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## **Hydraulic Fracturing and Drinking Water Contamination**

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The question of underground drinking water contamination from hydraulic fracturing is a settled issue; *hydraulic fracturing has not caused underground drinking water contamination*. However, professional environmental organizations – notably the Natural Resources Defense Council (NRDC) and the Sierra Club – continue to allege that fracturing not only poses a serious risk of contamination, but that the process has been linked to such contamination on numerous occasions. This is not based on scientific evidence (as the following examples will attest), but rather as one particular tool in a broader agenda to reduce or eliminate the development and use of oil and natural gas.

Fracturing is a temporary part of oil and natural gas development that has been effectively controlled by state-based well construction and completion regulations for decades. The following are but a handful of comments from a variety of experts, regulators, and analyses of hydraulic fracturing that speak directly to the question of whether the process contaminates drinking water aquifers:

More than 25 scientific, peer-reviewed studies conclude hydraulic fracturing does not pose a major risk of groundwater pollution. The following is a list of major scientific studies and expert assessments that confirm fracking is not an major threat to drinking water.

- **The Academy of Medicine, Engineering and Science of Texas (TAMEST) (2017):** Fracking Has Not Contaminated Groundwater in Texas.
  - *“Direct migration of contaminants from targeted injection zones is highly unlikely to lead to contamination of potential drinking water aquifers.” (p. 128)*
  - *“In a study of 211 ground water contamination incidents in Texas associated with oil and gas activity (Kell, 2011) only 10 incidents were associated with well*

*drilling and completion and none were associated with stimulation (hydraulic fracturing).” (p. 123)*

- **United States Geological Survey (USGS)** (2017): Unconventional oil and gas production not affecting drinking water quality.
  - *“UOG [unconventional oil and gas] operations did not contribute substantial amounts of methane or benzene to the sample drinking-water wells.” (p. 6)*
- **Duke University**, funded by Natural Resources Defense Council (NRDC) (2017): Groundwater not affected by fracking in West Virginia.
  - *“Based on consistent evidence from comprehensive testing, we found no indication of groundwater contamination over the three-year course of our study.”*
- **University of Cincinnati** (2016): Water quality not impacted by fracking or natural gas drilling in Ohio.
  - *“All the samples fell within the clean water range and they did not find any changes over time either in any of our homes during the time series of fracking. We never saw a significant increase in methane concentration after (the) fracking well was drilled. There was no significant change in methane concentration over time, even as more and more natural gas wells were drilled in the area.”*
  - *“We found no positive relationship between CH<sub>4</sub> concentration in groundwater and proximity to active gas well sites, and we found no significant change in CH<sub>4</sub> concentration, isotopic composition of CH<sub>4</sub>, pH, or conductivity in water wells during the study period.” (Study abstract)*
- **German Federal Institute for Geosciences and Natural Resources** (2016): No threat of fracking contaminating water in North German Basin.
  - *“We found that the injected fluids did not move upwards into layers carrying drinking water.”*
- **University of Texas-Austin** (2016): Groundwater not affected by fracking in Parker County, Texas.
  - *“All elements of the study point to natural methane contamination in the Parker-Hood cluster.” (p. vii)*
  - *“Overall the source of the dissolved methane is likely natural sourced from shallow natural gas accumulations in the Barnett Shale, lignite beds associated with a fault in the Haynesville shale, and lignite and degradation of oil and deep organic matter associated with a fractured zone in the Eagle Ford Shale. The*

*Delaware Basin samples show no dissolved methane other than associated to a recent blowout.” (p. iii)*

- **Syracuse University** (2016): No evidence of fracking harming groundwater in Appalachian Basin.
  - *“Without a proper understanding of preexisting methane occurrence in groundwater, investigations may incorrectly conclude that unconventional hydrocarbon development and production has altered shallow groundwater quality when it has not (i.e. a false positive).” (p. 2)*
- **Wyoming Department of Environmental Quality** (2016): Groundwater not affected by fracking in Pavillion, Wyo.
  - *“Evidence does not indicate that hydraulic fracturing fluids have risen to shallow depths intersected by water-supply wells. Also, based on an evaluation of hydraulic fracturing history, and methods used in the Pavillion Gas Field, it is unlikely that hydraulic fracturing has caused any impacts to the water-supply wells.”*
- **Susquehanna River Basin Commission** (2016): Fracking has not polluted water supplies in the Susquehanna River Basin.
  - *“To date, the Commission’s monitoring programs have not detected discernible impacts on the quality of the Basin’s water resources as a result of natural gas development, but continued vigilance is warranted.” (p. 8)*
- **Proceedings of the National Academy of Sciences, Yale University** (2015): Fracking has not contaminated drinking water in the Marcellus Shale.
  - *“There was no evidence of association with deeper brines or long-range migration of these compounds to the shallow aquifers. Encouragingly, drinking water sources affected by disclosed surface spills could be targeted for treatment and monitoring to protect public health.” (p. 5)*
  - *“We have found no evidence for direct communication with shallow drinking water wells due to upward migration from shale horizons. This result is encouraging, because it implies there is some degree of temporal and spatial separation between injected fluids and drinking water supply.” (p. 5)*
- **U.S. Environmental Protection Agency** (2015): No evidence of widespread water contamination from fracking.
  - *“[H]ydraulic fracturing activities have not led to widespread, systematic impacts to drinking water resources.”*

