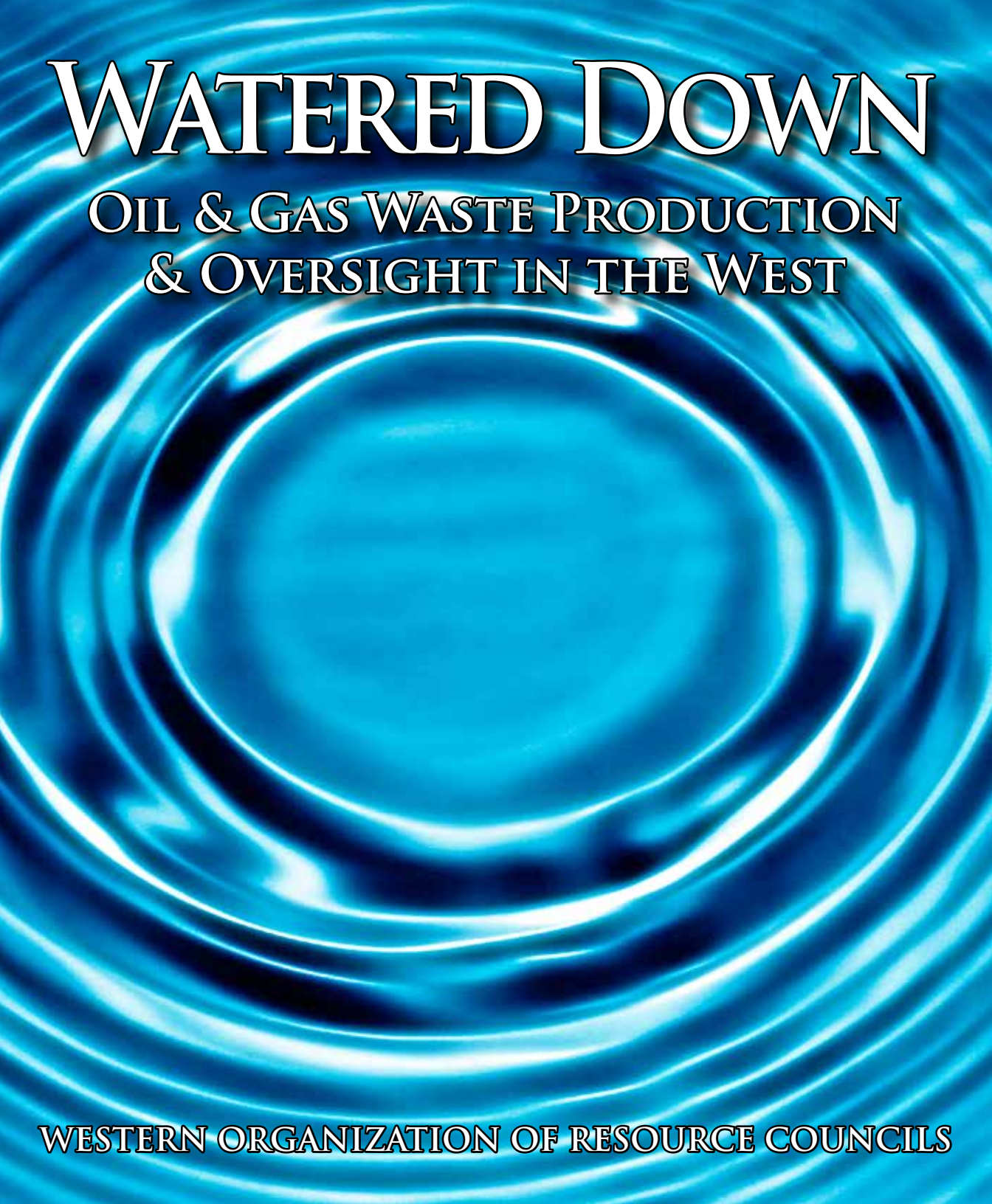
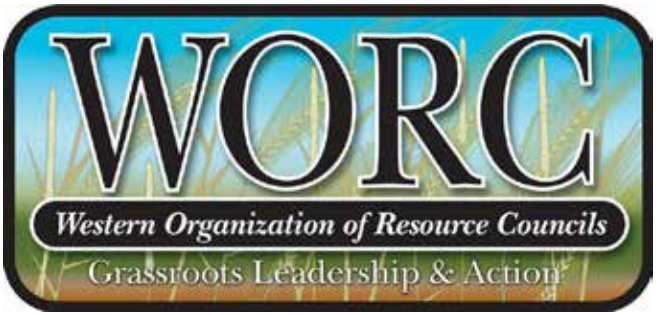

Watered Down
Oil & Gas Waste Production
& Oversight in the West
Western Organization of Resource Councils



