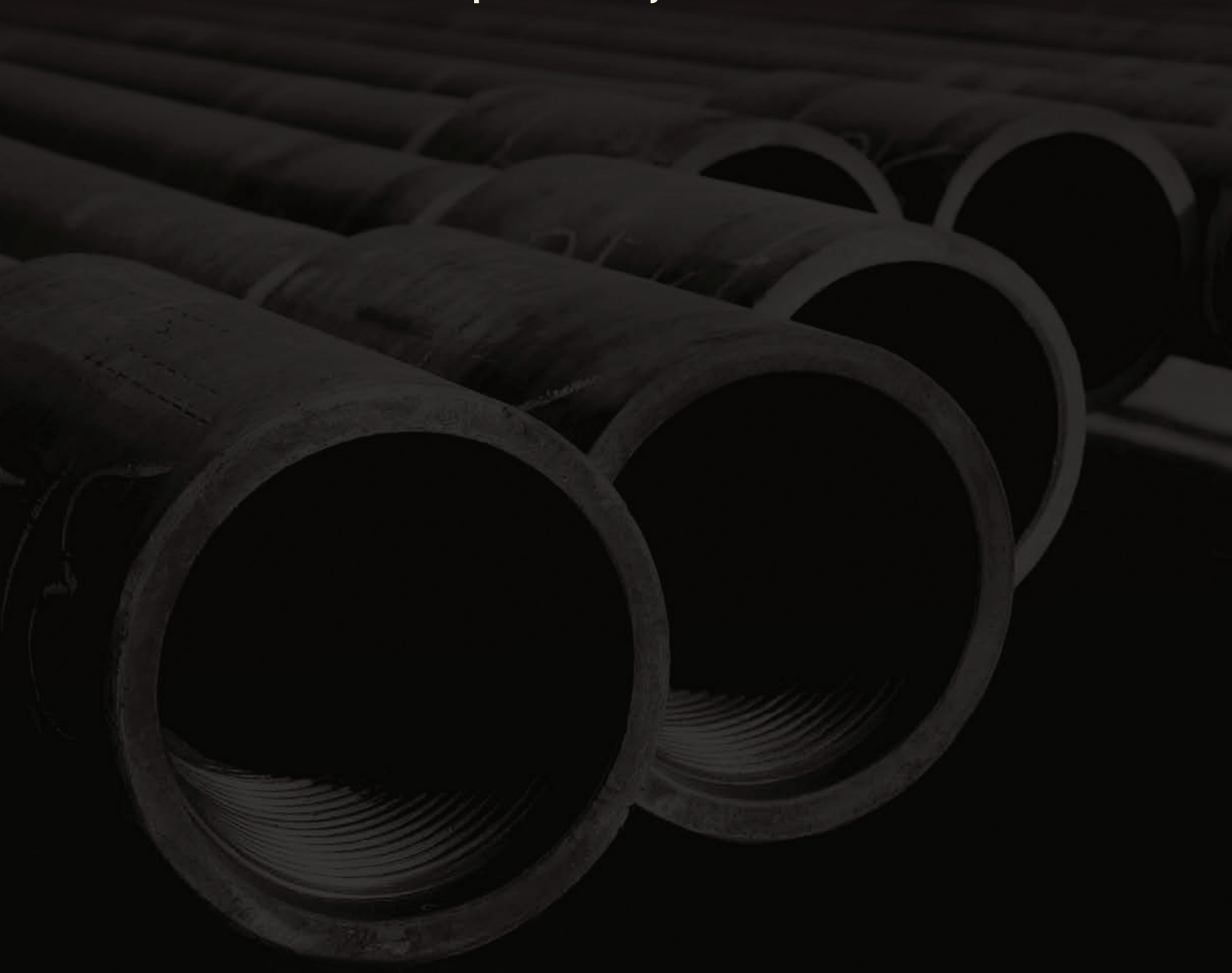




OIL AND GAS EXTRACTION WORKER FATALITIES

2014 Mid-Year Report: January 1, 2014 — June 30, 2014



DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health



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September 2015

OVERVIEW OF THE FATALITIES IN OIL AND GAS EXTRACTION (FOG) DATABASE

This report was compiled by the NIOSH Oil and Gas Safety and Health Program using the NIOSH Fatalities in Oil and Gas Extraction (FOG) database. FOG is a new internal system that collects detailed information about land-based and offshore oil and gas extraction fatalities in the U.S. It is used to inform NIOSH, industry, and other stakeholder groups, and guide interventions that will prevent future loss of life in this industry.

FOG includes all identified fatal events to U.S. land-based and offshore oil and gas extraction workers, irrespective of the industry code of the employer (North American Industrial Classification System or NAICS code). A full description of inclusion and exclusion criteria is found below. 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.

INCLUSION 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 (common NAICS 211-operators, 213111-drilling operations, 213112-support activities”).
- Workers involved in site preparation and related construction activities for oil and gas wells (NAICS 238910).
- Workers involved in specialized freight trucking, local and long distance, that includes hauling of materials for oil and gas extraction activities (NAICS 484220, 484230).
- Workers involved in performing geophysical surveying and mapping services for oil and gas on a contract or fee basis (NAICS 541360).
- 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) a “mega commute”: travel in excess of 90 minutes or 50 miles one-way, 2) workers transported by a paid transportation service, and 3) workers traveling as a crew.

*For full NIACS descriptions, see Appendix A.

EXCLUSION CRITERIA

- Workers involved in oil and gas pipeline and related structures construction or 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.

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

- FOG's primary purpose is to collect detailed information on oil and gas extraction fatalities; while BLS CFOI's primary purpose is to collect a census of fatalities for ALL industries.
- A secondary purpose of FOG is to provide timely, preliminary information to stakeholders about fatalities that have occurred in the industry. The final counts determined by BLS will be more complete, and therefore greater than any count reported here. In particular, motor vehicle fatalities are currently undercounted in FOG.
- BLS CFOI includes three NAICS codes when reporting oil and gas extraction fatalities (211, 213111, 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 categorized under a non-oil and gas NAICS code (specialized freight), but are included in FOG.
- Both FOG and BLS CFOI include non-traditional commuting fatalities, but the definition of a non-traditional commute may differ between datasets.
- FOG reports all cardiac events that begin at work, and BLS 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. It may not always be possible to determine if exposure occurred. In order to support the identification and characterization of exposure risks in this industry, cardiac events are included in FOG.

Limitations to FOG

FOG does not currently capture all work-related fatalities for this industry. In particular, transportation incidents are likely underrepresented. Currently, the primary data sources FOG uses to identify fatalities during land-based oil and gas extraction activities are OSHA and media sources. Most transportation incidents are outside of OSHA's jurisdiction. Efforts are underway to develop better methods for identifying these fatalities through the appropriate state agencies in oilfield states. Secondly, work-related chronic illness fatalities are underrepresented.

INCIDENTS BY OPERATION TYPE

Fatalities in FOG by operation, January–June 2014

Operation	# of fatalities	Operation	# of fatalities
Rigging up/down*	9	Material handling	1
Unspecified operation	5	Routine drilling operations	1
Non-traditional commuting	4	Running casing	1
General well servicing	4	Tank gauging	1
Rig/equipment repair or maintenance	3	Tripping pipe	1
Coiled tubing operations	2	Truck transport: oil hauling	1
Flowback operations	2	Truck transport: other	1
Hot work/ welding	2	Truck transport: separated water hauling	1
Other types of operations	2	Winching activities	1
Equipment dismantling	1	Offshore	0
Total			43

Data source: NIOSH FOG

*Includes rig up/down operations of all oil and gas extraction rigs (drilling, workover, completions, production testing, etc.).

