontrollable flows of oil, natural gas or *well fluids*, fires, pipe or cement failures, pipeline ruptures or spills, vandalism, pollution, releases of toxic gases, adverse weather conditions or natural disasters, and other environmental hazards and risks (italics added),” Fort Worth, Texas-based Range Resources Corp. wrote in its 10-K form.”²⁹ Chesapeake noted that its insurance “may not be adequate to cover all losses or exposure to liability” from environmental damages³⁰ while Range commented that the company “may not be fully covered” by insurance for such damages.³¹ These disclosures offer additional evidence that chemicals from hydraulic fracturing would expose the basin to serious pollution and that taxpayers may be largely responsible for cleanup costs.

Other information from the EPA suggests that fracking chemicals are likely to be harmful. Through a Freedom of Information Act request, PFPI has conducted a four-year investigation of EPA’s health and environmental assessments of new chemicals proposed for use in drilling and fracking under the Toxic Substances Control Act. In 2016, we published some of our conclusions in *Toxic Secrets* referenced above and have continued to receive documents from EPA that raise concerns about human health risks.³² EPA records show that between 2003 and 2014, the agency reviewed 126 new drilling and fracking chemicals. EPA identified health concerns for 109 of the chemicals. The agency approved 62 of the chemicals for commercial use that evidence shows or suggests were later used commercially in oil and gas wells despite concerns that the chemicals might harm human health. The agency’s health concerns ranged from “irritation to the eye, skin, and mucous membranes”³³ to kidney toxicity,³⁴ liver toxicity,³⁵ neurotoxicity, and developmental toxicity.³⁶ Chemical manufacturers invoked confidentiality claims (allowed under federal law) for 41 of the 62 chemicals that shielded from the public (but not from EPA) the chemicals’ specific identities. Using the available data about these chemicals, PFPI searched FracFocus and the other leading fracking chemical disclosure database maintained by the state of California. PFPI was able to document only two of the 41 chemicals as being used in specific oil and gas wells. It is possible that some of these chemicals were used in wells

²⁸ Chesapeake Energy Corp. Form 10-K filed with the U.S. Securities and Exchange Commission (Feb. 22, 2018), at 30.

²⁹ Range Resources Corp. Form 10-K filed with the U.S. Securities and Exchange Commission (Feb. 28, 2018), at 34.

³⁰ Chesapeake Energy Corp. Form 10-K filed with the U.S. Securities and Exchange Commission (Feb. 22, 2018), at 21.

³¹ Range Resources Corp. Form 10-K filed with the U.S. Securities and Exchange Commission (Feb. 28, 2018), at 34.

³² Partnership for Policy Integrity. *Toxic Secrets* (April 7, 2016). See http://www.pfpi.net/wpcontent/uploads/2016/04/PFPI_ToxicSecrets_4-7-2016.pdf.

³³ See, e.g., EPA record number L-14-0273, FOCUS Report (April 30, 2014).

³⁴ See, e.g., EPA record number P-13-0369, SAT Report (Aug. 19, 2014) at 2.

³⁵ See, e.g., EPA record number P-12-0072, FOCUS Report (Dec. 15, 2011) at 2.

³⁶ See, e.g., EPA Record number P-10-0050, SAT Report (Nov. 26, 2014) at 2.

in Pennsylvania and could be used in wells in the Delaware River Basin. However, it is impossible to know whether the same chemicals declared confidential at the state level in FracFocus are the same chemicals declared confidential at the federal level during EPA's review process. In November 2017, a group of more than 100 first responders, health professionals and scientists wrote to EPA requesting that the agency reveal the chemical identities of the 41 chemicals referenced above. The Toxic Substances Control Act requires that confidential chemical identities "shall be disclosed if the Administrator determines that disclosure is necessary to protect health or the environment against an unreasonable risk of injury to health or the environment." As of this week, EPA had not responded to the request beyond an acknowledgment that it was received.³⁷

Another major problem facing regulators and citizens concerning drilling and fracking chemicals is that the chemicals' toxicities are often unknown. In its national study of fracking and drinking water, EPA identified 1,606 chemicals in fracking fluid or drilling wastewater including 1,084 identified in fracking fluid and 599 identified in wastewater. Yet only 173 of the chemicals had toxicity values from sources that met EPA's standards for conducting risk assessments. "This missing information represents a significant data gap that makes it difficult to fully understand the severity of potential impacts on drinking water resources," the agency wrote. For the 173 chemicals that had significant toxicity data, EPA found that "health effects associated with chronic oral exposure to these chemicals include carcinogenicity, neurotoxicity, immune system effects, changes in body weight, changes in blood chemistry, liver and kidney toxicity, and reproductive and developmental toxicity."³⁸

EPA did not mention that the agency's own failure to request health testing for new chemicals proposed for oil and gas drilling and regulated by EPA contributed to the lack of information about chemical risks.³⁹ From 2009 and 2017, the GAO consistently included EPA's chemical review program on a list of federal government programs at highest risk of waste, fraud, abuse, and mismanagement partly because of the lack of health testing data used to regulate chemicals. The GAO issues the list every two years at the beginning of each new Congress.⁴⁰ In our investigation of EPA's regulation of new chemicals proposed for use in drilling and fracking, we found that manufacturers said they submitted health testing data for only 21 of 126 chemicals and in only six of those cases were the data clearly available in the public record. EPA asked for health testing data for only 10 chemicals, and in only five of those cases were the data present in the public record and relevant to the agency's health concerns.⁴¹ This record gives us little

³⁷ Electronic communication with Dr. Kathleen Nolan, a signer of the letter who submitted it to EPA (Mar. 27, 2018).

