Workers Compensation and the Oil and Gas Industry

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Oil and gas issues, and particularly the practice of hydraulic fracturing ("fracking"), have received increased attention in state legislatures and the media over the past few years.

Fracking is a process for extracting oil and natural gas from low permeability source rock, typically shale. It involves pumping water, sand, and chemicals into a source rock formation under sufficient pressure to create fractures which increase permeability and enable the extraction of oil and natural gas. The fracking fluids flow back to the surface together with the hydrocarbons that are produced.

In addition to the economic and public health concerns that are typically raised in association with discussions about fracking, there is also a workers compensation element to be considered. The following offers a brief history and overview of the industry, along with some discussion of the workers compensation-related issues that bear watching if the industry continues to grow.

History of Fracking

The *Schlumberger Oilfield Glossary* provides the following definition of hydraulic fracturing:

> A stimulation treatment routinely performed on oil and gas wells in low-permeability reservoirs. Specially engineered fluids are pumped at high pressure and rate into the reservoir interval to be treated, causing a vertical fracture to open. The wings of the fracture extend away from the wellbore in opposing directions according to the natural stresses within the formation. Proppant, such as grains of sand of a particular size, is mixed with the treatment fluid to keep the fracture open when the treatment is complete. Hydraulic fracturing creates high-conductivity communication with a large area of formation and bypasses any damage that may exist in the near-wellbore area.

Fracking has been around for decades, at least since the 1940s. But it wasn't widespread until 2003, when energy companies began actively expanding oil and natural gas exploration, especially in Texas, Oklahoma, North Dakota, Pennsylvania, West Virginia, Wyoming, and Colorado. In 2004, an Environmental Protection Agency (EPA) study found that fracking was not a threat to underground drinking-water supplies. Shortly afterward, hydraulic fracturing was exempted from the Safe Drinking Water Act as part of the Energy Policy Act of 2005. These developments aided the rapid expansion of the fracking industry.

In October 2013, *The Wall Street Journal* reported that at least 15.3 million Americans live within a mile of a well that's been drilled since 2000. For example, in Johnson County, Texas, a county south of Fort Worth, there were less than 20 oil and gas wells in 2000. However, at the time of the article, there were more than 3,900 wells in the county, and 99.5% of its 150,000 residents lived within a mile of a well. According to *The Wall Street Journal*, similar changes took place in parts of Colorado, Pennsylvania, and Wyoming.

In 2014, FracTracker, an independent oil and gas research group, utilized data available from individual state governments to count and map more than 1.1 million active oil and gas wells across 36 states.

Perceived Benefits of Fracking

The perceived benefits of fracking include:

- Jobs, economic stimulus, and increased energy security.
- According to the US Energy Information Administration, increased use of natural gas is improving the environment by helping reduce carbon dioxide emissions in the United States to their lowest levels since 1994. A modern natural gas-fired electricity power plant emits about half the carbon dioxide per kilowatt-hour as a coal-fired power plant.
- More plentiful and domestically produced oil and natural gas.

Perceived Dangers and Drawbacks

As the fracking industry grows, so does the level of controversy over the process. The primary concerns include:

- High consumption of water resources
- Potential impact on drinking water and surface water resources
- Generation of large volumes of wastewater, which must be disposed of safely
- Potential for stimulating earthquakes due to injection of wastewater deep underground

Because the fracking process requires large amounts of water and chemicals, there is the possibility of those chemicals leaching into underground water supplies. Additionally, it is difficult to check water supplies for the chemicals. The manufacturers of chemical compounds used for fracking assert that the ingredients are trade secrets, so it is difficult to determine which chemicals to test for and difficult to pinpoint the source of any contamination.

Furthermore, fracking can release cancer-causing chemicals such as benzene and methane during the drilling process. However, this is not unique to fracking and can occur with other types of drilling.

Workers Compensation Implications

The rapidly expanding fracking industry has increased demand for skilled employees in oilfield service industries, particularly well drilling and completion, transportation, and pipeline construction. This may result in an increase in frequency of claims due to an influx of new and inexperienced workers. In addition, the scope of the work is inherently dangerous, which may increase the severity of injuries. Furthermore, because drilling sites are often in remote locations, quick access to medical facilities may be limited.