- **U.S. District Court, Wyoming** (2015): Experts have confirmed no water contamination from fracking.
  - *“[E]xperts and government regulators have repeatedly acknowledged a lack of evidence linking the hydraulic fracturing process to groundwater contamination.” (p. 26)*
- **Syracuse University** (2015): No evidence of fracking contaminating groundwater in heavily drilled areas of Pennsylvania, West Virginia, and Ohio.
  - *“We see no broad changes in variability of chemical quality in this large dataset to suggest any unusual salinization caused by possible release of produced waters from oil and gas operations, even after thousands of gas wells have been drilled among tens of thousands of domestic wells within the two areas studied.”*
- **California Council on Science & Technology** (2015): Fracking has not caused groundwater contamination in California.
  - *“We found no documented instances of hydraulic fracturing or acid stimulations directly causing groundwater contamination in California.” (p. 52)*
  - *“The study found no releases of hazardous hydraulic fracturing chemicals to surface waters in California and no direct impacts to fish or wildlife.” (p. 35)*
- **Stanford University** (2015): No evidence of fracking fluids leaking up into drinking water aquifers.
  - *“Using innovative techniques such as isotopic ‘tracer’ compounds that distinguish the source of chemicals in well water, Jackson has not found evidence that frack water contaminants seep upward to drinking-water aquifers from deep underground.”*
- **U.S. Department of Energy, National Energy Technology Laboratory** (2014): No evidence of gas or brine migration from hydraulic fracturing in Marcellus Shale.
  - *“Current findings are: 1) no evidence of gas migration from the Marcellus Shale; and 2) no evidence of brine migration from the Marcellus Shale.” (p. 2)*
  - *“Conclusions of this study are: 1) the impact of hydraulic fracturing on the rock mass did not extend to the Upper Devonian/Lower Mississippian gas field; and 2) there has been no detectable migration of gas or aqueous fluids to the Upper Devonian/Lower Mississippian gas field during the monitored period after hydraulic fracturing.” (p. 2)*
- **U.S. Geological Survey** (2014): No water contamination from fracking in West Virginia.

- *“The comparison of groundwater data from this study with historical data found no significant difference for any of the constituents examined and therefore warrant no further discussion.” (p. 47)*
- **Duke University, U.S. Geological Survey** (2013): Fracking had no effect on groundwater wells in Arkansas.
  - *“Although preproduction water-quality data were lacking for the wells sampled for this study, geochemical data presented a well-defined pattern of geochemical evolution based on natural rock-water and microbially mediated processes, strongly suggesting that the resulting water quality is derived from these natural processes with no effects from gas-production activities.” (p. 28)*
- **Gradient** (2013): There is “no scientific basis” for the claim that fracking fluids will contaminate water aquifers.
  - *“Overall, there is no scientific basis for significant upward migration of HF fluid or brine from formations in sedimentary basins. Even if upward migration from a target formation to potable aquifer were hypothetically possible, the rate of migration would be extremely slow and the resulting dilution of the fluids would be very large...Given the overall implausibility and very high dilution factor, this exposure pathway does not pose a threat to drinking water resources.” (p. ES-4)*
- **University of Michigan – Technology Report** (2013): Water contamination from fracking has never “reliably” been shown to have occurred.
  - *“The often-postulated percolation upward of fracking water used in deep, long lateral well extensions to contaminate drinking water aquifers near the surface through the intervening impermeable rock formations is highly unlikely and has never reliably been shown to have occurred.” (p. 13)*
- **National Groundwater Association** (2013): Fracking not affecting groundwater in northeastern Pennsylvania.
  - *“[T]hese findings suggest that the methane concentrations in Susquehanna County water wells can be explained without the migration of Marcellus shale gas through fractures, an observation that has important implications for understanding the nature of risks associated with shale-gas extraction.”*
  - *“Our evaluation of 1701 groundwater quality analyses shows that methane is common in Susquehanna county water wells and is best correlated with topography and groundwater geochemistry, rather than shale-gas extraction activities.” (p. 15)*

- **Cardno Entrix** (2012): Fracking has not caused groundwater contamination in Los Angeles.
  - *“Routine tests by the water purveyor show the community’s water supply meets drinking water standards, including the period of high-rate gravel packs and conventional hydraulic fracturing, as well as the first high-volume hydraulic fracture in September 2011... Before-and-after monitoring of groundwater quality in monitor wells did not show impacts from high-volume hydraulic fracturing and high-rate gravel packing.” (p. 3)*
- **U.S. Government Accountability Office** (2012): The fracking process has not been identified as a cause of groundwater contamination.
  - *“[R]egulatory officials we met with from eight states – Arkansas, Colorado, Louisiana, North Dakota, Ohio, Oklahoma, Pennsylvania, and Texas – told us that, based on state investigations, the hydraulic fracturing process has not been identified as a cause of groundwater contamination within their states.” (p. 49)*
- **Ground Water Protection Council** (2011): Texas and Ohio have never had a documented occurrence of fracking contaminating groundwater.
  - *“Neither state [Ohio and Texas] has documented a single occurrence of groundwater pollution during the site preparation or well stimulation phase of operations.” (p. 3)*
  - *“In recent years, the national debate on natural gas E&P has been focused nearly exclusively on a single, brief, yet essential activity, hydraulic fracturing. Neither state has identified hydraulic fracturing as the cause of a single documented groundwater contamination incident.” (p. 102)*
- **The Center for Rural Pennsylvania** (2011): Gas drilling in the Marcellus Shale has not contaminated nearby water wells.
  - *“In this study, statistical analyses of post-drilling versus pre-drilling water chemistry did not suggest major influences from gas well drilling or hydrofracturing (fracking) on nearby water wells, when considering changes in potential pollutants that are most prominent in drilling waste fluids.” (p. 4)*
- **New York State Department of Environmental Conservation Revised Draft Supplemental Generic Environmental Impact Statement** (2011): Groundwater contamination has not occurred as a result of hydraulic fracturing.
  - *“A supporting study for this dSGEIS concludes that it is highly unlikely that groundwater contamination would occur by fluids escaping from the wellbore for hydraulic fracturing. The 2009 dSGEIS further observes that regulatory officials*

*from 15 states recently testified that groundwater contamination as a result of the hydraulic fracturing process in the tight formation itself has not occurred.” (p. 11)*

- **Massachusetts Institute of Technology (2010):** Risk of water contamination is low due to distance between groundwater and where fracking occurs.
  - *“The protection of freshwater aquifers from fracture fluids has been a primary objective of oil and gas field regulation for many years. As indicated in Table 2.2, there is substantial vertical separation between the freshwater aquifers and the fracture zones in the major shale plays. The shallow layers are protected from injected fluid by a number of layers of casing and cement — and as a practical matter fracturing operations cannot proceed if these layers of protection are not fully functional. Good oil-field practice and existing legislation should be sufficient to manage this risk.” (p. 15)*