³⁸ U.S. Environmental Protection Agency. Hydraulic fracturing for oil and gas: impacts from the hydraulic fracturing water cycle on drinking water resources in the United States. Washington, DC: Office of Research and Development; 2016, at ES-45 to ES-46 and 9-1. EPA Report # 600/R-16/236F. See <https://www.epa.gov/hfstudy>.

³⁹ Dusty Horwitt, Environmental Issues Concerning Hydraulic Fracturing, Volume 1 (Kevin A. Schug and Zachariah L. Hildenbrand, eds.), at 101 (2017).

⁴⁰ U.S. Government Accountability Office. High-risk series: an update. [Publication No. GAO-09-271]; 2009. p. 22 – 4. Retrieved from <http://www.gao.gov/assets/290/284961.pdf>. U.S. Government Accountability Office. High-risk series: an update. [Publication No. GAO-15-290]; 2017. p. 425 – 9. See <http://www.gao.gov/assets/690/682765.pdf>.

⁴¹ Records on file with PFPI.

confidence that EPA will soon act to identify and protect the public from risks associated with drilling and fracking chemicals.

Other authorities have banned fracking due to the significant risks and uncertainties involved. As mentioned previously, in 2014, New York State banned high-volume hydraulic fracturing citing uncertainties about harms and how to prevent them. In 2016, Maryland Gov. Larry Hogan signed a ban on hydraulic fracturing passed by the state legislature, concluding “that possible environmental risks of fracking outweigh any potential benefit.”⁴² The Delaware River Basin Commission is wise to take similar action. Allowing high-volume fracking activities in the basin would amount to a huge gamble with people’s health.

The Commission Should Also Prohibit Wastewater Importation Into the Basin

The Commission has proposed to allow the treatment and discharge of fracking wastewater in the basin if it is treated at a centralized waste treatment facility (CWT) and meets other standards. Among the most important of these other requirements are that the project sponsor who wishes to treat and discharge the wastewater conduct an “analysis, characterization and quantification of all pollutants of concern” as defined in an EPA technical document. The sponsor must also show that “the acute and chronic toxicity of the waste, measured as Whole Effluent Toxicity (WET), have been evaluated.”⁴³

Based on the information we have presented previously about confidential chemicals and missing toxicity data, we are skeptical that operators could effectively meet these standards. Part of our concern is that wastewater is likely to contain confidential chemicals that may not appear in EPA’s technical document. Therefore, it seems possible that an operator could conduct an analysis of “all pollutants of concern” but fail to analyze confidential chemicals that are not listed in EPA’s document – chemicals that might be harmful. In its national study of fracking and drinking water, EPA concluded about centralized waste treatment facilities that “the effectiveness of treatment cannot be evaluated for constituents for which the wastewater has not been tested. This makes it challenging to know the degree to which effluent from a CWT is protective of public health.”⁴⁴ We are also skeptical that operators would be able to measure the acute and chronic toxicity of the waste when EPA has found toxicity values to be lacking for more than 1,400 chemicals found in fracking fluid or wastewater.

In its national study, EPA identified several additional concerns with centralized waste treatment facilities:

Historically, CWTs have not included processes to treat for constituents that are difficult to remove, such as the high concentrations of TDS found in wastewater from unconventional reservoirs. As a result, impacts on drinking water resources

⁴² Jon Hurdle. With governor’s signature, Maryland becomes third state to ban fracking. State Impact. See <https://stateimpact.npr.org/pennsylvania/2017/04/04/with-governors-signature-maryland-becomes-third-state-to-ban-fracking/>.

⁴³ Delaware River Basin Commission. Proposed New 18 CFR Part 440 – Hydraulic Fracturing in Shale and Other Formations, 440.1, 440.5(f).

⁴⁴ EPA Fracking & Drinking Water Study, at 8-34.

have included increased suspended solids and chloride concentrations downstream of discharging facilities that were accepting hydraulic fracturing wastewater...and elevated bromide concentrations and radium concentrations in CWT effluent...Even if wastewater could be effectively treated, EPA has found that “spills and leaks can occur in pits or impoundments associated with the storage of treated wastewater at CWTs...Wastewater being transported by truck or pipeline to and from a CWT can also present a vulnerability for spills or leaks...”⁴⁵

The EPA added that “even an efficient treatment process may not be able to reduce the concentrations of some constituents to levels that allow for discharge to a drinking water resource if influent concentrations are so high that they exceed the capabilities of the treatment technology(ies) to meet those discharge limits.”⁴⁶ The agency stated, too, that “relatively few studies describe the ability of individual treatment processes to remove constituents from hydraulic fracturing wastewater.”⁴⁷ In light of all the uncertainties and risks, the commissions should prohibit or place a moratorium on fracking wastewater importation and discharge.

