



HYDRAULIC FRACTURING

BAKKEN SAFETY TOUR 2016
AUGUST 31 - SEPTEMBER 2

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Incidents and Lessons Learned



Bakken Safety Tour 2016

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Presentation Summary

- Overview of incidents.
- Increase awareness of hazards.
- Methods of reducing/eliminating hazards.
- Not intended to assign fault or blame—we all share the responsibility to provide and ensure a safe workplace.



Case Study 1

- Employee was working on the derrick board—stringing pipe—when he attempted to remove a screen from one of the sections.
- Moved to “monkey” board to get better position.
- Crossed over another employee.
- Crew was still tripping pipe.



Case Study 1

- Traveling block and top drive descended.
- Caught lanyard.
- Pulled employee off the platform.
- Snapped harness, employee fell approximately 75 feet to his death.



Case Study 1

- *Critical Factors & Prevention*
- Fall protection systems, to include their anchoring mechanisms, should be designed to ensure their pathways remain clear of the traveling block and all moving mechanical parts or systems.
- Whenever an employee is climbing or descending the derrick ladder, keep the traveling block (and all moving mechanical parts) in a stationary position. This will prevent any “catch” onto the fall protection system line.



Case Study 2

- Two employees engaged in boiler maintenance on a drilling rig.
- Noticed boiler pressure and temperature were low—even though boiler was on high burn.
- Were trained to use an improper procedure—quick opening and closing of valves.
- “Water Hammering.”
- Furnace exploded, killing one and severely burning the other.



Case Study 2

- *Critical Factors & Prevention*
- The boiler manufacturer's procedures for shut-down must be followed at all times. Using the quick opening valves to alternate the blow down is highly dangerous.
- Employees engaged in boiler maintenance and servicing operations must receive adequate training specific to their assigned tasks.



Case Study 3

- Well servicing operation.
- Four person crew.
- Derrick man climbed up to the basket.
- Crew at bottom opened the pressure release valve—bleeding off natural gas.
- Derrick man working above the valve fell to his death.
- He was wearing a harness, but not secured to an anchoring system.



Case Study 3

- *Critical Factors & Prevention*
- Ensuring fall protection systems, to include their anchoring mechanisms, are utilized at all times where required. Wearing a harness without tying off is the same as not wearing a harness at all.
- Employees with exposure to fall hazards to receive training specific to their work operation and potential workplace hazards.
- Use of four-gas monitors (CO, O₂, H₂S, LEL).



Case Study 4

- Well servicing operation.
- Preparing to begin snubbing operation.
- Well was still under pressure, free-flowing product to a separation tank.
- Uncontrolled release of pressure—blowing the top flange cover off.
- Amputation of one employee's arm—concussions to two others.



Case Study 4

- *Critical Factors & Prevention*
- Ensuring the correct well control procedures are followed at all times. For example, making sure the pipe ram is closed prior to beginning snubbing operations.
- Ensuring employees engaged in oil & gas operations receive training specific to their work operations and potential workplace hazards. This is especially important for “short-service” employees and those new to the company. *Prior oilfield experience is not necessarily an indicator of one’s knowledge of safe working practices.*



Case Study 5

- Dismantling a drilling rig to move to a new location.
- Derrick was lowered.
- Employees dropping the floor plates to pull the draw works skid off the drill floor.
- Platform was not connected to the frame.
- As platform pins were pulled, the platform collapsed.
- Employee fell 14 feet and later died from his injuries.



Case Study 5

- *Critical Factors & Prevention*
- Ensure specific procedures for rig assembly and tear down are developed. These procedures must take into account the hazards employees may be exposed to during the operation.
- Ensure employees engaged in rig assembly and tear down are trained towards these procedures. Once again, prior oilfield experience is not necessarily an indicator of one's knowledge of safe working practices.



Case Study 6

- Well servicing operation.
- Installing a new pumpjack—horsehead pump.
- Removed wellpipe and in process of reinserting when well started to overflow.
- Operator attempted to activate the BOP—three times—to no avail.
- Well exploded.
- New employee, 2 days, engulfed in flames and died.
- Three other employees severely burned.
- One died, another had both legs amputated.



Case Study 6

- *Critical Factors & Prevention*
- Ensuring employees engaged in oil & gas operations receive training specific to their work operations and potential workplace hazards.
- Ensuring the correct well control procedures are followed at all times. This includes ensuring the BOP is correctly installed.



Case Study 6

- *Critical Factors & Prevention*
- Ensuring an auxiliary means of escape, such as a Geronimo line, is installed. (if the line was installed, the most employee would not have had to climb down towards the explosion).
- Ensuring the personal protective equipment or PPE, suitable for the work operations, is provided and utilized. This is particularly important for work operations where the nature of the hazards require the use of Flame Resistant Clothing or FRC.



Case Study 7

- Hydraulic fracturing operation.
- Modified zipper fracturing.
- Multiple contractors.
- 4100 PSI on high pressure rigid line.
- Employee opened a bleed valve.
- High pressure rigid line “launched” up—striking employee in the chest.
- Employee later died from his injuries.
- Another employee, knocked down, suffered injuries to hands and wrists.



Case Study 7

- *Critical Factors & Prevention*
- Ensuring communication between contractors at all times on site.
- High pressure rigid lines should be secured.
- Flexible high pressure hoses should also be secured.
- Effective site control.



Conclusion

- Each incident shared similar conditions.
- Presence of SSEs (Short-Service Employees).
- Inadequate training.
- Inadequate on-site enforcement by the employer.
- Inadequate/infrequent communication amongst contractors.

Oilfield work can be done safely with the strong commitment by employers and employees to develop, implement, and aggressively enforce safe work practices—we all share the responsibility.



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