

OIL AND GAS EXTRACTION WORKER FATALITIES 2014

NIOSH Fatalities in Oil and Gas Extraction (FOG) Database



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Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

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EXECUTIVE SUMMARY

This report describes fatal incidents identified by the NIOSH Fatalities in Oil and Gas Extraction (FOG) database that occurred in 2014. The purpose of FOG is to collect detailed information about worker fatalities related to U.S. oil and gas extraction. This report provides updates to fatalities published in the *Oil and Gas Extraction Worker Fatalities, 2014 Mid-year Report: January 1, 2014–June 30, 2014*, and also includes fatalities from the second half of the year. It is intended to serve as a resource for health and safety professionals, managers, and other stakeholders in identifying and eliminating hazards encountered by workers during oil and gas extraction operations. In this report, fatalities are presented by rig count, workforce, location, industry group, event type, operation, activities, and the number of fatalities per incident. Cardiac and undetermined fatalities with no known work exposure are excluded from this report (unless otherwise specified on page 11), but are included in FOG. More information about the FOG database is available on the website at <https://www.cdc.gov/niosh/topics/fog/>.

SIGNIFICANT FINDINGS

FOG identified 88 fatal incidents accounting for 101 fatalities that occurred in 2014.* In ten of these incidents, more than one worker was fatally injured. Fatalities occurred in 14 states, with the largest proportion occurring in Texas (44%), Oklahoma (11%), and North Dakota (10%). These states also had the greatest proportion of industry activity (as measured by the number of active U.S. rotary rigs), with 47%, 11%, and 9% respectively.

The majority of fatalities in FOG were to workers from servicing companies (45 fatalities, 45%). Fatal incidents to servicing company workers occurred throughout all oil and gas extraction operations, with the largest proportions occurring during completions (14 fatalities), production (11 fatalities), and well servicing, workover, or intervention (5 fatalities). The industry group with the second highest number of fatalities were drilling companies (27 fatalities, 27%). Most of these fatalities were concentrated during drilling operations (20 fatalities). Across all operations, drilling operations accounted for the largest proportion of all fatalities (26%, 26 fatalities). Material handling using a crane, forklift, or winch truck was the activity associated with the most on-site fatalities (n=12), occurring across different company types and operations.

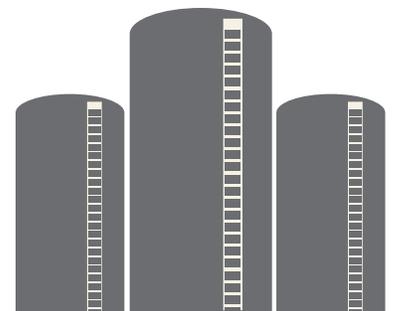
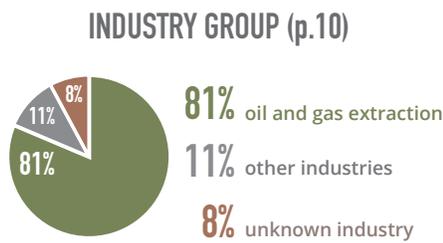
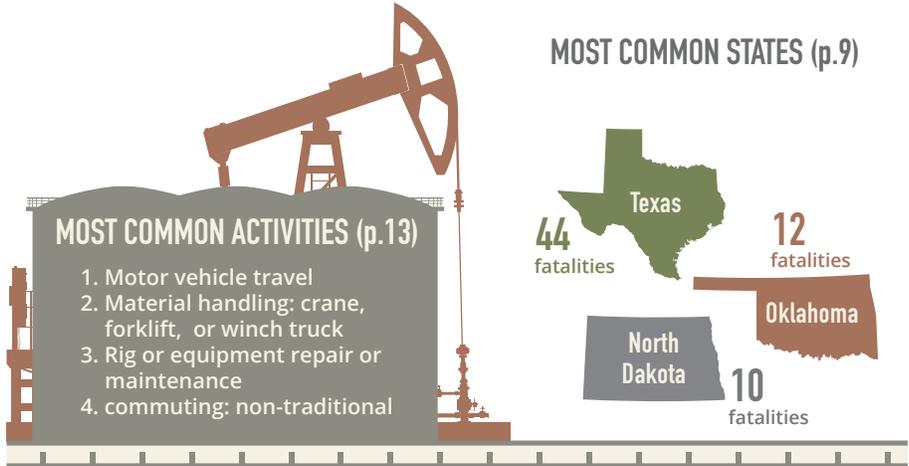
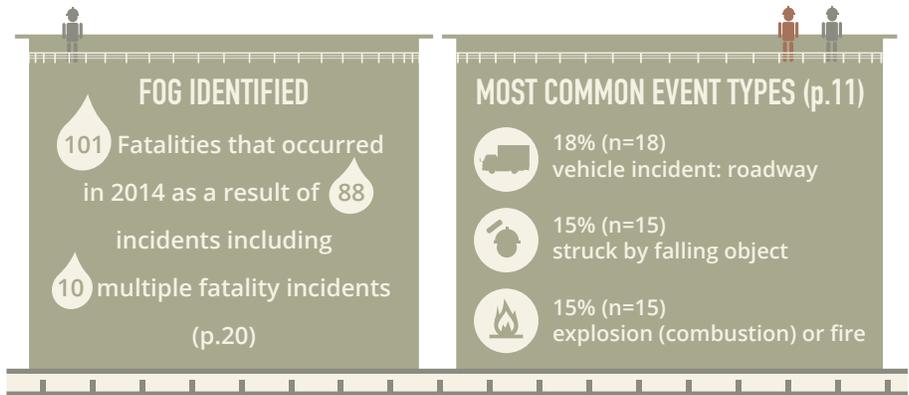
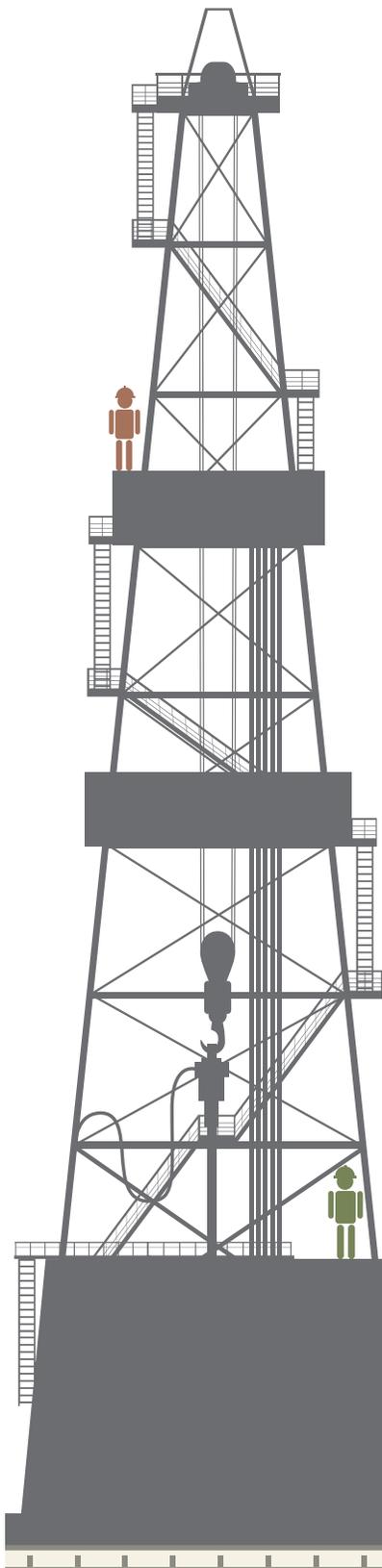
Roadway vehicle incidents were the leading cause of death (18 fatalities, 18%). Of these incidents, nine fatally injured workers were not wearing a seatbelt and five drivers were fatigued, leading to seven worker fatalities. Contact injuries resulted in 24 deaths (24%), including 15 deaths from falling objects (15%). Approximately three-quarters of contact injury fatalities were associated with at least one of the four following activities: material handling using a crane, forklift, or winch truck; laydown or pickup of tubulars; make up or break out of tubulars; or rigging up or down.

*Currently, only a portion of worker deaths in the oil and gas extraction industry are identified by FOG. The Census of Fatal Occupational Injuries (CFOI) can provide the most complete count of worker fatalities in this industry.

DISCUSSION AND FUTURE DIRECTIONS

The ability of FOG to characterize fatalities by oil and gas extraction specific variables, such as the operation and activities occurring at the time of the incident allows for a deeper understanding of these events. Safety and health professionals should use FOG data to target interventions, paying particular attention to the operations, activities, and other contributing factors that have resulted in the most fatalities. Future releases of FOG data and recommendations to prevent fatal incidents are planned and will be disseminated as data become available.

2014 FATALITIES AT A GLANCE



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ACRONYMS

BLS

Bureau of Labor Statistics

BOP

Blowout preventer

BSEE

Bureau of Safety and Environmental Enforcement

CFOI

Census of Fatal Occupational Injuries

CO

Carbon monoxide

FOG

Fatalities in Oil and Gas Extraction (database)

FRC

Flame-resistant clothing

GVWR

Gross vehicle weight rating

H₂S

Hydrogen sulfide

JSA

Job safety analysis

LEL

Lower explosive limit

LOTO

Lockout tagout

NAICS

North American Industrial Classification System

NIOSH

National Institute for Occupational Safety and Health

OSHA

Occupational Safety and Health Administration

QCEW

Quarterly Census of Employment and Wages

RGVW

Registered gross vehicle weight

USCG

United States Coast Guard

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THE FATALITIES IN OIL AND GAS EXTRACTION (FOG) DATABASE

This section provides information about the data and methods of the FOG database.



OVERVIEW OF THE FOG DATABASE

The NIOSH Oil and Gas Extraction Safety and Health Program prepared this report using the NIOSH FOG database. FOG is a data collection system that compiles detailed information about oil and gas extraction fatalities in the U.S. It is used to inform NIOSH, industry, and other stakeholder groups, and to guide interventions that will prevent future loss of life in this industry. FOG includes all identified worker fatalities related to U.S. land-based and offshore oil and gas extraction, irrespective of the industry code of the employer (known as the North American Industry Classification System or NAICS code). A full description of inclusion and exclusion criteria is found in this section. Fatal events are identified through the Occupational Safety and Health Administration (OSHA), the Bureau of Safety and Environmental Enforcement (BSEE), the United States Coast Guard (USCG), other government sources, media alerts, and professional contacts.



Worker takes notes at a snowy production site next to the pump jack and wellhead.

Photo by Thinkstock

INCLUSION CRITERIA

FOG includes all worker fatalities related to oil and gas extraction, whether land-based or offshore, that meet the following criteria:

- Workers involved in the exploration for crude petroleum and natural gas; drilling, completing and equipping wells; operating separators, emulsion breakers, desilting equipment, and field gathering lines for crude petroleum and natural gas; and all other activities in the preparation of oil and gas up to the point of shipment from the producing property. This includes workers paid on a contract or fee basis (NAICS 211-operators, 213111-drilling, 213112- service).
- Workers involved in site preparation and related construction activities for oil and gas wells (included in NAICS 238910).
- Workers involved in specialized freight trucking, local and long distance that includes hauling of materials for oil and gas extraction activities (included in NAICS 484220, 484230).
- Workers involved in performing geophysical surveying and mapping services for oil and gas extraction on a contract or fee basis (included in NAICS 541360).
- Workers involved in hauling crude oil or natural gas from the producing property to a processing or storage facility.
- Workers who meet one of the above conditions and who are fatally injured in motor vehicle crashes that occur during non-traditional commutes to or from the worksite or temporary lodging camps. FOG defines a non-traditional commute as meeting one of the following criteria:
 1. Worker travel in excess of 90 minutes or 50 miles one-way.
 2. Workers transported by an employer-paid transportation service.
 3. Workers traveling as a crew.
- Workers who meet one of the above conditions who died from an alcohol or drug overdose while at work.
- Workers who meet one of the above conditions who have a cardiac event where symptoms begin at work.
- Workers who died from a chronic illness that is reported to be related to their work in oil and gas extraction.

EXCLUSION CRITERIA

FOG excludes:

- Events to workers involved in oil and gas pipeline, distribution, transportation, refineries, bulk storage, wholesale, gasoline stations and other midstream and downstream activities (NAICS 22121, 23712, 486, 32411, 42471, 42472, 447, 4869).
- Non-fatal injuries and illnesses occurring in the oil and gas extraction industry.

LIMITATIONS

- FOG does not currently identify all work-related fatalities for this industry. In particular, roadway motor vehicle crashes are likely under reported in FOG. Currently, the primary data sources for FOG are OSHA investigation information and media sources. Most transportation incidents are outside of OSHA's jurisdiction. Efforts by NIOSH are underway to identify sources and develop methods for collecting information about roadway motor vehicle crashes from appropriate state and federal agencies.
- Fatalities associated with work-related chronic illnesses are under-reported, due to a lack of available data and latency between exposure and diagnosis of illness.

How is this database different than what is collected by the Bureau of Labor Statistics (BLS), Census of Fatal Occupational Injuries (CFOI)?

- The purpose of FOG is to collect detailed and industry specific information on oil and gas extraction fatalities, while the purpose of CFOI is to collect a census of fatalities for all industries. The case definitions (or inclusion criteria) differ. Therefore, each system will have a different number of fatalities each year.
- CFOI identifies fatalities as oil and gas extraction only when coded to one of three NAICS codes (211, 213111, and 213112). FOG includes all fatalities that are determined to be oil and gas extraction related, even if they are assigned another NAICS code. For example, fatalities to sand haulers are sometimes categorized as specialized freight (NAICS 4842), but are included in FOG.
- Both FOG and CFOI include non-traditional commuting fatalities, but the definition of a non-traditional commute differs between datasets.
- FOG includes all cardiac events where symptoms begin at work, but CFOI does not. Cardiac events that begin at work are included in FOG because acute exposure to some chemicals or toxic substances can mimic or induce cardiac events. Also, they are included to support the identification and characterization of factors that may influence the occurrence or outcome of these incidents.

OVERVIEW OF DATA ELEMENTS USED IN THIS REPORT

The FOG database includes many data elements. The data elements used in the report are described below.

FOG ID

The FOG ID is the unique identifier assigned to every FOG incident. Incidents in FOG are referenced by their FOG ID in all FOG reports.

EVENT TYPE

FOG event types describe how the fatal injury or illness occurred. Each fatally injured worker is assigned only one event type. In instances where two or more events occur, precedence is given to the initial event type. For example, a worker that is struck by a piece of equipment resulting in a fall will be categorized as a struck by incident since this event caused the fall.

In this report, fatalities categorized as “cardiac event: no identified exposure” and “undetermined: no identified exposure” have been excluded unless otherwise indicated (see page 11), since the primary purpose of this report is to provide information on fatalities with a known or possible direct work-related cause.