The Commission Should Prohibit Water Withdrawals for Fracking

The commission has already expressed concern that water withdrawals for fracking “may adversely affect aquatic ecosystems and river channel and riparian resources downstream, including wetlands, and may diminish the quantity of water stored in an aquifer or a stream’s capacity to assimilate pollutants.” The commission continued: “Because HVHF operations may significantly increase the volume of water withdrawn in a localized area, they may ultimately upset the balance between the demand on water resources and the availability of those resources for uses protected by the Commission’s comprehensive plan, particularly during periods of low precipitation or drought.”⁴⁸ In addition, the EPA and Susquehanna River Basin Commission have found that 90 and 96 percent of the water used for hydraulic fracturing, respectively, is permanently removed from the water cycle. In contrast, the commission found that 90 percent of water withdrawn from the basin for domestic and commercial uses is returned to the basin. Therefore, water withdrawals for hydraulic fracturing are likely to have a particularly adverse effect on water quantity in the basin, especially during times of drought.

In addition, evidence shows that the amount of water used to fracture wells near the basin could be significantly higher than the highest nearby average per-well water use reported by the commission, 6.5 million gallons for wells drilled in the Susquehanna River Basin. Such higher water use would be consistent with the commission’s observation that “advances in horizontal drilling technology are leading to longer drill paths and the need

⁴⁵ Id.

⁴⁶ Id.

⁴⁷ Id.

⁴⁸ Delaware River Basin Commission. Proposed rule; notice of public hearing, at 6. See <http://www.state.nj.us/drbc/library/documents/HydraulicFracturing/RulemakingNotice113017.pdf>.

for more fracturing fluid volumes for each path.”⁴⁹ FracTracker analyzed FracFocus data and showed that the average water use for each unconventional well fractured in Pennsylvania in 2017 was 11.6 million gallons.⁵⁰ This figure may represent a significant increase in water consumption even over the course of a year or two. Data from a report in March 2016 by energy consulting firm IHS commissioned by the U.S. Energy Information Administration shows that drilling companies were using nearly 8.35 million gallons of water to fracture a typical well in an area of the Marcellus shale known as the “Super Core” located just west of the basin in Pennsylvania. Companies were using 3.7 million gallons in another nearby area known as the “Northeast Core.” In the “Periphery” area located across a swath of central Pennsylvania, drilling companies were fracturing typical wells with 10.19 million gallons of fluid, IHS found. And in areas of southwest Pennsylvania, drilling companies were using more than eight million gallons of water per well.⁵¹ These figures suggest that if drilling companies withdrew water from the basin for fracking, the withdrawals might be far greater than currently anticipated.

We understand that water withdrawals from the basin are discouraged, and that any proposed withdrawals would be carefully evaluated. However, the drilling industry’s demand for water is growing, and any withdrawals are likely to mean a permanent removal of water from a basin that 15 million people depend on for drinking water. The commission has identified risks to water quantity should such withdrawals occur. We therefore encourage the commission to prohibit or place a moratorium on such withdrawals.

Conclusion

For the stated reasons, we support the commission’s proposal to ban high-volume hydraulic fracturing and believe that the commission should prohibit or place a moratorium on fracking wastewater disposal and water withdrawals for fracking. We are happy to answer any questions that you might have and appreciate the opportunity to provide comments.

Sincerely,

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⁴⁹ Id.

⁵⁰ Data on file with FracTracker.

⁵¹ U.S. Energy Information Administration. Trends in U.S. Oil and Gas Upstream Costs (March 2016) (authored by IHS, commissioned by EIA), at 69, 71. See <https://www.eia.gov/analysis/studies/drilling/pdf/upstream.pdf>.



Written Comments by Partnership for Policy Integrity to the Delaware River Basin Commission
Concerning Special Regulations Regarding Natural Gas Development Activities
Submitted March 30, 2018

Thank you for the opportunity to provide comments on the Delaware River Basin Commission's proposed regulations that would prohibit high volume hydraulic fracturing in shale and other rock formations in the basin, set standards for the management in the basin of wastewater from fracking, and set standards for exports from the basin of freshwater for fracking.

Partnership for Policy Integrity is a nonprofit organization that focuses on energy and environmental policy. For the past three years, we have investigated the EPA's regulation of new chemicals used in drilling and fracking and published a major report about our findings in 2016 entitled *Toxic Secrets*.¹ This fall, *Marketplace* on NPR broadcast a two-part story on our investigation.² Also this fall, Elsevier published a textbook, *Environmental Issues Concerning Hydraulic Fracturing, Vol. 1*, that included a chapter on hydraulic fracturing chemical disclosure by our Senior Counsel, Dusty Horwitt.³ Horwitt has spent more than a decade researching oil and gas drilling and hydraulic fracturing. He has testified about drilling issues before several government bodies including four times before the New York City Council regarding the risks to the city's drinking water from high-volume hydraulic fracturing in the Delaware River Basin.

Based on our recent findings about the widespread use of secret and potentially harmful drilling and fracking chemicals, mounting evidence about additional risks, and significant data gaps, we support the Delaware River Basin Commission's proposal to prohibit high-volume hydraulic fracturing in the basin. Recent decisions and statements by New York State and the state of Maryland are consistent with this position. We also urge the commission to prohibit wastewater disposal, water withdrawals and other related activities. We are not convinced that the proposed protections for wastewater disposal or water withdrawals would be sufficient to protect drinking water quantity or quality in the basin.

The Delaware River Basin is a critically important watershed. Most significantly, it provides drinking water for more than 15 million people, including those who live in New York City and

¹ Dusty Horwitt. *Toxic Secrets*. Partnership for Policy Integrity. See http://www.pfpi.net/wpcontent/uploads/2016/04/PFPI_ToxicSecrets_4-7-2016.pdf.

