

Fatal Injuries

in the upstream U.S. oil and gas extraction industry

**FIGURE 1 — Leading Causes of Fatality by Company
U.S. Oil and Gas Extraction Workers 2003-2008**

| Rank | Operator 121 (18%) | Drilling Contractor 198 (31%) | Well Servicing Company 329 (51%) | All Company Types 648 |
|-------|------------------------------|-------------------------------------|--|-------------------------------|
| 1 | Highway Crash 29 (24%) | Struck by Object 52 (26%) | Highway Crash 120 (36%) | Highway Crash 190 (29%) |
| 2 | Struck by Object 19 (16%) | Highway Crash 41 (21%) | Struck by Object 60 (18%) | Struck by Object 131 (20%) |
| 3 | Aircraft 14 (12%) | Falls 28 (14%) | Explosion 34 (10%) | Explosion 53 (8%) |
| 4 | Fire 14 (12%) | Caught/compressed 17 (9%) | Caught/compressed 20 (6%) | Caught/Compressed 46 (7%) |
| 5 | Explosion 10 (8%) | Electrocution 13 (7%) | Fire 15 (5%) | Falls 45 (7%) |
| Other | 35 (28%) | 47 (23%) | 80 (25%) | 183 (29%) |

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Oil and gas extraction requires frequent use of heavy tools and equipment, work in remote and rugged environmental conditions and is physically demanding. These factors may influence the industry's fatality rate, which is seven times higher than for all U.S. industries (according to U.S. Bureau of Labor Statistics. [2010]. "Census of Fatal Occupational Injuries"). The authors' previously found a significant relationship between the average annual number of rotary rigs and the industry's fatality rate. This relationship may be a result of more inexperienced workers, longer work hours, and the use of older rigs during times of high demand. In order to identify the most common causes of fatality and the groups of

workers most at risk, the National Institute for Occupational Safety and Health (NIOSH) conducted an analysis of fatalities in the oil and gas extraction industry.

Methods

NIOSH analyzed the Bureau of Labor Statistics' (BLS) Census of Fatal Occupational Injuries (CFOI) to identify and describe fatalities to oil and gas extraction workers during 2003-2008, the most current data available. CFOI is a cooperative program between federal and state agencies to track the number of all fatal, work-related injuries. Oil and gas extraction companies were identified by the North American Industry Classification System (NAICS) codes 211 (oil and gas operators); 213111 (drilling

contractors); and 213112 (well servicing companies). To analyze fatalities by company size, companies were categorized the following way: "small" companies employed fewer than 20 workers; "medium" companies employed 20-99 workers; and "large" companies employed 100 or more workers (in one location). Fatality rates were calculated using worker estimates from the BLS' Quarterly Census of Employment and Wages (QCEW) Program. In addition, the authors reviewed the narrative field in the CFOI dataset for all highway crash fatalities for the purpose of identifying risk factors contributing to each crash.

The purpose of this analysis was to: (1) identify the most common types of fatalities; (2) investigate

risk factors that may contribute to those fatalities; (3) compare the risk of being fatally injured by company type and size; and (4) determine the proportion of “short service workers” who died.

Results

There were 648 oil and gas extraction workers who died on the job during 2003-2008. Workers employed by well servicing companies made up half of all fatalities (329 or 51%), followed by drilling contractors (198 or 31%) and then operators (121 or 18%). The most common fatality was highway crashes, making up 29% of fatalities as shown in **Figure 1**. Highway crashes included crashes on all public roads but not including parking lots or private lands. Being struck by an object was the second most common type of fatality for workers, resulting in 131 deaths. Thirty of the workers were struck by metal or other heavy pipes and another 25 were struck by machinery or other equipment.

Fatalities varied by company type. Highway crashes were the most common type of fatality for well servicing companies and operators (36% and 24% respectively), but being struck by an object was the most common fatality for workers employed by drilling contractors (26%).