OPERATION AND ACTIVITIES

FOG collects information about the operation and activities occurring at the time of the incident. Operations are distinct stages or processes, while activities are components or steps within operations that may occur many times during several different operations. For example, material handling using a forklift, crane, or winch truck is a common *activity* that is conducted throughout all *operations* including site preparation, drilling, completions, production, and well servicing. In most cases, only one operation will be occurring at any one point in time, while several activities may be occurring simultaneously. Therefore, each incident will be assigned one operation and as many activities as appropriate to adequately characterize the incident. In some cases, it may not be possible to identify the operation or activities due to the limitations of available data.

INDUSTRY GROUP

Industry group is based on NAICS, which codes business establishments according to similarity in the processes used to produce goods or services.

For more information on NAICS codes, see <http://www.census.gov/eos/www/naics/>.

RIG COUNT

The active rotary rig count is a recognized metric of industry activity in oil and gas extraction. The number of active rotary rigs is used to gauge industry activity because when drilling rigs are active they consume products and services produced by the industry. The active rig count is a primary indicator of demand for products used in drilling, completing, producing, and processing hydrocarbons. In this report, the data source for the active rotary rig count is the Baker Hughes Rig Count and includes both land-based and offshore rigs. Baker Hughes defines an active rotary rig as a drilling rig that is in the process of drilling an oil or gas well. Rigs that are in transit, rigging up or down, or being used for activities such as workovers, completions, or production testing are generally not included in the count. For more information on the Baker Hughes Rig Count see <http://phx.corporate-ir.net/phoenix.zhtml?c=79687&p=irol-rigcountsoverview>.

WORKFORCE ESTIMATES

Workforce estimates in this report come from the BLS Quarterly Census of Employment and Wages (QCEW), and are used to estimate the number of workers for the oil and gas extraction NAICS codes (211, 213111, and 213112). QCEW includes workers who received pay and are covered under state or federal unemployment insurance. It does not include workers who are self-employed. For more information about QCEW, see <http://www.bls.gov/cew/home.htm>.

Oil and gas wellsite with multiple wellheads, several flowback tanks, a well servicing rig, and six production fluid tanks.



2014 FATALITIES IN FOG IN DEPTH

This section explores the fatalities identified by FOG that occurred in 2014 by several variables, including rig count, workforce, location, industry group, event type, operation, activities, and the number of fatalities per incident.



RIG COUNT AND WORKFORCE

- FOG identified 101 work-related fatalities that occurred in 2014 with an average of eight per month. November and December were the months with the greatest number of fatalities.
- After steadily increasing to a peak of 1,931 rigs in September, rig activity plateaued during the last quarter of 2014.
- There were 621,265 workers employed in the industry in 2014 (NAICS codes 211, 213111, 213112), more than double the workforce that was seen a decade before.

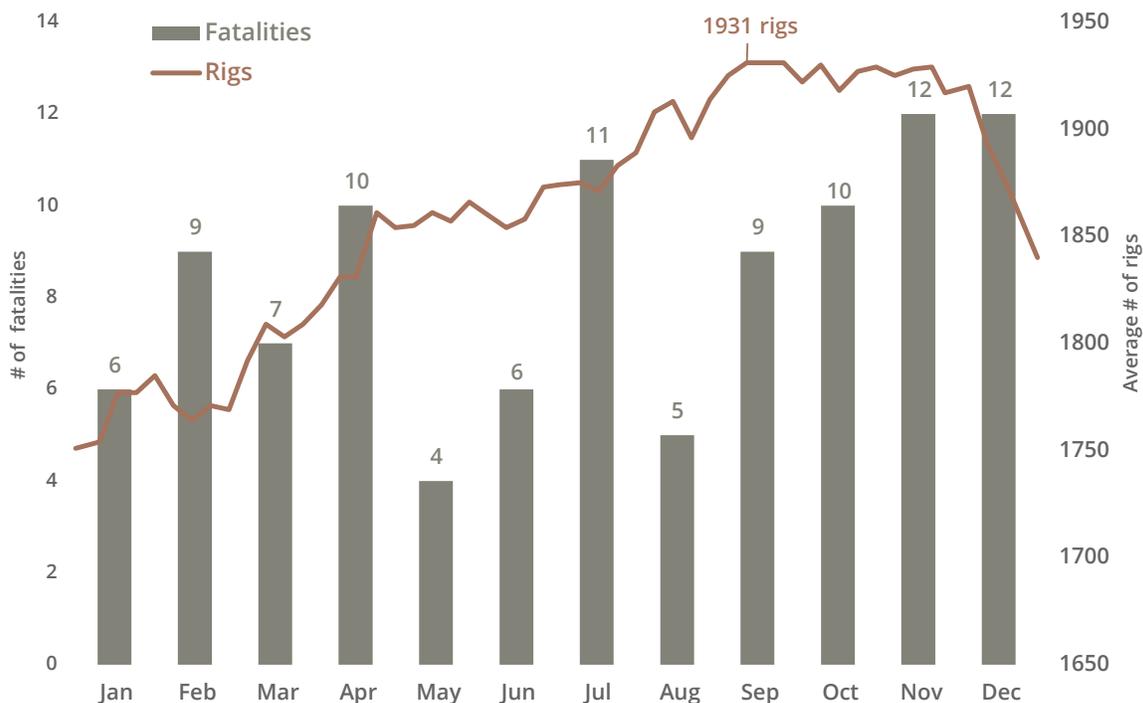
RIG COUNT

The active rotary rig count is a recognized metric of industry activity in oil and gas extraction. The data source for the active rotary rig count is the Baker Hughes Rig Count and includes both land-based and offshore rigs.

WORKFORCE ESTIMATES

Workforce estimates are from the BLS QCEW, and estimate the number of workers in the oil and gas extraction NAICS codes (211, 213111, and 213112).

AVERAGE NUMBER OF ACTIVE U.S. ROTARY RIGS AND NUMBER OF FATALITIES IN FOG, 2014



LOCATION AND RIG COUNT

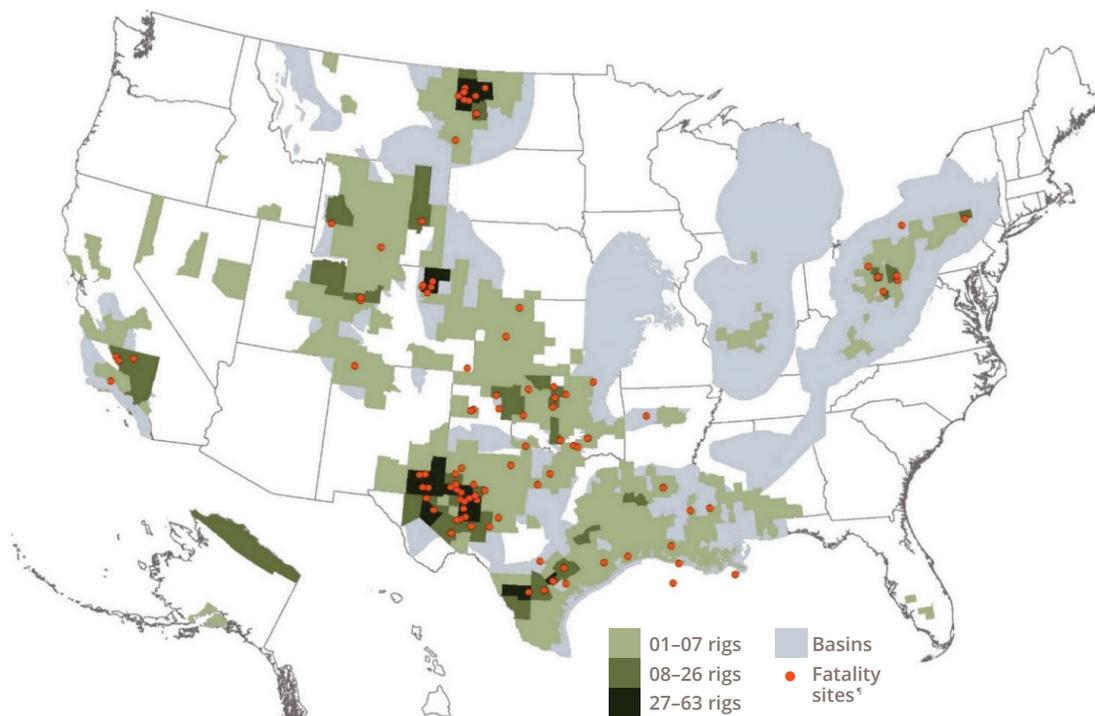
- Fatalities occurred throughout the U.S., with the largest occurring in states with the greatest amount of rig activity (Texas, Oklahoma, and North Dakota).

RIG COUNT

The active rotary rig count is a recognized metric of industry activity in oil and gas extraction. The data source for the active rotary rig count is the Baker Hughes Rig Count and includes both land-based and offshore rigs.

FATALITIES IN FOG BY LOCATION AND AVERAGE NUMBER OF ACTIVE U.S. ROTARY RIGS, 2014*

STATE	# OF FATALITIES (%)	AVERAGE # OF RIGS (%)
Texas	44 (44%)	882 (47%)
Oklahoma	12 (12%)	199 (11%)
North Dakota	10 (10%)	176 (9%)
Colorado	8 (8%)	68 (4%)
Louisiana	6 (6%)	111 (6%)
New Mexico	6 (6%)	92 (5%)
Pennsylvania	4 (4%)	56 (3%)
Wyoming	3 (3%)	54 (3%)
Ohio	2 (2%)	41 (2%)
California	1 (1%)	42 (2%)
All other states combined†	5 (5%)	145 (8%)
Total	101 (100%‡)	1862§ (100%)



*Basin data source: U.S. Energy Information Administration. Data Projection: Albers Equal Area Conic United States Geological Survey. Datum GCS WGS 1984.

†Includes states with less than 2% of the total U.S. rig count (UT, WV, KS, AR, MT, MS, AK, AL, IL, NV, FL, IN, KY, and NE).

‡Percentage does not total due to rounding

§Rig count averages do not total due to rounding

*Incidents with more than one fatality are represented as a single fatality site

INDUSTRY GROUP

- Forty-five percent of fatalities (45 deaths) were to servicing company workers (NAICS 213112), the most of any industry group. Service company workers made-up 52% of the workforce in 2014, the largest proportion of any industry group.
- Twenty-seven percent of fatalities (27 deaths) were to drilling company workers (NAICS 213111). Drilling company workers made-up 16% of the workforce in 2014.
- Eight percent of fatalities (8 deaths) were workers from other industries doing work in oil and gas extraction at the time of the incident.

INDUSTRY GROUP

The industry group is based on the NAICS code of the employer. A company's NAICS code is determined by its primary business. Each fatality is assigned to one industry group.

WORKFORCE ESTIMATES

Workforce estimates are from the BLS QCEW, and estimate the number of workers in the oil and gas extraction NAICS codes (211, 213111, and 213112).

Fatalities from other industries include:

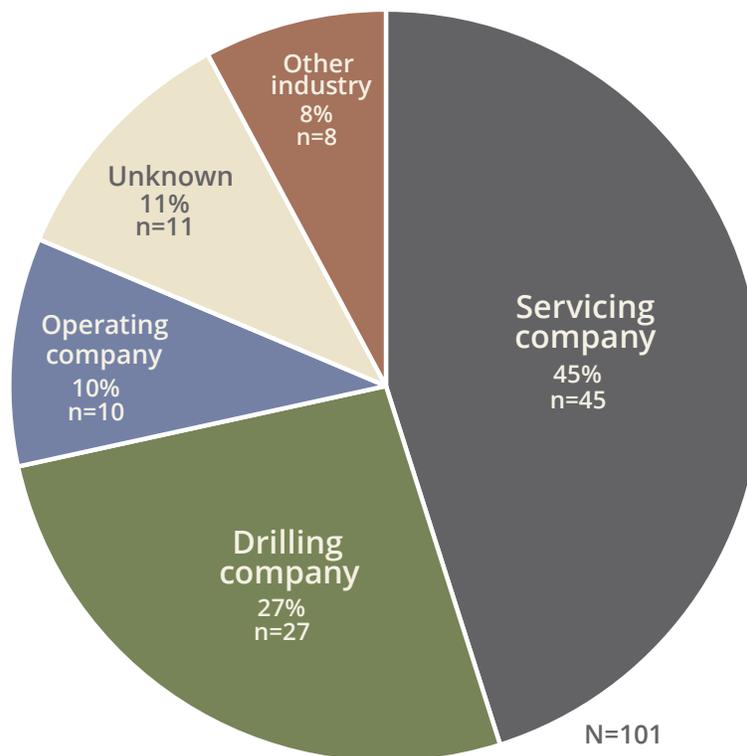
All other specialty trade contractors (NAICS 238990): 3 fatalities

Specialized freight (NAICS 4842): 3 fatalities

Hazardous waste treatment and disposal (NAICS 562211): 1 fatality

Constructing, mining, and forestry machinery and equipment rental and leasing (NAICS 532412): 1 fatality

FATALITIES IN FOG BY INDUSTRY GROUP*, 2014



*Percentages do not total due to rounding

OPERATION

- The most common type of fatality was motor vehicle incidents (28 deaths)*.
- The second most common type of fatality was contact injuries (24 deaths). Among contact injuries, being struck by a falling object was the most common (15 out of 24 deaths, 63%).

EVENT TYPE

The event type describes how the fatal injury or illness occurred. Each fatality is assigned one event type.

FATALITIES IN FOG BY EVENT TYPE, 2014

EVENT TYPE	# OF FATALITIES
Vehicle incident	28
On-site	8
Other location	2
Roadway	18
Contact Injuries	24
Caught between or crushed	6
Struck by	3
Struck by falling object	15
Explosion (combustion) or fire	15
Exposure	11
Cardiac event: possible work exposure	3
Alcohol or drug poisoning	1
Environmental	1
Harmful substance	5
Undetermined: possible work exposure	1
Explosion (pressure)	8
Falls	8
From height	6
Same level (slip or trip)	2
Electrocutions	7
Total	101

Cardiac and undertermined fatalities with no known work-related exposure

FOG collects information on all identified fatal incidents that begin at work, including incidents with no known direct work-related cause. FOG identified 11 of these fatalities that occurred in 2014. These 11 fatalities have not been included in other sections of this document except what is reported here.

Total fatalities: 11

Event types	# of fatalities
Cardiac event: no known work exposure	10
Undetermined: no known work exposure	1
Age of workers	Years
Mean	47
Median	54
Range	25–66

Is your worksite prepared for a cardiac event?

In at least 3 of the 11 fatalities, the worker was working alone*. One of these workers had to walk approximately one mile from the wellsite before reaching a highway to get help. In the incidents where workers were available to assist the distressed worker (at least seven incidents), an automated external defibrillator (AED) was not reported to have been used.

*FOG defines a "lone worker" as a worker that is alone at the worksite with nobody else present (including workers from other companies).

