Preventing Fire and Explosion Fatalities in the Oil & Gas Industry

By

J.D. Danni
Safety and Occupational Health Specialist (Oil & Gas)
OSHA Region VIII
Preventing Fire and Explosion Fatalities

• Statistics
• Fatalities
• Prevention
• Outreach and Assistance
Number and Rate of Fatal Work Injuries

Note: Fatality counts from BLS Census of Fatal Occupational Injuries. Worker Estimates from BLS Quarterly Census of Employment and Wages (2013). Rate per 100,000 workers per year. Includes NAICS 211, 213111, 213112. *Data for 2014 are preliminary.
Event Related to Upstream Federal OSHA Fatalities from 2011 – 2015

• Struck-By* 55%
  * Struck-by includes struck-by/against and caught in-between hazards
• Fires/Explosions 14%
• Falls 10%
• Chemical Exposure 7%
Federal OSHA Fatalities by NAICS Code From 2011 - 2015

- 211111 Crude Petroleum and Natural Gas Extraction: 3%
- 213111 Drilling Oil and Gas Wells: 28%
- 213112 Support Activities for Oil and Gas Operations: 69%
Fatalities Associated with Fires and Explosions

- NIOSH (National Institute of Occupational Safety and Health)
  - FOG Database (Fatalities in the Oil & Gas Extraction Industry)
  - http://www.cdc.gov/niosh/topics/fog/about.html
Fatalities Associated with Fires and Explosions

• 85 Fatalities from 2005 – 2015

• 28 Fatalities from Hot Work
  – On production sites and at maintenance shops
  – Welding, propane torch, cutting torch
  – Storage tanks, tanker/vacuum trucks containing produced water, heater-treaters, flowlines from wellhead
  – General maintenance and repairs
Hospitalization Associated with Hot Work
Fatalities Associated with Hot Work

- 3 employees were doing repair and dismantling of storage tanks. All 3 employees were killed from a fire/explosion. Welding and cutting tools, plus a gas powered saw were found on location.
Fatalities Associated with Hot Work

• 2 employees from one service company and 1 employee from welding company were installing a 2 inch gas line from the heater/treater to a crude oil storage tank containing 33 barrels of oil. Hot work was being performed within 20 feet of the crude oil tank when a fire and explosion occurred, killing all three workers.
An employee was killed in an explosion while using a propane torch to loosen a frozen ball valve on the back of a tanker truck. The metal hatch blew off the back of the tanker and struck the employee. The tanker was empty and had previously hauled production lease salt water from an oil well site. The tanker truck was in the yard.
3 employees were performing maintenance on an oil/water separator when a fire/explosion occurred from an employee using an electric impact gun removing bolts. The fire immediately started from a spark inside the impact gun.

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3 Burned From Hot Work
Fatalities Associated with Hot Work

• Major Contributing Causes
  – Not recognizing the hazard
  – Not cleaning or thoroughly cleaning out tank before beginning work
  – No Venting
  – No Monitoring
  – No Hotwork permit
  – Spark producing tools
  – No JSAs
  • Have Supervisors sign off on permit/audit work procedures
Hot Work Hazard Alert

- Oil & Gas Industry
- STEPS
- AESC
- OSHA Alliance
  - Posting Soon
  - OSHA QuickTakes
- NIOSH
- Design by PEC
Fatalities Associated with Fires and Explosions

• 85 Fatalities from 2005 – 2015
• 29 Fatalities from Mobile Engines/Motors as ignition source
  – Servicing Rigs, Drilling Rigs, Production Sites and Flowback Operations
  – Diesel Engines, Pump motors, Pickup trucks/forklift, portable light generator
  – Well Head, Flowback tanks, Production tanks,
Fatalities Associated with Mobile Engines/Motors

• The Servicing Rig was tripping back into the well when the well started to flow. They tried closing the BOP but it did not work properly. The servicing rig's engine started racing and the operator ran over to turn it off. Immediately thereafter, the well exploded.
Fatalities Associated with Mobile Engines/Motors

• The flowback fluids were being routed to frac tank and a worker was opening the valve on the manifold to depressurize the well for the operation. 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 a light pole attached to it placed within 12 feet of the frac tank.
Fatalities Associated with Mobile Engines/Motors

• Major Contributing Causes
  – Not recognizing the hazard – e.g. Conducting a Fire Risk Assessment
  • Identify areas where there is a potential for flammable gas or vapors to be released (wellbore, flowback tanks, frac tanks, production tanks)
  • Evaluate where mobile engines/motor are located.
  • Evaluate and establish acceptable areas, boundaries, and entry routes for mobile engines/motors
  • Monitoring for flammable gases and vapors (e.g. LELs), H2S, and oxygen
Fatalities Associated with Mobile Engines/Motors

• Major Contributing Causes
  – Not recognizing the hazard – e.g. Conducting a Fire Risk Assessment (Cont’)

• Establish Emergency Procedures
  – Ensure employees know what to do during an overrev engine situation
  – Ensure employees know their specific duties during shutdown operations
Fatalities Associated with Mobile Engines/Motors

• Use Other Preventable Measures such as:
  – Installing shutdown systems (positive air shut-off for diesel or ignition kill for gasoline) for mobile engines.
  – Installing intake flame arrestors and exhaust system spark arrest systems, or other appropriate protective systems for mobile engines.
  – Installing fixed flammable gas and vapor detectors and alarms in area such as wellbore, flowback tanks, frac tanks, production tanks, etc.
Fatalities Associated with Mobile Engines/Motors

• Use Other Preventable Measures such as:
  – Safe work permit system to control mobile engine access into areas that could contain flammable vapors and gases.
  – Using a safe work permit system to control the use of open flames and spark-producing operations and equipment (e.g., welding, grinding, brazing, etc.)

• See Hot Work Hazard Alert
Fatalities Associated with Mobile Engines/Motors

- Mobile Engine/Motor Hazard Alert
  - Working group to develop Alert
    - Oil & Gas Industry/STEPS/AESC/OSHA/NOISH
  - Webex and Conference calls
    - Weekly, Bi-monthly, etc.
  - Need Participation
    - Let me know
    - Starting soon
Thank You

Any Questions
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J.D. Danni
OSHA Region VIII
Safety and Health Specialist (Oil & Gas)
720-264-6581
danni.jd@dol.gov