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Occupational Safety & Health Training

Well Site Completion and Servicing Safety

More than 450,000 workers were employed in the oil and gas industries in 2011. These workers are engaged in many different industrial processes needed to successfully drill and service a well. Safety and health hazards and dangerous conditions can result in fatalities for oil and gas workers. This course provides information on industry standards that can help you identify and prevent hazards in the dangerous oil and gas industry.

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OSHAcademy Course 903 Study Guide

Well Site Completion and Servicing Safety

Contact OSHAcademy to arrange for use as a training document.

The primary document used as a reference for this course is the OSHA Oil and Gas Well Drilling and Servicing eTool (http:/www.osha.gov). This study guide is designed to be reviewed off-line as a tool for preparation to successfully complete OSHAcademy Online Course 903.

We hope you enjoy the course and if you have any questions, feel free to email or call:

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Disclaimer

Revised: October 4, 2017

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Course Introduction

The oil and gas industry employs hundreds of thousands of people and is a vital component of the national economy. Sitemap Worker safety and health are important to this industry.

More than 450,000 workers were employed in the oil and gas industries in 2011 (Quarterly Census of Employment and Wages). These workers are engaged in many different industrial processes needed to successfully drill and service a well. These processes frequently require the use of specialized equipment and specialized work crews.

From 2003 to 2010, 823 oil and gas extraction workers were killed on the job–a fatality rate seven times greater than the rate for all U.S. industries (Census of Fatal Occupational Injuries). Safety and health hazards and dangerous conditions that can result in fatalities for oil and gas workers include:

- Vehicle Accidents
- Struck-By/ Caught-In/ Caught-Between
- Explosions and Fires
- Falls
- Confined Spaces
- Chemical Exposures

The information and resources provided in this course can help workers and employers identify and eliminate hazards in their workplace. The course introduces applicable OSHA regulatory requirements, as well as industry standards and guidance aimed at identifying, preventing, and controlling exposure to hazards.

Which OSHA Rules Apply to Oil and Gas?

Employers must protect the safety and health of workers involved in oil and gas operations according to:

1. OSHA's General Industry Standards (29 CFR 1910)

2. OSHA's Construction Standards (29 CFR 1926)

3. General Duty Clause of the Occupational Safety and Health (OSH) Act

Module 1 – Well Completion Safety

Introduction

Once the design well depth is reached, the formation must be tested and evaluated to determine whether the well will be completed for production, or plugged and abandoned.

To complete the well production, casing is installed and cemented and the drilling rig is dismantled and moved to the next site.

A service rig is brought in to perforate the production casing and run production tubing. If no further pre-production servicing is needed, the Christmas tree is installed and production begins.

The Christmas tree includes the control valves, pressure gauges, and chokes assembled at the top of a well to control flow of oil and/or gas after the well has been drilled and completed. It is used when reservoir pressure is sufficient to cause reservoir fluids to rise to the surface.

Specifically, well completion activities include:

- conducting drill stem test
- setting production casing
- installing production tubing
- starting production flow
- hydraulic fracturing
- beam pumping units

After production starts, the well may need further servicing.

If it's decided that the well will not be completed, then it will be plugged and abandoned.

Conducting Drill Stem Test

To determine the potential of a producing formation, the operator may order a drill stem test (DST).

The DST crew makes up the test tool on the bottom of the drill stem, then lowers it to the bottom of the hole.

Weight is applied to the tool to expand a hard rubber sealer called a packer.

Opening the tool ports allows the formation pressure to be tested.

This process enables workers to determine whether the well can be produced.

Potential Hazards:

- being pinched or struck by the drill stem test tools during floor operations
- swabbing the hole on the way out with the test tool could cause a kick to occur (could result in a blowout leading to injuries and deaths
- being exposed to unexpected release of H2S or other gases or liquids
- a packer seat failure or fluid loss to an upper formation could cause a kick that might result in a blowout causing injuries and deaths
- other hazards are similar to those encountered during tripping out/in

Possible Solutions:

- Wear appropriate PPE.
- Instruct workers in handling and using the special tools required during drill stem testing.
- Keep a method for filling the hole in place at all times. Before any test starts, the rig management must ensure that the blow-out prevention system includes a kill system that is capable of pumping fluid into the well below the annular preventer and at least on-set of pipe rams.
- Run a pump-out-sub or downhole circulating device in the test string to enable the system to be reversed.