² Scott Tong. Documents Show Undisclosed EPA Health Concerns on Fracking Chemicals. *Marketplace* (Nov. 14, 2017). See <https://www.marketplace.org/2017/11/14/world/documents-show-undisclosed-epa-health-concerns-fracking-chemicals-0>. Scott Tong. "The Public Has a Right to Know": Fracking Companies Don't Have to Disclose Chemicals Linked to Health Concerns." *Marketplace* (Nov. 15, 2017). See <https://www.marketplace.org/2017/11/15/sustainability/epas-legalized-suppression-fracking-chemical-secrets>.

³ Kevin A. Schug and Zachariah L. Hildenbrand. *Environmental Issues Concerning Hydraulic Fracturing, Vol. 1*. Accessed at <https://www.elsevier.com/books/environmental-issues-concerning-hydraulic-fracturing/schug/978-0-12-812802-2>.

Philadelphia.⁴ To be sure, extracting natural gas from the basin through high-volume fracking would likely generate tax revenue and a modest number of jobs. However, the costs of contaminated drinking water alone would likely outweigh these benefits, particularly if the water were difficult or impossible to clean up. The likelihood of such a catastrophic scenario is unknown, but the risk is too great considering the large number of highly toxic and unknown chemicals associated with drilling and fracking. Allowing high-volume hydraulic fracturing and related activities in the basin amounts to a huge gamble with one of our nation's major drinking water supplies.

Background

Hydraulic fracturing typically involves the underground injection into oil and gas wells at high pressure of a mixture of water, sand, and chemicals. The fluid fractures underground rock formations, liberating trapped oil and/or natural gas. High volume hydraulic fracturing as defined by the commission involves the use of a combined total of 300,000 gallons or more of water in all stages of well completion whether a well is vertical or horizontal.⁵ If allowed, fracking could occur in about 40 percent of the basin that is located in New York and Pennsylvania and sits above the Marcellus and Utica shales. As the commission notes, these formations are known to contain natural gas. West of the basin, drilling companies are extracting oil and natural gas from these formations using high-volume hydraulic fracturing, which combines directional (typically horizontal) drilling and hydraulic fracturing using large quantities of water. The commission states that it is unknown whether the Marcellus and Utica shales within the basin contain "commercially viable" natural gas.⁶ Because New York banned high-volume hydraulic fracturing (HVHF) in 2014 due to uncertainties about health impacts and whether such impacts could be reduced or prevented,⁷ drilling in these formations could currently occur only in Pennsylvania's portion of the basin, namely in Carbon, Lackawanna, Luzerne, Monroe, Pike, Schuylkill, Sullivan, and Wayne counties.⁸ The commission adds that "the South Newark basin formation, which underlies portions of Pennsylvania and New Jersey, may also contain oil and gas deposits capable of development by HVHF."⁹

⁴ Delaware River Basin Commission. Basic Information. See <http://www.state.nj.us/drbc/basin/>. Delaware River Basin Commission. Resolution directing the Executive Director to publish for public comment revised draft regulations regarding certain natural gas development activities in the Delaware River Basin (Sept. 11, 2017). Accessed at http://www.state.nj.us/drbc/library/documents/ResForMinutes_nat-gas_initiate-rulemkgDRAFT.pdf. City of Philadelphia. Drinking Water Treatment. See <http://www.phila.gov/water/wu/drinkingwater/treatment/Pages/default.aspx>.

⁵ Delaware River Basin Commission. Proposed new 18 CFR Part 440. See http://www.state.nj.us/drbc/meetings/proposed/notice_hydraulic-fracturing.html.

⁶ Delaware River Basin Commission. Proposed rule; notice of public hearing, at 4. See <http://www.state.nj.us/drbc/library/documents/HydraulicFracturing/RulemakingNotice113017.pdf>.

⁷ New York State Department of Health. A Public Health Review of High Volume Hydraulic Fracturing for Shale Gas Development (December 2014), at 2. See https://www.health.ny.gov/press/reports/docs/high_volume_hydraulic_fracturing.pdf.

⁸ Delaware River Basin Commission. Extent of Marcellus Shale Formation in the Delaware River Basin. See <http://www.state.nj.us/drbc/library/documents/maps/MarcellusShaleDRB.pdf>.

⁹ Id.

The Commission’s Ban on High-Volume Hydraulic Fracturing is Justified – and There is an Even Stronger Case to be Made