Faced with this overwhelming body of analysis, why do the NRDC and Sierra Club continue to target fracturing? Put simply, hydraulic fracturing – and especially its abbreviated version, “fracking” – sounds scary. The NRDC and the Sierra Club use the term to describe the entire oil and natural gas industry, even segments and processes that have nothing to do with the fracturing process – including but not limited to pipelines, compressor stations, and even facilities processing liquefied natural gas (LNG) exports. It was instructive that, when pressed for concrete evidence during a U.S. Senate roundtable discussion on May 23, 2013, neither representative from NRDC nor the Sierra Club could identify any specific example of hydraulic fracturing contaminating drinking water aquifers.

In summary, a consensus of regulatory and scientific opinion contradicts claims that hydraulic fracturing has contaminated or poses a serious risk of contaminating underground drinking water supplies.

### **Regulatory “Failure” and Federal Standards**

Another common assertion about oil and natural gas development is that it is under-regulated or even unregulated – particularly by federal environmental law. These are false assertions, and yet, thanks to organizations spending millions of dollars across the country to promote such a message, the effort has resulted in anxiety in communities throughout the nation. Examination of the issues, however, demonstrates its mendacity.

There are two specific themes within this assertion. The first alleges incidents of harm, attributable to supposed regulatory failure. The second asserts a failure of federal action.

Turning to the first assertion, it hinges on two factors – first, that all instances of damage are true and that they result from fracturing; and second, that a single incident is an

indication of inadequate regulation. During the U.S. Senate round table on May 23, 2013, the Sierra Club tried to use the Dimock, Pa., ground water example to trick the Committee into believing the incident was related to fracturing. It is an outdated and easily refuted claim, based upon a comprehensive review by none other than the U.S. EPA.

In July 2012, the EPA concluded its third and final round of water sampling in Dimock. From the Agency's release:

"Based on the outcome of that sampling, EPA has determined that there are not levels of contaminants present that would require additional action by the Agency."

E&E News also covered EPA's test results, in a story dated July 26, 2012:

"U.S. EPA yesterday ended the latest chapter in the turbulent drilling dispute in Dimock, Pa., finding that contaminant levels in its water show no health threat and no connection to hydraulic fracturing chemicals."

Mischaracterizing incidents involving oil and natural gas production is a regular practice of the NRDC and Sierra Club. What follows is a list of examples and allegations that organizations opposed to or critical of hydraulic fracturing have leveraged, but which similarly have been shown to be false:

**Arkansas:** *In 2008, Charlene Parish of Bee Branch reported contamination of drinking water during hydraulic fracturing of a nearby natural gas well owned by Southwestern Energy Company. Her water smelled bad, turned yellow, and filled with silt.*

**Arkansas:** *In 2009, a family in Bee Branch, who wishes to remain anonymous, reported changes in water pressure and drinking water that turned gray and cloudy and had noxious odors after hydraulic fracturing of a nearby natural gas well owned by Southwestern Energy Company.*

**Arkansas:** *In 2007, a family in Center Ridge reported changes in water pressure and water that turned red or orange and looked like it had clay in it after hydraulic fracturing of nearby wells owned by Southwestern Energy Company. They told their story on YouTube.*

**Arkansas:** *In 2008, a homeowner in Center Ridge reported changes in water pressure and water that turned brown, smelled bad, and had sediment in it after hydraulic fracturing of a nearby well owned by Southwestern Energy Company. He also told his story on YouTube.*

**REALITY:** "Tests on complainants' water found no traces of the chemicals used in the drilling fluids, officials said. Dick Cassat, chief lab supervisor at the Arkansas Department of Environmental Quality, said that water he's tested after residents complained about nearby gas drilling was simply higher in iron and manganese, two naturally occurring substances in Arkansas groundwater sources." (Northwest Arkansas Newspapers, 7/09)



**Colorado:** *In 2001, two families in Silt reported a water well blow-out and contamination of their drinking water during hydraulic fracturing of four nearby natural gas wells owned by Ballard Petroleum, now Encana Corporation. Their drinking water turned gray, had strong smells, bubbled, and lost pressure. One family reported health symptoms they believe are linked to the groundwater contamination.*

**REALITY:** “The Amos/Walker water well has been sampled numerous times since [the Colorado Oil & Gas Conservation Commission] staff received the initial complaints in 2001. Benzene, toluene, ethylbenzene, and xylenes (BTEX), frac fluid constituents, or other oil and gas related contaminants have never been detected in any of the water samples collected from the Amos/Walker water well to date.” (7/05)

**Colorado:** *In June, 2010, the day hydraulic fracturing began on a nearby gas well in Las Animas County, landowner Tracy Dahl checked his cistern and found approximately 500 gallons of grayish brown murky water where water had previously run clear for years. The Dahls have extensive water testing documentation going back many years, verifying that their water has always been clean and clear. They were told by Colorado Oil and Gas Conservation Commission (“COGCC”) staff that the water could not be tested for chemicals in the hydraulic fracturing fluid because there is insufficient information about the chemicals used. Three monitor wells on the ranch are now producing methane at an escalating rate.*

**REALITY:** “Our environmental staff has investigated hundreds of groundwater complaints over the years, to date we have found no verified instances of hydraulic fracturing harming groundwater,’ [Colorado Oil and Gas Conservation Commission Director Dave Neslin] said.” (Trinidad Times, 7/16/10)

“‘Pioneer has funded hydrologic experts to conduct scientific investigations of domestic water wells in the vicinity of our natural gas wells,’ [Pioneer Natural Resource’s environmental advisor Gerald] Jacob said. ‘These investigations have discovered not impacts from hydraulic fracturing but problems from the ways in which domestic water wells have been drilled, constructed and produced. For example, we have found uncased, uncemented domestic water wells drilled into methane producing formations that provide a direct conduit for methane gas to reach the surface or to connect with shallow groundwater. We have found unsterilized bacteria breach the domestic water wells and produce biogenic methane gas, colonies of bacteria that clog these wells and prevent them from producing water.’” (Trinidad Times, 7/16/10)

**New Mexico:** *A 2004 investigation by the U.S. Environmental Protection Agency found two residents who reported that the quality of their water was affected by hydraulic fracturing.*

**REALITY:** Interestingly, the source of this “2004 investigation” is none other than the 2004 EPA report on hydraulic fracturing – the one that found “no evidence” indicating a link between the use of hydraulic fracturing and the contamination of underground sources of drinking water.