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Watered Down

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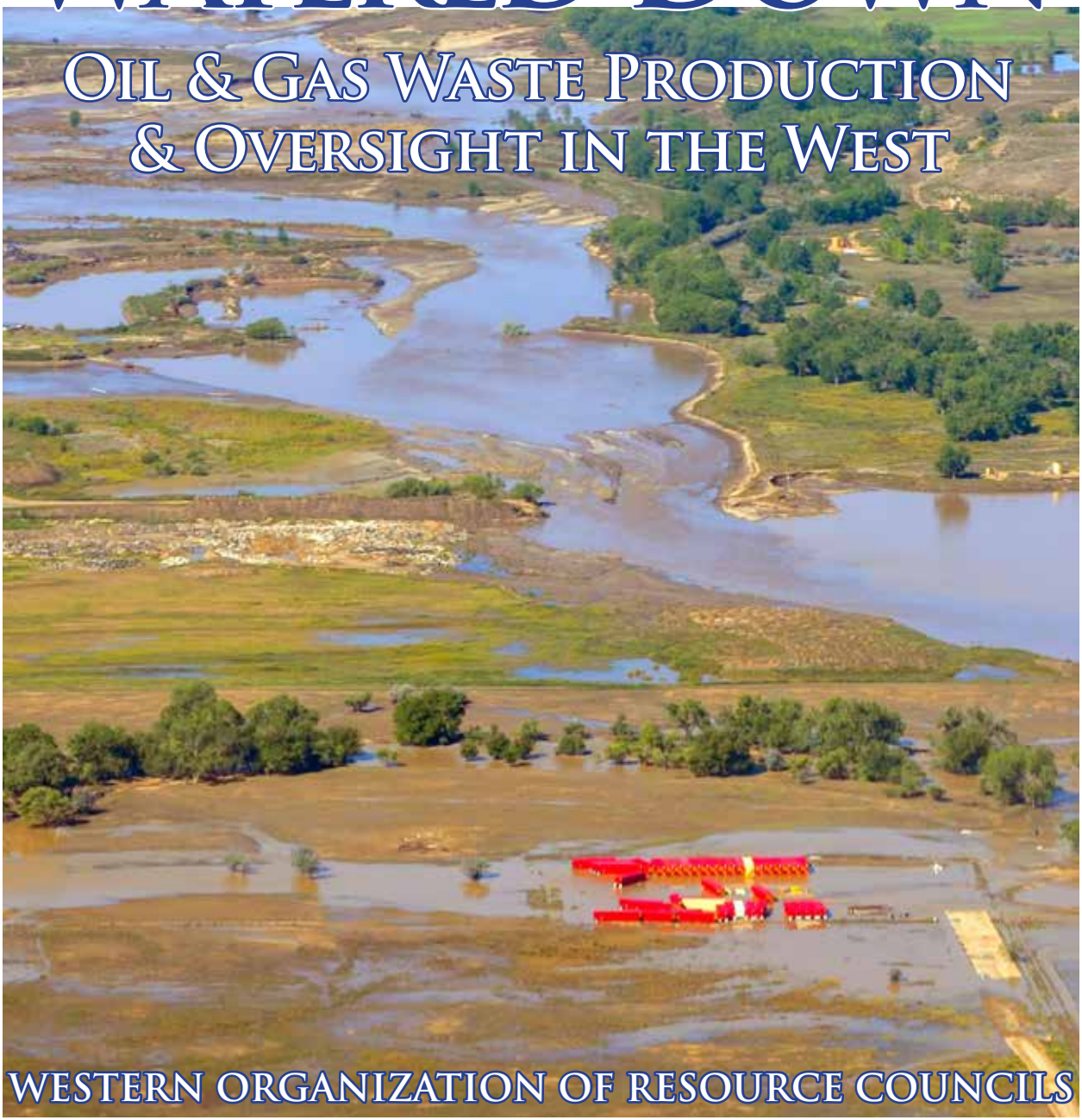

Western Organization of Resource Councils

This report is a publication of the Western Organization of Resource Councils (WORC). WORC is a regional network of grassroots community organizations that include 10,000 members and 35 local chapters. WORC's network includes: Dakota Resource Council (North Dakota); Dakota Rural Action (South Dakota); Idaho Organization of Resource Councils; Northern Plains Resource Council (Montana); Oregon Rural Action; Powder River Basin Resource Council (Wyoming); and Western Colorado Congress. WORC's mission is to advance the vision of a democratic, sustainable, and just society through community action. WORC is committed to building sustainable environmental and economic communities that balance economic growth with the health of people and stewardship of their land, air, and water.

Principal research and writing was completed by Mark Trechock. The report was edited by John Smillie, Sara Kendall and Kevin Dowling, with layout and design by Kerri Nelson Wolenetz.

All views and opinions expressed in this report are those of WORC and do not necessarily reflect the views of WORC's funders. Any errors are the responsibility of WORC.

Previous page: Flooding in Weld County, Colorado in August 2013. The red tanks hold a water and chemical mixture used for hydraulic fracturing. Photo courtesy: Ecoflight, ecoflight.org.

Contents

Foreword

This is the second of a series of reports by WORC, the Western Organization of Resource Councils, on the impact of oil and gas extraction impacts on water. *Gone for Good*, the first report, outlined where the oil and gas industry gets the massive quantities of water used for hydraulic fracturing, or "fracking." It also identified how state governments track water use (when they do), and how much is actually consumed without the possibility of reuse any time soon. Almost all water used for fracking is consumed and cannot be reused, as it turns out.