The commission makes a compelling case for banning high volume hydraulic fracturing in the basin. Among the reasons provided include the need to acquire large amounts of water for fracturing – 6.5 million gallons per well or more – most of which will be injected underground and not returned to the basin’s usable ground or surface water. Such consumptive use of water may adversely affect water quantity, “particularly during periods of low precipitation or drought.”¹⁰ The commission cited the potential for spills of chemicals added to fracturing fluid and noted that some of the chemicals’ identities are withheld from the public by drilling companies as confidential business information. Such spills can contaminate surface and ground water.¹¹ Cracks in wells’ protective steel casing or cement create a risk that gas or fluids inside the well can leech into nearby ground- and surface water.¹² Disposal of significant quantities of wastewater creates more contamination risks because scientists have found high levels of total dissolved solids and toxic substances in wastewater from the Marcellus shale including carcinogenic benzene and radium.¹³ “Because produced water contains high TDS and dissolved inorganic constituents that most publicly owned treatment works and other municipal wastewater treatment facilities are not designed to remove,” the commission wrote, “these constituents can be discharged from such facilities; can disrupt treatment processes, for example by inhibiting biological treatment, can accumulate in biosolids (sewage sludge), limiting their beneficial use; and can facilitate the formation of harmful disinfection byproducts.” The commission noted that EPA finalized a rule in 2016 that would prohibit publicly owned treatment works from receiving untreated wastewater from “unconventional” formations such as the Marcellus and Utica shales. However, the commission notes that the rule does not extend to commercially owned treatment works that could treat wastewater from the shale formations nor does it extend to discharge of wastewater to publicly owned treatment works after the wastewater has been partially treated at centralized waste treatment facilities.¹⁴ On top of these risks, the commission cites many uncertainties about the impact of hydraulic fracturing on drinking water identified in major reports by the U.S. Environmental Protection Agency and the State of New York.¹⁵

Partnership for Policy Integrity believes that the case for a ban on fracking in the basin is even stronger based in part on the extensive use of confidential chemicals in drilling and fracking, some of which may be harmful to human health. The commission notes that regarding chemical identities, “in *some cases*, chemical information is considered Confidential Business information and not disclosed by the fracturing operator (*italics added*).”¹⁶ However, the use of confidential chemicals is extensive. Drilling companies are required by many oil and gas producing states, including Pennsylvania, to publicly disclose chemicals used in hydraulic fracturing. Most or all of these states allow companies to withhold chemical identities as confidential. Drilling

¹⁰ Id. at 6-7.

¹¹ Id. at 7-8.

¹² Id. at 8.

¹³ Id. at 9.

¹⁴ Id. at 9-10.

¹⁵ Id. at 11.

¹⁶ Id. at 7.

companies are required to make many of these disclosures available to the public through FracFocus, a nongovernmental organization that is the nation's largest repository for well-by-well hydraulic fracturing chemical disclosure data. For example, Pennsylvania requires fracking chemical disclosures to be made to FracFocus for unconventional wells, the type that would be drilled in the Delaware River Basin if high-volume hydraulic fracturing were allowed.¹⁷ EPA analyzed more than 39,000 FracFocus disclosures made between 2011 and 2013 and found that operators withheld the identities of 11 percent of the chemicals disclosed and at least one chemical identity on more than 70 percent of well-by-well disclosures.¹⁸ In a study published in 2015, two Harvard researchers analyzed FracFocus disclosures made between 2013 and 2015 for more than 53,000 wells and found that well operators withheld 16.5 percent of all the Chemical Abstracts Service numbers submitted and withheld at least one chemical identity on 92.3 percent of the well-by-well disclosures.¹⁹ Chemical Abstracts Service numbers, or CAS numbers, are considered the most precise way to identify chemicals because each chemical has only one, whereas chemicals can have multiple names or trade names.²⁰

Pennsylvania-based FracTracker Alliance recently found similar results when the organization worked with Partnership for Policy Integrity to analyze data from FracFocus for Pennsylvania. The data showed that between 2013 and 2017, hydraulic fracturing injections for 3,702 of 4,525 wells reported to FracFocus from Pennsylvania or almost 82 percent, contained at least one confidential chemical. Drilling companies injected a total of 19,306 confidential chemicals in the 3,702 wells or an average of about five confidential chemicals per well. Some wells received injections of far more confidential chemicals. In Susquehanna County, directly adjacent to the Delaware River Basin, drilling companies injected 16 confidential chemicals per well into three different wells and injected 14 confidential chemicals per well into at least two additional wells. In total, drilling companies injected 3,703 confidential chemicals into 649 wells in Susquehanna County, the second highest county-wide totals in the state.²¹ FracTracker found that more than 99 percent of the wells for which fracking chemical disclosure information was reported to FracFocus from Pennsylvania were unconventional wells, according to a comparison between API numbers reported to FracFocus and those reported to the Pennsylvania Department of Environmental Protection.²² API numbers are unique numeric identifiers assigned to each well

¹⁷ Dusty Horwitt. Hydraulic Fracturing Chemical Disclosure: Can the Public Know What's Going into Oil and Natural Gas Wells? *Environmental Issues Concerning Hydraulic Fracturing*, Vol. 1, (Kevin A. Schug and Zacariah Hildenbrand eds., 2017), at 76-98.

¹⁸ U.S. Environmental Protection Agency. Hydraulic fracturing for oil and gas: impacts from the hydraulic fracturing water cycle on drinking water resources in the United States. Washington, DC: Office of Research and Development; 2016. EPA Report # 600/R-16/236F, at 5-20. See <https://www.epa.gov/hfstudy>. See, e.g., U.S. Environmental Protection Agency. Focus report for chemical number P-06-0676. Washington, DC: New Chemicals Program; 2006. [Hereinafter EPA Fracking & Drinking Water Study.]

¹⁹ Konschnik K, Dayalu A. Hydraulic fracturing chemicals reporting: analysis of available data and recommendations for policymakers. *Energy Policy* 2016; 88 :504 – 14.

²⁰ FracFocus. What chemicals are used. See <http://fracfocus.org/chemical-use/what-chemicals-are-used>; 2017.

²¹ Only Washington County had more wells drilled using at least one confidential chemical and more confidential chemicals injected.