As part of the agency's due diligence in compiling that report, EPA stated in its concluding chapters that some residents with whom it had communicated postulated that hydraulic fracturing may have been the cause of problems with their wells. Although EPA included that testimony as part of its study, as per its charge, it concluded that "no confirmed cases" of water contamination related to hydraulic fracturing could be found.

**New York:** *In 2007, the Lytle family in Seneca County reported contamination of drinking water the morning after hydraulic fracturing of a nearby natural gas well owned by Chesapeake Energy Corporation. The water turned gray and was full of sediment.*

**REALITY:** "[Dept. of Environmental Conservation] Spokesman Yancey Roy said the DEC has a record of the Chesapeake well near Lytle's house — but no record of a complaint, spill, or problem with Lytle's well. 'It is likely that if any turbidity was experienced in a nearby water well, it occurred when the well was being drilled — not when it was hydraulically fractured. Also, turbidity essentially is stirred up sediment — and problems with turbidity do not involve toxicity,' Roy said by e-mail." (Press & Connects, 12/8/09)

Thus, the claim that water was contaminated after hydraulic fracturing is simply not true. The well operator also tested water at the Lytle residence on at least three separate occasions: prior to drilling, after drilling, and after the well had been hydraulically fractured. The operator found no contamination or degradation in water quality in those tests.

**North Dakota:** *The North Dakota non-profit organization Bakken Watch reports very serious health symptoms in humans, livestock, and pets after nearby hydraulic fracturing. Their website has photos of sick animals, pit leaks, and corroded tanks. North Dakota state legislators admit they are "understaffed and overwhelmed" and "struggling to provide adequate oversight amid an explosion of activity in North Dakota's oil patch."*

**REALITY:** "Lynn Helms of the North Dakota Department of Mineral Resources says that there has never been a case of fracturing causing groundwater contamination. Helms says that in every instance that fracturing has been blamed for contamination has been found to have been caused by other sources like bacteria occurring in the water or poor well construction procedures." (Plains Daily, 12/1/10)

"Much of our entire regulatory framework, from drilling to completion, production, and finally plugging and abandonment, is centered around measures to prevent any contamination of the water resource. ...Regulations alone don't begin to provide the full measure of a regulatory program. The North Dakota Oil and Gas Division of the Department of Mineral Resources utilizes 8 performance measures to monitor our activity in the areas of drilling permitting, UIC permitting, wellbore construction, well bore mechanical integrity testing, spill containment and clean up, fluid measurement, oil and gas conservation, and customer satisfaction. At least five of these measures are directly related to protection of water resources. These performance

measures are backed up by a staff of field inspectors who visit the wells every day from when the drilling rig moves in until the permanent wellhead is installed and at least quarterly after that.” (Lynn Helms, Director, North Dakota Dept. of Mineral Resources, congressional testimony, 6/4/09)

**Ohio:** *“In 2007, there was an explosion of a water well and contamination of at least 22 other drinking water wells in Bainbridge Township after hydraulic fracturing of a nearby natural gas well owned by Ohio Valley Energy Systems. More than two years later, over forty families are still without clean drinking water and are waiting to be connected to a town water system.”*

**REALITY:** On December 15, 2007, an explosion occurred in the basement of a home in Bainbridge, Ohio. Neither the house nor its furnishings suffered any kind of fire or smoke damage. Subsequent to the event, the Ohio Division of Mineral Resources Management (DMRM) conducted an extensive, year-long investigation of the incident – at the end, publishing a report summarizing its findings and describing what it believed caused the incident. DMRM concluded the explosion was not caused by hydraulic fracturing. Moreover: “DMRM has concluded that it is highly unlikely that fluids used in the hydraulic fracturing process, or flow back fluids escaped from the borehole or entered into local aquifers.”

**Pennsylvania:** *In 2009, the Zimmerman family of Washington County reported contamination of drinking water after hydraulic fracturing of nearby natural gas wells owned by Atlas Energy. Water testing on their farm found arsenic at 2,600 times acceptable levels, benzene at 44 times above limits, naphthalene at five times the federal standard, and mercury and selenium levels above official limits.*

**REALITY:** “A recent blog from an environmentalist points to four cases in Pennsylvania...The Washington County case involved the appearance of arsenic at 2,600 times the EPA levels for safe drinking water. Arsenic is not an additive in fracture stimulation...there is no physical link to deep hydraulic fracturing.” (Terry Engelder, Professor of Geosciences, Pennsylvania State University)

“George Zimmerman filed suit against Atlas Energy Inc., alleging that Atlas’ hydraulic fracturing methods had caused property damage to Zimmerman’s land...Causation will continue to prove a significant obstacle to plaintiffs’ claims of property damage and groundwater impact, especially since available information concerning the composition of frac chemicals does not generally support allegations of material concentrations of carcinogenic or otherwise toxic compounds.” (11/17/09)

**Pennsylvania:** *In 2009, families in Bradford Township reported contamination of drinking water after hydraulic fracturing of nearby natural gas wells owned by Schreiner Oil & Gas. The drinking water of at least seven families has been contaminated.*

**REALITY:** To be clear, hydraulic fracturing was not to blame in this instance; but rather, the failure was associated with well design and construction:

“The department suspects the stray gas occurrence is a result of 26 recently drilled wells, four of which had excessive pressure at the surface casing seat and others that had no cement returns.” (Bradford Era, 5/4/09)

While the operator was cited under Pennsylvania state law, hydraulic fracturing had nothing to do with these violations. If well design and construction guidelines in place at the time of the incident had been followed, the incident would not have occurred. Nonetheless, Pennsylvania has taken this issue head on, recently enacting new standards for well design and construction.