*Roadway transportation fatalities are underreported in FOG

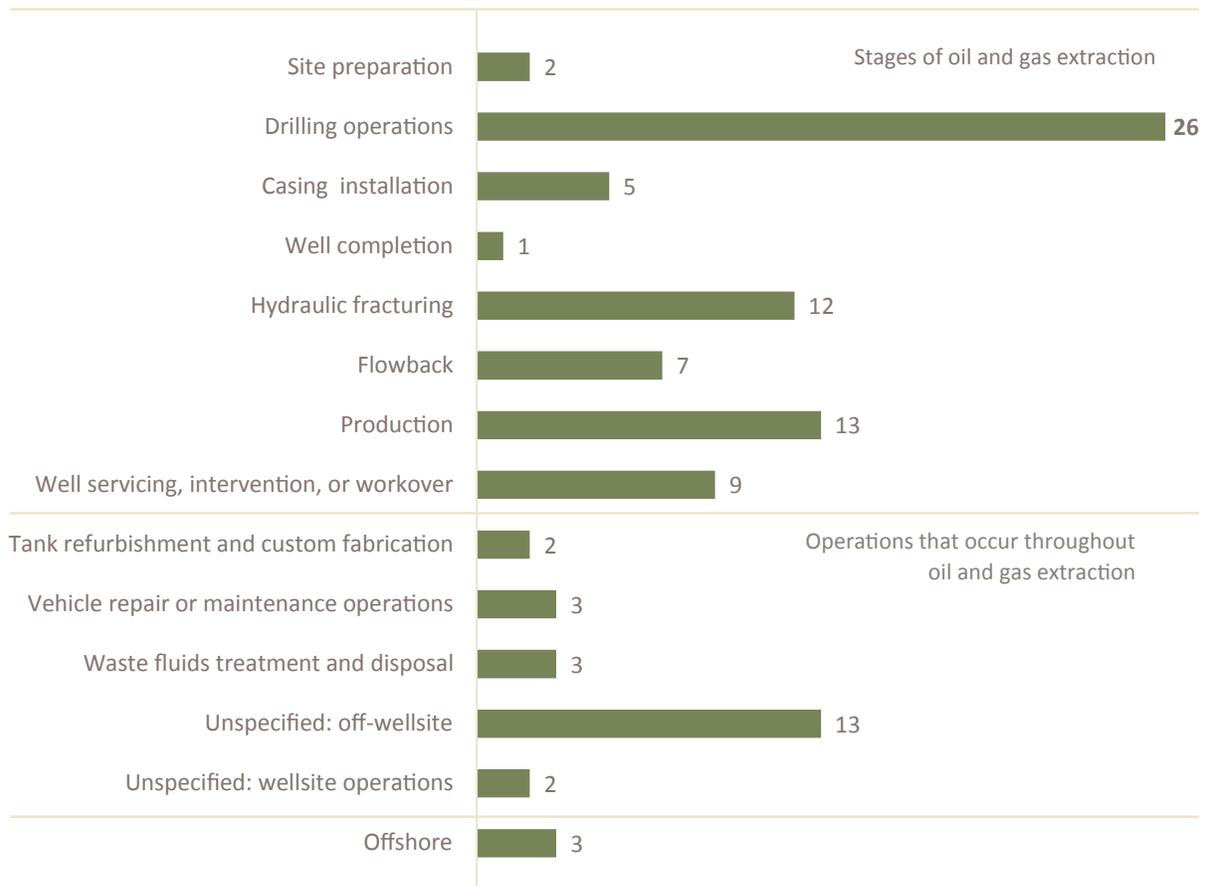
OPERATION

- The operation could be determined in 75 (85%) of the 88 incidents. Where operation is unspecified, the incidents were categorized into off-wellsite and on-wellsite operations (13 incidents accounting for 15 fatalities)
- The largest number of fatalities occurred during drilling operations (26 fatalities).
- Twenty worker fatalities occurred during completions (well completion, hydraulic fracturing, and flowback).

OPERATION

Operations are distinct stages or processes in oil and gas extraction. Each incident is assigned one operation.

FATALITIES IN FOG BY OPERATION, 2014



N=101

ACTIVITIES

- Fatalities occurred during 43 different types of activities.
- Activities that were most commonly associated with fatalities included motor vehicle travel (including non-traditional commuting), material handling using a crane, forklift or winch truck, and rig or equipment repair or maintenance.

ACTIVITIES

Activities are components or steps within oil and gas extraction operations that may occur several times. Each incident is assigned as many activities as appropriate.

FATALITIES IN FOG BY ACTIVITY, 2014

HIGH FREQUENCY (8+ FATALITIES)	
ACTIVITY	# OF FATALITIES
Motor vehicle travel	18
Material handling: crane, forklift, winch truck	12
Rig or equipment repair or maintenance	11
Commuting: non-traditional	10
Make up or break out tubulars	8
Production rig activities	8
Rigging up or down	8

MODERATE FREQUENCY (4–7 FATALITIES)	
ACTIVITY	# OF FATALITIES
Tank gauging or sampling	7
Equipment install or dismantle	6
Produced and waste fluids storage	6
Wellhead or pumping unit activities	6
Making a connection	5
Separation equipment activities	5
Well control equipment activities	5
Hotwork and welding	4
Laydown or pickup tubulars	4
Pressure pumping	4
Tripping pipe in or out	4
Truck transport: crude oil hauling	4
Vacuum truck activities	4
Wellsite maintenance or construction	4

LOW FREQUENCY (1–3 FATALITIES)	
ACTIVITY	# OF FATALITIES
Downhole tool and equipment activities	3
Production monitoring	3
Running casing	3
Spotting	3
Tank cleaning or maintenance	3
Truck transport: equipment or supplies hauling	3
Coiled tubing activities	2
Drilling fluid mixing and pumping	2
Non-motor vehicle travel	2
Pulling or running rods	2
Truck transport: produced or waste water hauling	2
Truck transport: unspecified cargo	2
Well cleanout	2
Well testing and logging	2
Break or rest	1
Plug drill out	1
Production tubing installation	1
Pulling or running tubing	1
Racking back tubulars	1
Snubbing	1
Truck transport: water hauling	1
Vehicle repair or maintenance activities	1

OPERATION AND INDUSTRY GROUP

- Fatalities to servicing company workers occurred throughout most operations, with the highest number of fatalities occurring during hydraulic fracturing and production.
- Most fatalities to drilling company workers occurred during drilling operations (20 deaths). However, three employees died during casing installation and another three during flowback.
- Workers from all industry groups were killed during drilling operations.

OPERATION

Operations are distinct stages or processes in oil and gas extraction. Each incident is assigned one operation.

INDUSTRY GROUP

The industry group is based on the NAICS code of the employer. A company's NAICS code is determined by its primary business and may be different than the work being done at the time of the incident. Each fatality is assigned to one industry group.

FATALITIES IN FOG BY INDUSTRY GROUP (NAICS) AND OPERATION, 2014

OPERATION	OPERATING COMPANY (211)	DRILLING COMPANY (213111)	SERVICING COMPANY (213112)	OTHER INDUSTRY	UNKNOWN	TOTAL
Site preparation			1	1		2
Drilling operations	1	20	4		1	26
Casing installation		3	2			5
Well completion	1					1
Hydraulic fracturing	1		11			12
Flowback		3	3	1		7
Production	2		11			13
Well servicing, intervention, or workover	2		5	2		9
Tank refurbishment and custom fabrication	1		1			2
Vehicle repair or maintenance operations			2	1		3
Waste fluids treatment and disposal		1		2		3
Unspecified: off-wellsite	1		4	1	7	13
Unspecified: wellsite	1		1			2
Offshore					3	3
Total	10	27	45	8	11	101

OPERATION AND EVENT TYPE

- Contact injuries made up a large proportion of fatalities during drilling operations (38%), casing installation (80%), and well servicing, workover, or intervention (33%).
- Pressure-related explosions were most frequently identified during completions operations.
- Sixty-four percent of exposure-related deaths occurred during production.

OPERATION

Operations are distinct stages or processes in oil and gas extraction. Each incident is assigned one operation.

EVENT TYPE

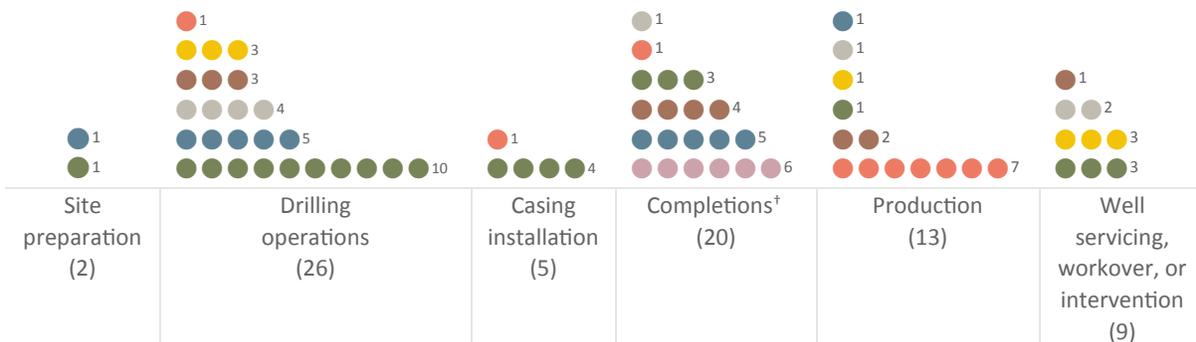
The event type describes how the fatal injury or illness occurred. Each fatality is assigned one event type.

FATALITIES IN FOG BY OPERATION* AND EVENT TYPE 2014

Each circle = 1 fatality

- Contact injury
- Electrocutation
- Explosion (combustion) or fire
- Explosion (pressure)
- Exposure
- Fall
- Vehicle incident

Operations by stages in the oil and gas extraction process



Operations that occur throughout the oil and gas extraction process

Tank refurbishment and custom fabrication (2)	● ●
Vehicle repair or maintenance operations (3)	● ● ●
Waste fluids treatment and disposal (3)	● ● ●

Unspecified operations

Unspecified: off-wellsite (13)	● ● ● ● ● ● ● ● ● ● ● ● ●
Unspecified: wellsite (2)	● ●

*Offshore fatalities not included.

†Includes flowback, hydraulic fracturing, and well completion operations.

OPERATION AND ACTIVITIES

- Fifty percent of the fatalities during drilling operations occurred either while workers were making up or breaking out tubulars or rigging up or down.
- Fatalities during production operations were most frequently associated with tank gauging or sampling, produced and waste fluids storage, or crude oil transport.
- During well servicing, intervention, or workover, production rig activities were associated with six fatalities.

OPERATION

Operations are distinct stages or processes in oil and gas extraction. Each incident is assigned one operation.

ACTIVITIES

Activities are components or steps within oil and gas extraction operations that may occur several times. Each incident is assigned as many activities as appropriate.

FATALITIES IN FOG BY OPERATION AND ACTIVITIES, 2014[†]

OPERATION	# OF FATALITIES	MOST FREQUENT FATAL ACTIVITIES (# OF FATALITIES- ACTIVITY)
Casing installation	5	3 - Running casing
Drilling operations	26	7 - Make up or break out tubulars 6 - Rigging up or down 4 - Making a connection 4 - Material handling: crane, forklift, winch truck 4 - Tripping pipe in or out
Flowback	7	3 - Well control equipment activities
Hydraulic fracturing	12	3 - Commuting: non-traditional 3 - Material handling: crane, forklift, winch truck 3 - Motor vehicle travel 3 - Pressure pumping
Production	13	6 - Tank gauging or sampling 4 - Produced and waste fluids storage 4 - Truck transport: crude oil hauling
Well servicing, intervention, or workover	9	6 - Production rig activities 3 - Equipment install or dismantle 3 - Material handling: crane, forklift, winch truck 3 - Well head or pumping unit activities
Unspecified: off-wellsite	13	12 - Motor vehicle travel 3 - Commuting: non-traditional

[†]Only operations with more than four fatalities are listed.

INDUSTRY GROUP AND EVENT TYPE

- Both drilling and servicing companies had a high number of fatalities due to contact injuries (10 and 11 deaths respectively).
- Servicing companies had a high number of exposure-related fatalities (9 deaths).
- Vehicle incidents that occurred on-site were the most common type of fatality for operating companies (4 deaths).

INDUSTRY GROUP

The industry group is based on the NAICS code of the employer. A company's NAICS code is determined by its primary business. Each fatality is assigned to one industry group.

EVENT TYPE

The event type describes how the fatal injury or illness occurred. Each fatality is assigned one event type.

FATALITIES IN FOG BY INDUSTRY GROUP (NAICS) AND EVENT TYPE, 2014

OPERATION	OPERATING COMPANY (211)	DRILLING COMPANY (213111)	SERVICING COMPANY (213112)	OTHER INDUSTRY	UNKNOWN	TOTAL
Contact Injuries	2	10	11	1		24
Caught between or crushed		4	1	1		6
Struck by		1	2			3
Struck by falling object	2	5	8			15
Electrocutions	1	3	1	2		7
Explosion (combustion) or fire	2	6	5	1	1	15
Explosion (pressure)		1	5	2		8
Exposure		1	9	1		11
Cardiac event: possible work exposure			3			3
Alcohol or drug poisoning		1				1
Environmental			1			1
Harmful substance			4	1		5
Undetermined: possible work exposure			1			1
Falls	1	3	4			8
From height	1	2	3			6
Same level (slip or trip)		1	1			2
Vehicle incident	4	3	10	1	10	28
On-site	4	2	2			8
Other location					2	2
Roadway		1	8	1	8	18
Total	10	27	45	8	11	101

INDUSTRY GROUP AND ACTIVITIES

- Activities associated with fatalities differed across industry groups. However, material handling and rig equipment repair or maintenance were associated with several fatalities for both drilling and service companies.
- Material handling using a crane, forklift, or winch truck is a high hazard activity for service companies.
- Make up and break out of tubulars is a high hazard activity for drilling companies.

INDUSTRY GROUP

The industry group is based on the NAICS code of the employer. A company's NAICS code is determined by its primary business and may be different than the work being done at the time of the incident. Each fatality is assigned to one industry group.

ACTIVITIES

Activities are components or steps within oil and gas extraction operations that may occur several times. Each incident is assigned as many activities as appropriate.

