



TOXIC WORKPLACE: Fracking Hazards on the Job



Issue Brief • August 2014

Oil and gas workers are being injured and even killed from accidents, and are being exposed to harmful toxins while on the job. The oil and gas industry has promoted the rapid expansion of drilling and fracking across the country as fostering economic development, job creation and energy independence;¹ however, less attention has been given to the serious health and safety risks that burden the industry's workforce.²

Fracking sites, where many laborers work, operate 24 hours a day and are densely packed with personnel, equipment and machinery.³ Many of the most common jobs are dangerous: excavating, drilling, commercial truck driving and operating different types of heavy machinery and diesel-powered equipment.⁴ While on the job, workers can be exposed to countless hazardous materials, radioactive toxins, temperature extremes, and airborne pollutants and respiratory irritants such as diesel particulate matter and silica.⁵

The Process, The Site, The Workplace

Fracking, short for hydraulic fracturing, is a method used to extract natural gas and oil from shale and other rock formations buried deep within the Earth.⁶ Approximately three to

five acres of land need to be cleared to prepare a "drill pad,"⁷ after which heavy machinery is put in place to begin drilling. As described in an *Oil & Gas Monitor* article, "Equipment includes up to 20 diesel-engine-driven compressors, 30 frac tanks for water storage, high pressure pumps and hoses, a crane, a wireline rig, truck-mounted hoppers and delivery systems for sand or ceramic proppants, numerous chemical additive containers, storage tanks for the recovered natural gas and recovered water, and support trailers for site personnel."⁸

After drilling down to a rock formation that holds oil or natural gas, typically drilling sideways through the targeted layer of rock, millions of gallons of water mixed with chemicals and a proppant are injected under extreme pressure to fracture (or "frack") the rock.⁹ New technology allows for a multi-well

pad with as many as 4 to 18 gas or oil wells at a single site.¹⁰ The proppant, most commonly sand, keeps the fractures ajar, enabling oil or natural gas to flow up the well.¹¹

It takes approximately one year to prepare, drill and frack a new onshore oil or gas well, and, according to a study of the Marcellus Shale, about 98 percent of the employment associated with each well occurs during this pre-production phase.¹²

Occupational Injuries

Many common fracking jobs are physically demanding and dangerous.¹³ A 2013 article in the *New York Times* described fracking workplace injuries and the great need to treat them: “The patients come with burns from hot water, with hands and fingers crushed by steel tongs, with injuries from chains that have whipsawed them off their feet. Ambulances carry mangled bloodied bodies from accidents on roads packed with trucks and heavy-footed drivers.”¹⁴ In North Dakota, one county hospital in the midst of the drilling and fracking boom saw the number of emergency room visits quadruple from 2010 to 2012, and the state health department reported that trauma cases in the region tripled between 2007 and 2012. Many of the new patients were uninsured oil workers.¹⁵