Incident Descriptions

Incident descriptions are compiled from one or more FOG data sources. Data sources include: 1) OSHA preliminary descriptions, citations, and closed investigations; 2) BSEE and USCG fatality investigation reports; 3) media reports; 4) formal investigations from federal, state, and local agencies; 5) crash reports; 6) emergency responder and police reports; 7) coroner and medical examiner reports; and 8) death certificates. NIOSH has made every effort to keep descriptions as similar as possible to the data source and include all relevant details. However, in order 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:

- All identifiable information has been removed. This includes personal identifiers (e.g., names, date of births, date of deaths), identifiers of the businesses or companies involved in the incident (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 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.

Descriptions are ordered alphabetically by operation and by event type[†] within each operation.

COILED TUBING OPERATIONS

Fatalities: 2
NAICS: 213112

Explosion

To increase the flow of the well, coiled tubing was being used to pump pressurized fluid into the well bore. While the procedure was taking place, a pipe connection started leaking. In an attempt to stop the leak, a worker struck the pipe connection with hammer causing pipe to explode. Two workers were killed.

FOG ID: 2014-001

EQUIPMENT DISMANTLING

Fatalities: 1
NAICS: 213112

Undetermined

A worker was standing on the accumulator trailer platform talking on his cell phone when he collapsed onto the platform. Prior to making the phone call, the worker was rolling up the accumulator hoses in preparation for moving the accumulator trailer since the work at the site had been completed.

FOG ID: 2014-004

FLOWBACK OPERATIONS

Fatalities: 2
NAICS: 213112,
4842

Explosion

Two workers were killed by the high pressurized explosion of a sand separator and related piping. The well was in the flowback production phase when the incident occurred. A flowback worker opened the well head 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

[†]For a full description of FOG event types, see Appendix B.

workers was observed closing the valve between the sand separator and the sand box collector, thus causing the well head 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

GENERAL WELL SERVICING

Fatalities: 1
NAICS: 213112

Cardiac Event

The worker (52 years old) lost consciousness while pulling an oil sample out of a thief hatch on a tank. The worker fell backwards on the 90 degree corner of the catwalk guardrail. The worker's clothing became hooked to the guardrail. The worker was hanged by his sweatshirt hood. From the toxicology report, autopsy, and extensive air monitoring conducted by the employer and emergency personnel it was determined this individual died from natural causes. The cause of death was sudden cardiac death due to ischemic heart disease. Contributing factors include atherosclerosis and cardiomegaly.

FOG ID: 2014-006

Fatalities: 1
NAICS: 213112

Undetermined

A truck driver pumping and hauling crude oil from a tank battery was found on the catwalk next to a tank slumped over and non-responsive. It appears he was measuring the volume of liquid from on top of the tank battery. There were no signs of physical trauma and both the worker and a second driver who found the fatally injured worker were wearing H₂S (hydrogen sulfide) monitors that did not alarm. The cause of death is unknown at this time.

FOG ID: 2014-007

Fatalities: 1
NAICS: 213112

Undetermined

At approximately 4:30 PM, a rig operator complained of feeling light-headed and nauseated and he asked to be relieved from his duty station at the controls of the workover rig. His symptoms progressed to confusion. Co-workers at the site suspected a heart attack and began to transport the rig operator to a hospital. Before reaching the hospital, the rig operator stated that he felt hot. He then began to convulse and became unresponsive. He arrived at the hospital in cardiac arrest and died shortly thereafter. The attending physician indicated that the symptoms suffered by the rig operator are commonly seen with inhalation injury, including severe inflammation of the upper airway.

FOG ID: 2014-008

Fatalities: 1
NAICS: 211

Vehicle Incident: On-Site

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

FOG ID: 2014-009

HOT WORK/WELDING

Fatalities: 1
NAICS: 213112

Explosion

A worker was in 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 erupted/explored, 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

Fire

Worker #1 was fatally injured from a 210 barrel crude oil storage tank explosion. Prior to the incident, worker #1 and worker #2 were welding in a weld shop. Worker #2 was tack welding two mild steel sheets together while worker #1 was on the top of the 210 barrel 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 approximately 6 inches from the lifting eye. This caused the flammable vapors 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, where he became engulfed in flames. From the explosion worker #2 was knocked onto his back, but was able to exit out of a man door at the back of the weld shop. Worker #2 retrieved a fire extinguisher and returned to worker #1, where he extinguished and pulled worker #1 out of the hazardous area. Worker #1 died from his injuries.

FOG ID: 2014-011

MATERIAL HANDLING

Fatalities: 1
NAICS: 213112

Struck by Falling Object

Worker #1 was fatally injured when he was crushed by oil/gas well equipment that fell on top of him at an oil/gas fracking site. The equipment was being removed from the well head in preparation for the well's first hydraulic fracturing operation. Worker #1 was standing on top of a step ladder that was leaning against

the blow-out preventer (BOP). Worker #1 was unscrewing a cap and unhooking the BOP while workers #2 and #3 held the base of the ladder. The equipment began to tip away from worker #1, who stepped backwards and fell approximately 8 feet off of the ladder. Worker #2 fell in another direction while worker #3 ran clear of the equipment. The equipment tipped back towards worker #1, disconnected from the crane's device, and fell on top of worker #1, crushing him. Worker #2 and worker #3 were unharmed.

FOG ID: 2014-012

NON-TRADITIONAL COMMUTING

Fatalities: 1
NAICS: 213112

Undetermined

A worker was found slumped over in the driver's seat of the company vehicle that had drifted off the road. The worker appears to have had a heart-related episode.

FOG ID: 2014-002

Fatalities: 3
NAICS: 213112

Vehicle Incident: Off-Site

A van with seven oilfield workers collided with a school bus as the bus was pulling into an RV park. The impact caused the van to roll. The driver and two passengers were killed in the crash. The other four passengers were taken to area hospitals. It is suspected that driver fatigue was a factor since there were no brake marks at the scene and the crew was returning from a 24 hour shift. The three fatally injured workers were not wearing seat belts.

FOG ID: 2014-003

OTHER TYPES OF OPERATIONS

Fatalities: 1
NAICS: 213112

Fall

A worker was in the process of descending from the rig floor from an elevator that runs from the rig floor to the ground. It appears that the worker was reaching in-between the guardrail system around the rig floor when he fell through the guard rails to the ground below from a height of approximately 30 feet.

FOG ID: 2014-013

Fatalities: 1
NAICS: 211

Vehicle Incident: Unspecified Location

A worker stepped out of his truck to talk to another worker. His work truck started rolling forward so he attempted to run in front of the truck to stop it. The worker slipped in front of the truck and the truck ran over him.

FOG ID: 2014-014

RIG/EQUIPMENT REPAIR OR MAINTENANCE

Fatalities: 1
NAICS: 213112

Fire

A worker was in the process of removing a valve on the heater treater when the heater treater began to leak and caught on fire. The worker was transported to the hospital where he died approximately 7.5 hours after the incident.

FOG ID: 2014-015

Fatalities: 1
NAICS: 213111

Struck by Falling Object

The pin(s) that hold the fork carrier on to the fork lift had come out, so the company man instructed the crew to replace the pin(s). The fatally injured worker was attempting to adjust the forks while underneath the raised forks. The forks fell and crushed the worker.