> "The oil and gas industry uses a lot of fresh water. That's starting to put a real strain on water sources."
>
> —John Ontiveros, CEO, Winner Water Services

Unfolding events have shown that the report flagged legitimate concerns—in particular the experience of one small town in Texas. Barnhart has no water. The town's well went dry June 6. The Texas Water Development Board estimated that oil and gas companies used 64.2 million gallons of water in 2010 for fracking in Irion County, where Barnhart is located. The board expects use to be five times as great by 2020. Meanwhile, the state has no management strategy to protect its water resources from conflicts caused by increased use of water for fracking. In fact, the state views extraction of fresh groundwater for fracking as an "exempt use," so that oil and gas companies don't even need a permit to take it. The state Department of Environmental Quality has said it expects another 30 Texas towns to run out of water by the end of this year.[1]

At the federal level, there is growing concern about water shortages, and fracking is perceived as an emerging threat to water availability. According to the Environmental Protection Agency (EPA), at least 36 states are faced with local or regional water shortages, and a 2012 study requested by the State Department said that at the present rate of consumption, global demand for fresh water will exceed supply by 40% in 2030.[2]

The U.S. Department of Energy (DOE) has apparently been less forthcoming than the State Department. DOE was required under the 2005 Energy Policy Act to conduct a study similar to the State Department's, but has never completed it. A draft was submitted to Congress in 2007 and returned for further work. The Civil Society Institute (CSI) recently obtained and reviewed a 2011 draft of the DOE report and related documents. CSI discovered that the authors' initial findings about the conflict between water and energy production had been, well, watered down.

"On multiple occasions, the editors asked for changes in the document because certain assertions would likely lead to rejection by the Office of Management and Budget (OMB)," CSI said. CSI also concluded that revisions were made "regardless of whether or not the assertions were true, and regardless of whether or not OMB's response would be a 'fair critique.'" CSI noted that the 2007 draft predicted groundwater shortages due to fracking, but the 2011 draft blandly asserted that new technology will solve the problem.[3]

Meanwhile, the oil and gas industry continues to talk about water recycling technologies, but data on actual use of recycling are hard to come by, and it appears that these technologies are not yet widely used. A few companies do appear to be taking steps toward more water recycling. Range Resources says that it reuses all of the water it extracts from its wells in Pennsylvania.[4] OriginOil Inc., a California company, announced in early October its first contract with an oil field service provider, Colorado-based Industrial Systems Inc., for use of a product that separates and cleans up contaminated wastewater to be used for hydraulic fracturing or other industrial applications.[5]

Saving money may get oil and gas companies to reuse or recycle water, but sticks may do the work as well as carrots. The *Journal of Petroleum Technology* reported that Pennsylvania drillers in the Marcellus Shale are exploring water re-use technology because the Pennsylvania Department of Environmental Protection told 15 public water treatment plants to stop handling waste water from the Marcellus Shale.[6] Another business, Winner Water Services, has a somewhat different plan—to treat water from "other related industrial production and deliver it to water-hungry oil fields." The company's CEO, John Ontiveros, put the focus on the critical issue. He said, "The oil and gas industry uses a lot of fresh water. That's starting to put a real strain on water sources."[7]

Introduction: Wastes of Unknown Hazard

Clearly, the one-time use of fresh water and its depletion due to fracking remains a very serious environmental threat. But it isn't the only one. The focus of this study is where the water actually goes once it has been used, and what happens to it in the process. The water in question here is of two types. One type is "flowback water"—the water used in combination with various chemical agents to stimulate wells so that they produce oil or gas or both, which then comes back out of the well after fracking. The other type of water examined here is "produced water"—underground water in or near the drilling area, some which comes to the surface during oil or gas production.[8] In reality, these substances should be called produced and flowback "materials," since they contain many substances besides water. These substances include agents used for fracking, but also materials that were in the ground and, combined with groundwater, rose to the surface as a result of drilling and fracking. These materials are often stored in on-site pits or tanks, transported by pipeline or truck, and ultimately disposed of through dumps, injection or land disposal. Produced and flowback materials are generally called exploration and production (E&P) waste. The management and disposal of these wastes remains poorly regulated in general and has a history of creating environmental damages.

> "Fracturing fluid is therefore hazardous from the time it leaves the manufacturing facility until it touches the inside of a well, when it is suddenly no longer considered hazardous under federal law."
>
> — Jessica Helms, Sierra Club

The use of water for fracking is a water availability issue. What happens to fracking water after its use is a waste management issue. Like many other environmental issues, waste disposal and its attendant pollution stirred national controversy and resulted in federal legislation a generation ago. On September 30, 1976, Congress passed the Resource Conservation and Recovery Act (RCRA), and President Gerald Ford signed it into law. From the beginning, though, it was clear that waste related to oil and gas production presented unique challenges, both regulatory and political. Unlike most industries, oil and gas exploration and production did not occur in a factory, but in the midst of nature, and on nearly a million separate sites in 38 states.

Unlike most industries, oil and gas exploration and production did not occur in a factory, but in the midst of nature, and on nearly a million separate sites in 38 states.