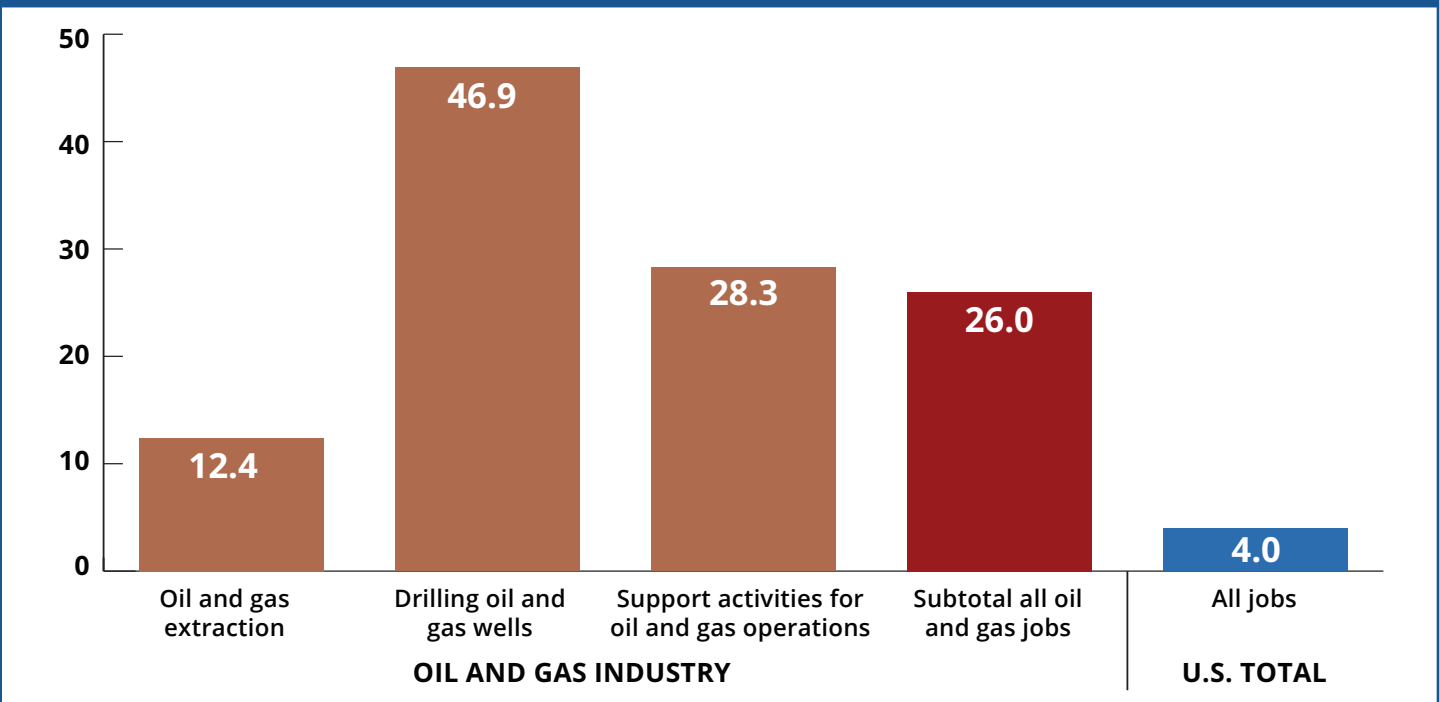
Fatal

Vehicle accidents are the leading and most deadly occupational risk to oil and gas workers. Being struck by or caught in machinery; exposure to chemicals, explosions and fires; and falls to lower levels are among the other most common fatal accidents in the oil and gas extraction sector.¹⁶ Workers can experience fatigue from irregular and long work hours,¹⁷ which increases risk of injury or death. For example, after a 17-hour shift at a natural gas well two years ago, Timothy Roth and three coworkers hopped in a truck for their four-hour drive from Ohio back to their company in West Virginia; the driver fell asleep at the wheel, and Roth was killed.¹⁸

Based on data from the Bureau of Labor Statistics, from 2003 to 2012, 26 out of every 100,000 workers in the oil and gas sector died on the job. That is 6.5 times the fatality rate of all U.S. workers. Drilling oil and gas wells was especially dangerous. During that decade, oil and gas drilling jobs were nearly 12 times as deadly as the average job in the United States.¹⁹ (See Figure 1.)