“We strengthened the rules governing the design and construction of gas wells and this rule became effective in January 2011... The standards are much stronger than the pre-existing rules and are now state of the art. The new gas drilling rules are essential to public safety, and they must be rigorously followed and enforced.” (*Former Pennsylvania Secretary of Environmental Protection, John Hanger, Business Journal, 1/14/11*)

**Pennsylvania:** *“In 2009, the Smitsky family in Hickory reported contamination of their drinking water after hydraulic fracturing of nearby natural gas wells owned by Range Resources. Their water became cloudy and foul-smelling. Testing found acrylonitrile, a chemical that may be used in hydraulic fracturing. The EPA is now investigating this incident.”*

**REALITY:** A review of the MSDS information on-file with the PA Department of Environmental Protection (DEP) reveals that no acrylonitrile was used in the process of fracturing this well. According to reports, Ms. Smitsky expressed her concerns with the well a full five years after the drilling procedure had been completed.

Questions also remain about the quality of the well’s water prior to the operations taking place. According to the Center for Rural Pennsylvania, an agency of the PA General Assembly, “approximately 41 percent of the [private water] wells tested [in PA] failed to meet at least one of the health-based drinking water standards.”

**Texas:** *In 2007, three families who share an aquifer in Grandview reported contamination of drinking water after hydraulic fracturing of a nearby well owned by Williams. They experienced strong odors in their water, changes in water pressure, skin irritation, and dead livestock. Water testing found toluene and other contaminants.*

**REALITY:** Toluene is a chemical widely used as an industrial feedstock and as a solvent in common products such as paint thinners; as well as a gasoline additive and a component of dynamite. Private consultants hired to test the water well in question found toluene levels to be within federal government standards:

“Dr. Judy Reaves, a hydrogeologist with almost 20 years’ experience, said the level of toluene ‘doesn’t exceed the Environmental Protection Agency’s level of risk.’” (Fort Worth Weekly, 4/30/08)

“Richard S. Record, a geologist and Cirrus’ Dallas operations manager, also noted that toluene in the sample from Sayers’ well falls below the level that the EPA labels as unsafe.” (Fort Worth Weekly, 4/30/08)

**Texas:** *The Scoma family in Johnson County is suing Chesapeake Energy, claiming the company contaminated their drinking water with benzene and petroleum by-products after hydraulic fracturing of natural gas wells near the Scoma home. The family reports that its drinking water sometimes runs an orange-yellow color, tastes bad and gives off a foul odor.*

**REALITY:** “Based on his role as special projects director for the Ground Water Protection Council, Mike Nickolaus says he doesn’t believe that fracking poses a serious threat to groundwater. ‘Groundwater contamination from other sources is a far greater risk to human health and the environment,’ said Nickolaus, a Granbury resident who has a geology degree and was director of the oil and gas division of the Indiana Department of Natural Resources from 2000 to 2005. Among those other sources, he cites storm water runoff, large septic systems that don’t operate properly and the improper disposal of industrial waste by injecting it into zones above or within underground sources of drinking water. ... Nickolaus said the risk of groundwater contamination from fracking is exceptionally remote in areas like the Barnett Shale and the Marcellus Shale, where more than a mile of dense rock typically separates shallow freshwater aquifers from petroleum deposits.” (Star-Telegram, 10/4/10)

**Texas:** *Tarrant County Commissioner J.D. Johnson, who lives in the Barnett shale area, reported groundwater contamination immediately after two gas wells on his property were hydraulically fractured. His water turned a dark gold color and had sand in it.*

**REALITY:** “The Texas Railroad Commission, which regulates the oil and gas industry, investigated but did not find any problems that appeared to be related to drilling and hydraulic fracturing of the gas wells, according to Michael O’Quinn, a commission district director. By the time the commission re-inspected it 40 days later, Johnson told the agency that he had his water tested and that it was drinkable, O’Quinn said. The specific cause of Johnson’s well problem has not been conclusively determined. ...the Barnett drilling boom also has provided ‘lots of pluses,’ [Johnson] said, including jobs, tax revenue and extra income for many thousands of mineral owners.” (Star-Telegram, 9/4/10)

**Texas:** *Carol Grosser, in south Texas, noticed changes in her water after a neighbor told her a nearby well was being hydraulically fractured. Carol noticed changes in her water pressure and rust-colored residue in her stock tanks. The fish in her tanks died, and some of her goats had abnormal milk production and produced kids with unusual birth defects.*

**REALITY:** Many similar allegations have been made in Texas, often producing an outcome such as this: “Texas Railroad Commissioners found that Range Resources’ natural gas wells be allowed to continue to produce as the wells are not causing or contributing to contamination of any Parker County domestic water wells.” (Texas Railroad Commission, 3/22/11)

*Texas: Susan Knoll in the Barnett shale reports that last year her drinking water became foamy right after hydraulic fracturing of a well adjacent to her property. Since that time, additional gas wells have been fractured near her home and her drinking water has continually gotten worse. It sometimes foams, becomes oily, and has strong odors that burn Susan’s nose when she smells her water. Susan has a lot of videos and more information on her blog.*

**REALITY:** “[The Texas Railroad Commission and the Texas Commission on Environmental Quality] have visited [Knoll’s] property but have found no violations. ... The agency found nothing wrong.” (Denton Record-Chronicle, 3/30/11)

A separate charge of water contamination in Denton County proved unfounded: “At Smith’s well, though, testing by the Texas Railroad Commission, which regulates drilling, found no high levels of toxic materials. Contaminants detected in the water were not at a level that would violate state or federal water quality standards, officials said. ‘Therefore, we would not expect any adverse health effects after ingestion of water with these concentrations,’ Railroad Commission spokeswoman Stacie Fowler said.” (Star-Telegram, 7/01/10)