FATALITIES IN FOG BY INDUSTRY GROUP AND ACTIVITIES, 2014

INDUSTRY GROUP (NAICS)	# OF FATALITIES	MOST FREQUENT FATAL ACTIVITIES (# OF FATALITIES-ACTIVITY)
Operating company (211)	10	2 - Production rig activities 2 - Wellsite maintenance or construction
Drilling company (213111)	27	7 - Make up or break out tubulars 5 - Rigging up or down 4 - Making a connection 4 - Tripping pipe in or out 3 - Downhole tool and equipment activities 3 - Laydown or pickup tubulars 3 - Material handling: crane, forklift, winch truck 3 - Rig or equipment repair or maintenance 3 - Well control equipment activities
Servicing company (213112)	45	8 - Motor vehicle travel 7 - Material handling: crane, forklift, winch truck 7 - Tank gauging or sampling 6 - Rig or equipment repair or maintenance 5 - Produced and waste fluids storage 5 - Production rig activities 4 - Commuting: non-traditional 4 - Truck transport: crude oil hauling 3 - Pressure pumping 3 - Separation equipment activities 3 - Spotting 3 - Well head or pumping unit activities
Other industry	8	3 - Equipment install or dismantle 3 - Well head or pumping unit activities
Unknown	11	8 - Motor vehicle travel 5 - Commuting: non-traditional

MULTIPLE FATALITY INCIDENTS

- Of the 88 separate incidents identified by FOG that occurred in 2014, 10 (11%) were multiple fatality incidents. These multiple fatality incidents accounted for 23 (23%) of the 101 total fatalities.
- Four multiple fatality incidents (10 deaths) occurred during the completions stage (well completions, hydraulic fracturing, and flowback operations), accounting for 50% of fatalities during this stage.
- Three multiple fatality incidents (7 deaths) occurred while workers were commuting.
- Two of the five incidents that resulted in electrocutions were multiple fatality incidents. In both cases, workers were moving material using a crane, forklift, or winch truck.

MULTIPLE FATALITY INCIDENTS

Multiple fatality incidents are incidents that involve more than one worker death.

EVENT TYPE

The event type describes how the fatal injury or illness occurred. Each fatality is assigned one event type.

OPERATION

Operations are distinct stages or processes in oil and gas extraction. Each incident is assigned one operation.

ACTIVITIES

Activities are components or steps within oil and gas extraction operations that may occur several times. Each incident is assigned as many activities as appropriate.

MULTIPLE FATALITY INCIDENTS IN FOG, 2014

FOG ID	# OF FATALITIES	EVENT TYPE	OPERATION	ACTIVITIES
2014-020	2	Electrocution	Drilling operations	<ul style="list-style-type: none"> ▪ Rigging up or down ▪ Material handling: crane, forklift, winch truck
2014-053	2	Electrocution	Well servicing, intervention, or workover	<ul style="list-style-type: none"> ▪ Well head or pumping unit activities ▪ Equipment install or dismantle ▪ Material handling: crane, forklift, winch truck
2014-049	3	Explosion (combustion) or fire	Drilling operations	<ul style="list-style-type: none"> ▪ Making a connection ▪ Make up or break out tubulars
2014-040	3	Explosion (combustion) or fire	Flowback	<ul style="list-style-type: none"> ▪ Well control equipment activities
2014-005	2	Explosion (pressure)	Flowback	<ul style="list-style-type: none"> ▪ Separation equipment activities ▪ Well head or pumping unit activities
2014-001	2	Explosion (pressure)	Hydraulic fracturing	<ul style="list-style-type: none"> ▪ Well cleanout ▪ Pressure pumping ▪ Coiled tubing activities
2014-107	2	Vehicle incident: other location	Offshore	<ul style="list-style-type: none"> ▪ Rig or equipment repair or maintenance ▪ Commuting: non-traditional ▪ Non-motor vehicle travel
2014-003	3	Vehicle incident: roadway	Hydraulic fracturing	<ul style="list-style-type: none"> ▪ Commuting: non-traditional ▪ Motor vehicle travel
2014-060	2	Vehicle incident: roadway	Unspecified: off-wellsite	<ul style="list-style-type: none"> ▪ Commuting: non-traditional ▪ Motor vehicle travel
2014-067	2	Vehicle incident: roadway	Unspecified: off-wellsite	<ul style="list-style-type: none"> ▪ Motor vehicle travel

INCIDENT DESCRIPTIONS

This section provides a description of each fatal incident identified by FOG that occurred in 2014 and information and insights about the incidents. Incident descriptions are organized by operation and begin on page ##. For each incident the number of fatalities, event type, activities, and NAICS of each fatally injured worker is provided with the incident.



INCIDENT DESCRIPTION OVERVIEW

Incident descriptions are compiled from one or more FOG data sources. Data sources include:

- OSHA preliminary descriptions, citations, and closed investigations from state and federal run programs
- BSEE and USCG fatality investigation reports
- Media reports
- Other formal investigations from federal, state, and local agencies
 - Crash reports
 - Emergency responder and police reports
 - Coroner and medical examiner reports
- Other public information
 - Obituaries
 - Press releases
- Death certificates

NIOSH has made every effort to keep descriptions as similar as possible to the data source and include all relevant details. However, to enhance the readability of the descriptions and protect the confidentiality of the individuals and companies involved in the incident, the following changes have been made to descriptions:

- Information that would allow for the identification of specific workers, companies, or events have been removed. This includes personal identifiers (e.g., names, date of births, date of deaths), company data (e.g., names or addresses of employers, contractors, operators, equipment manufacturers, medical service providers), and incident location information (e.g., state, well information, basin).
- Spelling and grammatical errors contained in the source documents have been corrected.
- Details that are duplicative or do not add value to the descriptions have been removed.
- Some terms and phrasings have been modified for consistency (e.g., the term 'worker' is used in all FOG descriptions rather than other synonyms that might have been used in the original source descriptions, such as employee, decedent, and victim).
- Whenever possible, confusing, incomplete, or inconsistent source descriptions have been altered to provide clarity. During this process, careful attention has been paid to preserving description meaning. As such, industry jargon has not been removed.

INCIDENT DESCRIPTION COMMON FACTORS

Incident descriptions were reviewed closely to identify recurring situations, locations, types of equipment, or other conditions that were associated with or contributed to fatalities in 2014. Below are the commonalities identified within selected event types. For some event types — explosion (pressure); fall: same level; and vehicle incident: other — clear patterns did not emerge.

CONTACT INJURIES (24 FATALITIES)

- **Location: Rig floor**
11 fatalities occurred on the rig floor
- **Hoisting equipment failure**
5 fatalities resulted from hoisting equipment or components (cables, chains, latches, etc.) failing
- **Unsecuring loads or equipment**
4 fatalities occurred while workers were unsecuring (removing pins, tiedowns, etc.) loads or equipment

ELECTROCUTIONS (7 FATALITIES)

- **Overhead powerlines**
5 fatalities involved contact with overhead powerlines by vehicles or equipment

EXPLOSIONS (COMBUSTION) OR FIRE (14 FATALITIES)

- **Tanks**
10 fatalities involved ignition of vapors, gases, or fluids from storage tanks, tankers, or separators
- **Equipment positioning**
7 workers died in 3 incidents where the suspected ignition source was diesel powered equipment

EXPOSURE (11 FATALITIES)

- **Tanks**
8 workers were working in or around fluid storage tanks, tankers, or separators when exposed
- **Working alone or unobserved**
7 workers were by themselves or were out of eyesight or earshot of another worker

FALL: FROM HEIGHT (6 FATALITIES)

- **Fall from rig**
4 workers fell from a drilling or production rig
- **Not wearing or improper use of fall protection**
3 workers were not wearing or using fall protection properly
- **Fall protection system failure**
2 fatalities were caused by harnesses or lifelines failing during a fall

VEHICLE INCIDENT: ON-SITE (8 FATALITIES)

- **Backing vehicle**
3 workers were struck by a vehicle that was backing
- **Unsecured and unattended vehicle**
3 workers were stuck by their vehicle after exiting

VEHICLE INCIDENT: ROADWAY (18 FATALITIES)

- **No seatbelt**
9 fatally injured workers were not wearing seatbelts
- **Fatigue**
7 workers and 1 civilian died in 5 worker fatigue related incidents
- **Low visibility**
5 workers died in 4 incidents that occurred on unlit roads at night
- **Alcohol or drugs**
4 fatalities occurred while 3 workers were driving under the influence of alcohol or drugs

Worker looks at the horizon with a pump jack behind him.



5 Incidents
5 Fatalities

CASING INSTALLATION INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: 213111

CAUGHT BETWEEN OR CRUSHED

Activities: Equipment install or dismantle

After tripping out the drill string using the power tongs to break connections, the crew needed to use the manual tongs to make a connection to the casing running tool (CRT). Earlier, during trip out, the snub line to the manual tongs had been disconnected so that the crew could position the power tongs over the wellbore. The crew did not reinstall the snubbing line before attempting to connect the CRT. At the time of the incident, the fatally injured worker was placing the manual tongs in position on the CRT. When the top drive was rotated to tighten the assembly, the worker was crushed between pull back line and the top drive.

FOG ID: 2014-027

Fatalities: 1
NAICS: 213112

EXPOSURE: ENVIRONMENTAL

Activities: Commuting: non-traditional
Motor vehicle travel

Two workers were on their way home after completing a casing job. Heavy rainfall caused flash flooding in the area and their vehicle was unable to cross an intersection due to high water. Both workers exited the vehicle to climb to safety and wait for help. After leaving the vehicle, one of the workers went missing and was found deceased by law enforcement. The other worker was able to climb to safety. Flooding in this area caused more than 100 oilfield workers to be stranded.

FOG ID: 2014-059

Fatalities: 1
NAICS: 213112

STRUCK BY

Activities: Running casing
Make up or break out tubulars

Production casing was being run in a well. Two crews, a drilling rig crew and casing crew, were working on-site together. The driller was operating the rig drawworks. The casing crew was making the pipe connections, handling the casing pipe on the catwalk, and operating the trough styled lay down truck. At the time of the incident, the casing crew was guiding a 4½ -inch joint of casing that was being hoisted by the rig into position. As the driller lowered the next joint for stabbing, the crew missed inserting the pipe into collar on top of the casing string in the well bore. The bottom of the new joint of casing was caught on the top edge of the casing string. Worker #1 (casing crew member) tried to push the pipe end into position. At the same time, the rig blocks descended and made contact with the top of the new joint of casing. The rig blocks put pressure on the pipe until the pipe bowed and eventually broke loose. The casing joint struck worker #1 from the mid-abdomen to the head.

Fatalities: 1
NAICS: 213111

The driller did not see the blocks descending and did not apply the drawworks brake handle. Worker #1 was transported to the hospital in a pickup truck. Worker #1 died two days after the incident.

FOG ID: 2014-078

STRUCK BY FALLING OBJECT

Activities: **Running casing**
Material handling: crane, forklift, winch truck

Worker #1 was operating a telescopic forklift. When worker #1 tilted the forks forward, he noticed the forks were not fully secured to the boom. The two pins that are on each side of the attachment point were only partially engaged and not fully through the bottom of the unit. These pins prevent the forks from becoming detached from the boom. Worker #1 and two other coworkers made several attempts to fully engage the pins, but were unsuccessful. The crew was then instructed by the company man to move a piece of casing using the forklift. The company man said the crew could figure out how to fully engage the pins later. Since the forks were not wide enough to pick up the 24-foot piece of casing, the crew began to spread the right fork. During this process, the right fork fell off the forklift and fatally struck worker #1 on the head.

FOG ID: 2014-016

Fatalities: 1
NAICS: 213111

STRUCK BY FALLING OBJECT

Activities: **Running casing**
Production rig activities
Laydown or pickup tubulars

A 41-foot 4-inch long casing joint was being pulled into the derrick of a workover rig. The casing joint fell and fatally struck a worker on the head. The worker was transported to the hospital by private vehicle where he was pronounced dead on arrival.

FOG ID: 2014-079

**[23 Incidents
26 Fatalities]**

DRILLING OPERATIONS INCIDENT DESCRIPTIONS

**Fatalities: 1
NAICS: 213111**

CAUGHT BETWEEN OR CRUSHED

Activities: Rigging up or down

The crew was rigging up the substructure (derrick tower). A job safety analysis (JSA) was conducted for the operation, but the crew had deviated from it because it was a short rig move. The fatally injured worker was trying to scope out the derrick. The worker was directed to knock pins out of a section of the derrick. The worker used a 12-pound sledge hammer to remove an 8-inch long by 3-inch diameter pin from the left crown support bracket. The worker was not in the correct position to be removing the pins and was under a suspended load. When the pin was removed, the right crown support bracket broke. The middle section of the derrick dropped approximately 16 inches and fatally crushed the worker between the section of derrick and the fifth wheel on the transport truck.

FOG ID: 2014-018

**Fatalities: 1
NAICS: 213111**

CAUGHT BETWEEN OR CRUSHED

Activities: Rigging up or down

A worker was leaning on the man lift and removing a pin to disconnect the monkey board from the derrick. The monkey board shifted and fatally crushed the worker between the derrick (fixed object) and the monkey board (moving object).

FOG ID: 2014-023

**Fatalities: 1
NAICS: 213111**

CAUGHT BETWEEN OR CRUSHED

**Activities: Tripping pipe in or out
Make up or break out tubulars**

A worker was fatally injured while tripping pipe. The worker leaned over to pull slips. When the worker grabbed the iron roughneck and extended the handle, he caught his head between the iron roughneck and the drill pipe.

FOG ID: 2014-087

**Fatalities: 2
NAICS: 213111**

ELECTROCUTION

**Activities: Rigging up or down
Material handling: crane, forklift, winch truck**

A crew of four workers (two riggers, a signalman, and a crane operator) were using a crane to remove a diesel engine from the rig. The load had been removed and the crane operator rotated the boom to the left

Fatalities: 1
NAICS: 213111

under the direction of the signalman. The signalman stopped the crane approximately 3–4 feet from 7,200 volt power lines. The engine became stuck on the left front outrigger of the crane. The two riggers attempted to free the engine from the outrigger. Once the engine was freed, the wire rope boom line contacted the power lines and fatally electrocuted the two riggers.

FOG ID: 2014-020

ELECTROCUTION

Activities: Break or rest

The fatally injured worker went to the sleep trailer on-site to get snacks for the crew on duty. The worker was found about 10 minutes later under the edge of a 480-volt/3-phase/60-hertz generator. Two coworkers pulled the worker out from the generator. They observed that the worker was unresponsive and had a severe burn on his right arm between his shoulder and elbow. The worker had been electrocuted. None of the crew saw the worker contact an energized source or go towards the generator. However, the generator did have a history of shocking crew members. It was routine for crew members to bypass the display start sequence and start the generator manually. It is possible the fatally injured worker slipped and fell due to rain and mud, and then came into contact with the generator.

FOG ID: 2014-099

Fatalities: 3
NAICS: 213111

EXPLOSION (COMBUSTION) OR FIRE

Activities: Making a connection Make up or break out tubulars

Three workers were fatally injured and two workers were seriously injured in a flash fire. At the time of the incident, one worker was at the mud pits and four workers were on the drilling rig floor preparing to make a drill pipe connection. A flash fire occurred on the rig floor. All four workers' clothing caught fire along with all the combustible debris and floor materials. Of the four workers on the rig floor, two of the workers died on-site, one died 15 days after the incident, and one was hospitalized for approximately three months for serious burn injuries. The worker who was at the mud pits received severe burns to the hands while aiding the other workers. The ignition source was likely a forced air open flame diesel heater on the rig floor. The oil-based drilling mud was likely the initial and main fuel source. The heater was being used due to cold temperatures in the area. Not all workers were wearing flame-resistant clothing (FRC).