RCRA, as it was signed into law, directed the U.S. Environmental Protection Agency (EPA) to study whether and how E&P waste should be regulated, and report its findings to Congress. When EPA "sampled drilling fluids and produced water at field sites," it found "pollutants at levels that exceed 100 times the agency's standards" and "62 documented cases where waste from oil or natural gas operations had endangered human health." Staff recommended regulation as hazardous waste "but they were overruled by senior agency officials in 1988 when the EPA exempted wastes uniquely associated with oil and gas exploration from RCRA's hazardous waste provisions."[9] The result was that RCRA was watered down in its applicability to E&P waste before it could be put to use. Rather than being classified as hazardous waste, E&P waste was destined to remain a waste of unknown hazards. As Jessica Helms of the Sierra Club put it, "Fracturing fluid is therefore hazardous from the time it leaves the manufacturing facility until it touches the inside of a well, when it is suddenly no longer considered hazardous under federal law."[10] U.S. Representative Matt Cartwright (D-PA), along with 49 co-sponsors, introduced a bill in July 2013, that would undo the E&P waste exemption under RCRA.[11]

What Goes Down Must Come Up

The widespread use of fracking has dramatically changed both the volume and make-up of the E&P waste materials that come out of drilled oil and gas wells. Fracking relies on utilization of high water pressure in combination with a variety of chemical agents. In general, the purpose of these agents is to create and sustain openings in the formation that will allow oil or gas to be pumped to the surface.

Provided that fracking chemicals arrive safely, the first risk of things going wrong at a fracking site is that drillers may "lose the well," resulting in a blowout in which water, oil, fracking fluids and debris come back out of the well hole in an uncontrolled manner. In the absence of federal law, authority to address such accidents rests at the state level. Blowouts are not uncommon. The Forum News Service in Fargo reported in August 2013 for example, that according to the North Dakota Department of Mineral Resources, North Dakota had 23 "well control incidents" over the previous 12 months. One oil worker died as a direct result of one of these incidents. The Department of Mineral Resources said the five worst blowouts each spewed at least 600 barrels of oil and saltwater, and in one case more than 2,000 barrels. The largest fine, $379,025, was against Slawson Exploration, whose well near Lake Sakakawea spilled oil, gas and saltwater for three days in December 2012. The largest part of the fine, $300,000, was not for the blowout itself, but for failing to report the chemicals used in fracking to the FracFocus website. The remainder of the fine was for failure to control subsurface pressure "during all drilling, completion and well-servicing operations," and because oil "was allowed to flow over and pool on the surface of the land and infiltrate the soil."[12]

According to FracFocus, the Slawson well was initially fracked on October 4, 2012. About 80% of what went down the hole was water, and sand accounted for another 19%. But more than 30 other ingredients were listed as used in the fracking process. Six of these ingredients were listed as "proprietary," meaning

that the drilling company considered their precise chemical makeup a trade secret, not subject to disclosure. These proprietary ingredients were listed only by their generic chemical types.[13]

The Slawson spill triggered a federal investigation, although to date no charges have been filed. The well was within the boundaries of the Fort Berthold Reservation, although it was on privately owned land. Nearby lies federal land and also Lake Sakakawea, which was formed by the federally built Garrison Dam, both areas administered by the Army Corps of Engineers. There is no federal authority directly related to oil well blowouts per se. However, land nearby includes critical habitat for two species protected under the Endangered Species Act, the piping plover and least tern. Both are endangered and use habitat adjacent to the well site, but none were on the site at the time of the spill since they had flown south for the winter. A company-conducted review of the spill and cleanup found only trace evidence of contamination. The U.S. Fish and Wildlife Service said in late September that it was still reviewing the case to determine if violations had occurred.[14]

> "Accidents will happen. We don't live in a perfect world."
> —then interim Wyoming Oil and Gas Conservation Commission Supervisor, Bob King

By contrast, no fines have been levied against Chesapeake Energy, the company responsible for a blowout that released an estimated two million cubic feet of natural gas and 31,500 gallons of oil-based drilling mud near Douglas, Wyoming in April, 2012. The state has no specific laws or rules that address such blowouts, and its maximum fine for violations of any kind of state oil and gas law is $5,000 per violation per day.[15] No federal agencies have been involved in the investigation to date. "Accidents will happen," then interim Wyoming Oil and Gas Conservation Commission Supervisor Bob King told the press. "We don't live in a perfect world."[16]

Chesapeake told reporters that its air quality testing showed no danger, yet the company asked nearby residents to evacuate the area and provided hotel rooms in Douglas and Casper for three nights to those who chose to leave.[17] By

way of compensation to affected parties like Kristi and Pete Mogen, Chesapeake offered $800 cash for the inconvenience to those families who would waive damage claims. The Mogens turned down the offer because they were not sure of the full extent of damages. Since then, everyone in the family has been sick, as have their livestock. The Mogens, who use no chemicals, fertilizer, herbicide or pesticide on their farm and ranch, believe these illnesses were caused by exposure to drilling muds that spewed from the rig during the blowout. They decided to put their property up for sale, but after two months had no offers.[18]

Fracking waste fluid pit near Pavillion, Wyoming. Photo courtesy: Ecoflight, ecoflight.org.