- Ensure all workers on the location understand the dangers before starting any drill stem test. They should be fully informed of and trained in appropriate safety procedures, including the use of safety equipment and breathing apparatus.

- If in an H2S area, post a sign indicating the test in full view for the general public to see. Post reliable people to stop them from coming to the location. Define a minimum of two muster points with all vehicles parked in an appointed area.

Setting Production Casing

Production casing is the final casing in a well. It can be set from the bottom to the top. Sometimes a production liner is installed.

This casing is set the same as other casings, and then cemented in place.

Installing Production Tubing

A well is usually produced through tubing inserted down the production casing. Oil and gas is produced more effectively through this smaller-diameter tubing than through the large-diameter production casing.

Joints of tubing are joined together with couplings to make up a tubing string. Tubing is run into the well much the same as casing, but tubing is smaller in diameter and is removable.

The steps for this activity are:

- Tubing elevators are used to lift tubing from the rack to the rig floor.

- The joint is stabbed into the string, which is suspended in the well, with air slips.

- Power tongs are used to make-up tubing.

- This process is repeated until tubing installation is complete.

- The tubing hanger is installed at the wellhead.

New technology allows tubing to be manufactured in a continuous coil, without joints. Coiled tubing is inserted into the well down the production casing without the need for tongs, slips, or elevators, which takes considerably less time to run.

Potential Hazards:

- getting pinched fingers and hands from tongs and slips
- being struck by swinging tubing and tubing elevators
- getting caught between the joint and tongs or stump
- being struck by the tubing hanger wrench if it should slip
- getting fingers and hands pinched and caught between tubing hanger and tubing head

Possible Solutions:

- Keep all fingers and hands away from pinch points.
- Instruct workers to be on alert when on the rig floor and pipe racking area.
- Avoid placing hands on the end of the tubing stump.
- Use the correct tools for each task.
- Inspect the tools before use.
- Use coiled tubing.

Starting Production Flow

Production flow is started by washing in the well and setting the packer.

- **Washing in** means to pump in water or brine to flush out the drilling fluid. Usually this is enough to start the well flowing.

If the well does not start flowing, then the well may need to be unloaded. This means to swab the well to remove some of the brine.

- A **swab** is a hollow mandrel fitted with swab cups used for swabbing. The swab operates on a wireline to lower the pressure in the well bore and bring well fluids to the surface when the well does not flow naturally. Swabbing is a temporary operation to determine whether the well can be made to flow. If the well does not flow after being swabbed, a pump is installed as a permanent lifting device to bring the oil to the surface.

- A **wireline** is a slender, rodlike or threadlike piece of metal used for lowering special tools into the well.

If this does not work the flow might be started by pumping high-pressure gas into the well before setting the packer.

- The **packer** is a piece of downhole equipment that consists of a sealing device, a holding or setting device, and an inside passage for fluids.

Potential Hazards:

- A blowout may be possible whenever well pressures are changed.

Possible Solutions:

- Monitoring of well pressures and working blow out preventers (BOP's) are the best way to prevent blowouts.

If the well does not flow on its own, well stimulation or artificial lift may need to be considered.

- **Stimulation** is the action of attempting to improve and enhance a well's performance by:
    - the application of horsepower using pumping equipment,
    - injecting water, sand and chemicals in artificially created fractures in rock, or
    - using chemicals such as hydrochloric or acetic acid to dissolve the soluble portion of the rock.