FOG ID: 2014-016

Fatalities: 1
NAICS: 213112

Struck by Falling Object

Two workers were performing rig maintenance 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

RIGGING UP/DOWN

Fatalities: 1
NAICS: 213111

Caught Between/Crushed

The fatally injured worker was involved in the rig up operation of the substructure (derrick tower), and before the incident occurred, the worker was trying to scope out the derrick. The worker was directed to knock some pins out of a section of the derrick. The worker used a 12-pound sledge hammer to remove the 8-inch by 3-inch diameter pin from the left crown support bracket. When the pin was removed, the right crown support bracket gave way and broke. The middle section of the derrick dropped approximately 16 inches, fatally crushing the worker between the section of derrick and the fifth wheel.

FOG ID: 2014-018

Fatalities: 1
NAICS: 213111

Caught Between/Crushed

A worker was removing a pin to disconnect the monkey board from the derrick. The monkey board shifted and caught the worker between the derrick and the monkey board, resulting in fatal injuries.

FOG ID: 2014-023

Fatalities: 1
NAICS: 211

Electrocution

The crew was rigging down; they just finished cleaning the mud tanks. First responders were told that a worker stepped on an electrical cable and was electrocuted.

FOG ID: 2014-021

Fatalities: 1
NAICS: 213112

Electrocution

A three-man crew was removing a pump jack from a well site using a rig up truck equipped with an A-Frame boom. The truck operator (worker #1) was maneuvering around site to unload the samson post while 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: 213111

Electrocution

The crew was using a crane to remove a diesel engine from the rig. The four workers comprised of two riggers, a signalman, and a crane operator. The load had been removed and the crane operator rotated the boom to the left under the direction of the signalman. The signalman had stopped the crane approximately 3 to 4 feet from 7200 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

Fatalities: 1
NAICS: 211

Fall

A roustabout was fatally injured when he fell off a platform. The roustabout had been working directly for the employer for approximately three years, working primarily on a production rig. The day of the incident, the roustabout had been working with a floorhand and the field manager on the production rig performing well service. They had completed the well service and were in the process of rigging down the production rig. The production rig is a single hoist style. At the time of the incident, the roustabout climbed onto a platform at the base of the derrick located over the cab of the rig. The platform was approximately 7 feet 7 inches from the ground. The field manager lowered the traveling block and manually pushed it over towards the platform and held it 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, to the ground below

Fatalities: 1
NAICS: 213112

from the platform. 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 definite cause of the fall is unknown.

FOG ID: 2014-022

Struck by Falling Object

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

FOG ID: 2014-024

Fatalities: 1
NAICS: 213111

Vehicle Incident: On-Site

During the rigging up process, 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

ROUTINE DRILLING OPERATIONS

Fatalities: 1
NAICS: 211

Struck by Falling Object

A worker was operating the rig at the driller's console when the traveling block crashed onto the worker and into the floor. The worker's body was crushed and there were multiple injuries. The worker was declared dead on the site by the county coroner.

FOG ID: 2014-026

RUNNING CASING

Fatalities: 1
NAICS: 213111

Caught Between/Crushed

The crew was installing the casing tool and a worker was holding the tongs in position. The worker was working the tongs to tighten the casing running tool. The snub line was not connected. The worker was caught between the top drive and the pull line of the tongs.

FOG ID: 2014-027

TANK GAUGING

Fatalities: 1
NAICS: 213112

Exposure

A 20-year-old male flow tester was found unresponsive on a well pad site and later determined to have died at this well site. The worker was expected to gauge a crude oil tank. The worker was discovered in the early morning face down in the upper hatch of a crude oil storage tank. The well pad was not known to have risks for exposures to H₂S in the area nor had H₂S been detected in the past at this site. This death was ruled work-related by OSHA. The medical examiner reported the cause of death included cardiac arrhythmia with cardiac hypertrophy, coronary artery hypogenesis, obesity and exposure to petroleum hydrocarbons vapors.

FOG ID: 2014-028

TRIPPING PIPE

Fatalities: 1
NAICS: 211

Struck by Falling Object

The crew was laying down tubing on a pulling unit. Before the incident occurred, the fatally injured worker was running the tongs and unscrewing the pipes. During the operation, the elevators came open and a 2 3/8 inch pipe fell, striking the worker on the back of his head. The worker was taken to a hospital for treatment and died the following day due to the head injury.

FOG ID: 2014-029

TRUCK TRANSPORT: OIL HAULING (INCLUDING SAMPLING)

Fatalities: 1
NAICS: 213112

Undetermined

A transport company worker (57 year old) was found collapsed on a catwalk adjacent to crude oil tank, non-responsive, unable to resuscitate, and was declared dead by the coroner. Emergency responders did not detect the presence of significant hydrocarbons or H₂S when they arrived. Time of death was 11:00 a.m.

FOG ID: 2014-030

TRUCK TRANSPORT: OTHER (INCLUDING SAMPLING)

Fatalities: 1
NAICS: 213112

Struck by

A tractor trailer was stuck in mud. Worker #1 was assigned to attach a tow strap between the tractor trailer and the bucket of

a track excavator. The excavator operator was in the cab of the excavator with the hydraulic system energized and fully responsive to controls. The excavator operator leaned out the window to give verbal instruction to worker #1. The joystick for the crowd arm was actuated by the excavator operator's clothing. The crowd arm extended, and caused the bucket to strike and force worker #1's head against the grill of the tractor trailer.

FOG ID: 2014-031

TRUCK TRANSPORT: SEPARATED WATER HAULING (INCLUDING SAMPLING)

Fatalities: 1
NAICS: 4842

Exposure

A worker died from exposure to inhaled hydrocarbons. He was using a truck to haul separated water out of oil wells.

FOG ID: 2014-032

UNSPECIFIED OPERATION

Fatalities: 1
NAICS: 213112

Exposure

The crew was working at the site when they lost pressure at the filling unit. Worker #1 entered a mobile heating unit to check the heaters. The crew noticed that worker #1 had been gone for approximately 15–30 minutes and went to look for him. Worker #1 was found on the floor of the mobile heating unit, unresponsive, eyes open, and with no detectable pulse. The crew removed worker #1 from the unit, started doing chest compressions, and called for help. Worker #1 passed away in the ambulance on the way to the hospital. It is suspected that carbon monoxide poisoning caused the worker's death.

FOG ID: 2014-033

Fatalities: 1
NAICS: 211

Fire

During activities to prepare the well #7 for production, an explosion and fire occurred. As a result of the explosion, fire, and resultant heat, well #6 was damaged and also ignited. These fires burned for five days. One worker died and another was injured at the well site. The fatally injured worker's remains were found between a crane and tank on the well pad. The cause of the fires is still under investigation.

FOG ID: 2014-034

Fatalities: 1
NAICS: 213112

Undetermined

A worker collapsed to the ground and later passed away due to unknown causes. At the time of the incident, the worker had been sitting down for several minutes, stood up and then fell forward onto the ground and was not responsive. Emergency medical services were

Fatalities: 1
NAICS: Unknown

contacted shortly thereafter and CPR was provided by a co-worker until emergency medical services arrived. The investigation is ongoing.

FOG ID: 2014-035

Vehicle Incident: Unspecified Location

A worker was struck and killed by motor vehicle.