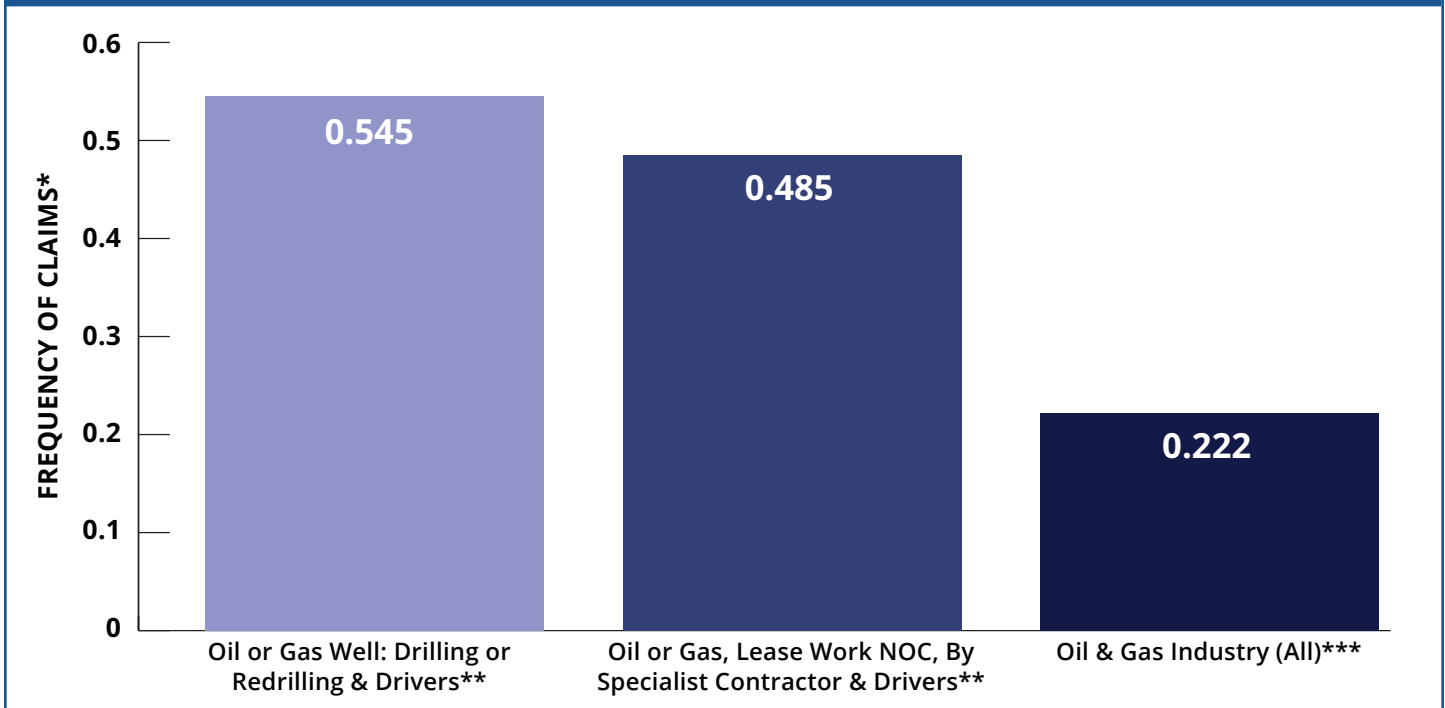
An analysis of the oil and gas extraction industry by the National Institute for Occupational Safety and Health (NIOSH) identified that when drilling activity (i.e., the number of rotary rigs) increased, occupational death rates in the oil and gas extraction sector also increased.²⁰

Figure 1: U.S. Worker Fatality Rates From 2003 to 2012, Fatalities per 100,000 Workers



SOURCE: Food & Water Watch calculation based on the following: Bureau of Labor Statistics. Census of Fatal Occupational Injuries (2003–2010). Available at <http://data.bls.gov/cgi-bin/dsrv?fi>, accessed April 30, 2014; Bureau of Labor Statistics. Census of Fatal Occupational Injuries (2011 Foreword). Available at <http://data.bls.gov/cgi-bin/dsrv?fw>, accessed April 30, 2014; Bureau of Labor Statistics. Quarterly Census of Employment and Wages. Available at <http://data.bls.gov/cgi-bin/dsrv?en>, accessed April 30, 2014.