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According to the North Dakota Petroleum Council, since 2007, oil and gas job growth has tripled, workers compensation claims have quadrupled, and oil and gas truckers' workers compensation claims have grown six-fold.

The Occupational Safety and Health Administration (OSHA) and National Institute for Occupational Safety and Health (NIOSH) have noted the following impacts from fracking:

- Growth in silica exposure
- Exposure to exhaust gases
- High and low temperature extremes
- High noise levels
- Overexertion and fatigue
- Increasing motor vehicle accidents and injuries
- Fires and explosions

The medical implications include:

- Stress on medical facilities
- Growth in emergency room visits
- Growing number of injuries to uninsured laborers, leading to growth in hospital debt
- Lack of trained medical staff
- Increase in severe injuries
- Inability to provide complete rehabilitation and other therapeutic care

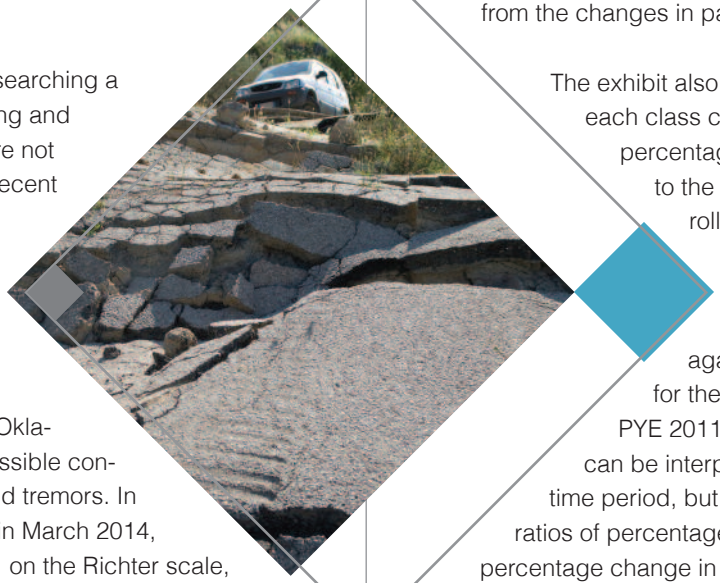
Related Implications

Drilling escalation has increased motor vehicle traffic, especially for large vehicles and equipment, and there has been a growth in traffic accidents in drilling areas. For example, in May 2014, the *Associated Press* reported:

- In North Dakota, drilling counties' population increased by 43% in the last decade; however, traffic fatalities increased 350%
- In a Texas drilling area, drivers were 2.5 times more likely to have a fatal accident than the statewide average for miles driven
- In West Virginia drilling areas, traffic fatalities increased 42% while the rest of the state decreased by 8%

According to OSHA, vehicle accidents are the biggest cause of fatalities to oil and gas workers. Furthermore, the velocity of growth exceeds the ability of governments to increase services and maintain essential infrastructure.

In addition, scientists are researching a possible link between fracking and earthquakes in states that are not known for seismic activity. Recent research published by the Seismological Society of America concludes that some earthquakes in Ohio during 2013 and 2014 coincided closely with hydraulic fracking in the same areas. Oklahoma is investigating the possible connection between fracking and tremors. In California, two earthquakes in March 2014, which registered 3.6 and 5.1 on the Richter scale, have raised concerns that fracking and tremors are related.



Workers Compensation Experience for the Oil and Gas Industry: PYE 2007 – PYE 2011

Matching Class Codes With Industry Functions

NCCI does not capture experience for workers compensation fracking exposures per se. But, much of the recent growth in classifications related to oil and gas industries is due to fracking.

Exhibit 1 on page 37 shows data for workers compensation claims for classification codes relevant to the oil and gas industry over policy years ending (PYE) 2007 through 2011. Class codes are grouped according to major industry function: drilling and completion, production, and transportation.