FOG ID: 2014-036

Fatalities: 1
NAICS: 211

Vehicle Incident: Unspecified Location

A dozer operator stopped the vehicle on an uphill slope. When he exited the cab, the dozer began rolling back down the incline and struck the worker. The worker's entire body was crushed when the dozer rolled over him.

FOG ID: 2014-037

WINCHING ACTIVITIES

Fatalities: 1
NAICS: 213112

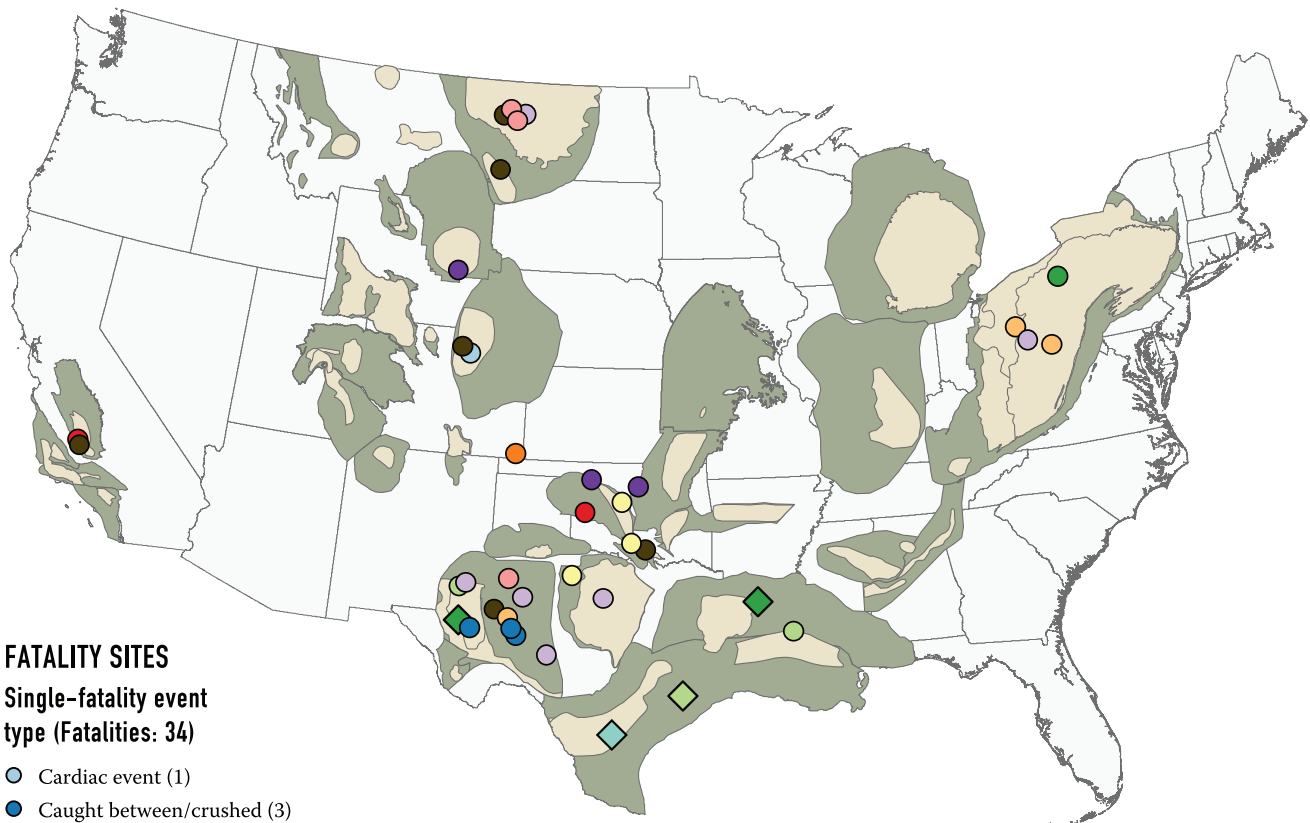
Vehicle Incident: On-Site

A worker was involved in winching activities on a soon to be well site. The worker was struck by a welding truck when the welding truck was backing up to leave the area where it had been parked.

FOG ID: 2014-038

FATALITY CHARACTERISTICS

Sites of fatalities in FOG by event type, January–June 2014



FATALITY SITES

Single-fatality event type (Fatalities: 34)

- Cardiac event (1)
- Caught between/crushed (3)
- Electrocution (2)
- Explosion (1)
- Exposure (3)
- Fall (2)
- Fire (3)
- Struck by (1)
- Struck by falling object (6)
- Vehicle incident: on-site (3)
- Vehicle incident: unspecified location (3)
- Undetermined (6)

Multiple-fatality event type (Fatalities: 9)

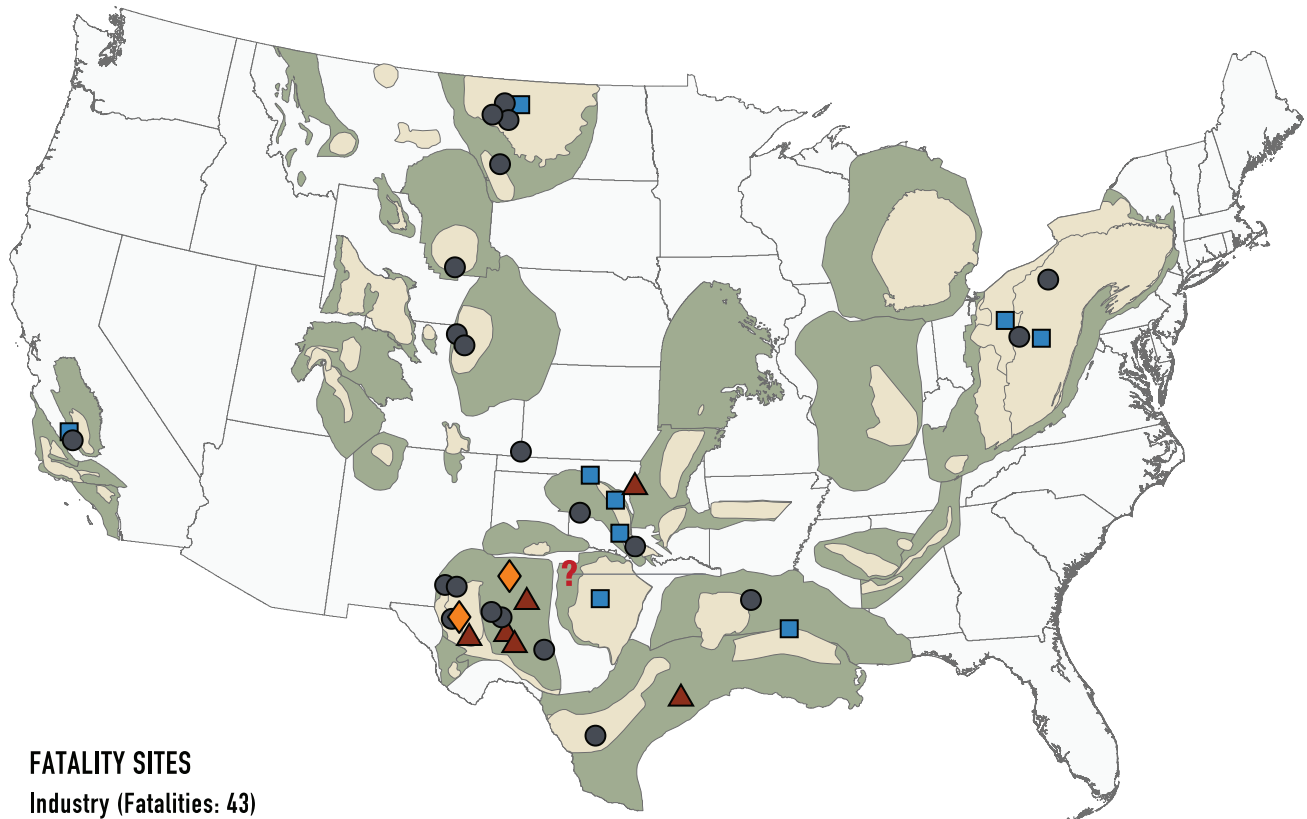
- ◇ Electrocution (2)
- ◇ Explosion (4)
- ◇ Vehicle incident: off-site (3)