²² FracTracker's analysis is on file with Partnership for Policy Integrity.

by the American Petroleum Institute.²³ These figures suggest that if high-volume hydraulic fracturing were allowed in the Delaware River Basin, drilling companies would extensively use confidential chemicals including multiple confidential chemicals per well.

It is unacceptable to expose drinking water for 15 million people to such unknown chemicals, especially when EPA has found that fracking chemicals are involved in six of seven steps in the hydraulic fracturing process that EPA concluded are “more likely than others to result in more frequent or more severe impacts” to drinking water.²⁴ These steps include:

- Spills during the management of hydraulic fracturing fluids and chemicals or produced water that result in large volumes or high concentrations of chemicals reaching groundwater resources;
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In 10-K forms required to be filed with the U.S. Securities and Exchange Commission, drilling companies have disclosed to investors that releases of fluids and water contamination are among the most serious risks facing their businesses. “Oil and natural gas operations are subject to many risks, including well blowouts, cratering, explosions,

²³ West Virginia Department of Environmental Protection. API number explanation (2017). See <http://www.dep.wv.gov/oil-and-gas/GI/Documents/API%20Number%20Explanation.pdf>.

²⁴ EPA Fracking & Drinking Water Study, at ES-3.

²⁵ Id.

²⁶ Id. at 8-11.

²⁷ U.S. Environmental Protection Agency. Hydraulic fracturing for oil and gas: impacts from the hydraulic fracturing water cycle on drinking water resources in the United States. Washington, DC: Office of Research and Development; 2016, at 10-25. EPA Report # 600/R-16/236F. See <https://www.epa.gov/hfstudy>.

pipe failures, fires, formations with abnormal pressures, uncontrollable flows of oil, natural gas, *brine or well fluids*, oil spills, severe weather, natural disasters, *groundwater contamination* and other environmental hazards and risks (italics added),” Oklahoma City-based Chesapeake Energy Corp. recently reported in its 10-K form.²⁸ “Natural gas, NGLs [natural gas liquids] and oil operations are subject to many risks, including...uncontrollable flows of oil, natural gas or *well fluids*, fires, pipe or cement failures, pipeline ruptures or spills, vandalism, pollution, releases of toxic gases, adverse weather conditions or natural disasters, and other environmental hazards and risks (italics added),” Fort Worth, Texas-based Range Resources Corp. wrote in its 10-K form.”²⁹ Chesapeake noted that its insurance “may not be adequate to cover all losses or exposure to liability” from environmental damages³⁰ while Range commented that the company “may not be fully covered” by insurance for such damages.³¹ These disclosures offer additional evidence that chemicals from hydraulic fracturing would expose the basin to serious pollution and that taxpayers may be largely responsible for cleanup costs.

Other information from the EPA suggests that fracking chemicals are likely to be harmful. Through a Freedom of Information Act request, PFPI has conducted a four-year investigation of EPA’s health and environmental assessments of new chemicals proposed for use in drilling and fracking under the Toxic Substances Control Act. In 2016, we published some of our conclusions in *Toxic Secrets* referenced above and have continued to receive documents from EPA that raise concerns about human health risks.³² EPA records show that between 2003 and 2014, the agency reviewed 126 new drilling and fracking chemicals. EPA identified health concerns for 109 of the chemicals. The agency approved 62 of the chemicals for commercial use that evidence shows or suggests were later used commercially in oil and gas wells despite concerns that the chemicals might harm human health. The agency’s health concerns ranged from “irritation to the eye, skin, and mucous membranes”³³ to kidney toxicity,³⁴ liver toxicity,³⁵ neurotoxicity, and developmental toxicity.³⁶ Chemical manufacturers invoked confidentiality claims (allowed under federal law) for 41 of the 62 chemicals that shielded from the public (but not from EPA) the chemicals’ specific identities. Using the available data about these chemicals, PFPI searched FracFocus and the other leading fracking chemical disclosure database maintained by the state of California. PFPI was able to document only two of the 41 chemicals as being used in specific oil and gas wells. It is possible that some of these chemicals were used in wells

²⁸ Chesapeake Energy Corp. Form 10-K filed with the U.S. Securities and Exchange Commission (Feb. 22, 2018), at 30.

²⁹ Range Resources Corp. Form 10-K filed with the U.S. Securities and Exchange Commission (Feb. 28, 2018), at 34.

³⁰ Chesapeake Energy Corp. Form 10-K filed with the U.S. Securities and Exchange Commission (Feb. 22, 2018), at 21.

³¹ Range Resources Corp. Form 10-K filed with the U.S. Securities and Exchange Commission (Feb. 28, 2018), at 34.

³² Partnership for Policy Integrity. *Toxic Secrets* (April 7, 2016). See http://www.pfpi.net/wpcontent/uploads/2016/04/PFPI_ToxicSecrets_4-7-2016.pdf.

³³ See, e.g., EPA record number L-14-0273, FOCUS Report (April 30, 2014).

³⁴ See, e.g., EPA record number P-13-0369, SAT Report (Aug. 19, 2014) at 2.

³⁵ See, e.g., EPA record number P-12-0072, FOCUS Report (Dec. 15, 2011) at 2.