The exhibit shows aggregate payroll for PYE 2011 by class and changes in aggregate payroll, frequency, severity, and total loss dollars from PYE 2007 to PYE 2011:

- Payroll is in millions of dollars and adjusted for wage changes through 2011
- The change in frequency is the change in the number of lost-time claims per million dollars of wage-adjusted payroll at first report
- The change in severity is the change in the average cost per lost-time claim, medical and indemnity combined, at first report
- The change in total loss dollars is the change in the total loss dollars at first report; this change can be derived from the changes in payroll, frequency, and severity

The exhibit also shows the loss elasticity for each class code, which is the ratio of the percentage change in total loss dollars to the percentage change in payroll. The loss elasticities reported here were estimated via linear regression of the logarithm of total loss dollars against the logarithm of payroll for the five years from PYE 2007 to PYE 2011. The estimated elasticities can be interpreted as averages over the time period, but do not necessarily match the ratios of percentage change in total loss to the percentage change in payroll between the terminal years PYE 2007 and PYE 2011.

Under Drilling & Completion, Class Code 6235 covers well drilling, and Class Code 6206 covers most fracking and pressure pumping operations; in both cases subject to the requirement that these are performed by a contractor other than the lease operator, which is standard practice in the

Exhibit 1 **Oil and Gas Workers Compensation Experience**

Class Descriptions	Class Code	PYE 2011 Payroll (in millions)	Change from PYE 2007 to PYE 2011 Payroll	Frequency	Severity	Total Loss $	PYE 2007 to PYE 2011 Estimated Loss Elasticity
Drilling and Completion							
Oil or Gas Well—Drilling or Redrilling & Drivers	6235	$ 1,246.6	–12.9%	–22.8%	17.8%	–20.8%	**0.9**
Oil or Gas Well—Cementing & Drivers	6206	705.5	–3.3%	40.1%	–0.8%	34.3%	**–0.5**
Oil or Gas Well—Specialty Tool & Equipment Leasing NOC	6213	1,169.3	12.7%	3.2%	33.1%	54.8%	**1.3**
Oil or Gas Well—Instrument Logging or Survey Work & Drivers	6237	1,474.7	9.3%	–32.9%	71.2%	25.7%	**0.9**
Lease Operator Group (Mostly Production)							
Oil or Gas Lease Operator—All Operations & Drivers	1320	$ 2,209.5	33.7%	–39.7%	8.4%	–12.6%	**–0.5**
Oil or Gas—Lease Work NOC—By Specialist Contractor & Drivers	6216	2021.8	42.0%	–20.5%	–0.4%	12.4%	**0.3**
Pipeline Group							
Oil or Gas Pipeline Construction & Drivers	6233	$ 1,420.7	96.9%	–25.6%	66.0%	143.3%	**1.3**
Oil or Gas—Pipeline Operation & Drivers	7515	1,938.5	21.1%	–31.2%	83.8%	53.2%	**2.5**
Other Codes							
Tool Mfg.—Agricultural, Construction, Logging, Mining, Wells	3126	$ 1,515.3	12.0%	–24.3%	57.8%	33.8%	**2.8**
Total		$ 13,701.8	21.3%				

Statistical Plan data for all states where NCCI provides ratemaking services, excluding WV
Payroll is adjusted for wage changes through 2011
Frequency is lost-time claims at 1st report per $1M of wage-adjusted payroll
Severity is the average reported cost per lost-time claim as of 1st report, medical and indemnity combined

industry. And Class Codes 6213 and 6237 cover specialized measurement, repair, or workover functions, also as performed by contractors.

For the Lease Operator Group, Class Codes 1320 and 6216 capture a broad range of similar activities mostly related to production, and are distinguished by the worker's relationship to the lease operator. Class Code 1320 applies to functions performed directly by the lease operator or principal contractor, while Class Code 6216 covers similar functions if performed by a specialist contractor. A specialist contractor is likely to have less familiarity with the well site than the lease operator.

The Pipeline Group consists of Class Codes 6233 and 7515, which pertain to pipeline construction and pipeline operation, respectively. The long-term development of oil and gas fields requires construction of pipelines from producing regions to end markets, although rail transportation may substitute during an oilfield's early development.