Module 1 Quiz

1. **To determine the potential of a producing formation, the operator may order _____.**

   a. Christmas tree scan
   b. formation analysis
   c. a drill stem test (DST)
   d. flow rate test

2. **The hazards encountered during a drill stem test(DST)conducted as part of the well completion process include all the following, <u>except</u> _____.**

   a. being pinched or struck by the drill stem
   b. being exposed to release of hydrogen sulfide
   c. the potential for a kick and blowout
   d. being exposed to excessive noise

3. **The hazards to which you may be exposed while installing production tubing include all the following, <u>except</u> _____.**

   a. being exposed to biological hazards
   b. getting pinched fingers and hands from tongs
   c. being struck by swinging tubing
   d. being struck by the tubing hanger wrench

4. **Which of the following is the primary hazard encountered when starting the production flow process?**

   a. Being exposed to release of hydrogen dioxide
   b. Being exposed to a possible blowout
   c. Being pinched or struck by the drill stem and casing pipe
   d. Being struck by falling objects from the derrick

5. Each of the following is well stimulation methods, <u>except</u> _____.

a. using under-pressure to draw up oil and gas
b. the use of pumping equipment to apply horsepower
c. injecting water, sand, and chemicals to fracture rock
d. using chemicals to dissolve the soluble portion of rock

Module 2 – Hydraulic Fracturing

Hydraulic fracturing or "fracking" is a process used to "stimulate" well production in the oil and gas industry. It is not a new process, but its use has increased significantly in the last 10 years because of new horizontal drilling and multi-stage fracking (or "completions") technologies that improve access to natural gas and oil deposits.

Fracking involves pumping large volumes of water and sand into a well at high pressure to break up or fracture shale and other tight formations, allowing oil and gas to flow into the well.

Hydraulic fracturing generally involves the following activities:

- rig up
- well and equipment testing
- perforating
- fracturing fluid blending and pumping
- isolation
- flowback

Rig Up

Rig up is the transport and assembly of equipment and materials to perform hydraulic fracturing operations. Hydraulic fracturing operations require more equipment on the well pad than conventional well completion. Due to the additional equipment, walking and working surfaces become even more restricted.

Potential Hazards:

- falling from heights
- slips, trips and falls
- struck-by moving vehicles, equipment and pressure; falling or dropped equipment; and flying particles

- caught-in or between pinch points (such as hammer union wings and hammers, pump iron and racks)
- fires and explosions
- inhaling respirable crystalline silica (see OSHA-NIOSH's Hazard Alert)
- inhaling diesel particulate
- exposure to concentrated chemical additives
- exposure to high noise levels
- overexertion or receiving sprains and strains while handling materials (such as sacks and buckets)

Possible Solutions:

- Preplan equipment locations and use a spotter to position equipment out of the fall lane of the derrick and upwind of vents, vapor sources and gas sources.
- Conduct a pre-job inspection to identify and eliminate or correct hazardous work surfaces.
- Use appropriate fall protection equipment.
- Require all non-essential personnel to stand clear of the work zone.
- Secure all elevated lines.
- Use proper hand and body positioning.
- Provide adequate bonding and grounding for blending, pumping and sand transfer equipment.
- Use hose covers or shielding for transfer or suction lines containing flammable liquids to prevent them from being ruptured resulting in fires or explosions.
- Cap unused fill ports (e.g., cam lock caps) on sand movers.

- Reduce the drop height between the sand transfer belt and T-belts and blender hoppers.
- Apply fresh water to roads and around the well site to reduce silica dust.
- Enclose points where silica dust is released. Use local exhaust ventilation to collect silica-containing dusts and prevent dust escape. Install dust collection systems onto machines or equipment that release dust.
- Where possible, use enclosed cabs or booths. Consider providing operator cabs and booths with HEPA filters and climate controls to protect workers from silica dust and environmental extremes.
- Replace proppant transfer belts with screw augers.
- Ensure that workers follow the safe handling procedures found in Safety Data Sheets.
- Conduct personal protective equipment assessments and require employees to wear prescribed personal protective equipment (PPE) including respiratory and hearing protection.
- Use mechanical lifting aids, proper lifting techniques and team lifting where appropriate.

Well and Equipment Testing

Before the actual process of hydraulic fracturing begins, well servicers conduct a pressure test on the system.