In Transit

According to the federal Department of Transportation, there are over 2.5 million miles of pipelines in the United States—enough to circle the earth about 100 times. These pipelines are operated by approximately 3,000 different companies.[19] There are also a large but unknown number of smaller oil and gas gathering lines, according to a study by the Roosevelt-Custer Regional Council for Development. Lisa Call, who did the research for the study, said no one "is keeping a comprehensive list of what's being built where.[20]

Oil and gas themselves can become waste materials if they are not captured properly at the wellhead, but can also escape while being delivered to market. Pipeline spills, for example, plagued the Keystone I pipeline during its first year of operation, with the largest spill (about 21,000 gallons of tar sands oil) taking place in southeastern North Dakota in 2011.[21] Those spills made pipeline safety a critical part of the controversy over the proposed Keystone XL pipeline.

An oil spill more than 40 times as large as the Keystone I spill occurred in late September, 2013, when a Tesoro pipeline leaked an estimated 20,600 barrels of crude oil (or 865,200 gallons, the equivalent of approximately 29 tanker railcars) near Tioga, North Dakota, in the heart of the Bakken formation. The spill spread over an estimated 7.3 acres, about the size of seven football fields. A local farmer, Steve Jensen discovered the leak while harvesting wheat on September 29. Jensen told the press he would "like to see better monitoring systems put in place."

Tesoro's director of contingency planning and emergency response, Eric Haugstad, said the pipeline was 20 years old. State environmental geologist Kris Roberts said the spill might have been caused by corrosion. Authorities also said there were "no lakes, streams or rivers…within five miles of the spill." Roberts said a natural layer of clay more than 40 feet thick lies under the spill site, preventing the spill from reaching ground water, and added that the company "got very lucky," presumably because he thought federal Clean Water Act (CWA) and Safe Drinking Water Act (SDWA) violations apparently did not occur. Tesoro told the press that federal EPA and Pipeline and Hazardous Materials Safety Administration (PHMSA) were at the site.[22]

A spokesperson for the Dakota Resource Council told the press the spill demonstrated "the need for tighter regulation." Brian Kalk, chairman of the North Dakota Public Service Commission, the state regulatory agency that oversees pipelines, echoed the sentiment. "When you get more pipeline in the ground," he said, "you need more inspectors.[23]

This was by no means the first major spill in the region. In July 2011, the 20-year old Exxon Silvertip pipeline spilled 63,000 gallons of crude oil directly into the Yellowstone River west of Billings, Montana. The federal government was involved immediately because of the Clean Water Act. According to a 2013 news report, the U.S. Department of Transportation found that Exxon had made the spill worse by taking 46 minutes to close a "key control valve."[24] When Exxon contested the $1.7 million fine levied by the PHMSA, members of the Northern Plains Resource Council, Montana Conservation Voters, the Yellowstone Valley Citizens Council and the National Wildlife Federation held a rally in Billings on July 1, 2013, carrying signs that read "Pay Your Fine" and "Take Responsibility."[25]

Two years after the Exxon Silvertip pipeline leaked 63,000 gallons of crude oil into the Yellowstone River, local citizens rallied by the river in Billings, Montana to protest Exxon's decision to contest a $1.7 million fine for the spill.

A few days later a Phillips 66 pipeline with a record of prior accidents broke again, spilling 25,000 gallons of gasoline on the Crow Indian Reservation near Lodge Grass, Montana.[26]

Spills and leaks are endemic to oil-and-gas-producing areas. One spill in Colorado that gained national publicity early this year took place at a pipeline near a Williams-owned gas processing plant at Parachute, where a pressure gauge on a pipeline failed. Williams reported the spill March 8. As of late June, an estimated 369,000 gallons of contaminants had leaked into groundwater—including cancer-causing benzene and toluene—and left an underground plume of 10.6 acres that was still growing.[27]

Vacuum trucks collected over 60,000 gallons of hydrocarbon material and 5,400 gallons of oil from the Parachute Creek gas plant leak in Garfield County, Colorado. Cancer-causing benzene was detected in the groundwater and in the creek. Photo courtesy: Ecoflight, ecoflight.org.

It's the Pits

Most oil and gas drilling operations avoid blowouts. Nevertheless, managing the fluids, sand and chemicals used in fracking present additional challenges. The first of these is where to direct fracking fluids after they are used (the *flowback* materials), and where to direct everything besides the oil and gas that comes to the surface during drilling and production (the *produced* materials). Reserve pits have long been the industry standard for E&P waste storage. However, there is no federal law or regulation that specifies construction or performance standards for these pits, and leakage is quite possible. Provided that pit construction does prevent leakage, pits are an improvement over simply dumping the waste onto bare ground, where it can migrate to surface water and shallow aquifers.