Figure 2: A Comparison of the Frequency of Workers Compensation Claims in Fracking Jobs vs. in the Entire Oil and Gas Industry, 2011



* Frequency refers to the number of lost-time workers compensation claims in Q1 per million dollars of wage-adjusted payroll.

** According to the NCCI, the following classes of the industry workforce are most likely to be fracking jobs: NCCI Contracting Codes 6235 (Oil or Gas Well Drilling) and 6216 (Oil or Gas Lease Work by Specialist Contractor).

*** Includes all industry class codes, including those representative of hydraulic fracturing.

SOURCE: NCCI. [Research Brief.] "Workers Compensation Claim Frequency - 2013 Update." September 2013 at 27.

Nonfatal

Nonfatal workplace injuries are more difficult to track than fatal injuries because nonfatal injuries are not always reported. Many oil and gas companies offer incentives to encourage laborers not to file workers' compensation claims. "There became a huge push to not report so people can get their stupid jean jackets," according to a Wyoming attorney whose firm represents injured oil workers. "Those are ways of manipulating injury rates in a way that's really disingenuous."²¹

An industry worker, for example, told *Mother Jones* magazine that after he crushed two vertebrae while working at a gas plant, his employer opted to cover his salary for a year rather than having him apply for workers' compensation. "When you report something up here to workman's comp, there's a lot of companies that look at your accident record," he said, "and if you have X amount of accidents they're not gonna let your company work for them."²² According to a safety chief for the AFL-CIO, underreporting occupational injuries distorts the industry's national safety figures.²³

Even with many injuries going unreported, injury rates on fracking jobs are notable. The National Council on Compensation Insurance, Inc. (NCCI) found that in 2011, the frequency

of workers' compensation claims was "substantially higher" for hydraulic fracturing jobs than for the oil and gas industry as a whole.²⁴ (See Figure 2.)

Occupational Health Hazards

More than 1,000 doctors and other healthcare professionals have called on President Barack Obama to protect public health from the harms of fracking.²⁵ Without a doubt, oil and gas industry workers can be exposed to toxic pollutants at the worksite.²⁶ The fracking process itself involves chemicals that could cause cancer, disrupt the endocrine system, affect the nervous, immune and cardiovascular systems, or affect sensory organs and the respiratory system.²⁷

On site, workers can be exposed to volatile organic compounds, including benzene and toluene, as well as fugitive methane, which are often released during fracking and can mix with nitrogen oxide emissions from diesel-fueled vehicles and stationary equipment to form ground-level ozone.²⁸ Chronic exposure to ground-level ozone can cause asthma and chronic obstructive pulmonary disease. When combined with particulate matter of a certain size (less than 2.5 micrometers), ozone can form smog, a harmful form of air pollution.²⁹

Long-term exposure to diesel exhaust and diesel particulate matter, a known human carcinogen, can heighten the risk of cardiovascular, cardiopulmonary and respiratory disease as well as lung cancer. Short-term exposure may cause headaches, eye, nose and throat irritation and dizziness.³⁰ Similarly, mining, processing, transporting and using frac sand generate and spread particulate matter and crystalline silica, a known human carcinogen. These pollutants can exacerbate or cause respiratory and cardiovascular problems.³¹

Frac Sand, A Dusty Carcinogen

Sand is the most common propping agent, or proppant, that keeps the fractures in the source rock ajar, enabling oil or natural gas to flow up the well.³² Long-term exposure to fine particles of silica, a component that makes up as much as 99 percent of frac sand,³³ increases the likelihood of developing silicosis, which damages lung tissue and inhibits lungs function. Breathing silica can make a person more susceptible to tuberculosis and is associated with other diseases such as kidney disease and autoimmune disorders.³⁴ Studies indicate that workers — whether at sand mining operations or at drilling sites — who are exposed to crystalline silica dust have increased lung cancer rates.³⁵