- Shale plays
- Shale basins
- U.S. States

Fatality data source: NIOSH FOG
 Shale basin data: U.S. Energy Information Administration
 Data projection: Albers Equal Area Conic USGS
 Datum: GCSWGS 1984
 Map created by Teri Jacobs, NIOSH Geospatial Lab, 07/01/2015

FATALITY CHARACTERISTICS (CONTINUED)

Sites of fatalities in FOG by industry sector, January–June 2014*



FATALITY SITES

Industry (Fatalities: 43)

- NAICS 211- Operators (9)
- ▲ NAICS 213111- Drilling operations (7)
- NAICS 213112- Support activities (24)
- ◆ NAICS 4842- Specialized freight trucking (2)
- ? Unknown (1)

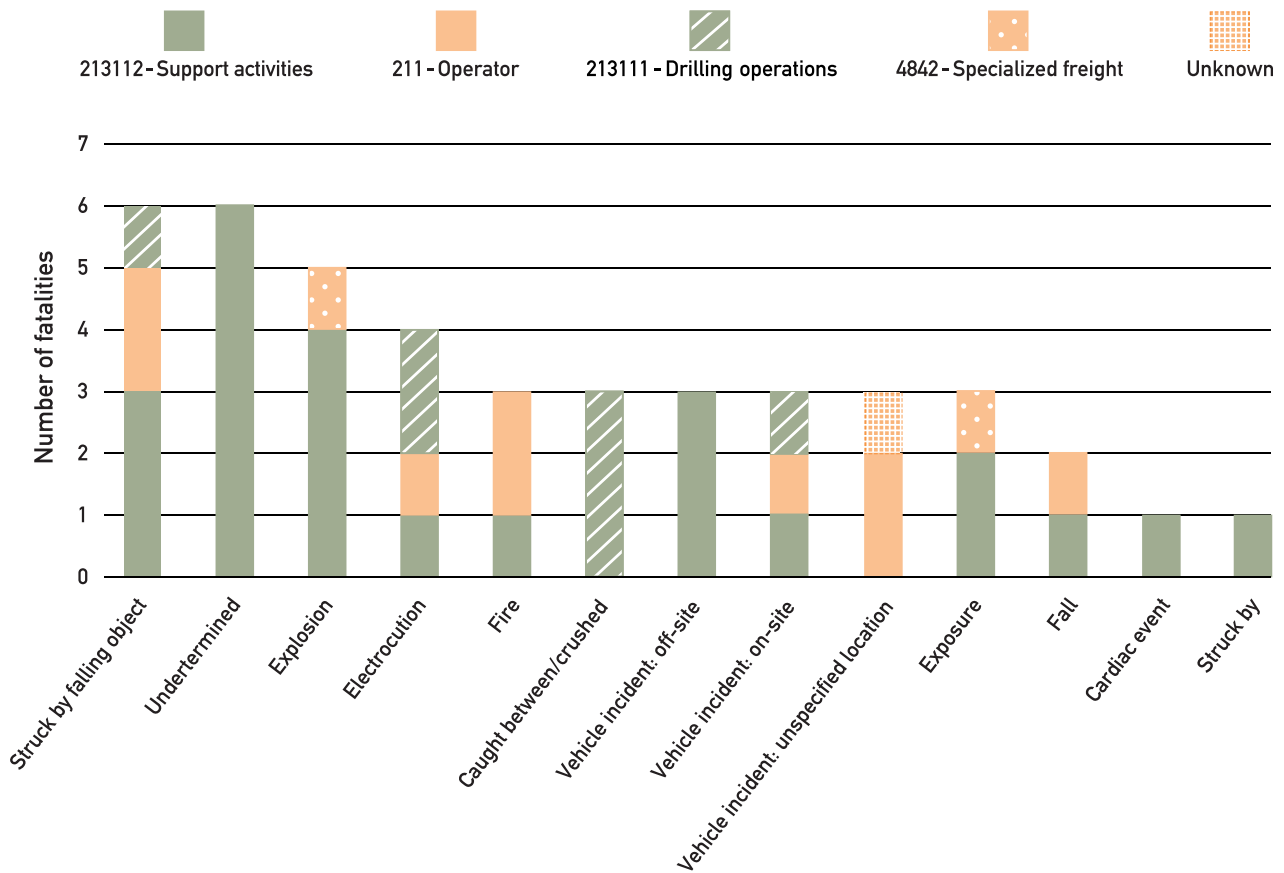
- Shale plays
- Shale basins
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Fatality data source: NIOSH FOG
 Shale basin data: U.S. Energy Information Administration
 Data projection: Albers Equal Area Conic USGS
 Datum: GCSWGS 1984
 Map created by Teri Jacobs, NIOSH Geospatial Lab, 04/27/2015

*For table listing of information displayed in this map, see Appendix C.

FATALITY CHARACTERISTICS (CONTINUED)

Fatalities in FOG by NAICS code and event type, January–June 2014*

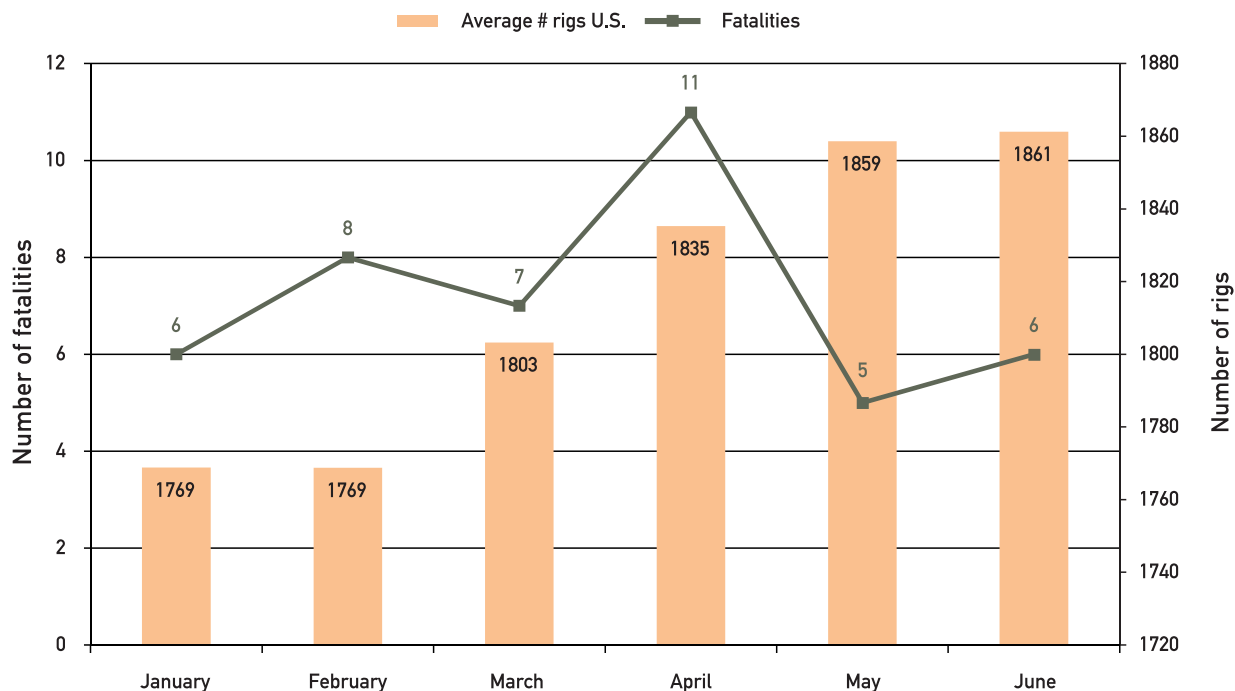


Data source: NIOSH FOG

*For table listing of information displayed in this map, see Appendix D.