Natural disasters such as flooding pose another risk at oil and gas exploration and production sites. The severe flooding on September 11, 2013, in the South Platte River and its tributaries along Colorado's Front Range inundated numerous oil and gas installations.[28] The Colorado Oil and Gas Conservation Commission (COGCC) has reported 15 "notable" spills, amounting to about 44,000 gallons, and 1,900 wells shut down due to flooding.[29] This spill count does not include flooded waste pits, which the COGCC has not yet fully assessed. While the Denver Post reports state data documenting 3,200 permits for open pits in Weld County alone,[30] Anadarko and Encana report that they no longer use open pits in Colorado.[31] Two Congressmen, Jared Polis (D-CO) and Peter DeFazio (D-OR) wrote to the House Natural Resources Committee calling for a hearing on the spills.[32]

Such natural disasters can be a stimulus to improved regulation over the long term. It remains to be seen whether Colorado will review or improve its state oil and gas rules in response to the flood, and if so how. In North Dakota, overflows at an estimated 47 reserve pits during the spring thaw of 2011 led to the adoption of new state oil and gas rules by the Department of Mineral Resources. The rules initially proposed to eliminate all reserve pits at wells drilled deeper than 5,000 feet, which would have put an end to these pits at wells in the Bakken and Three Forks formations, where virtually all wells are fracked. However, the rules were amended after industry pleas to allow reserve pits at deeper wells "if they utilize low sodium content water based mud systems." An industry

Crude oil leaking near the South Platte River along the Front Range of Colorado, in September 2013. Photo courtesy: Ecoflight, ecoflight.org.

publication estimated increased costs of $200,000 to $400,000 per well to oil and gas industry operators if pits were outlawed.[33] The Dakota Resource Council criticized the continued use of open reserve pits even for more shallow wells, since shallow wells are "no less likely to overflow than reserve pits for deeper wells, just as likely to cause surface erosion, and even if they do not contain hydraulic fracturing fluids, may contain saltwater and other materials that could contaminate soil and water."[34]

The new North Dakota rules have reduced the amount of waste stored at drilling locations, but of course haven't reduced the amount of waste produced by drilling. One consequence of the new rule has been a proliferation of proposed oilfield and industrial waste management facilities. According to correspondence from the state Department of Health there were seven operating oil waste facilities in North Dakota by September, 2013, and three others permitted or under construction. Seven additional applications were under review, and four had been denied. Another eight proposals had been filed, but the applicants had not completed their submissions. All but one of the 25 existing or pending sites were in oil-producing counties, including eight in Williams County alone.[35]

The wet North Dakota spring of 2011 brought about not only overflowing reserve pits, but the deaths of waterfowl that evidently mistook the pits for seasonal wetlands teeming with feed. U.S. Attorney Timothy Purdon filed suit against seven oil and gas companies under the federal Migratory Bird Treaty Act of 1918 for killing 28 waterfowl. Three companies pleaded guilty and agreed to fines. However, U.S. District Court Judge Daniel L. Hovland threw out the government's complaint. He concluded that, "lawful commercial activity which may indirectly cause the death of migratory birds does not constitute a federal crime."[36] Nevertheless, the case evidently influenced a major state rulemaking that went into effect April 1, 2012, under which "all open pits and ponds which contain saltwater must be fenced" and "all pits which contain oil must be fenced, screened, and netted."[37]

Too Hot to Handle

At some drilling locations, production waste has turned out to be radioactive. WORC reported in *Gone for Good* that some oilfield waste in North Dakota—especially material trapped by filter socks—was setting off Geiger counters at local municipal solid waste landfills. North Dakota has a relatively stringent limit of five picocuries of radiation per gram at waste facilities.[38] The nearest landfill that could legally accept the filter socks was in Colorado. Shortly after the filter sock problem came to light, largely rural McLean County, North Dakota, with a population of less than 9,000, considered establishing an oil waste landfill. The plan was that Great River Energy would turn a tract of strip-mined farmland at the Falkirk mine into an oil waste facility. It met with significant resistance from local residents who were concerned that the state would raise the picocuries limit and bring in radioactive waste. A crowd estimated at more than 120 took part in a County Commission hearing. They saw Commissioner Pam Link, a former Great River employee, move to deny the zoning change request and cast the deciding vote.[39]

In Dawson County, Montana, Oaks Disposal Service had already moved to fill the void. Aided by lack of local zoning control and the more lax state radiation limit of 30 picocuries per gram, landowner Ross Oakland got a Montana Department of Environmental Quality permit for a 130-acre landfill. Its capacity is two million tons of waste, its estimated life 14 years, and its permit includes the ability to bury filter socks and other oilfield waste. Oakland has no experience in waste management.[40] The permit was the first of its kind issued in the state. The state prepared an Environmental Assessment, which concluded there were "no anticipated impacts to groundwater resources," even though it acknowledged that there was an aquifer 15 feet below the surface. Oakland is currently the landfill's only employee and is required to test for petroleum hydrocarbon and radiation levels.[41]

Evidence of radioactive hazards to water posed by flowback and produced water, permitted or not, is growing. A recent research report by several scientists, including geochemist Avner Vengosh of Duke University, found that river sediments downstream from a fracking wastewater plant in western

Pennsylvania "contain 200 times more radium than mud that's naturally present upstream of the plant." The concentrations were higher than those found in some radioactive waste dumps. These findings resulted from two years of monitoring of sediments above and below the plant. Vengosh also noted that levels of salinity in the plant's discharge "were up to 200 times higher than what is allowed under the Clean Water Act—and 10 times saltier than ocean water."[42] Fluid Recovery Services ran the facility, as well as two others in the area, all of which are now closed. The fracking wastes and produced waters are now being disposed of through deep injection. The company settled with EPA over violations and paid $83,000 in CWA fines earlier this year. One of the researchers, Nathaniel Warner, now with Dartmouth College, said he imagined that other facilities in the area have used similar methods, "so some of the larger operators would have similar results."[43]

Dakota Resource Council member Gene Wirtz helped to organize grassroots opposition to stop Great River Energy's plan for an oil waste dump near his farm in McLean County, North Dakota.