Impact on Workers Compensation Loss Patterns: Pipelines a Big Driver

Frequency and Severity: All of the class codes for the oil and gas industry have relatively high frequency and severity rates per payroll. As in most other industries, claim frequency declined across most oil and gas class codes from PYE 2007 to PYE 2011. Severity increased for most oil and gas class codes. Some of the biggest increases in severity occurred in the Pipeline Group, both construction and operation. Interestingly, Oil or Gas Well Cementing (Code 6206) is the exception—frequency increased significantly but severity decreased slightly.

Loss Elasticity: Because the market for oilfield services related to drilling, completion, and transportation is national rather than regional or state-specific, and since the period from 2006 has shown a rapid industry expansion followed by a plateau around 2011, it makes sense to consider the relationship between losses and payroll for different class codes. A question is, have total loss dollars changed in proportion to payroll, or have they varied more or less than payroll since the beginning of the shale boom?

A simple metric for answering this question is the loss elasticity with respect to payroll, which is the ratio of the percentage change in total loss dollars to the percentage change in payroll over the relevant data period. Of course, the change in total loss dollars can be separated into the change in payroll, the change in frequency, and the change in severity. A loss elasticity of one is a useful benchmark: it signifies that total loss dollars changed in direct proportion to payroll for the affected class code. Similarly, loss elasticity greater than one indicates increased loss incidence in a class code where payroll has expanded. The elasticity metric will confound trend effects (e.g., frequency changes, with all else equal) with scale effects (e.g., payroll changes, with all else equal) if both are occurring simultaneously over the same time period.

However, as NCCI research has shown that loss trends in most industries are (mildly) negative, we would expect to observe long-term loss elasticities less than or equal to one for most class codes. Conversely, a loss elasticity significantly above one indicates that loss rates for a class code are particularly sensitive to payroll changes in that segment of the oilfield service industry. The elasticities discussed here are based on five years of experience for each class.

While they reflect relationships between payroll changes and loss changes during this period of growth, they are not likely to be indicative of longer-term elasticities.

Elasticity: Drilling and Fracking. Loss elasticity for drilling (Code 6235) is close to one. Loss elasticity for Class Code 6206, including most fracking and pressure pumping services, is negative, indicating that total loss dollars increased as payroll decreased.

Elasticity: Pipelines. Loss elasticity is above one for both class codes in the Pipeline Group (6233, 7515). Note also that both pipeline codes experienced large payroll increases from PYE 2007–PYE 2011.

Elasticity: Tool Manufacturing. Class Code 3126, covering the manufacture of tools used in oilfield services as well as other sectors, has the highest loss elasticity of any class code surveyed here. However, Code 3126 is concentrated in Texas—81% of payroll and 75% of total loss dollars for PYE 2011 occurred in Texas—whereas every other class code in the table has a much more national employment footprint.

Elasticity: Measurement, Repair, Workover Services. The loss elasticity greater than one for Class Code 6213, which pertains to measurement, repair, or workover services distinct from drilling or fracking, is largely driven by exceptionally high losses in PYE 2011. If PYE 2011 constitutes an outlier, then the resulting high elasticity is an anomaly.

Pipelines a Big Driver: These observations suggest that a major driver for workers compensation losses via the shale boom is not drilling and fracking per se, but rather, associated employment growth in related sectors, especially pipelines, induced by oil and gas development.

In summary, for this group of nine classes, payroll went up 21% from PYE 2007 to PYE 2011, while total loss dollars rose 15%. For the combination of the two classes in the Pipeline Group, payroll rose 45% and losses increased 95%.

Continued Expansion?

At the end of 2014 and beginning of 2015, gas and oil price drops were threatening profits from fracking, which is more expensive than conventional drilling. In November 2014, in fact, Reuters reported that permit applications to drill oil and gas wells in the United States declined almost 40%.

While some experts expect that the price drops will lead to less domestic production, others hold that the industry will continue to maintain and even increase production for at least several years.

Apart from the economic questions, workplace safety and workers compensation claims issues associated with the fracking industry will continue to be an area of broad industry interest.

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