NIOSH and the Occupational Safety and Health Administration (OSHA) have been evaluating worker health and safety hazards related to oil and gas extraction,³⁶ and in 2010 NIOSH began its examination of 11 fracking sites in Arkansas, Colorado, North Dakota, Pennsylvania and Texas. The field studies found that levels of silica dust exposure for many jobs in fracking operation fields were significantly higher than occupational health safety limits and federal safety limits established by NIOSH and OSHA.³⁷ Findings led to the release of the agencies' 2013 Hazard Alert, "Worker Exposure to Silica during Hydraulic Fracturing."³⁸

Worker exposure to silica dust exceeded the NIOSH Recommended Exposure Limit, sometimes by a factor of 10 or more,³⁹ and more than half of the 111 samples of workplace exposures exceeded the OSHA Permissible Exposure Limit and more than two-thirds exceeded the NIOSH limit.⁴⁰ NIOSH and OSHA have plans to continue evaluating health impacts that this industry has on workers by researching various chemical exposures — including diesel emissions, fracking fluids, hydrogen sulfide and volatile organic compounds.⁴¹

Unexpected and Unexplainable Illness

In addition to the numerous air pollutants, workers can be exposed to elevated levels of radiation through direct contact with radioactive waste during transport or while working at the site.⁴⁵

Some of the water used to frack a well returns to the surface as wastewater. This flowback wastewater contains, in addition to the original fracking fluids, potentially extreme levels

Renewed Investment in OSHA Is Needed

Over the years, OSHA has become underfunded and understaffed, and when a penalty is issued, it is often too weak to act as a deterrent.⁴² Federal divestment and neglect of OSHA is detrimental to the health and safety of all workers, including those working dangerous oil and gas extraction jobs. OSHA lacks the resources necessary to effectively limit or reduce fatalities in the oil and gas industry⁴³ and to monitor overall safety.

The AFL-CIO's 2013 report *Death on the Job: The Toll of Neglect* described the severity of this problem:

At its current staffing and inspection levels, it would take federal OSHA 131 years to inspect each workplace under its jurisdiction just once. In seven states (Arkansas, California, Delaware, Florida, Louisiana, New Hampshire and South Dakota), it would take 150 years or more for OSHA to pay a single visit to each workplace. In 24 states, it would take between 100 and 149 years to visit each workplace once. Inspection frequency is better in states with OSHA-approved plans, yet still is far from satisfactory. In these states, it now would take the state OSHA plans combined 76 years to inspect each worksite under state jurisdiction once.⁴⁴

of harmful contaminants, which can include arsenic, lead, hexavalent chromium, barium, strontium, benzene, polycyclic aromatic hydrocarbons, toluene, xylene, corrosive salts and naturally occurring radioactive material, such as radium-226.⁴⁶

When awaiting disposal in pits or holding tanks, the naturally occurring radioactive materials can become concentrated and can produce technologically enhanced naturally occurring radioactive materials.⁴⁷

"If I would have known the damage those tanks would do to me, I would never have cleaned them," said Jose Lara, a former industry worker, in a recorded disposition. For six years, his job had been to climb into and clean wastewater tanks for natural gas drilling companies. Lara, now deceased, believed that he got pancreatic and liver cancer from his job.⁴⁸

Despite the noxiousness of the wastewater, Lara was not supplied with any protective clothing or gear nor was he briefed on the toxins he would be exposed to on the job. He described the chemicals he cleaned out of tanks as smelling terrible. "Once I got out, I couldn't stop throwing up," he said in his disposition. "I couldn't even talk."⁵⁷

After Jose Lara passed away, OSHA eventually issued citations and fined his employer for nine violations of federal law for

Radiation Exposure

Radon is a naturally occurring radioactive material that is the leading cause of lung cancer among non-smokers in the United States, killing more than 20,000 Americans each year.⁴⁹ Radon forms from the radioactive decay of radium, which is often present in the formation waters of sedimentary basins.⁵⁰