³⁶ See, e.g., EPA Record number P-10-0050, SAT Report (Nov. 26, 2014) at 2.

in Pennsylvania and could be used in wells in the Delaware River Basin. However, it is impossible to know whether the same chemicals declared confidential at the state level in FracFocus are the same chemicals declared confidential at the federal level during EPA’s review process. In November 2017, a group of more than 100 first responders, health professionals and scientists wrote to EPA requesting that the agency reveal the chemical identities of the 41 chemicals referenced above. The Toxic Substances Control Act requires that confidential chemical identities “shall be disclosed if the Administrator determines that disclosure is necessary to protect health or the environment against an unreasonable risk of injury to health or the environment.” As of this week, EPA had not responded to the request beyond an acknowledgment that it was received.³⁷

Another major problem facing regulators and citizens concerning drilling and fracking chemicals is that the chemicals’ toxicities are often unknown. In its national study of fracking and drinking water, EPA identified 1,606 chemicals in fracking fluid or drilling wastewater including 1,084 identified in fracking fluid and 599 identified in wastewater. Yet only 173 of the chemicals had toxicity values from sources that met EPA’s standards for conducting risk assessments. “This missing information represents a significant data gap that makes it difficult to fully understand the severity of potential impacts on drinking water resources,” the agency wrote. For the 173 chemicals that had significant toxicity data, EPA found that “health effects associated with chronic oral exposure to these chemicals include carcinogenicity, neurotoxicity, immune system effects, changes in body weight, changes in blood chemistry, liver and kidney toxicity, and reproductive and developmental toxicity.”³⁸

EPA did not mention that the agency’s own failure to request health testing for new chemicals proposed for oil and gas drilling and regulated by EPA contributed to the lack of information about chemical risks.³⁹ From 2009 and 2017, the GAO consistently included EPA’s chemical review program on a list of federal government programs at highest risk of waste, fraud, abuse, and mismanagement partly because of the lack of health testing data used to regulate chemicals. The GAO issues the list every two years at the beginning of each new Congress.⁴⁰ In our investigation of EPA’s regulation of new chemicals proposed for use in drilling and fracking, we found that manufacturers said they submitted health testing data for only 21 of 126 chemicals and in only six of those cases were the data clearly available in the public record. EPA asked for health testing data for only 10 chemicals, and in only five of those cases were the data present in the public record and relevant to the agency’s health concerns.⁴¹ This record gives us little

³⁷ Electronic communication with Dr. Kathleen Nolan, a signer of the letter who submitted it to EPA (Mar. 27, 2018).

³⁸ U.S. Environmental Protection Agency. Hydraulic fracturing for oil and gas: impacts from the hydraulic fracturing water cycle on drinking water resources in the United States. Washington, DC: Office of Research and Development; 2016, at ES-45 to ES-46 and 9-1. EPA Report # 600/R-16/236F. See <https://www.epa.gov/hfstudy>.

³⁹ Dusty Horwitt, Environmental Issues Concerning Hydraulic Fracturing, Volume 1 (Kevin A. Schug and Zachariah L. Hildenbrand, eds.), at 101 (2017).

⁴⁰ U.S. Government Accountability Office. High-risk series: an update. [Publication No. GAO-09-271]; 2009. p. 22 – 4. Retrieved from <http://www.gao.gov/assets/290/284961.pdf>. U.S. Government Accountability Office. High-risk series: an update. [Publication No. GAO-15-290]; 2017. p. 425 – 9. See <http://www.gao.gov/assets/690/682765.pdf>.

⁴¹ Records on file with PFPI.

confidence that EPA will soon act to identify and protect the public from risks associated with drilling and fracking chemicals.

Other authorities have banned fracking due to the significant risks and uncertainties involved. As mentioned previously, in 2014, New York State banned high-volume hydraulic fracturing citing uncertainties about harms and how to prevent them. In 2016, Maryland Gov. Larry Hogan signed a ban on hydraulic fracturing passed by the state legislature, concluding “that possible environmental risks of fracking outweigh any potential benefit.”⁴² The Delaware River Basin Commission is wise to take similar action. Allowing high-volume fracking activities in the basin would amount to a huge gamble with people’s health.

The Commission Should Also Prohibit Wastewater Importation Into the Basin

The Commission has proposed to allow the treatment and discharge of fracking wastewater in the basin if it is treated at a centralized waste treatment facility (CWT) and meets other standards. Among the most important of these other requirements are that the project sponsor who wishes to treat and discharge the wastewater conduct an “analysis, characterization and quantification of all pollutants of concern” as defined in an EPA technical document. The sponsor must also show that “the acute and chronic toxicity of the waste, measured as Whole Effluent Toxicity (WET), have been evaluated.”⁴³

Based on the information we have presented previously about confidential chemicals and missing toxicity data, we are skeptical that operators could effectively meet these standards. Part of our concern is that wastewater is likely to contain confidential chemicals that may not appear in EPA’s technical document. Therefore, it seems possible that an operator could conduct an analysis of “all pollutants of concern” but fail to analyze confidential chemicals that are not listed in EPA’s document – chemicals that might be harmful. In its national study of fracking and drinking water, EPA concluded about centralized waste treatment facilities that “the effectiveness of treatment cannot be evaluated for constituents for which the wastewater has not been tested. This makes it challenging to know the degree to which effluent from a CWT is protective of public health.”⁴⁴ We are also skeptical that operators would be able to measure the acute and chronic toxicity of the waste when EPA has found toxicity values to be lacking for more than 1,400 chemicals found in fracking fluid or wastewater.