INDUSTRY ACTIVITY AND FATALITIES

Average number of active U.S. rotary rigs* (land-based and offshore) and number of fatalities in FOG, January–June 2014

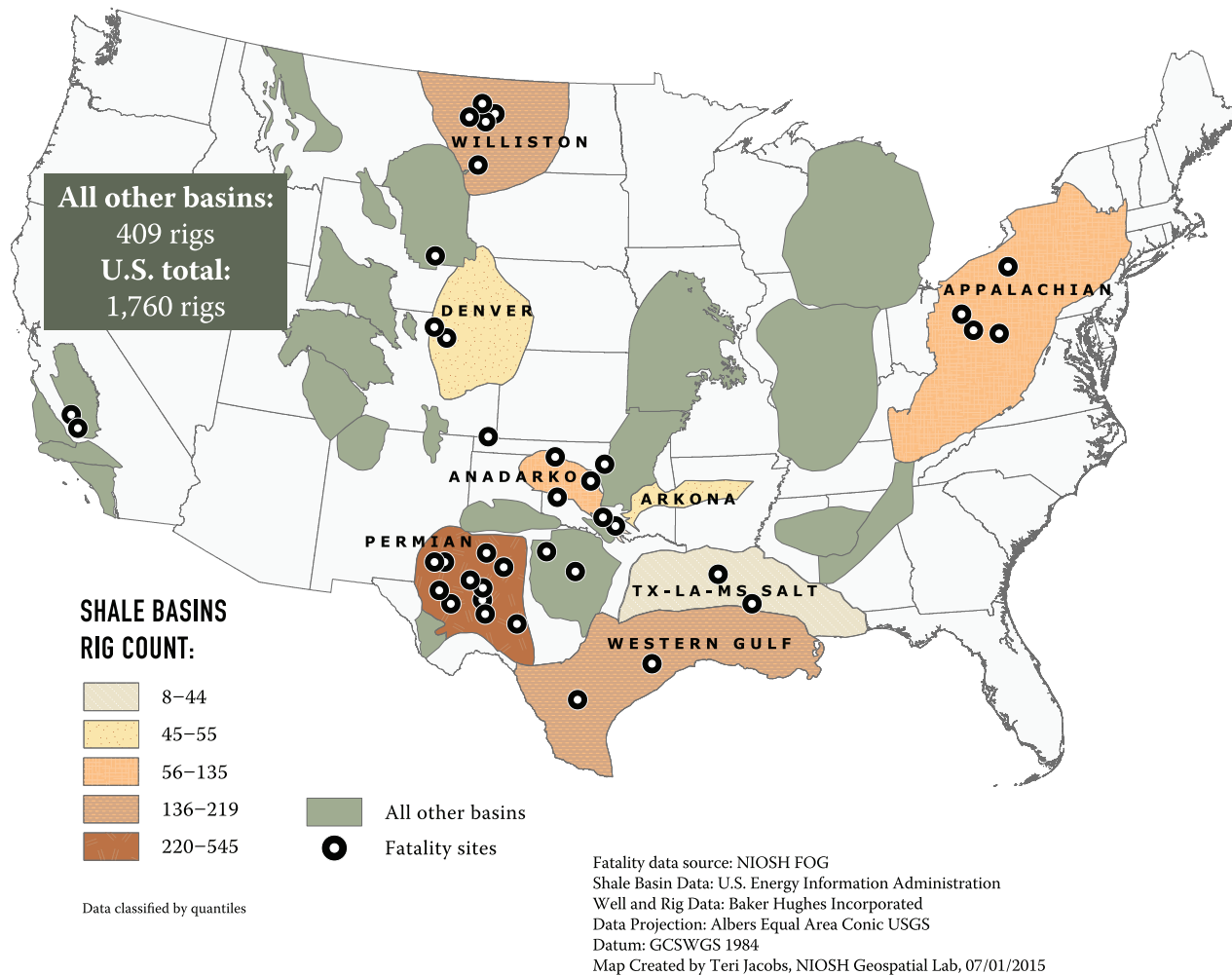


Data source: Baker Hughes Rig Count; NIOSH FOG

*The active rotary rig count is a recognized metric of industry activity in oil and gas extraction. An active rotary rig is defined 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. The number of active rotary rigs is used to gauge industry activity because it indicates demand for services and products used in producing, drilling, completing, and processing oil and gas.

INDUSTRY ACTIVITY AND FATALITIES (CONTINUED)

U.S. onshore active rig count by basin (average January–June 2014)
and sites of fatalities in FOG, January–June 2014



INDUSTRY ACTIVITY AND FATALITIES (CONTINUED)

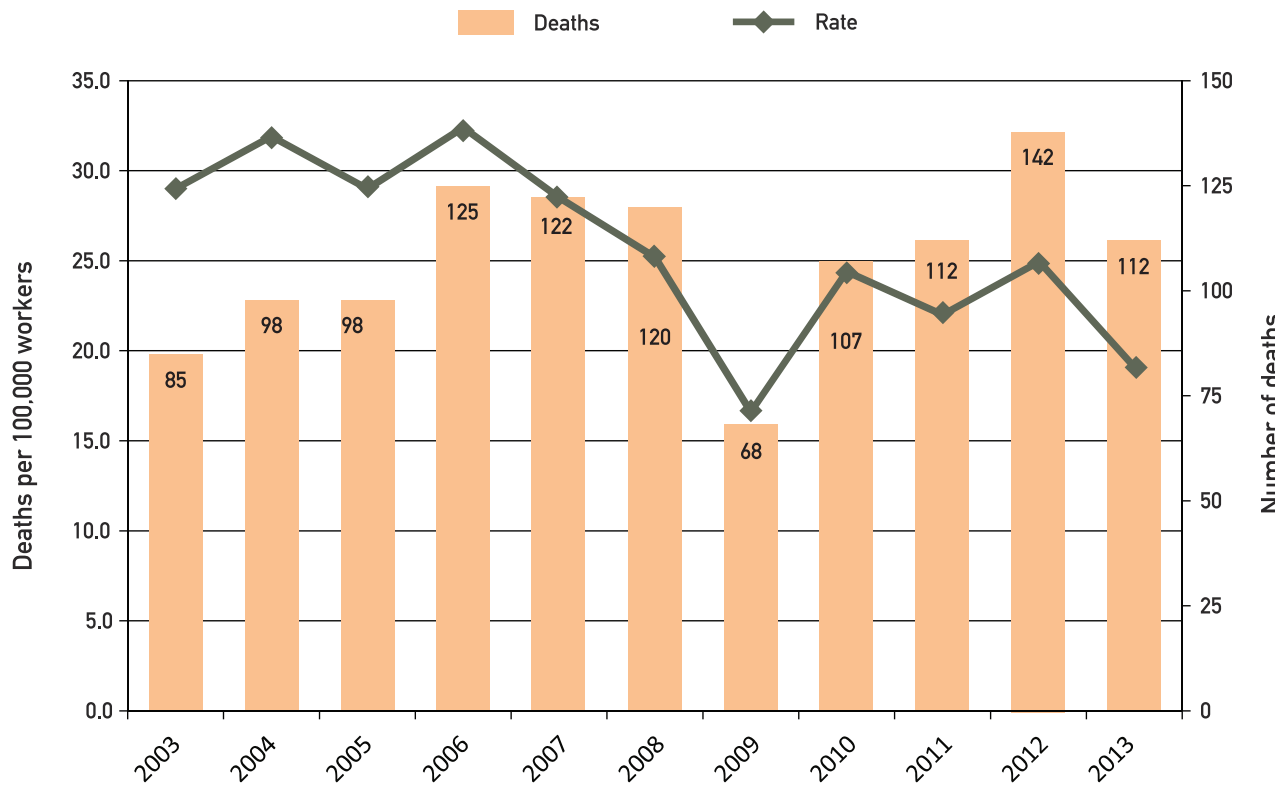
**Comparison of fatalities in FOG and active rotary rig
(land-based and offshore) count by state, 2013 and January–June 2014**