FOG ID: 2014-049

Fatalities: 1
NAICS: 213111

EXPOSURE: ALCOHOL OR DRUG POISONING

Activities: **Tripping pipe in or out**
Racking back tubulars

Before the incident, the worker was on the derrick board approximately 60 feet above the ground preparing to move drill pipe. The worker was seen lying on the derrick board by crew members who were working below. The crew called emergency services and the worker was pronounced dead at the scene. The medical examiner reported the worker died from acute methamphetamine intoxication with aspiration of gastric contents.

FOG ID: 2014-088

Fatalities: 1
NAICS: 213112

FALL: FROM HEIGHT

Activities: **None assigned**

While checking on the drilling operations, the company man was fatally injured in a 30-foot fall from the drilling rig floor to the ground. The drilling rig was equipped with guardrails that met Occupational Safety and Health Administration (OSHA) standards. It is unknown if the company man fell between or over the top of the guardrails.

FOG ID: 2014-013

Fatalities: 1
NAICS: 213111

FALL: FROM HEIGHT

Activities: **Well testing and logging activities**
Tripping pipe in or out

A derrick hand was on the derrick platform tripping pipe for a logging operation. The worker was tied off from the derrick to a tool ring that was sewn on the waist of his harness. The worker was moving a drill collar when he fell. The line tightened and the tool ring pulled out of the harness stitching, causing the worker to fall approximately 58 feet to the ground. He died on-site. The tool ring was still attached to the "D" ring on the derrick indicating the worker's attachment point on his safety harness failed. The worker had been employed for the company for one day.

FOG ID: 2014-089

Fatalities: 1
NAICS: 213111

FALL: FROM HEIGHT

Activities: **None assigned**

A worker climbed the derrick to unhook a bridle line. The worker fell from the derrick approximately 70 feet to the rig floor. Coworkers did not see what happened, but preliminary investigation revealed that the worker did not take a lanyard attachment before climbing the derrick.

FOG ID: 2014-100

Fatalities: 1
NAICS: 213111

FALL: SAME LEVEL (SLIP OR TRIP)

Activities: **None assigned**

A drilling rig worker walking on the wellsite near pump shed, water tanks, boiler and other structures the when he likely slipped on an icy rig mat and hit his head on either the mat or the ground. There were no witnesses to the incident.

FOG ID: 2014-101

Fatalities: 1
NAICS: 213111

STRUCK BY

Activities: **Downhole tool and equipment activities**
Rig or equipment repair or maintenance
Tripping pipe in or out
Make up or break out tubulars

The crew was tripping pipe to facilitate repairs to the high pressure mud pump clutch. The crew had tripped out four stands of pipe that were two joints tall. The fatally injured worker was handling the hold tongs when the shackle for the hold tongs came lose and caused the tong arm to strike the worker in the head. The worker died on-site from severe fractures to the neck and head.

FOG ID: 2014-090

Fatalities: 1
NAICS: 213111

STRUCK BY FALLING OBJECT

Activities: **Making a connection**
Laydown or pickup tubulars
Make up or break out tubulars

A floorman was making up a stand of drill pipe in the mouse hole on the rig floor when the next joint of drilling pipe being elevated to the rig floor fell from the pipe delivery system trough and struck the floorman from overhead. This caused the floorman to fall backwards and fatally strike his head on the manual tongs lying on the drilling rig floor. The drill pipe fell from the trough because the equipment operator was multitasking and lost focus on elevating the drill pipe to the rig floor. The conditions at the time of the incident were cold and rainy, and both rig floor workers were wearing hoodies that could have obstructed their view.

FOG ID: 2014-091

Fatalities: 1
NAICS: 211

STRUCK BY FALLING OBJECT

Activities: **None assigned**

A driller was operating the rig at the driller's console when the traveling block crashed onto the driller, pinning him between the block and the rig floor. The worker's body was crushed and there were multiple injuries. He was declared dead on-site.

FOG ID: 2014-026

Fatalities: 1
NAICS: 213112

STRUCK BY FALLING OBJECT

Activities: **Rig or equipment repair or maintenance**

Two workers were performing maintenance on drilling rig from a material basket that was elevated on the forks of a rough terrain, telescoping boom forklift. The basket was elevated approximately 7–8 feet and was not secured to the forklift. The basket slid off the forks. Worker #1 fell to the ground and was fatally crushed by the basket. Worker #2 was able to jump away from the falling basket.

FOG ID: 2014-017

Fatalities: 1
NAICS: 213112

STRUCK BY FALLING OBJECT

Activities: **Well control equipment activities**
Material handling: crane, forklift, winch truck
Spotting

A gin pole truck was transporting a 16,000-pound annular blowout preventer (BOP) assembly from the drilling rig to a large wooden skid about 75 feet away. A 9/32-inch welded steel chocker chain was being used to keep the BOP assembly in the upright position during transport. To lay down the assembly, the truck driver backed up to the skid with the assistance of the swamper spotting him. As he started to lower the assembly the chain broke, causing the assembly to fall and fatally strike the swamper in the head and back as he tried to get out of the way.

FOG ID: 2014-058

Fatalities: 1
NAICS: 213111

STRUCK BY FALLING OBJECT

Activities: **Downhole tool and equipment activities**
Laydown or pickup tubulars

The crew was laying down the bottomhole assembly. A motorman was pushing a tubular towards the v-door on the rig floor when an 8-inch drill collar came unscrewed from the lift sub used to pick the drill collar up into the mast. The drill collar fell to the rig floor and struck the motorman in the back as the crew pushed the bottom end into the top end of the laydown trough.

FOG ID: 2014-077

Fatalities: 1
NAICS: 213111

STRUCK BY FALLING OBJECT

Activities: **Well testing and logging activities**
Downhole tool and equipment activities
Make up or break out tubulars

A worker was assisting in the connection of a drilling test tool when the tool fell and fatally struck the worker.

FOG ID: 2014-052

Fatalities: 1
NAICS: 213112

VEHICLE INCIDENT: ON-SITE

Activities: Rigging up or down

Material handling: crane, forklift, winch truck

The crew was rigging up for drilling operations when a swamper was fatally backed over by a welding truck. At the time of the incident, the swamper was helping a winch truck driver move mud and water tanks. The swamper was assisting in the horizontal rigging of the tank to winch equipment, and had positioned himself along the storage tank being winched. At the same time, a welding truck was in the process of moving past the winch truck operations. At some point during the two simultaneous operations, the swamper stepped backwards and into the path of the welding truck as it was backing. The welding truck completely ran over the swamper.

Several factors that may have contributed to this incident were identified by Wyoming OSHA and are summarized below.

- **Swamper's limited ability to hear or see the welding truck:**
The swamper may have not been able to hear the welding truck because the welding truck had never been equipped with a back-up alarm and there were four diesel engines on-site that were much louder than the quiet gasoline engine of the welding truck. The swamper was limited in his ability to see the welding truck because he was wearing a hooded sweatshirt, which could have impaired his peripheral vision. He also had his back to the welding truck driver.
- **Welding truck driver's limited ability to see the swamper:** The design of the welding truck and the welding equipment did not allow the welding truck driver to see directly to the rear while he was backing. He also was backing without the benefit of a spotter.
- **Hazard identification:** All three workers on-site did not recognize the hazard present. The welding truck driver did not ask for a spotter and the winch truck driver or swamper did not offer to be a spotter while the welding truck was backing. Also, the welding truck driver arrived after the morning job safety analysis (JSA) and tailgate safety meeting.

For the complete Fatal Accident Alert issued by Wyoming OSHA that details the incident, significant factors, and recommendations see: http://www.wyomingworkforce.org/_docs/osha/accidents/02-05-2014.pdf

FOG ID: 2014-038

Fatalities: 1
NAICS: 213111

VEHICLE INCIDENT: ON-SITE

Activities: Rigging up or down

During rig up of a drilling rig, a worker went to the tool trailer to get bolts needed to install a floor plate. The worker was struck by a tractor being used as a forklift. The tractor was backing up and turning to the driver's right. The left front tire hit the worker and knocked him down. He was caught under the forks and was dragged approximately 20 feet.

FOG ID: 2014-025

Fatalities: 1
NAICS: 213111

VEHICLE INCIDENT: ON-SITE

Activities: Drilling fluid mixing and pumping
Rig or equipment repair or maintenance
Vacuum truck activities

A worker was kneeling down using a vacuum hose to vacuum up mud from the drilling rig containment area after it had been released due to a pump failure. The worker was run over by an end loader that was backing.

FOG ID: 2014-075

Fatalities: 1
NAICS: 213111

VEHICLE INCIDENT: ROADWAY

Activities: Commuting: non-traditional
Motor vehicle travel

A swamper was driving to work in the morning (before dawn) when he failed to negotiate a curve on an unlit rural 2-lane highway. The swamper's vehicle crossed into the opposite lane of traffic and veered off the road where it struck a barbed wire fence. It then began to roll and came to a rest on its roof. The swamper died on-scene. The swamper was wearing a seatbelt and fatigue was noted as a contributing factor on the crash report.

FOG ID: 2014-106

Fatalities: 1
NAICS: Unknown

VEHICLE INCIDENT: ROADWAY

Activities: Truck transport: produced or waste water hauling
Motor vehicle travel

A worker was hauling waste water from a natural gas drilling site at night. While traveling at a slow speed, he attempted to descend a steep snowy hill. The truck slid to the left side of the road, hit a ditch with the left front end, and then continued to slide along the ditch. As the truck was sliding, the driver exited the truck. He fell underneath the truck and was run over. He was pronounced dead at the scene. It was reported that several other water trucks were unable to make it up the hill that the worker was descending.

FOG ID: 2014-094

4 Incidents
7 Fatalities

FLOWBACK INCIDENT DESCRIPTIONS

Fatalities: 3
NAICS: 213111

EXPLOSION (COMBUSTION) OR FIRE

Activities: Well control equipment activities

The crew had been tasked to replace the existing wellbore pipe to a smaller diameter pipe to increase pressure and flow. At the time of the incident, the flowback fluids were being routed to a frac tank, and the crew was in the process of depressurizing the well. The vapors from the open frac tank drifted downwind to where the crew was working. The vapors ignited and caused a flash fire. Three workers died and two workers were hospitalized as a result of the incident. A potential ignition source was a portable generator with an attached light pole, placed within 12 feet of the frac tank.

FOG ID: 2014-040

Fatalities: 2
NAICS: 213112,
and 4842

EXPLOSION (PRESSURE)

Activities: Separation equipment activities
Well head or pumping unit activities

Two workers were killed by a high pressure explosion of a sand separator and related piping. The well was in the flowback phase when the incident occurred. A flowback worker opened the wellhead that was connected to a sand separator (pressure vessel). The sand separator was connected to a sand box collector on one end and a manifold on the other end. One of the workers was observed closing the valve between the sand separator and the sand box collector, thus causing the wellhead pressure to build up in the sand separator (improper valve line-up). With the pressure having nowhere to go but into the sand separator, which was not equipped with a pressure relief valve, the sand separator and related piping exploded, killing two workers. Other workers in the area suffered minor injuries but none were hospitalized.

FOG ID: 2014-005

Fatalities: 1
NAICS: 213112

EXPLOSION (PRESSURE)

Activities: Snubbing
Production rig activities
Plug drill out
Making a connection

A service rig crew was performing a snubbing operation to drill out frac plugs. They had drilled out the 8th of 11 plugs and were in the process of making connections when the rig's engine began to torque down. The rig operator reversed the drill string out of the wellbore. The third joint from the top of the drill string parted and the top of the drill string (made of three joints) came out of the wellbore, fatally striking the rig operator in the head. The crew was using 2 3/8 inch L80 drill pipe. It was found there

Fatalities: 1
NAICS: 213112

were no violations of the manufacturers' recommendations for the drill pipe or power swivel, and the crew did not deviate from recommended practices for this operation.

FOG ID: 2014-045

FALL: FROM HEIGHT

**Activities: Produced and waste fluids storage
Tank gauging or sampling**

A worker was gauging a flowback tank when he fell, likely through the ladder cage, causing fatal injuries to his head and neck. The height and cause of the fall is unknown.

FOG ID: 2014-086

9 Incidents
12 Fatalities

HYDRAULIC FRACTURING INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: 213112

CAUGHT BETWEEN OR CRUSHED

Activities: Produced and waste fluids storage
Tank cleaning or maintenance
Vacuum truck activities
Material handling: crane, forklift, winch truck

The crew was emptying a frac tank so that it could be moved to another location on-site. The crew needed to drain the fluids to one end of the frac tank where the vacuum hose was attached. To do this, the crew attached a chain from the end of the frac tank to the bucket of a backhoe and lifted the end of the frac tank up. Two workers then proceeded to clean the tank (worker #1 and #2). Once finished, the backhoe operator (worker #3) instructed worker #1 to detach the chain from the backhoe. As worker #1 approached the bucket of the backhoe, the backhoe operator stood up, turned to his left to get the attention of the operations manager (worker #4) who was walking away from the backhoe. As the backhoe operator turned, his leg bumped and actuated the joystick that controlled the reticulating arm and bucket. The bucket extended a few feet forward and crushed worker #1 against the manifold portion of the frac tank. When the backhoe operator noticed worker #1 had been crushed, he pulled the bucket back and worker #1 collapsed. Worker #2 and #4 began CPR on worker #1, but he died a short time later. A preliminary medical report indicated worker #1 suffered a collapse of both lungs.

FOG ID: 2014-083

Fatalities: 2
NAICS: 213112

EXPLOSION (PRESSURE)

Activities: Well cleanout activities
Pressure pumping activities
Coiled tubing activities

During a coiled tubing operation to flush out sediment in the wellbore, pipe over-pressurization caused an explosion that fatally injured two workers. For the operation, pressurized fluid was routed through a pump truck and injected into the well through hollow coiled tubing on a coiled tubing truck. The fluid was returned by 2-inch steel piping. Prior to the incident, worker #1 (supervisor) and worker #2 put together three lengths of pipe to connect the well's fluid return line to the frac stack. They discovered a leak in one of the connections of the piping and took turns hammering the coupling to tighten it. At this time, worker #3 (pump truck operator) stepped away from his position in the pump truck where he could monitor the well's pressure. Then, worker #1 told worker #4 to open a block valve to begin the initial flush of the well. After the initial flush, worker #4 was directed to close this valve. At this time, another block valve was not opened. Worker #4 was then instructed to open the wing valve on the frac stack. The return fluid started flowing back and

Fatalities: 1
NAICS: 213112

worker #1 resumed hammering on the coupling. Since another block valve had not been opened, the return fluid did not have an open pathway to the frac tank for hydraulic relief. This caused the piping between the wellbore and frac stack to become over-pressurized and explode, fatally injuring workers #1 and #2.