Any level of radiation from radon can damage DNA, and this damage can result in cancer-causing mutations, so no level of radon exposure is safe.⁵¹ The U.S. Environmental Protection Agency recommends taking action if indoor air contains radon at or above a concentration of 4 picocuries per liter (pCi/L).⁵²

In a preliminary analysis, the U.S. Geological Survey (USGS) found that 6 out of 10 natural gas samples from three Marcellus Shale wells had radon at or above a concentration of 30 pCi/L.⁵³ In two samples from one well, the produced gas contained radon above 75 pCi/L.⁵⁴ Estimates based on earlier data suggest that much higher levels of radon are possible.⁵⁵ It takes about four days of radioactive decay to cut radon concentration in half.⁵⁶

exposing Lara to hydrogen sulfide,⁵⁸ a noxious, colorless gas described as having a “rotten egg” stench; it is naturally occurring in natural gas and crude petroleum. Exposure to it can cause respiratory problems, headaches, nausea, vomiting, headaches, difficulty breathing, coma, convulsions and death.⁵⁹

Lara’s story, unfortunately, is not an isolated incidence. Randy Moyer, for instance, worked for the fracking industry as a subcontractor, tasked with hauling shale gas wastewater in the Appalachia region, scrubbing mats placed around wells and climbing into large tanks to clean remaining fracking fluids out.⁶⁰ Now Moyer is extremely ill, and despite meeting with over 40 doctors, not one can determine the source of his rashes, migraines, pain that shoots down his back and legs, irregular heartbeat and chest pain, the relentless white noise ringing in his ears, or his blurred vision, vertigo, memory loss and breathing difficulties that necessitate the use of inhalers.⁶¹

Mac Sawyer, a former coworker of Moyer who is also now ill, told a public health forum on fracking, “Randy’s [sick] in a really bad way.” Moyer was too sick to attend the forum, so

Sawyer talked about his friend’s experience. “They had him cleaning out the frack trucks without any protective gear,” Sawyer said. “Other guys are just wearing a paper jumpsuit, a hardhat, no mask, essentially no protection. They send you in tethered to a rope, and if you pass out, someone hauls you out.”⁶² Sawyer also experiences swelling, rashes and skin burns, breathing difficulties, pain in his spine, headaches, nosebleeds and painful joints.⁶³

“A Culture of Fear”⁶⁴

Almost all fracking jobs occur during the drilling phase and are filled, at least initially, by out-of-state employees or workers that relocate to the towns, which fuels population growth.⁶⁵ North Dakota has had an influx of young male fracking workers, many of whom retain their primary homes elsewhere and live in temporary dorm-like *man camps*.⁶⁶ One laborer, who regrettably missed the birth of his son because he needed to earn an income to support his family, compared living in a man camp to a prison cell.⁶⁷

Population growth can also trigger housing shortages and inflate the prices for what little housing is available. So when necessary shelter is unavailable, some workers, despite their high salaries, end up homeless, living in cars or RVs in campgrounds, at truck stops or in retail parking lots.⁶⁸

Moreover, these workers are often isolated from their families and social ties, making already bleak living conditions emotionally taxing. For some — looking to cope, and armed with ample incomes and little to occupy their time — it can lead to increased drug and alcohol abuse and rowdy behavior.⁶⁹ One 23-year-old transient worker residing in Pennsylvania admitted: “We definitely do drink a lot. I ain’t going to lie.”⁷⁰

“It’s a sick industry,” said a former industry trucker whose job was to haul water. “...when they told me go clean a frac truck out, I said under OSHA regulations I’ve got to have a haz mat suit on. They laughed me out of it. It’s a culture of fear that’s in the oil industry right now...”⁷¹

The jobs created by this industry are physically and mentally taxing; it encourages workers not to report their injuries while forcing them to live in difficult and isolating conditions. These are not the long-term sustainable jobs that people need or deserve. The oil and gas industry has tried its hardest to obscure the harms that it inflicts upon humans and the environment, and fracking workers deserve greener, healthier, safer forms of employment.

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