Of the 190 highway crash fatalities, half involved workers who were occupants of a pick-up truck and another one-quarter (28%) involved workers who were occupants of a large truck. The majority of fatal crashes (65%) occurred on rural state/U.S. highways rather than on interstates, freeways or expressways. Over one-third of the events were single vehicle events where the vehicle jack-knifed or overturned. Single vehicle events were much more common among large trucks. Even though seatbelt use was not consistently reported, 40% of fatalities (76 deaths) occurred to workers who were

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not wearing a seatbelt at the time of the crash. In 19 more fatalities, the decedent was ejected from their vehicle, indicating that a seatbelt was most likely not worn. Apart from seatbelt non-use, another driver’s error (worker died in a crash that was caused by another driver) was the most commonly reported factor in the crashes, followed by excessive speed, and overcorrecting and losing control as **Figure 2** illustrates.

During 2003-2008, the fatality rate for oil and gas extraction workers was 29.1 per 100,000 workers as compared to 3.9 per 100,000 for all U.S. workers. While the number of fatalities increased by 41% during 2003 and 2008 (85 and 120

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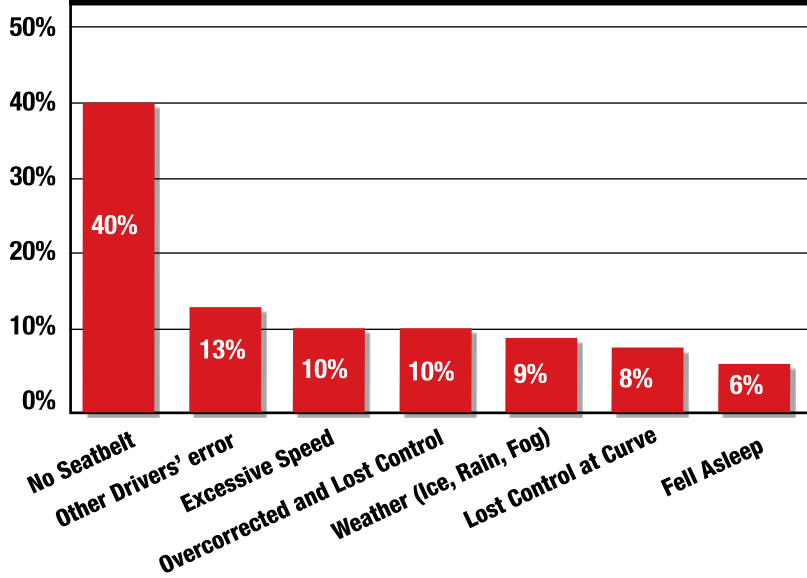
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FIGURE 2 – Most commonly noted contributing factors in motor vehicle fatalities, 2003-2008



deaths respectively), there was a 62% increase in the number of workers employed in the industry (US BLS 2009) and a 46% increase in the number of active drilling and workover rigs (Baker Hughes and Guiberson 2008). As a result, the overall fatality rate remained elevated during the time period with a slight decrease between 2007 and 2008.

The risk of fatality varied by company type and size. Overall, drilling contractors had the highest fatality rate at 45.8 per 100,000 workers, followed by well servicing companies with 33.3 and oil and gas operators with 15.0 as **Figure 3** shows. In terms of company size, companies with fewer than 20 employees experienced the highest fatality rate at 65.5 deaths per 100,000 workers, as compared to medium

and large sized companies with 23.4 and 13.4 respectively. When the fatality rates were examined by both company type and size, small drilling contractors were found to have the highest fatality rate at 211.7.

The largest proportion of workers who died were new employees, or “short service workers.” The length of service with the employer was only reported for 56% of workers who died. Where it was reported, more than half of the workers (198 or 55%) had been employed by their current employer for exactly one year or less as shown in **Figure 4**. There were some notable differences in the type of fatalities occurring to these short service employees as compared to other workers. The following types of injuries more commonly killed short service workers: struck

by object, caught-in equipment, contact with electric current, explosions, fires and pedestrian injuries. It was not possible to calculate fatality rates for workers based on length of service because there are no industry estimates on the number of workers by length of service. Nonetheless, this suggests that short service workers may be at increased risk of being fatality injured on the job.