The Salt of the Earth

One of most widespread contaminants produced and brought to the surface in the process of oil and gas drilling is salt, which can pollute drinking water supplies and sterilize soil. North Dakota has seen both the Clean Water Act and the Safe Drinking Water Act come into play with relation to saltwater spills. The Safe Drinking Water Act requires that state underground injection programs "shall contain minimum requirements for effective programs to prevent underground injection which endangers drinking water sources."[44] This statute came into play recently in North Dakota when the state's Industrial Commission levied $1.5 million in fines against Halek Operating ND LLC, which "was accused of injecting saltwater into a Stark County disposal well after being told to stop because the site was not up to state standards."[45] Nathan Garber, president of Executive Drilling LLC, recently entered an "Alford plea" in the case, acknowledging there was evidence enough to convict him, and agreeing to a small fine, but not admitting guilt. Garber's company took over Halek in February, 2012, after the violations occurred. The state is now preparing action against the company.[46]

Several years earlier a spill from a North Dakota produced water disposal pipeline in McKenzie County resulted in state regulatory action. The spill was discovered in January 2006, but it is likely that it started in late 2005 and went unnoticed for at least two weeks. The pipeline, owned by Zenergy, was delivering produced water to a central disposal well, but broke near the headwaters of Charbonneau Creek, a tributary of the Yellowstone River. The state Department of Health, which has been delegated primacy to enforce the federal CWA in North Dakota, sued and eventually settled with Zenergy on fines, which could be reduced by remediation activities. On the state DMR data base for spills, Zenergy estimated the spill at 4,500 barrels, or 189,000 gallons. The state, however, estimated at least one million gallons. Between 2006 and early 2012, an estimated 10 million gallons of contaminated water were removed from

surface water, and another 20 million gallons of contaminated groundwater were removed during that period. By 2012, chloride levels at six different pumping stations in the area ranged from 1,000 to 24,000 parts per million—or roughly 200 to 4,800 times the normal levels in the creek. Pumping continues to this day.[47]

Not all oil and gas spills trigger the Clean Water Act or any other federal law, however. There is no federal "Clean Dirt Act," so spills into farmland do not necessarily result in federal or even state enforcement. Lack of authority under the law is probably the reason the Department of Mineral Resources has rebuffed more than one request by the Dakota Resource Council to require input-output monitors on all saltwater disposal pipelines.[48] Instead, the DMR told DRC it was asking for voluntary monitoring in "high consequence" areas—that is areas near surface water (where CWA protections apply). One of the "low consequence areas" turned out to be a field in Bottineau County, North Dakota, where a saltwater line break was discovered July 20, 2011. Petro Harvester, the company that owned the line, said they spilled 300 barrels of saltwater, but Bottineau County emergency manager, Larry Peterson, said the line's capacity was 3,600 barrels per day and estimated a greater spill volume. Terrell Dobkins, vice president of operations for Petro Harvester, said the company would remove the topsoil, but Darwin Peterson, who farms the land, said the saltwater was "already down in the clay base, and from there it will just continue to spread out."[49] The state has taken no enforcement action.

Saltwater spills onto agricultural land are nothing new in North Dakota. In fact, the state at one time actually encouraged disposal of saltwater through ponds, which were called "evaporation ponds," based on the belief that the salt would evaporate. The volume of saltwater produced in North Dakota from 1951 to 1986 was nearly one billion barrels—slightly greater than the volume of oil produced. Permits for evaporation ponds were not required until 1969. By about 1980, ponds were discontinued, and existing ones backfilled and leveled. Companies began to dispose of most waste water in underground injection wells. A 1988 study[50] conducted at two such evaporation ponds in Bottineau County, which were in use from 1959 to nearly 1980, determined that in a semi-arid climate like North Dakota's, brine leaches much more slowly than in wet climates. It also moves horizontally at about seven times the rate it leaches vertically.

Leaching salt damages farmland up to 500 feet from oil facilities as seen in this site in Bottineau County in north-central North Dakota. Photo courtesy of Northwest Landowners Association.

The result has been the persistent sterility of land adjacent to evaporation ponds about 500 feet in all directions. The scientists who conducted the study estimated that the contamination area could continue to grow for hundreds of years. They estimated the cost of clean-up at $20,000 to $30,000 per site, but noted that land restored to typical agricultural production levels would quickly pay for the cost of its remediation. Nevertheless the state has never initiated a program for remediation of brine-damaged lands.

Another regional example of saltwater damages to farm and ranch land has been the result of coal bed methane well discharges in places like the Powder River Basin of eastern Montana and Wyoming. In the Powder River Basin, the groundwater that is pumped to the surface to release CBM is safe for consumption by livestock and as drinking water without treatment, but damages aquatic life and irrigated soils and crops, thus making farms less productive. Yet water quality rules allowed discharges of CBM water into the Tongue River and other rivers and streams.