State	Rotary rig count			Fatalities in FOG			
	2014 Mid-year			2014 Mid-year		2013	
	Average	% of total	% Change since 2013	Count	% of total	Count	% of total
Texas	869	47.8%	4.01%	17	39.5%	28	42.4%
Oklahoma	189	10.4%	5.76%	6	14.0%	4	6.1%
North Dakota	172	9.5%	-0.34%	5	11.6%	9	13.6%
Louisiana	109	6.0%	0.61%	3	7.0%	3	4.5%
New Mexico	86	4.7%	11.21%	2	4.7%	5	7.6%
Colorado	63	3.5%	0.20%	3	7.0%	1	1.5%
Pennsylvania	56	3.1%	-4.99%	2	4.7%	0	0.0%
Wyoming	50	2.8%	5.17%	1	2.3%	1	1.5%
California	40	2.2%	5.53%	2	4.7%	1	1.5%
Ohio	38	2.1%	18.59%	2	4.7%	3	4.5%
Kansas	31	1.7%	13.12%	0	0.0%	2	3.0%
West Virginia	27	1.5%	-2.56%	0	0.0%	4	6.1%
Utah	27	1.5%	-8.36%	0	0.0%	1	1.5%
All other states*	59	3.3%	-6.14%	0	0.0%	4	6.1%
Total US	1816	100%	3.12%	43	100%	66	100%

Data source: Baker Hughes Rig Count; NIOSH FOG

*States with less than 1.0% of the total rotary rig count for the U.S. were combined. These states include, Arkansas, Montana, Mississippi, Alaska, Alabama, Illinois, Nevada, Florida, Indiana, Kentucky, Nebraska, and Idaho.

INDUSTRY ACTIVITY AND FATALITIES (CONTINUED)

BLS number and rate of occupational fatalities
in oil and gas extraction, 2003–2013

Data source: Fatality counts from BLS Census of Fatal Occupational Injuries (see page 2, “How is this database different than what is collected by the Bureau of Labor Statistics, Census of Fatal Occupational Injuries (BLS CFOI)” for more information on how this fatality count is different than FOG fatality counts). Worker Estimates from BLS Quarterly Census of Employment and Wages (2013). Rate per 100,000 workers per year. Includes NAICS 211, 213111, and 213112.

GLOSSARY

BLS

Bureau of Labor Statistics

BOP

Blowout preventer

FOG

NIOSH Fatalities in Oil and Gas Extraction database

NAICS

North American Industrial Classification System

NIOSH

National Institute for Occupational Safety and Health

OSHA

Occupational Safety and Health Administration

H₂S

Hydrogen sulfide

APPENDIX A

COMMON NAICS CODES WITH INVOLVEMENT IN THE OIL AND GAS INDUSTRY

“UPSTREAM” OIL AND GAS

NAICS: 211

Oil and Gas Extraction

Industries in the Oil and Gas Extraction subsector operate and/or develop oil and gas field properties. Such activities may include 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 subsector includes the production of crude petroleum, the mining and extraction of oil from oil shale and oil sands, and the production of natural gas, sulfur recovery from natural gas, and recovery of hydrocarbon liquids.

NAICS: 213111

Drilling Oil and Gas Wells

This industry comprises establishments primarily engaged in drilling oil and gas wells for others on a contract or fee basis. This industry includes contractors that specialize in spudding in, drilling in, re-drilling, and directional drilling.

NAICS: 213112

Support Activities for Oil and Gas Operations

This U.S. industry comprises establishments primarily engaged in performing support activities on a contract or fee basis for oil and gas operations (except site preparation and related construction activities). Services included are exploration (except geophysical surveying and mapping); excavating slush pits and cellars, well surveying; running, cutting, and pulling casings, tubes, and rods; cementing wells, shooting wells; perforating well casings; acidizing and chemically treating wells; and cleaning out, bailing, and swabbing wells.

SITE PREPARATION

NAICS: 238910

Site Preparation Contractors

This industry comprises establishments primarily engaged in site preparation activities, such as excavating and grading, demolition of buildings and other structures, and septic system installation. Earth moving and land clearing for all types of sites (e.g., building, nonbuilding, mining) is included in this industry. Establishments primarily engaged in construction equipment rental with operator (except cranes) are also included.

SPECIALIZED FREIGHT TRUCKING

NAICS: 484220

Specialized Freight (except Used Goods) Trucking, Local

This industry comprises establishments primarily engaged in providing local, specialized trucking. Local trucking establishments provide trucking within a metropolitan area that may cross state lines. Generally the trips are same-day return.

NAICS: 484230

Specialized Freight (except Used Goods) Trucking, Long Distance

This industry comprises establishments primarily engaged in providing long-distance specialized trucking. These establishments provide trucking between metropolitan areas that may cross North American country borders.

GEOPHYSICAL SURVEYING

NAICS: 541360

Geophysical Surveying and Mapping Services

This industry comprises establishments primarily engaged in gathering, interpreting, and mapping geophysical data. Establishments in this industry often specialize in locating and measuring the extent of subsurface resources, such as oil, gas, and minerals, but they may also conduct surveys for engineering purposes. Establishments in this industry use a variety of surveying techniques depending on the purpose of the survey, including magnetic surveys, gravity surveys, seismic surveys, or electrical and electromagnetic surveys.

“MIDSTREAM” OIL AND GAS (EXCLUDED FROM FOG)

NAICS: 22121

Natural Gas Distribution

This industry comprises: (1) establishments primarily engaged in operating gas distribution systems (e.g., mains, meters); (2) establishments known as gas marketers that buy gas from the well and sell it to a distribution system; (3) establishments known as gas brokers or agents that arrange the sale of gas over gas distribution systems operated by others; and (4) establishments primarily engaged in transmitting and distributing gas to final consumers.