*Texas: The Harris family of Denton County, Texas, is suing Devon Energy. They say that their water became contaminated soon after Devon commenced drilling and hydraulic fracturing near their home in 2008, and that their water became polluted with a gray sediment. Testing results performed on the well water found contamination with high levels of metals: aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, nickel, potassium, sodium, strontium, titanium, vanadium, and zinc.*

**REALITY:** “The Texas Railroad Commission had the Harris’ water tested for chlorides and a variety of minerals associated with oil and natural gas production, but the test came back negative, according to railroad commission correspondence to Devon provided by Devon spokeswoman Alesha Leemaster. ‘While we cannot comment directly on pending litigation, it is important to note the Harris well was reported and the family’s concerns were investigated by the Texas Railroad Commission in 2009,’ Leemaster said in an e-mail. ‘That investigation found no evidence linking the Harris water well to natural gas drilling operations.’ The Texas Railroad Commission investigation found ‘no past or current oilfield related source’ of contamination in the Harris water...” (Journal Record, 12/17/10)

*Virginia: Citizens reported drinking water contamination after hydraulic fracturing. Water was murky and had oily films, black sediments, methane, and diesel odors. Individuals experienced rashes from showering. The Buchanan Citizens Action Group reported over 100 documented*

*complaints of adverse effects of hydraulic fracturing and the Dickenson County Citizens Committee reported ground water quality deteriorated throughout the county as a result of the large number of hydraulic fracturing events.*

**REALITY:** It's tough to know where to begin here, simply due to the astounding dearth of facts, evidence and science to support the accusation. In 2000 and 2001, the Buchanan Citizens Action Group and the Dickenson County Citizens Committee provided public comment to EPA during their previous study of hydraulic fracturing. In 2002 the NRDC prepared and submitted a report to the U.S. Senate while incorporating the Virginia groups' claims as supposed evidence of fracturing's liabilities. But in 2004, upon submitting their final report, EPA "determined that fracturing posed "little or no threat"" to groundwater. (E&E News, 2/24/11)

To summarize: this formless claim relies upon decade-old assertions fed into the very 2004 EPA report concluding that fracturing posed "little or no threat" to groundwater.

**West Virginia:** *The Hagy family in Jackson County, West Virginia, is suing four oil and gas companies for contaminating their drinking water. They say their water had "a peculiar smell and taste" and the parents as well as their two children are suffering from neurological symptoms. A news article reports that the lawsuit makes the connection between the drinking water contamination and the hydraulic fracturing process.*

**REALITY:** "As far as issues with groundwater contamination and some other problems raised by others, [secretary of the West Virginia Department of Environmental Protection Randy] Huffman said horizontal drilling and hydraulic fracturing is 'not new' and has been done for some time. 'We just haven't seen the kind of problems that people are raising as issues,' Huffman said. 'This fracking is taking place at such depths, we don't really have a concern or evidence of reason to be concerned over groundwater at a couple hundred feet being impacted by hydraulic fracturing taking place at eight or nine thousand feet.'" (Register-Herald, 2/24/11)

**West Virginia:** *In Wetzel County, Marilyn Hunt reported to the EPA in 2010 that "frac drilling is contaminating the drinking water here." Residents report health symptoms, such as rashes and mouth sores, as well as illness in their lambs and goats, which they suspect is linked to drinking water contamination.*

**REALITY:** "'People complain a lot about gas in their wells and stuff like that, but in West Virginia that is a fairly common thing,' said Tim Carr, West Virginia University geology professor. Carr said that before a nearby gas well can be blamed, the contamination needs to be investigated. Thermogenic natural gas is often found in wells and septic systems.'" (Register-Herald, 2/24/11)

### **Pattern of Accusation without Scientific Evidence**

This pattern of accusation without scientific evidence is intended to create anxiety and opposition to natural gas production, and to discredit the effective regulatory programs that

manage the environmental risks associated with such production. To be clear, no one suggests that the extraction of natural gas is a risk free process. In fact, it requires effective regulation, which currently exists in the states, which themselves have long managed natural gas exploration and production.

However, oil and natural gas opponents want to suggest that even a single failure or incident constitutes such a crisis that the only solution is to overturn the entire regulatory structure and replace it with aggressive federal regulation. No regulatory system can meet the standard of zero failures. Regulatory systems are designed to assure that proper management of industrial activities is required, which in turns minimizes risk. This is true for any industry subject to regulation in the United States.

State oil and gas programs meet this test, and through efforts of organizations like the Interstate Oil and Gas Compact Commission (IOGCC), the Ground Water Protection Council (GWPC) and the State Review of Oil and Natural Gas Environmental Regulations (STRONGER), they have continued to respond to new conditions and alter their requirements to effectively manage environmental risks.

But, the NRDC and Sierra Club, among others, seek federal regulations to manage oil and natural gas production, and therefore must demean the current regulatory programs. Consequently, they pursue tactics denigrating state programs and asserting that federal regulation is nonexistent, which – they claim – has resulted in scores of environmental incidents. They also allege that oil and natural gas production is treated differently under federal law, and assert that these distinctions must be eliminated. This demonstrates a fundamentally flawed and dishonest assessment of the nature of federal environmental laws.

There are two key factors in federal environmental law that the NRDC and Sierra Club either willfully ignore or grossly mischaracterize. The first is the federal-state relationship. Most federal environmental regulatory laws inherently rely on a partnership with the states, wherein the states become the daily regulatory body. This partnership is also known as “delegation” or “primacy.” The federal Environmental Protection Agency (EPA) is neither structured nor funded to bear the burden of daily regulation in the states. Consequently, federal environmental laws presume a delegation to the state regulators to carry out their objectives.