FOG ID: 2014-001

EXPLOSION (PRESSURE)

Activities: Rig or equipment repair or maintenance

One worker was killed and two workers were hospitalized when a high pressure water line ruptured. The three workers were trying to disassemble pipe to dislodge ice from a water line that had frozen overnight. The fatally injured worker was hammering on an elbow-shaped swivel joint/coupling iron connection when the connection popped off and released a water stream at an estimated 3,000–4,500 pounds per square inch. The swivel joint struck the worker in the head, causing a fatal contusion. The other two members of the crew were hospitalized. The temperature at the time of the incident was about 10 degrees Fahrenheit and overnight temperatures were well below 0 degrees Fahrenheit.

FOG ID: 2014-039

Fatalities: 1
NAICS: 213112

EXPOSURE: HARMFUL SUBSTANCE

Activities: Rig or Equipment repair or maintenance Pressure pumping

The crew was monitoring several water heaters that were being used during a hydraulic fracturing operation. The eight water heaters were housed in a shipping container. When the demand for water was high, the pressure change would trip a breaker. To reset the pressure switch, workers would have to enter the shipping container and restart the system. Before the incident, worker #1 and worker #2 were taking 30-minute turns monitoring the water heaters from inside the shipping container since the pressure switch was continuously tripping. During one of his shifts, Worker #1 was found unresponsive in the shipping container by other crew members. The crew removed worker #1 from the shipping container, started chest compressions, and called for help. Worker #1 died in the ambulance. Worker #1 was fatally exposed to carbon monoxide (CO) levels of 5,273 parts per million for approximately 25 minutes while inside the shipping container monitoring the heaters. The insulated shipping container had two vents and was approximately 40 feet long, 8 feet wide, and 8.5 feet high. The water heaters took up the majority of the space in the shipping container and were a potential source of carbon monoxide since they were energized by natural gas combustion. Adequate CO detection equipment was not used at the site.

FOG ID: 2014-033

Fatalities: 1
NAICS: 213112

STRUCK BY FALLING OBJECT

Activities: Well control equipment activities
Equipment install or dismantle
Material handling: crane, forklift, winch truck

The crew was removing the blowout preventer (BOP) from the wellhead in preparation for the well's first hydraulic fracturing operation. Worker #1 was standing on the top step of a ladder that was leaning against the BOP. Workers #2 and #3 were holding the base of the ladder. While Worker #1 was unscrewing a hoisting device from the top of the BOP, the BOP began to swing. Worker #1 fell backwards approximately 8 feet off the ladder, and the BOP disconnected from the crane's device. The 6,500-pound BOP fell on the worker and fatally crushed him. Worker #2 and worker #3 were able to get out of the way of the BOP and were unharmed.

FOG ID: 2014-012

Fatalities: 1
NAICS: 213112

STRUCK BY FALLING OBJECT

Activities: Material handling: crane, forklift, winch truck
Spotting

A worker was spotting for a forklift driver in a warehouse used to store fracking sand for an oilfield transportation company. The worker was standing by a stack of sand bags containing 3,000–3,500 pounds of sand each when one of the stacks collapsed and buried the worker. The worker died on-scene.

FOG ID: 2014-057

Fatalities: 1
NAICS: 211

VEHICLE INCIDENT: ON-SITE

Activities: Wellsite maintenance or construction

A bulldozer operator stopped the vehicle on an uphill slope on a frac pond construction site. When he exited the cab, the bulldozer's parking brake disengaged causing it to roll back down the incline. The worker was fatally struck and pinned beneath the bulldozer.

FOG ID: 2014-037

Fatalities: 1
NAICS: 213112

VEHICLE INCIDENT: ON-SITE

Activities: Spotting

At approximately 5:30 p.m., a worker was directing a semi-tractor trailer into position during hydraulic fracturing operations. The worker was fatally crushed when he was pinned between the semi-tractor trailer and a frac water holding tank.

FOG ID: 2014-102

Fatalities: 3
NAICS: 213112

VEHICLE INCIDENT: ROADWAY

Activities: Commuting: non-traditional
Motor vehicle travel

A school bus was attempting to make a right turn into an RV park and had to stop in its lane of travel to wait for another vehicle to exit the RV park. A van, carrying seven oilfield workers returning from a hydraulic fracturing operation, struck the bus from behind. The impact caused the van to roll. The driver and two passengers were killed in the crash. None of the fatally injured workers were wearing seatbelts. The other four passengers were taken to area hospitals. The peace officer's crash report indicated that driver fatigue may have contributed to the crash. There were no brake marks at the scene and the crew was returning from a 24- hour shift.

FOG ID: 2014-003

2 Incidents
3 Fatalities

OFFSHORE INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: Unknown

EXPLOSION (COMBUSTION) OR FIRE

Activities: Separation equipment activities
Tank cleaning or maintenance

A crew of four workers were tasked with cleaning an electrostatic heater treater on an offshore platform. They began draining the heater treater, and when the fluid level was below the manway hatch, the crew opened the hatch. Shortly after, when the supervisor started rinsing the lip of the manway hatch with salt water from a hose an explosion occurred inside the heater treater. The explosion caused fatal injuries to the supervisor and caused the other workers to fall backwards on the platform deck. The well was not in production at the time.

An investigation conducted by the Bureau of Safety and Environmental Enforcement (BSEE) revealed the following about the incident. The explosion was caused by ignition of flammable vapors in the heater treater after oxygen was introduced into the vessel when the manway hatch was opened. The most likely cause of ignition was improper lockout tagout (LOTO) procedures that resulted in energy being supplied to the electrostatic components of the heater treater during the work. Several factors that contributed to the incident are summarized below.

- **Improper LOTO procedures:** The heater treater breaker was found in the 'On' position with a lock and tag only through its handle and not locked to the breaker panel wall in the 'Off' position. Also, a disconnect switch adjacent to the manway hatch that was along the circuit of energy was not turned off. Furthermore, verification of isolation of the equipment was inadequate.
- **Inadequate ventilation and air monitoring:** After the heater treater was partially drained, a significant amount of space remained inside the tank where flammable vapors could accumulate. These vapors were not adequately removed through ventilation methods before the manway hatch was opened and oxygen was introduced into the heater treater.
- **Lack of protection of electrostatic grid:** The heater treater did not have low level switch, ground float, relay, or shunt trip function to de-energize the transformer when the fluid level in the heater treater was low and not protected (insulated) by being immersed in fluid (as it is in normal operating conditions).
- **Lack of training and hazard communication:** A job safety analysis (JSA) was conducted before the operation, but it was generic, did not follow the company's standard operating procedures (which were also not followed), and lacked explanation about specific hazards associated with the heater treater. Additionally, the workers who would be cleaning the heater treater did not seem to fully understand the hazards associated with their task and were given incorrect information that the heater treater was safe to work on.

Fatalities: 2
NAICS: Unknown

For the complete investigation from BSEE that details the incident, significant factors, and recommendations see: <https://www.bsee.gov/sites/bsee.gov/files/wd-105-e-panel-report-26-october-2016.pdf>

FOG ID: 2014-063

VEHICLE INCIDENT: OTHER LOCATION

Activities: Rig or equipment repair or maintenance
Commuting: non-traditional
Non-motor vehicle travel

During the afternoon, a helicopter transporting an HVAC technician to an offshore oil platform crashed just before reaching the destination. A worker, who was on the platform, saw the helicopter spin clockwise 8-10 times, fall silent, and then crash into the water. Workers on the platform launched a life boat, but the helicopter had already sunk before they reached it. Both the pilot and the HVAC technician were killed in the incident.

FOG ID: 2014-107

[13 Incidents]
[13 Fatalities]

PRODUCTION INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: 213112

CARDIAC EVENT: POSSIBLE EXPOSURE

Activities: Truck transport: crude oil hauling
Tank gauging or sampling

An oil hauler (51 years old) lost consciousness while pulling an oil sample out of a thief hatch of a crude oil storage tank. Another worker saw the oil hauler on-site, and then, approximately 12–15 minutes later, the same worker saw the oil hauler slumped over on the catwalk. The oil hauler had fallen backwards on the 90-degree corner of the catwalk guardrail. The oil hauler's clothing was hooked on the guardrail and he was found partially suspended by his sweatshirt hood. The oil hauler's sampling equipment was found inside the tank and the thief hatch was open. At the time of the incident, the worker was not using an atmospheric monitor. From the toxicology report, autopsy, and air monitoring conducted by the employer and emergency personnel, it was determined that the worker died from natural causes. The cause of death was sudden cardiac death due to ischemic heart disease, with atherosclerosis and cardiomegaly as contributing factors.

FOG ID: 2014-006

Fatalities: 1
NAICS: 213112

CARDIAC EVENT: POSSIBLE EXPOSURE

Activities: Truck transport: crude oil hauling
Tank gauging or sampling

An oil hauler (57 years old) was found collapsed and unresponsive on a tank battery catwalk. The oil hauler was found by another truck driver approximately 2.5 hours after arriving on-site. The tank battery consisted of 24 interconnected storage tanks (18 crude oil and 6 production water). At the time of the incident, the oil hauler was gauging and obtaining samples from a crude oil storage tank. The oil hauler had completed one of two samples. He was found partially upright with his face caught on the lower right edge of the metal lip around the thief hatch. His thief, gauging materials, and tool kit were next to the hatch. He was wearing an hydrogen sulfide (H₂S) gas monitor that did not alarm at the time of the incident. The tank's blow down valve was open. The oil hauler did not wear a 4-gas monitor and only non-fatal levels of benzene were found in his blood. The coroner determined the oil hauler died from atherosclerotic cardiovascular disease.

Investigation after the incident revealed that workers at the site were exposed to respiratory hazards while performing gauging and sampling of the crude oil tanks on the tank battery. Workers performed these tasks at open thief hatches and adjacent to open blow down vents. Flammable hydrocarbon gases and vapors vented through the open thief hatches and blow down valves, which exposed workers to oxygen deficient atmospheres and hydrocarbon gases and vapors.

FOG ID: 2014-030

Fatalities: 1
NAICS: 213112

CARDIAC EVENT: POSSIBLE EXPOSURE

Activities: Produced and waste fluids storage
Production monitoring
Tank gauging or sampling

A worker (63 years old) was found collapsed at the bottom of the catwalk stairs. The worker was monitoring a tank battery that had three water storage tanks and three crude oil storage tanks. The worker would gauge all six tanks on the hour, every hour. To gauge the tanks, the worker was required to climb the stairs to the catwalk and drop a gauger into the tank to measure the amount of fluid. The worker was coming down the catwalk stairs at approximately 3:00 a.m. when he collapsed. He was found at approximately 4:14 a.m. by a water hauler. The pathologist determined that the worker died from arteriosclerotic and hypertensive cardiovascular disease. The worker's blood was not tested for the presence of hydrocarbons and oxygenated volatiles at autopsy.

FOG ID: 2014-085

Fatalities: 1
NAICS: 211

ELECTROCUTION

Activities: None assigned

A lease operator and his assistant were approaching the wellsite when they saw a civilian whose tractor had become caught on an electrical distribution line guy/anchor wire. The two workers attempted to help the civilian dislodge the tractor. After some time, the lease operator went to the wellsite to carry out his duties while his assistant stayed behind to continue helping the civilian. The guy wire that the assistant was holding, gained slack and made contact with the energized line. The worker was fatally electrocuted.

FOG ID: 2014-098

Fatalities: 1
NAICS: 213112

EXPLOSION (COMBUSTION) OR FIRE

Activities: Separation equipment activities
Rig or equipment repair or maintenance

A roustabout was tasked with replacing the valve assembly and sight glass on the top and bottom ports of a 4-by-20-foot heater treater. He had completed work on the bottom port and climbed approximately 7 feet to the top port. When he removed the valve assembly from the top port, the production fluid (containing oil, water, and gas) in the heater treated began to leak and spew onto the roustabout. Soon after, the production fluid ignited and engulfed the roustabout. The roustabout was extinguished with water within minutes, but died from burn injuries approximately 7.5 hours later. The roustabout was wearing flame-resistant clothing (FRC).

Factors that may have contributed to the incident are described as follows.

- A job safety analysis (JSA) for the task had not been completed.

Fatalities: 1
NAICS: 213112

- The roustabout's employer did not have a lockout/tagout program, and the production fluid in the heater treater was not drained and isolated before maintenance.
- The heater treater was pressurized to 40–50 pounds per square inch during the work.
- The tools used by the roustabout were not intrinsically safe, and a fire extinguisher was not nearby while the work was being completed.

FOG ID: 2014-015

EXPLOSION (COMBUSTION) OR FIRE

**Activities: Produced and waste fluids storage
Tank cleaning or maintenance
Vacuum truck activities**

A crew of four workers was using a vacuum truck to spray clean the inside of a gas well condensate tank. They were using a lower access hatch to vacuum solids from the tank floor. During the operation, the tank suddenly exploded. Three of the workers received second and third degree burns and the fourth worker died the next day. Not all of the workers were wearing flame-resistant clothing (FRC).

Several factors that may have contributed to this incident were identified by Wyoming OSHA and are summarized below.

- **Lack of Lower Explosive Limit (LEL) monitoring:** Before the tank cleaning operation began, most of the condensate had been drained out and a vent hatch at the top of the tank had been open for approximately 24 hours. However, prior to the start of the tank cleaning process, LEL monitoring was not conducted.
- **Inadequate grounding and control of ignition sources:** The grounding cable from the vacuum truck was not bonded to the bonding grid on the tank. Also, the crew had improvised a 10-foot long piece of 4-inch PVC pipe and attached it to the end of the vacuum hose so they could reach farther back into the tank.
- **Lack of safety meeting:** A safety meeting was not conducted before starting the tank cleaning operation.

For the complete Fatal Accident Alert issued by Wyoming OSHA that details the incident, significant factors, and recommendations see: http://www.wyomingworkforce.org/_docs/osha/accidents/09-23a-2014.pdf

FOG ID: 2014-084

Fatalities: 1
NAICS: 213112

EXPOSURE: HARMFUL SUBSTANCE

Activities: **Produced and waste fluids storage**
Production monitoring
Tank gauging or sampling

A flow tester (20 years old) was found unresponsive in the early morning leaning over a crude oil production tank with his face next to an open thief hatch. The incident occurred overnight and the weather was rainy (intermittent) with high air moisture levels. The flow tester was found on a tank battery that consisted of 20 tanks supporting five producing wells (three crude oil tanks and one produced water tank per well). The flow tester was responsible for gauging the tanks associated with two of the wells. He would gauge the tanks every hour during his 12-hour shift. While gauging, the flow tester was trained to open the thief hatch, walk up wind from the hatch, watch the vapors rise out of the tank, listen to the vapors pressure off, and then approach the tank once the flow tester thought the vapors had dissipated. The flow tester shared a hydrogen sulfide (H₂S) monitor with the dayshift flow tester. No other atmospheric monitors were made available to the worker. The well pad was not known to have risks for exposures to H₂S nor had H₂S been detected in the past at this site. The medical examiner ruled the flow tester died of cardiac arrhythmia with cardiac hypertrophy, coronary artery hypogenesis, obesity, and petroleum vapor exposure as other significant conditions. This death was ruled work related by Occupational Safety and Health Administration (OSHA).