For years, local irrigators have asked for limits on these discharges. Roger Muggli, a member of the Tongue and Yellowstone Irrigation District and the Northern Plains Resource Council testified before the House Natural Resources Committee in 2007. "What we're asking for is relatively straightforward—stop wasting water and every single one of the problems I've talked about will be minimized. Treat it and reinject it. If that truly cannot be done, put it to a true beneficial use."[51]

The discharges continued, however, often failing to meet Montana's water quality standards. Today, members of the Tongue River Water Users Association like Art Hayes of Birney, Montana, say that saline water discharges by the coalbed methane industry over the last 15 years have polluted their water supply and made farming "very, very marginal." Hayes estimated lost production for area farmers and ranchers at about one-third, and said CBM producers had turned the Tongue River into a "$15 million septic tank." [52] With CBM production declining now in Wyoming, the Water Users Association's case will be heard by the U.S. Supreme Court this fall.[53]

Summary of Findings: What's Wrong with this Picture?

Oil and gas drilling extends over large areas of the United States. It impacts thousands of individual sites, often in remote areas, but increasingly also in or near population centers. The processes that take place at these sites entail both the use of massive volumes of water and the production of massive volumes of waste. A lot of things can and do go wrong, including blowouts at well sites, leaks and spills from a variety of sources, especially tar sand pipelines, saltwater and chemical contamination of land, groundwater or surface water, improper disposal of radioactive waste from produced materials, and floods that overwhelm hundreds of well sites at a time.

NO FEDERAL LAW SPECIFICALLY ESTABLISHES COMPREHENSIVE STANDARDS FOR OIL AND GAS PRODUCTION.

Despite the clear danger of major environmental damage from oil and gas wells throughout the nation, no federal law specifically establishes comprehensive standards for oil and gas production. Oil and gas exploration and production waste is exempt from important protections in numerous federal environmental statutes designed to protect land, air, water and public health. In many cases, such as pipelines and underground injection, those federal protections that do apply are limited. Although proximity of oil and gas facilities to homes, water wells, and bodies of water is a major factor in calculating risks of oil and gas production, no federal law establishes setback distances from all oil and gas installations

Most states and some local governments have enacted their own setbacks and other standards for oil and gas drilling. State regulation is piecemeal, however, and has not prevented what feels to many residents of oil-and gas-producing areas like an endless stream of harmful accidents and impacts. A movement toward local ordinances to provide better protections can be useful in addressing local concerns, but the oil and gas industry generally prefers to see local autonomy curtailed in favor of state hegemony. Not surprisingly, many states where oil and gas are produced discourage such local ordinances, or prevent them altogether.

Recommendations

While fracking has captured headlines across the nation, the concerns and complaints of people living with oil and gas development are more comprehensive. To address the growing controversies surrounding oil and gas development, elected officials, government regulators and the industry itself need to acknowledge real problems that affect those living it its path. They also must commit to regulatory programs that improve industry performance in preventing leaks, spills and other sources of contamination, identifying problems promptly when they do occur, and remediating pollution quickly and completely.

Standards

In general, clear, enforceable performance standards, such as well site construction, waste stream testing and disposal are lacking. The public needs assurance that oil and gas facilities and operations will not pollute the air, water and land that the people rely on. There should be no blowouts, no leaks and spills from pits, pipelines, or other sources. Yet these events regularly occur.

Monitoring

The longer it takes to discover a leak, spill or other contamination, the more extreme the damage is likely to be. It can be difficult to agree on a source of pollution if baseline monitoring has not taken place. Regulators need to embrace the need for comprehensive monitoring and testing systems, including for pipelines, and legislators need to fund them. When these systems are in place, data must be made available to the public in a comprehensive and easily usable form.

Enforcement

The fundamental problem in many boom situations is that the states simply don't have the capacity to enforce their own laws and regulations. The solution is obvious, but has been surprisingly difficult to implement. States simply should not permit more wells than they can properly oversee. Arriving at a reasonable number should be feasible for an enforcement agency. It is equally important that agencies have staff with the expertise to evaluate risks to public health and the environment. Regulatory agencies will need help from elected officials to obtain the personnel and authority they need. Naturally, elected officials are often eager to take credit for a boom that results in increased private investment and state revenue. They also need to understand that oil production, if not properly overseen, is likely to result in a series of accidents that endanger workers and pollute water and soil and damage both public and private property.

Outreach

It is also important that regulators value and seek out the insights and information of local people. Agencies should establish, promote and adequately staff hotlines that allow state residents to report problems at oil and gas sites—and respond to the calls promptly. Too often, people living in and around oil and gas production express frustration at being unable to get the attention of enforcement agencies when they observe spills, accidents or other irregularities. They often have the feeling that the state and industry are working together, and as landowners or local residents they are just in the way. People know their own land better than anyone, and can provide important service to enforcement agencies, which should welcome and even solicit rather than rebuff their reports.

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Watered Down is the second in a series of reports by WORC, the Western Organization of Resource Councils, on the impact of oil and gas extraction impacts on water. *Gone for Good*, the first report, outlined where the oil and gas industry gets the massive quantities of water used for hydraulic fracturing, or "fracking." It also identified how state governments track water use (when they do), and how much is actually consumed without the possibility of reuse any time soon.