The effectiveness of primacy is why former EPA administrator Lisa Jackson said in November 2011:

*"We have no data right now that lead us to believe one way or the other that there needs to be specific federal regulation of the fracking process."*

A few months later, in February 2012, Jackson also said:



*“Let me speak really plainly: There is no EPA setup that allows us to oversee each and every well that’s drilled.”*

Ironically, by demeaning state regulators, environmental groups are casting doubt on their own agenda of federalizing oil and natural gas production regulation.

The second key element of federal environmental laws is that it is structured around a manufacturing factory model, and as such must be adjusted for industries that do not fit that model. Federal environmental laws use, as the typical regulated source, a factory with concentrated emissions and direct discharges, or a hazardous waste management operation with highly-concentrated, low-volume wastes. Because not all industries fit these models, federal environmental laws have provisions that reflect these differences. For example, industries like agriculture, mining, silviculture and – yes – oil and natural gas production have provisions that reflect their differences. The NRDC and Sierra Club attack these distinctions as “loopholes” and “exemptions,” which they quite clearly are not.

In reality, federal environmental laws do apply to oil and natural gas production, and suggesting otherwise is both misleading and demonstrably false. What follows is a number of the items routinely mischaracterized by opponents of development regarding the nature of oil and gas regulation, and a response outlining why the proposed change is unnecessary or out of sync with well-established regulatory precedent.

***Proposal:*** *Require oil and gas exploration and production companies to report to the Toxic Release Inventory to provide information to the public regarding chemicals that may pose a risk to the health of local communities.*

**Response:** The Toxic Release Inventory (TRI) was created by Congress to obtain information on chemical releases from the manufacturing sector, where concentrated operations at facilities pose a potential risk if releases occur. Oil and natural gas E&P operations are scattered throughout the country in mostly rural areas, and individually do not pose significant risks. While EPA has the authority expand the scope of the TRI reporting requirements and considered the issue in the mid-1990s, it has not added oil and natural gas E&P operations because there is no compelling reason to create a new reporting burden that provides no real additional information.

***Proposal:*** *Subject all hydraulic fracturing by the oil and gas industry to the Underground Injection Control program of the Safe Drinking Water Act;*

**Response:** The Safe Drinking Water Act (SDWA) Underground Injection Control (UIC) program is intended to manage the disposition of wastes into geologic repositories. Hydraulic fracturing is a well stimulation technology that has been used for more than 65 years and over one million times. It has been regulated for decades by states and never posed an environmental risk. It is

essential to the development of American oil and natural gas. There are no environmental benefits to additional federal regulation.

**Proposal:** *Increase daily fines for violations by the oil and gas industry to equal those for other industries; Require that the underground injection of materials associated with the oil and gas industry that meet RCRA's definition of hazardous waste meet the standards of Class I injection.*

**Response:** The SDWA regulates the disposal or use of produced water as Class II Underground Injection Control (UIC) wells. These two items appear to be related to the elements of the Class II UIC program that relate to produced water as a secondary or tertiary recovery technology to enhance production of American oil and natural gas. In 1980, Congress amended the SDWA to provide greater flexibility to states that had operational programs to manage the use of produced water for this purpose. The structure of the SDWA and its subsequent regulations for Class II wells proved so burdensome that states were unwilling to seek primacy under the SDWA to run the federal program. The law was changed to allow states to show that their programs provided comparable levels of protection rather than meet the specific federal program requirements. Without these changes, enhanced oil recovery would have been crippled – serving also as a cautionary tale against the proposal from opponents to use SDWA to control hydraulic fracturing.

**Proposal:** *Require stormwater permits for all oil and gas industry activities.*

**Response:** Stormwater permits are required for both construction and operations related to oil and gas industry activities when the stormwater is contaminated. The change in the Clean Water Act (CWA) in the Energy Policy Act of 2005 did not exclude the industry from regulation; it assures that regulation would be based on the same standard for both construction and operations.

**Proposal:** *Apply the Clean Water Act definition of "pollutant" to all materials used in oil and gas operations.*

**Response:** This item must refer to the definition of "pollutant" in the CWA which excludes "produced water" (water that is produced with oil and natural gas) that is injected under State programs for secondary and tertiary recovery of oil and natural gas. The definition was written in 1972. In 1974, Congress passed the Safe Drinking Water Act that provided federal authority on Underground Injection Control (UIC) and these operations are covered under Class II wells – largely run by states. Thus, it would be redundant (and illogical) to include these operations in the CWA. Additionally, produced water discharges to the surface are already regulated under the CWA.

**Proposal:** *Add hydrogen sulfide to the list of hazardous air pollutants.*

**Response:** Hydrogen sulfide is an acutely toxic gas; however, it has not been considered a toxic air pollutant in low concentrations. Congress removed hydrogen sulfide from the Clean Air Act toxic substance list in 1991. EPA studied hydrogen sulfide in the context of oil and gas operations and concluded in 1993 that it should be regulated with regard to accidental releases but not low level emissions. Hydrogen sulfide can be produced with oil and natural gas, and states have regulated it to protect against its acute effects.

**Proposal:** *Include all toxic wastes associated with oil and gas exploration and production under RCRA's cradle to grave hazardous waste provisions.*

**Response:** This issue relates to EPA's implementation of the 1976 Resource Conservation and Recovery Act (RCRA) law. In 1978, EPA produced a series of new requirements designed to address the management of concentrated hazardous wastes in landfills and other management options. However, these regulations did not adapt well to a series of high volume, low toxicity wastes. In 1980, Congress suspended regulation of these various wastes – oil and gas drilling fluids and produced water, utility coal ash, mining wastes, cement kiln dust, etc. – and required EPA to study them and their existing regulatory structure. In 1987, EPA determined that RCRA (Subtitle C) hazardous waste regulations were inappropriate for oil and gas drilling fluids and produced waters; that they were adequately regulated by the state management programs; and, that regulation under Subtitle C would significantly impair the development of American oil and natural gas. Since then, EPA has participated in recurring reviews of the state programs (currently conducted by STRONGER) to improve them when necessary. Simply put, RCRA Subtitle C is not an appropriate regulatory structure for these wastes – according to the EPA itself.