FOG ID: 2014-028

Fatalities: 1
NAICS: 213112

EXPOSURE: HARMFUL SUBSTANCE

Activities: **Truck transport: crude oil hauling**
Tank gauging or sampling

An oil hauler (59 years old) was found collapsed and non-responsive over the open hatch of a crude oil tank battery. The truck driver's work activity included traveling to wellsites to transfer crude oil located in large on-site storage tanks into a tanker truck. Prior to pumping the crude oil from the storage tanks the truck driver would climb onto a catwalk between the oil tanks, open the tank's thief hatch to visually assess the contents, manually gauge the tank, and then withdraw three crude oil samples. The tank battery where the truck driver was found consisted of 24 tanks (18 crude oil tanks and 6 produced water tanks) that supported six wells. The wells were brought into production approximately one month before the incident. The truck driver arrived on-site at around noon and was found by another worker about an hour and a half later. His thief, gauging materials, and tool kit were next to the open hatch. Two sample vials were filled. The tank's blow down valve was open. He was using a 4-gas monitor and a half mask air purifying respirator with an organic vapor and acid gas cartridge in combination with a P100 filter. Moments before the worker's death his 4-gas monitor recorded an oxygen deficient environment and the presence of hydrocarbons exceeding 100% of the lower explosive limit (LEL). Hydrogen sulfide (H₂S) was not detected by the 4-gas monitor. The autopsy report was amended on February 11,

Fatalities: 1
NAICS: 213112

Fatalities: 1
NAICS: 213112

2015 and states the truck driver died of sudden cardiac death due to inhalation of hydrocarbons and displacement of oxygen by those same agents in the presence of severe hypertensive atherosclerotic cardiovascular disease. Other personal factors such as diabetes and tobacco use may have contributed.

It is important to note that before this incident the truck driver experienced a similar episode while sampling tanks where he was found by another worker disoriented and dizzy on the catwalk. At the time of the incident, the truck driver was using a 4-gas monitor that recorded an environment that was oxygen deficient and elevated in hydrocarbons (sometimes exceeding 100% of the LEL) for approximately 15 minutes. He was not wearing a respirator. He was taken to a medical facility for evaluation and returned to work the next day.

FOG ID: 2014-093

EXPOSURE: HARMFUL SUBSTANCE

**Activities: Separation equipment activities
Rig or equipment repair or maintenance**

A worker was loosening a valve on a heater treater from a fixed industrial ladder to increase the flow when hydrogen sulfide (H₂S) gas escaped the piping. The exposure to H₂S caused the worker to fall from height and suffer a fatal head injury. The worker's H₂S monitor recorded 95 parts per million (ppm) H₂S for 9 minutes and 50 seconds.

FOG ID: 2014-043

FALL: SAME LEVEL (SLIP OR TRIP)

**Activities: Wellhead or pumping unit activities
Rig or equipment repair or maintenance**

An owner/operator of a roustabout company was preparing to change the pump jack motor. The worker was in the initial stages of the change out and was waiting for the motor to be delivered. He was alone on-site. At some point the worker approached the area alongside the pump jack where the counterweight crank assembly rotated. Here, it is suspected that he slipped or fell, causing his body to be fatally crushed between the rotating pump jack arm and concrete pad. The worker was found shortly after the incident by the worker delivering the motor.

Several factors that may have contributed to this incident were identified by Wyoming OSHA and are summarized below.

- **Unguarded machinery:** A section of fencing around the pump jack had not been installed.
- **Trip hazards:** Several trip hazards existed in the area where the incident occurred.
- **Improper lockout tagout (LOTO) procedures:** The worker approached the unguarded pump jack while it was in operation.

Fatalities: 1
NAICS: 213112

- **Lack of safety plan and training records:** There was no indication of training records or a safety plan for maintenance of the well.
- **Lone worker:** The worker was the only person on-site at the time of the incident.

For the complete Fatal Accident Alert issued by Wyoming OSHA that details the incident, significant factors, and recommendations see: http://www.wyomingworkforce.org/_docs/osha/accidents/09-03-2014.pdf

FOG ID: 2014-073

STRUCK BY FALLING OBJECT

Activities: Wellsite maintenance or construction

A worker was clearing trees from the tank battery area. At the time of the incident, he was picking up his tools before leaving when he noticed an axe was stuck in a tree limb. He removed the axe from the tree limb and threw the limb. The tree limb struck and broke the guy wire supporting the flare stack, causing the stack to fall onto the worker. The worker succumbed to his injuries four days later. The employer did not ensure that workers wore hard hats where there was a potential for falling objects

FOG ID: 2014-081

UNDETERMINED: POSSIBLE EXPOSURE

Activities: Truck transport: crude oil hauling
Tank gauging or sampling

An oil hauler (57 years old) was found unresponsive and collapsed on the catwalk of a tank battery. The tank battery consisted of eight tanks. The site had been operational for 45 days prior to the incident. The truck driver was discovered at 8:30 a.m. by another worker, approximately 30–45 minutes after arriving on-site. The truck driver was collapsed over the catwalk railing and over the tank's thief hatch. It appeared that the truck driver was in the process of completing his initial pre-loading sample checks. The truck driver and the other workers on-site were using hydrogen sulfide (H₂S) monitors that did not alarm. An autopsy was not performed on the truck driver and the cause of death is listed as undetermined.

FOG ID: 2014-007

VEHICLE INCIDENT: ON-SITE

Activities: Produced and waste fluids storage
Production monitoring

A worker was changing a natural gas production meter chart when the pickup truck he was driving pinned him between the vehicle and the meter house, causing asphyxiation.

FOG ID: 2014-009

Fatalities: 1
NAICS: 213112

Fatalities: 1
NAICS: 211

[2 Incidents]
[2 Fatalities]

SITE PREPARATION INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: 238990

CAUGHT BETWEEN OR CRUSHED

Activities: Wellsite maintenance or construction

Worker #1 was operating a trencher to dig a ditch at an oil well drilling site for spill control. Worker #2 was walking close behind the trencher blade, kicking dirt back into the trench, when his leg got caught in the trencher, causing fatal injuries.

Before the incident, worker #1 told worker #2 to stop kicking dirt back into the trench, but worker #2 said to worker #1 that he was not his boss and could not tell him what to do. Worker #1 did not report the incident to his supervisor and continued operating the trencher, even though he had the authority to stop work due to unsafe work practices. However, it was also reported that workers often walked behind trenchers to throw the dirt back into the ditch.

FOG ID: 2014-080

Fatalities: 1
NAICS: 213112

VEHICLE INCIDENT: ROADWAY

Activities: None assigned

A crew of two workers was surveying a corner plot of land that was adjacent to a roadway for oil/gas operations. One of the workers stepped into the roadway to place a surveying rod upon a monument that was on the centerline of the road. The worker was fatally struck by a pickup truck. The roadway was a paved rural highway with a speed limit of 55 miles per hour.

FOG ID: 2014-048

[2 Incidents]
[2 Fatalities]

TANK REFURBISHMENT AND CUSTOM FABRICATION INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: 213112

EXPLOSION (COMBUSTION) OR FIRE

Activities: Hotwork and welding

A worker was in the process of refurbishing a tank to be used for crude oil storage. The tank was presumed to be empty. The worker was on top of the tank, possibly using an acetylene torch to cut a hole in the tank lid. The tank exploded, throwing the lid and worker off the tank. The worker was found 60 feet away from the tank with multiple fractures to head, neck, arms, and legs. There were no eye-witnesses to the incident.

FOG ID: 2014-010

Fatalities: 1
NAICS: 211

EXPLOSION (COMBUSTION) OR FIRE

Activities: Hotwork and welding

Worker #1 was fatally injured in a crude oil storage tank explosion. Prior to the incident, worker #1 and worker #2 were welding a 210-barrel crude oil storage tank in the shop of a company that provides a variety of oil and gas extraction services, including tank refurbishment. Worker #2 was tack welding two mild steel sheets together while worker #1 was on the top of the tank mig welding a lifting eye to the center of the tank. Weld spark or hot slag fell into a 3-inch bung hole that was on the top of the tank and that was approximately 6 inches from the lifting eye. This caused flammable vapors in the tank to explode. The explosion made the tank rise approximately 5 feet, crushing worker #1 between the tank and the roof of the weld shop. Then, worker #1 fell approximately 15 feet to the ground between the tank and the inside wall of the building. Worker #2 was knocked onto his back by the explosion, but was able to exit out of a door at the back of the weld shop. Worker #2 retrieved a fire extinguisher and used it to keep the flames away from worker #1 until emergency personnel arrived. Worker #1 was transported to the hospital and died from blunt impact to the head and torso (no thermal injuries listed) approximately 90 minutes after the explosion. Prior to the incident, the tank had been purged with nitrogen, but an oxygen detector was not used to ensure that all of the oxygen had been displaced. Also, a combustible gas detector was not used before or during the hotwork to ensure vapors were below the lower explosive limit (LEL).

FOG ID: 2014-011

[11 Incidents]
[13 Fatalities]

UNSPECIFIED: OFF-WELLSITE INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: 211

VEHICLE INCIDENT: ON-SITE

Activities: None assigned

A worker was returning to the company's yard when he stepped out of his truck to help another worker who was mowing the premises. His work truck started rolling forward. He ran in front of the truck to try to stop it. The worker slipped and the truck ran over him.

FOG ID: 2014-014

Fatalities: 1
NAICS: Unknown

VEHICLE INCIDENT: ROADWAY

Activities: Motor vehicle travel

An oilfield worker and a passenger in a pickup truck were approaching a right turn on a rural 2-lane highway during the late morning. Instead of following the curve, the driver continued straight, veering into the opposite lane of traffic, and off the roadway. Once off the roadway the truck hit head first into the far side of a concrete culvert, causing the vehicle to flip and hit a powerline pole. The driver died on-scene and the passenger was transported to the hospital. Both the driver and passenger were wearing seat belts. Driver fatigue was noted as a contributing factor on the crash report.

FOG ID: 2014-104

Fatalities: 1
NAICS: 213112

VEHICLE INCIDENT: ROADWAY

Activities: Truck transport: equipment or supplies hauling
Motor vehicle travel

During the afternoon, two workers were hauling a trailer pulled by a pickup truck (20,900 pounds combined gross vehicle weight rating [GVWR]) for a roustabout company. While on a rural 2-lane highway the vehicles veered off the edge of the pavement causing the vehicles to jerk. The driver over-corrected to the left causing the vehicles to skid into the oncoming lane and off the side of the road where the vehicles struck a vent pipe and utility pole. The vehicles then separated. The trailer came to rest a short distance from the utility pole while the pickup truck rolled multiple times back across both lanes of traffic before coming to a rest in a ditch on the other side of the road. Both the driver and passenger were not wearing seatbelts and were ejected. The driver died on-scene and the passenger was transported to the hospital with multiple injuries. The driver was unlicensed, tested positive for methamphetamine, and had a blood alcohol concentration of 0.245. It was the crash investigator's opinion that intoxication due to drugs and alcohol was the main causative factor in this crash.

FOG ID: 2014-036

Fatalities: 1
NAICS: 213112

VEHICLE INCIDENT: ROADWAY

Activities: **Truck transport: unspecified cargo**
Motor vehicle travel

During the afternoon, a worker employed by a company specializing in assembling well control equipment was driving on a rural 2-lane highway in a single unit truck (25,960 pounds registered gross vehicle weight [RGVW]). The driver was either fatigued or asleep, causing the truck to drift off the right side of the road and into a concrete culvert and a delineator that was part of a ditch on the side of the road. This caused the truck to overturn to the right and strike a wire fence. The driver was partially ejected during the crash and later died at the hospital. The driver was not wearing a seatbelt.

FOG ID: 2014-096

Fatalities: 1
NAICS: Unknown

VEHICLE INCIDENT: ROADWAY

Activities: **Commuting: non-traditional**
Motor vehicle travel

A pickup truck travelling north hit the northbound guardrail and then travelled into the southbound lane. The pickup truck then struck a van head-on that was carrying five oilfield workers. The collision caused the van to travel into the northbound lane and roll on its left side. The front seat passenger of the van was declared dead on-scene. This passenger was wearing a seatbelt. The driver of the van was injured and was wearing a seatbelt. The three backseat passengers were not wearing seatbelts. All three sustained injuries and two were air lifted from the scene. The driver of the pickup truck had fallen asleep at the wheel and was under the influence of cannabis, which may have contributed to the incident.

FOG ID: 2014-062

Fatalities: 1
NAICS: 532412

VEHICLE INCIDENT: ROADWAY

Activities: **Truck transport: water hauling**
Motor vehicle travel

A water tank truck driver lost control on a curve, and the truck traveled into the opposite lane where it began to roll. The tanker then hit another vehicle and continued to roll over a hillside where it hit a residential garage. The driver of the truck was fatally injured. It was reported by residents that several crashes have occurred at that particular location in the past.

FOG ID: 2014-097

Fatalities: 1
NAICS: 213112

VEHICLE INCIDENT: ROADWAY

Activities: **Motor vehicle travel**

A pickup truck with two oilfield workers was driving on a rural 2-lane highway during the late afternoon. The driver of the pickup saw an sport utility vehicle (SUV) in the opposite lane of traffic sharply swerve towards the shoulder, and then begin to swerve back towards the centerline and into the pickup truck's lane. In an attempt to avoid a crash with the SUV, the driver of the pickup pulled over to the side of the road. The SUV crossed over the centerline, and crashed into the front driver side of the pickup while it was pulled over. The crash caused the pickup to roll onto its roof and into the ditch on the side of the road. Both vehicles immediately erupted into flames. The driver of the pickup was able to escape the vehicle. The passenger died on-scene. The driver of the pickup was wearing a seatbelt. The passenger was not wearing a seatbelt.