In its national study, EPA identified several additional concerns with centralized waste treatment facilities:

Historically, CWTs have not included processes to treat for constituents that are difficult to remove, such as the high concentrations of TDS found in wastewater from unconventional reservoirs. As a result, impacts on drinking water resources

⁴² Jon Hurdle. With governor’s signature, Maryland becomes third state to ban fracking. State Impact. See <https://stateimpact.npr.org/pennsylvania/2017/04/04/with-governors-signature-maryland-becomes-third-state-to-ban-fracking/>.

⁴³ Delaware River Basin Commission. Proposed New 18 CFR Part 440 – Hydraulic Fracturing in Shale and Other Formations, 440.1, 440.5(f).

⁴⁴ EPA Fracking & Drinking Water Study, at 8-34.

have included increased suspended solids and chloride concentrations downstream of discharging facilities that were accepting hydraulic fracturing wastewater...and elevated bromide concentrations and radium concentrations in CWT effluent...Even if wastewater could be effectively treated, EPA has found that “spills and leaks can occur in pits or impoundments associated with the storage of treated wastewater at CWTs...Wastewater being transported by truck or pipeline to and from a CWT can also present a vulnerability for spills or leaks...”⁴⁵

The EPA added that “even an efficient treatment process may not be able to reduce the concentrations of some constituents to levels that allow for discharge to a drinking water resource if influent concentrations are so high that they exceed the capabilities of the treatment technology(ies) to meet those discharge limits.”⁴⁶ The agency stated, too, that “relatively few studies describe the ability of individual treatment processes to remove constituents from hydraulic fracturing wastewater.”⁴⁷ In light of all the uncertainties and risks, the commissions should prohibit or place a moratorium on fracking wastewater importation and discharge.

The Commission Should Prohibit Water Withdrawals for Fracking

The commission has already expressed concern that water withdrawals for fracking “may adversely affect aquatic ecosystems and river channel and riparian resources downstream, including wetlands, and may diminish the quantity of water stored in an aquifer or a stream’s capacity to assimilate pollutants.” The commission continued: “Because HVHF operations may significantly increase the volume of water withdrawn in a localized area, they may ultimately upset the balance between the demand on water resources and the availability of those resources for uses protected by the Commission’s comprehensive plan, particularly during periods of low precipitation or drought.”⁴⁸ In addition, the EPA and Susquehanna River Basin Commission have found that 90 and 96 percent of the water used for hydraulic fracturing, respectively, is permanently removed from the water cycle. In contrast, the commission found that 90 percent of water withdrawn from the basin for domestic and commercial uses is returned to the basin. Therefore, water withdrawals for hydraulic fracturing are likely to have a particularly adverse effect on water quantity in the basin, especially during times of drought.

In addition, evidence shows that the amount of water used to fracture wells near the basin could be significantly higher than the highest nearby average per-well water use reported by the commission, 6.5 million gallons for wells drilled in the Susquehanna River Basin. Such higher water use would be consistent with the commission’s observation that “advances in horizontal drilling technology are leading to longer drill paths and the need

⁴⁵ Id.

⁴⁶ Id.

⁴⁷ Id.

⁴⁸ Delaware River Basin Commission. Proposed rule; notice of public hearing, at 6. See <http://www.state.nj.us/drbc/library/documents/HydraulicFracturing/RulemakingNotice113017.pdf>.

for more fracturing fluid volumes for each path.”⁴⁹ FracTracker analyzed FracFocus data and showed that the average water use for each unconventional well fractured in Pennsylvania in 2017 was 11.6 million gallons.⁵⁰ This figure may represent a significant increase in water consumption even over the course of a year or two. Data from a report in March 2016 by IHS Global Inc. commissioned by the U.S. Energy Information Administration shows that drilling companies were using nearly 8.35 million gallons of water to fracture a typical well in an area of the Marcellus shale known as the “Super Core” located just west of the basin in Pennsylvania. Companies were using 3.7 million gallons in another nearby area known as the “Northeast Core.” In the “Periphery” area located across a swath of central Pennsylvania, drilling companies were fracturing typical wells with 10.19 million gallons of fluid, IHS found. And in areas of southwest Pennsylvania, drilling companies were using more than eight million gallons of water per well.⁵¹ These figures suggest that if drilling companies withdrew water from the basin for fracking, the withdrawals might be far greater than currently anticipated.

We understand that water withdrawals from the basin are discouraged, and that any proposed withdrawals would be carefully evaluated. However, the drilling industry’s demand for water is growing, and any withdrawals are likely to mean a permanent removal of water from a basin that 15 million people depend on for drinking water. The commission has identified risks to water quantity should such withdrawals occur. We therefore encourage the commission to prohibit or place a moratorium on such withdrawals.

Conclusion

For the stated reasons, we support the commission’s proposal to ban high-volume hydraulic fracturing and believe that the commission should prohibit or place a moratorium on fracking wastewater disposal and water withdrawals for fracking. We are happy to answer any questions that you might have and appreciate the opportunity to provide comments.

Sincerely,

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⁴⁹ Id.

⁵⁰ Data on file with FracTracker.

⁵¹ U.S. Energy Information Administration. Trends in U.S. Oil and Gas Upstream Costs (March 2016) (authored by IHS, commissioned by EIA), at 69, 71. See <https://www.eia.gov/analysis/studies/drilling/pdf/upstream.pdf>.