On May 4, 2016, seven environmental activist groups, including the Environmental Integrity Project (EIP), Natural Resources Defense Council and Earthworks, filed a federal lawsuit against the Environmental Protection Agency (EPA) claiming the agency has failed to review and update rules regarding oil and gas wastewater disposal.

These activist groups are denying the existence of a robust regulatory framework governing waste, which involves the cooperation of local, state, and federal regulators. EPA officials said in a written statement that "states play a primary role in regulating most natural gas and oil development" and that the agency's authority is limited.

In their litigation, the environmental activist groups argue that the EPA has failed to review and update Subtitle D RCRA regulations for multiple decades and, therefore, is in violation of a general provision that requires review every three years.

What the activist groups completely ignore is that there are dynamic regulations in place governing oil and gas waste, all of which are regularly reviewed and implemented by both states and the EPA.

As a point of fact, under RCRA, the EPA has a largely non-regulatory role over solid waste management. Instead, regulation of solid waste is left to the states, with the EPA providing guidelines and criteria to assist the states with developing solid waste management plans.

In turn, states have developed and implemented their own regulations to deal with solid waste disposal, which in many cases go above and beyond the basic criteria set by the EPA.

Also, states have specific requirements for waste management in pits (including pit siting, pit lining, freeboard and secondary containment and pit closure) and requirements for waste management through underground injections (including existing wells, casing/cementing, operating pressure, monitoring, mechanical integrity testing, plugging and seismicity).

The fact is, states have more regulatory authority over waste management - and oil and gas operations as a whole - because everyone, including the EPA, recognizes that state regulators have more expertise and are better able to address local concerns and conditions.

Not only are states effectively regulating oil and gas - and constantly updating their rules to address new issues - but the environmental activist group's claim that EPA has not "reviewed" state regulations is demonstrably false.

In 2014, the EPA conducted a review of state regulations for oil and natural gas wastes in 26 states. The report, entitled "*Review of State Oil & Natural Gas Exploration, Development and Production (E&P) Solid Waste Management Regulations*," is based on information gathered from a number of sources, including:

- State regulations and statutes
- State regulatory agency personnel
- State Review of Oil and Natural Gas Environmental Regulations (STRONGER) Board State Reviews
- The 2009 Department of Energy (DOE) report "State Regulations Designed to Protect Water Resources"
- DOE's Drilling Waste Management Information System

A summary of the report is posted on EPA's website, but the EPA observed that "numerous states have recently updated [their] regulations" on hydraulic fracturing specifically, and that "state regulations continue to evolve" as additional information becomes available.

This information was clearly known to at least some of the potential litigants against EPA: The energy program director for Earthworks - one of the signatories of the notice of intent to sue - is a member of the STRONGER Board of Directors.

The EPA also conducts various annual reviews of its regulations. For example, every year the EPA reviews its programs and publishes a regulatory agenda for the upcoming year and beyond. The Agency holds various workshops in states to examine various aspects of RCRA, as well. EPA also reviews its programs and submits a budget to OMB and Congress annually. Finally, the EPA's recent hydraulic fracturing report, which found no evidence of widespread water contamination from fracking, included a vigorous review of state regulations.

These are just some of the ways in which the EPA has reviewed state oil and gas regulations, including those specifically pertaining to waste, and why the activists' claims are more about public messaging than an honest review of oil and gas regulation.

At the end of the day, the activists' lawsuit is not only unwarranted, but also will not make oil and natural gas production safer. In fact, it could have the opposite effect. As explained above, states have more stringent regulations in place that often far exceed the baseline standards set by the federal government. Another lengthy and redundant study of state regulations, which the groups are also demanding, would only waste taxpayer dollars.

So while these groups claim to want tougher regulations, in reality this is just another shallow attempt to shut down American oil and natural gas production.

This litigation will likely take some time.

***Proposal:*** *Include oil and gas under the Superfund law – CERCLA.*

**Response:** When Congress passed CERCLA in 1980 and amended it in 1986, it considered the appropriate scope of the new and extensive liability provisions of these acts. Among its decisions was that federally permitted releases should not be subject to Superfund, and that wastes that Congress had specifically excluded from regulation should not be included. Moreover, Congress specifically passed oil spill legislation in 1990. More broadly, with all the real challenges facing Superfund, there is no indication that the hundreds of thousands of oil and natural gas wells sites in the country pose anything close to a risk that necessitates coverage under Superfund.

Natural gas production is tightly regulated by state agencies that are most familiar with the specific circumstances and environmental management challenges in their particular regions. The geology and public concerns in Texas differ from those in Pennsylvania, and the types of risks to be managed in Louisiana and Wyoming vary considerably. There are no compelling reasons to suggest that the current regulatory structure is inadequate and, clearly, no compelling basis to suggest that greater federalization of natural gas production regulation is justified.

To highlight this point, during the recent U.S. Senate round table, Sen. John Barrasso (R-WY) inquired with the Bureau of Land Management's Tim Spisak about BLM's proposed federal

rule for hydraulic fracturing on federal and Indian lands. Senator Barrasso asked Mr. Spisak if the Bureau “can assure us that BLM’s hydraulic fracturing rule will not push oil and gas production off Federal public lands and off of Indian lands.” Mr. Spisak responded that additional changes could be coming, but not before admitting, “I’m not sure I can make that particular assurance.”

That quote is particularly relevant in examining proposals to impose new federal requirements on oil and gas development. Such proposals must be seen in the context of the goals of the groups who are pushing for them. In her prepared testimony submitted to the U.S. Senate round table, Amy Mall of the NRDC opined that “the goal of energy policy should be to move the U.S. away from fossil fuels,” and the Sierra Club’s Deb Nardone said “no amount of regulation will make fracking safe, nor acceptable.” These official position statements should raise concerns, especially when those individuals are recommending new specific rules and requirements for a process that they openly admit they would like to see banned. That BLM itself could provide no assurance that its proposed federal rule on hydraulic fracturing would not push oil and gas development off federal and Indian lands is a cautionary note about the real-world implications of such proposals.