NAICS: 23712

Oil and Gas Pipeline and Related Structures Construction

This industry comprises establishments primarily engaged in the construction of oil and gas lines, mains, refineries, and storage tanks. The work performed may include new work, reconstruction, rehabilitation,

and repairs. Specialty trade contractors are included in this group if they are engaged in activities primarily related to oil and gas pipeline and related structures construction. All structures (including buildings) that are integral parts of oil and gas networks (e.g., storage tanks, pumping stations, and refineries) are included in this industry.

NAICS: 486

Pipeline Transportation

Industries in the Pipeline Transportation subsector use transmission pipelines to transport products, such as crude oil, natural gas, refined petroleum products, and slurry. Industries are identified based on the products transported (i.e., pipeline transportation of crude oil, natural gas, refined petroleum products, and other products).

NAICS: 4869

Pipeline Transportation of Refined Petroleum Products

This industry comprises establishments primarily engaged in the pipeline transportation of refined petroleum products.

“DOWNSTREAM” OIL AND GAS (EXCLUDED FROM FOG)

NAICS: 32411

Petroleum Refineries

This industry comprises establishments primarily engaged in refining crude petroleum into refined petroleum. Petroleum refining involves one or more of the following activities: (1) fractionation; (2) straight distillation of crude oil; and (3) cracking.

NAICS: 42471

Petroleum Bulk Storage Stations and Terminals

This industry comprises establishments with bulk liquid storage facilities primarily engaged in the merchant wholesale distribution of crude petroleum and petroleum products, including liquefied petroleum gas.

NAICS: 42472

Petroleum and Petroleum Products Merchant Wholesalers

This industry comprises establishments primarily engaged in the merchant wholesale distribution of petroleum and petroleum products (except from bulk liquid storage facilities).

NAICS: 447

Gasoline Stations

Industries in the Gasoline Stations subsector retail automotive fuels (e.g., gasoline, diesel fuel, gasohol, alternative fuels) and automotive oils or retail these products in combination with convenience store items. These establishments have specialized equipment for the storage and dispensing of automotive fuels.

APPENDIX B

FOG EVENT TYPES

CARDIAC EVENT

Workers who died as a result of a confirmed heart attack, heart arrhythmia, sudden cardiac death or other heart-related episode that is not attributed to a specific event or exposure.

CAUGHT BETWEEN/CRUSHED

Workers who were fatally injured as a result of being squeezed, crushed, pinched, or compressed between two or more objects, between parts of an object, between other meshing objects, between a moving and stationary object, between two or more moving objects, in collapsing material, or in operating equipment. Exceptions include when contact between the fatally injured worker and source of injury was due to falls, vehicle incidents, fires, explosion, assaults or violent acts.

ELECTROCUTION

Workers who were fatally injured due to contact with electricity. This includes direct contact from the power source to the worker or indirect contact, such as when an object the worker is touching contacts a power source.

EXPLOSION

Workers who were fatally injured due to an explosion. This includes large, small, intentionally-set and unintentional explosions. Incidents in which a worker was fatally injured in an explosion that resulted in a fire will be categorized under fires. Also excluded from this division, are incidents in which the explosion resulted from a vehicle incident.

EXPOSURE

Workers who were fatally injured as a result of contact with, or exposure to, a condition or substance in the environment other than electrical current. This includes instances where the worker

was fatally injured due to inhalation of substances in confined or open spaces, oxygen deficient environments, exposure to caustic, noxious, or allergenic substances, drowning, contact with hot or cold objects, environments with extreme cold or heat (not as a result of fire), or venomous bites or stings.

FALL

Workers who were fatally injured as a result of a slip, trip, or fall. Exceptions include if the worker fell due to transportation incidents, fires, explosions, exposures, assaults, or violent acts.

FIRE

Workers who were fatally injured in an uncontrolled fire. This includes instances when a worker was fatally injured in a fire that originated at an intentional heat source (e.g., flare stack). Also included are workers who were fatally injured explosions resulting in fire.

STRUCK BY

Workers who were fatally injured as a result of contact or impact with objects or equipment that were not falling objects. This includes instances when a worker was fatally struck by flying, discharged, dislodged, swinging, slipping, sliding, or rolling objects or equipment.

STRUCK BY FALLING OBJECT

Workers who were fatally injured as a result of contact or impact with objects or equipment that fell from an elevation to a lower level. This includes instances where the injured person is crushed, pinned, or caught under a falling object.

UNDETERMINED

Workers who died while at work but the manner and cause of the worker's death is not apparent from available sources. Cases in this division usually require full investigation and autopsy results before a cause of death can be determined.

VEHICLE INCIDENT: OFF-SITE

Workers who were fatally injured in collisions involving motor vehicles, powered industrial vehicles or powered mobile industrial equipment that occur or originate at non-oil and gas extraction workplace locations (e.g., public highways, streets, or roads normally used for travel). Excluded are incidents where the worker was injured solely with the non-transport components of the vehicle, such as being struck by rising forklifts or swinging buckets on a loader, or falls from vehicles while the vehicle is not in transport.

VEHICLE INCIDENT: ON-SITE

Workers who were fatally injured in collisions involving motor vehicles, powered industrial vehicles or powered mobile industrial equipment, which occur at oil and gas extraction workplaces (e.g., oil and gas well sites, yards, storage facilities). Excluded are incidents where the worker was injured solely with the non-transport components of the vehicle, such as being struck by rising forklifts or swinging buckets on a loader, or falls from vehicles while the vehicle is not in transport.

VEHICLE INCIDENT: UNSPECIFIED LOCATION

Workers who were fatally injured in collisions involving motor vehicles, powered industrial vehicles or powered mobile industrial equipment where the location of the incident is not apparent from available sources. Excluded are incidents where the worker was injured solely with the non-transport components of the vehicle, such as being struck by rising forklifts or swinging buckets on a loader, or falls from vehicles while the vehicle is not in transport.

APPENDIX C

Fatalities in FOG by industry sector and state, January–June 2014

	211- Operator	213111-Drilling operations	213112-Support activities	4842-Specialized freight	Unknown	Grand total
Texas	1	6	7	2	1	17
Oklahoma	3	1	2	–	–	6
North Dakota	1	–	4	–	–	5
Colorado	–	–	3	–	–	3
Louisiana	1	–	2	–	–	3
California	1	–	1	–	–	2
Pennsylvania	1	–	1	–	–	2
New Mexico	–	–	2	–	–	2
Ohio	1	–	1	–	–	2
Wyoming	–	–	1	–	–	1
Grand total	9	7	24	2	1	43

Data source: NIOSH FOG

APPENDIX D

Fatalities in FOG by NAICS code and event type, January–June 2014

	211- Operator	213111-Drilling operations	213112-Support activities	4842-Specialized freight	Unknown	Grand total
Cardiac event	–	–	1	–	–	1
Caught between/ crushed	–	3	–	–	–	3
Electrocution	1	2	1	–	–	4
Explosion	–	–	4	1	–	5
Exposure	–	–	2	1	–	3
Fall	1	–	1	–	–	2
Fire	2	–	1	–	–	3
Struck by	–	–	1	–	–	1
Struck by falling object	2	1	3	–	–	6
Undetermined	–	–	6	–	–	6
Vehicle incident: off-site	–	–	3	–	–	3
Vehicle incident: on-site	1	1	1	–	–	3
Vehicle incident: unspecified location	2	–	–	–	1	3
Grand total	9	7	24	2	1	43

Data source: NIOSH FOG



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