FOG ID: 2014-105

Fatalities: 1
NAICS: Unknown

VEHICLE INCIDENT: ROADWAY

Activities: **Truck transport: equipment or supplies hauling**
Motor vehicle travel

Vehicle #1 (pickup truck), vehicle #2 (tractor trailer carrying large equipment), vehicle #3 (tractor trailer carrying large equipment), and vehicle #4 (pickup truck) were stopped in line at a stop signal light in a construction zone on a rural 2-lane highway during the day. Vehicle #5 (tractor trailer carrying large oilfield equipment, 99,500 pound combined gross vehicle weight rating [GVWR]) crashed into the rear-end of vehicle #4, causing vehicle #4 to rear-end vehicle #3, vehicle #3 to rear-end vehicle #2, and vehicle #2 to rear-end vehicle #1. After colliding with vehicle #4, vehicle #5 veered into oncoming traffic and struck vehicle #6 (flatbed tractor trailer). Vehicle #5's tractor and trailer units separated. Then, vehicle #5's tractor unit and vehicle #4 burst into flames. The driver of vehicle #4 (civilian) and the driver of vehicle #5 (oilfield worker) died on the scene. All persons involved in the crash were wearing seatbelts. The crash report indicated that the driver of vehicle #5 may have been fatigued or asleep.

FOG ID: 2014-092

VEHICLE INCIDENT: ROADWAY

Activities: **Truck transport: unspecified cargo**
Motor vehicle travel

During the early morning, a worker for a well servicing company was approaching a stop sign at a T- intersection in a single unit truck (26,000 pound gross vehicle weight rating [GVWR]) where the unlit road he was travelling on was ending. The truck driver did not stop at the stop sign and continued straight, striking a cattle guard. He then struck a dirt bank and the truck went airborne. The truck landed upright with the front of the vehicle striking the

Fatalities: 1
NAICS: 213112

Fatalities: 2
NAICS: Unknown

ground first. The driver was pronounced dead on-scene. He was not wearing a seatbelt and had a blood alcohol level of 0.268.

FOG ID: 2014-095

VEHICLE INCIDENT: ROADWAY

Activities: **Motor vehicle travel**

Two oilfield workers received permission from their employer to help another motorist change a flat tire on a trailer being towed by a vehicle. The trailer was stopped on the right shoulder of a multi-lane divided interstate. The oilfield workers were attempting to fix the tire when they were hit by a truck that crossed into the shoulder. Both workers died on-scene. The driver of the truck was distracted, reaching for a beverage, when the incident occurred.

FOG ID: 2014-067

Fatalities: 2
NAICS: Unknown

VEHICLE INCIDENT: ROADWAY

Activities: **Commuting: non-traditional**
Motor vehicle travel

A pickup truck with four oilfield workers was approaching a T-intersection at night on an unlit gravel road. The driver failed to negotiate a left turn and the truck went off the road and into a ditch, where it rolled on to its roof. The driver and one passenger died. The other two passengers were treated for minor injuries. The driver was the only worker not wearing a seat belt. Also, the driver had been drinking (blood alcohol results unknown). Distraction inside the vehicle was noted as a contributing factor.

FOG ID: 2014-060

[2 Incidents]
[2 Fatalities]

UNSPECIFIED: WELLSITE OPERATIONS INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: 213112

STRUCK BY FALLING OBJECT

Activities: Truck transport: equipment or supplies hauling
Material handling: crane, forklift, winch truck

With the help of a forklift operator, a truck driver was unloading pipe bundles that contained 13 PVC pipes that were 50 feet long and 6 inches in diameter from his tractor trailer. The forklift operator was moving one of the bundles to the laydown point when the truck driver decided to remove the tie-downs to the next layer of pipe bundles on the opposite side of the trailer. As the tie-downs were loosened, the bundle dislodged and fell on top of the truck driver causing fatal injuries.

FOG ID: 2014-055

Fatalities: 1
NAICS: 211

VEHICLE INCIDENT: ON-SITE

Activities: Wellsite maintenance or construction

A worker was clearing a right of way with a riding mulcher. The worker struck a natural gas pipeline causing an explosion that fatally injured him.

FOG ID: 2014-082

3 Incidents
3 Fatalities

VEHICLE REPAIR OR MAINTENANCE OPERATIONS INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: 213112

EXPLOSION (COMBUSTION) OR FIRE

Activities: Hotwork and welding

A worker was spot welding a pinhole leak in the sight glass stem on the back of a water hauling vehicle at the employer's yard. The worker was inside the tank when vapors ignited and caused an explosion. The worker suffered several injuries and died five days after the incident. The employer of the worker failed to clean the container of oil residue thoroughly before work began, inspect welding areas prior to work, vent container spaces, separate oxygen and fuel-gas cylinders, and provide a fire watch.

FOG ID: 2014-047

Fatalities: 1
NAICS: 4842

EXPOSURE: HARMFUL SUBSTANCE

Activities: None assigned

A truck driver and his supervisor were performing maintenance on a tanker truck that had been used to haul produced water. The truck driver and supervisor heard a noise in the tank that they thought was a piece of loose steel. The truck driver entered the tank to retrieve the piece of steel. While inside the tank, the truck driver said he felt dizzy and he tried to exit the tank. The supervisor went to assist the truck driver up the ladder and out of the tank when the truck driver began to lose consciousness. The supervisor tried to hold onto the truck driver, but he was unable to and the truck driver fell back into the tank. The supervisor called emergency services who rescued the truck driver from the tank. The truck driver was transported to the hospital where he died.

FOG ID: 2014-032

Fatalities: 1
NAICS: 213112

STRUCK BY FALLING OBJECT

Activities: None assigned

A loader was on a flatbed truck in the company's yard ready to go to a rig location when the truck driver (worker #1) noticed a leak in the hydraulic line of the loader. The truck driver went to the shop and asked worker #2 to fix the leak. Worker #2 and worker #3 went to check the leak on the loader. Worker #3 started the loader and lifted the boom with attached forks. Worker #2 walked under the boom and unscrewed the hydraulic line. That action released the pressure from the unscrewed hydraulic line causing the boom to fall and crush worker #2. Workers on-site used manual hydraulic jacks to lift the boom and extricate worker #2 who was conscious, but had suffered multiple blunt force injuries and died minutes after the incident.

FOG ID: 2014-056

3 Incidents
3 Fatalities

WASTE FLUIDS TREATMENT AND DISPOSAL INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: 4842

EXPLOSION (COMBUSTION) OR FIRE

Activities: Truck transport of waste water hauling
Vacuum truck activities
Vehicle maintenance activities
Hotwork and welding

A worker was at the employer's yard using a propane torch to loosen frozen ball valves on the back of a vacuum truck. The worker was fatally injured when the metal hatch plate blew off the back of the truck and struck the worker. The truck contained wastewater from oil and gas drilling sites. It is suspected that methane gas in the wastewater ignited causing the explosion.

FOG ID: 2014-046

Fatalities: 1
NAICS: 213111

EXPLOSION (PRESSURE)

Activities: Drilling fluid mixing and pumping
Rig or equipment repair or maintenance

A worker was fatally injured after being struck by a high pressure valve that separated from a vertical stand pipe. During the day shift, the stand pipe had been leaking and the day crew tightened and fitted the standpipe with a new gasket. The day driller informed the night crew of the repair, but the standpipe began to leak again during the night shift. To repair the gasket, the night crew attempted to dislodge the manifold, and the crew removed a 2-inch fill-up flex line. The gasket was replaced and the manifold was reassembled and tightened. The system was pressurized, and at 2,700 pounds per square inch, the 2-inch high-pressure fill line valve separated from the 2-inch high-pressure nipple on the standpipe. The fill line valve fatally struck a worker on the back of the head. The pipe nipple was found to have been inadequately secured to the fill line valve resulting in catastrophic failure of the connection.

FOG ID: 2014-074

Fatalities: 1
NAICS: 562211

EXPLOSION (PRESSURE)

Activities: Pressure pumping
Equipment install or dismantle

There were no witnesses to the incident, but a worker was fatally injured at an oilfield waste disposal site while removing a piece of pipe from a diesel-powered skid pump. The worker was using a pry bar to remove

a pipe that was under pressure. It is suspected that the pipe released violently and struck the pry bar that the worker was using, causing the pry bar to fatally strike the worker's head. Coworkers went looking for the worker after they had not seen him for about 20 minutes.

FOG ID: 2014-103

A worker applies lubricant to the end of a tubular that is being picked up into a drilling rig.



[1 Incidents]
[1 Fatalities]

WELL COMPLETION INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: 211

EXPLOSION (COMBUSTION) OR FIRE

Activities: Production tubing installation

Two workers were preparing for the morning safety meeting when they heard a hissing sound from one of the three wellheads on-site. The well was leaking natural gas. As the workers approached the pressurized wellhead, it ignited and caused a fire that burned for five days. One of the workers took refuge in a vehicle and was rescued shortly after the fire started. The other worker died in the fire. In the days prior to the incident, crews were preparing the well for the installation of production tubing to remove water from the well.

A fact finding investigation by the Pennsylvania Department of Environmental Protection (DEP) of the incident revealed the following. The gas leak was caused by the ejection of one of the eight lock pin assemblies from the Tubing Spool Assembly. The ejection created a hole that allowed gas to escape from the well. It is unclear what caused the gas to ignite, since several ignition sources existed on the well pad. Also, it is unknown what caused the ejection of the lock pin assembly, although in the days prior to the incident the following occurred and may have contributed. To remove the tubing hanger, the lock pin assemblies were manipulated by an inexperienced worker with inadequate supervision and training while the well was pressurized. The wellsite managers, whose job is to oversee the work of contractors and activities on the well site, changed often with little continuity between handovers, had varying levels of experience, provided differing levels of oversight, and often felt their workload was too demanding. Also, an obstruction in the well delayed completion of the tubing installation, meaning the wells were pressurized for several days awaiting completion. The absence of torqued-down tubing increased the risk of ejection of the lock pin assemblies. Finally, although the planned work for the three wells at the site could be performed safely while the wells were pressurized, the above practices increased the safety risk.

For the complete fact finding investigation from the Pennsylvania DEP see: <http://files.dep.state.pa.us/OilGas/OilGasLandingPageFiles/BOI%20Lanco%2078.pdf>

For the complete After Action Report from the Pennsylvania DEP detailing the incident and response:

<http://files.dep.state.pa.us/OilGas/OilGasLandingPageFiles/Chevron%20After%20Action%20Report.pdf>

FOG ID: 2014-034

[8 Incidents]
[9 Fatalities]

WELL SERVICING, INTERVENTION, OR WORKOVER INCIDENT DESCRIPTIONS

Fatalities: 1
NAICS: 213112

ELECTROCUTION

Activities: Well head or pumping unit activities
Equipment install or dismantle
Material handling: crane, forklift, winch truck

A crew of three workers was removing a pump jack from a wellsite using a rig up truck equipped with an A-Frame boom. The truck operator (worker #1) was maneuvering around the site to unload the samson post while the truck's boom was in the elevated position. Worker #2 was following the truck and guiding the samson post with a rope tag line. During this process, the truck made contact with overhead power lines. The driver was unaware of the contact and began reversing the truck to maneuver it into position to unload the post. At this time, worker #3 ran over to help guide the post. Worker #3 made direct contact with his hands, was electrocuted, and then thrown back onto the ground. Not knowing of the situation, the truck operator continued in reverse and ran over worker #3.

FOG ID: 2014-019

Fatalities: 2
NAICS: 238990

ELECTROCUTION

Activities: Well head or pumping unit activities
Equipment install or dismantle
Material handling: crane, forklift, winch truck

A crew of four workers was removing a pump jack using a winch truck with a boom. Worker #1 was driving the truck towards the well, while worker #2 was holding the winch cable in preparation to attach it to the pump jack. As worker #1 was backing, the truck contacted overhead powerlines and worker #2 was fatally electrocuted. Worker #3 saw the incident and went to retrieve a fire extinguisher from the truck. When worker #3 touched the truck he was fatally electrocuted. Worker #4 tried to pull worker #3 away from the truck and received an electric shock, but survived with burn injuries to his hands.

FOG ID: 2014-053

Fatalities: 1
NAICS: 213112

EXPLOSION (COMBUSTION) OR FIRE

Activities: Production rig activities

The crew of four workers was operating a workover rig. Air mixed with gas and there was a spark in the well. The uncontrolled release of pressure caused the blowout preventer to explode. The crew was thrown

Fatalities: 1
NAICS: 211

off the working platform and struck by the debris. One worker (floorhand) died from multiple injuries to the body and two workers were hospitalized.

FOG ID: 2014-044

FALL: FROM HEIGHT

Activities: **Production rig activities**
Rigging up or down

A roustabout was fatally injured when he fell off a platform. The roustabout had worked directly for the employer for approximately three years, primarily on a production rig. The day of the incident, the roustabout, floorhand, and field manager were in the process of rigging down a single hoist-style production rig after completing a well servicing job. During this process, the roustabout climbed onto a platform at the base of the derrick located over the cab of the rig. The field manager lowered the traveling block and manually pushed it towards the platform. The field manager held the block so that the roustabout could attach it to the derrick with a hook and sling. Once the hook was attached to the block, the field manager let go of the block. The roustabout then fell head first approximately 7 feet 7 inches from the platform to the ground below. The roustabout was pronounced dead at the scene. The cause of death was blunt force injuries to the head and neck from the fall. The cause of the fall is unknown.

FOG ID: 2014-022

FALL: FROM HEIGHT

Activities: **Production rig activities**
Pulling or running rods

The crew of a service rig was preparing to begin pulling rods. The derrickman was standing on the fingers of the rod basket. He was trying to disconnect the transfer chain from the welded shackle on the mast frame so that the rods from the block could be transferred to the rod basket fingers. He was wearing a full body harness and was attached to a self-retracting lifeline that was mounted on top of the rig mast. The worker lost his balance and fell. The lifeline broke and the worker continued to fall approximately 55 feet to the ground. The worker was pronounced dead at the scene.

FOG ID: 2014-071

STRUCK BY

Activities: **Production rig activities**
Pulling or running rods

The crew was pulling rods to repair a broken rod. The workover rig the crew was using was near the pump jack. The pump jack weights were in the up position. The blocks of the workover rig came down and struck

Fatalities: 1
NAICS: 213112

Fatalities: 1
NAICS: 211

the pump jack. The pump jack's brakes failed and caused the full weight of the pump jack to come swinging down over the rig floor. A worker, who was in the path of the pump jack, was struck in the head by the pump jack weights. The worker died from his injuries one week after the incident.

FOG ID: 2014-072

STRUCK BY FALLING OBJECT

Activities: **Production rig activities**
Pulling or running tubing
Laydown or pickup tubulars

The crew was laying down tubing on a pulling unit. The crew was using an elevator with an unstable latch on the hook, and during the operation the hook opened. A 23/8-inch pipe fell, striking the worker, who was running the tongs and unscrewing the pipes, on the back of his head. The worker was taken to the hospital and died the following day due to the head injury.

FOG ID: 2014-029

Fatalities: 1
NAICS: 213112

STRUCK BY FALLING OBJECT

Activities: **Production rig activities**
Rigging up or down

A worker was struck by a hinged working floor on a service rig. The floor was being winched up when the cable bridle broke. The floor fell and struck the worker.

FOG ID: 2014-024



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