Our analyses show that the oil and gas extraction industry continues to have a high fatality rate, but the risk of being fatally killed varies among workers. Understanding which groups of workers are most at risk of being killed provides information that will help better target prevention efforts. Based on our analysis, we have identified three key measures that should be adopted by oil and gas extraction companies and others whose mission is to improve safety in the industry: (1) assure the routine use of seatbelts by all workers; (2) increase attention to the safety and health of workers employed by small companies; and (3) increase training and/or more supervision of workers with less than one year with their current employer.

- Seatbelts have been proven to reduce the risk of fatality in a motor vehicle crash by 45%. Many oil and gas companies mandate the use of seatbelts. Nonetheless, these data indicate that continued efforts to increase seatbelt use among oil and gas workers through education and enforcement are needed. In addition, considering that half of all fatalities occurred in pick-up trucks, companies need to be vigilant in their motor vehicle

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FIGURE 3 — Rate (and Number) of Fatal Injury by Company Type and Size, U.S. Oil and Gas Extraction Workers 2003-2008

| Company Type | Small (0-19 workers) | Medium (20-99 workers) | Large (100+ workers) | Total |
|---------------------|----------------------|------------------------|----------------------|------------|
| Drilling Contractor | 211.7 (72) | 47.0 (39) | 20.8 (49) | 45.8 (198) |
| Well Servicing Co. | 72.0 (136) | 25.2 (90) | 18.1 (69) | 33.3 (329) |
| Operator | 28.2 (47) | 9.6 (18) | 5.3 (23) | 15.0 (121) |
| Total | 65.5 (255) | 23.4 (147) | 13.4 (141) | 29.1 (648) |

Company size is derived from the BLS/CFI field "Establishment Size" which identifies the number of workers employed by a company in a specific region and is not necessarily the size of the entire company. Rates calculated per 100,000 workers. The total column includes 105 fatalities for which the company size is unknown.

safety programs with all of their drivers, not just their commercially licensed drivers.

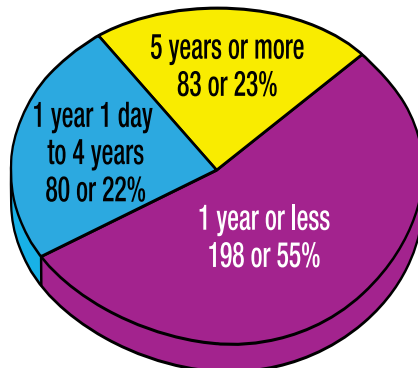
- Workers of small companies were five times as likely to die as those employed by large companies. Small companies may lack the resources to employ full-time safety and health professionals. Oil and gas companies who hire small contractors need to be aware that their workers may need additional safety training. Small contractors need to also feel empowered to stop a job if they identify safety and health problems and bring them to the attention of the company man or rig supervisor without retribution.

- Short-service employees need special attention, with particular attention to the most frequent types of fatality. Safety programs should include on-the-job mentoring and task and site-specific training. Where a formal program is not feasible, assigning an experienced worker to help "watch out" for a new employee during their first year may be a useful alternative. Standardized, industry-specific training is readily available for the oil and gas contractor community.

Conclusion

As an industry, we must continue to strive toward safe operating conditions and safe workplace environments. Our prevention efforts will lower incident rates and help to save lives. 🏠

FIGURE 4 – Number and Percent of Fatalities by Length of Employment



Note: Length of employment was missing from 287 fatalities.

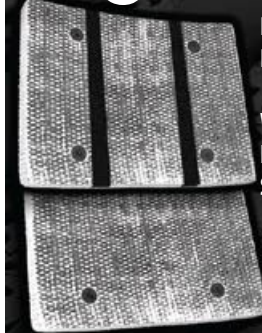
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