The pressure test is conducted by pumping fresh water, brine or drilling mud into the well to gradually increase the pressure. The pressure test involves the gradual increase of hydraulic pressure on the system. The final test pressure is above the maximum fracturing pressure, but below the lowest component failure pressure.

Potential Hazards:

- struck-by high-pressure lines or unexpected release of pressure (for example, mismatched or excessively worn hammer unions and line leaks or line failure)

- rotating equipment hazards
- inhaling diesel particulate
- exposure to high noise levels

Possible Solutions:

- Fasten high-pressure lines together properly.
- Use proper equipment inspection techniques that include hammer unions.
- Require all non-essential personnel to stand clear.
- Direct equipment operators to remain at their controls.
- Use proper equipment guards and covers.
- Wear proper PPE, such as respiratory, skin and hearing protection, as appropriate for the hazards present.

Perforating, Fracturing Fluid, Blending, and Pumping

The fracturing job begins by perforating the well casing.

The process of perforating involves piercing the casing wall and cement of a wellbore to provide holes through which formation fluids may enter or to provide holes in the casing so that materials may be introduced into the annulus between the casing and the wall of the borehole. Perforating is accomplished by lowering into the well a perforating gun, or perforator.

After perforating the well casing, workers blend and pump fracturing fluid into the well through high pressure lines.

Fracturing fluid is made up of a base fluid, proppant (sand, or an alternative proppant), and chemical additives. The blender and pump trucks run simultaneously for several hours while workers monitor well pressure and fracture progression.

Potential Hazards:

- slips, trips and falls

- struck-by high-pressure lines or an unexpected release of pressure (for example, mismatched or excessively worn hammer unions and line leaks or line failure)
- rotating and moving equipment hazards
- fires, explosions and uncontrolled chemical reactions
- inhaling respirable crystalline silica
- inhaling diesel particulate
- exposure to concentrated chemical additives
- exposure to high noise levels
- overexertion or suffering sprains and strains during material handling such as sacks and buckets

Possible Solutions:

- Conduct a pre-job inspection to identify and eliminate or correct hazardous work surfaces.
- Require all non-essential personnel to stand clear of the work zone.
- Fasten high-pressure lines together properly.
- Conduct adequate pressure tests on pump(s) and lines and ensure proper valve alignment before pumping. Install a check valve as close to the wellhead as possible.
- Use proper equipment inspection techniques that include hammer unions.
- Direct equipment operators to stay by their controls.
- Use proper equipment guards and covers.
- Provide adequate bonding and grounding for blending, pumping and sand transfer equipment.

- Use hose covers or shielding for transfer or suction lines containing flammable liquids to prevent them from being ruptured resulting in fires or explosions.
- Substitute less hazardous materials.
- Require the capping of unused fill ports (e.g., cam lock caps) on sand movers.
- Reduce the drop height between the sand transfer belt and T-belts and blender hoppers.
- Apply fresh water to roads and around the well site to reduce silica dust.
- Enclose points where silica dust is released. Use local exhaust ventilation to collect silica-containing dusts and prevent dust escape. Install dust collection systems onto machines or equipment that release dust.
- Where possible, use enclosed cabs or booths. Consider providing operator cabs and booths with HEPA filters and climate controls to further protect workers.
- Replace proppant transfer belts with screw augers on sand movers in new designs or retrofits.
- Ensure that workers follow the safe handling procedures found in SDSs.
- Use proper mixing procedures.
- Wear appropriate PPE, including respirators and eye, face and hearing protection.
- Provide an eyewash station and other appropriate flushing equipment as recommended by the SDS.
- Use mechanical lifting aids, proper lifting techniques and team lifting where appropriate.

Isolation

Once a stage is fully fractured, workers isolate it from the rest of the well by inserting a plug into the well. This requires wireline operations.

Flowback

After the entire well has been fractured, workers decrease the pressure at the wellhead and drill out the isolation plugs. A mixture of fracturing fluid and gas or oil flows back out of the well through flow lines into pits or tanks.

Drilling out the plugs will require wireline operations, snubbing, or coil tubing procedures. See Wireline Operations, Snubbing, and Coil Tubing for further information. We will cover those special processes later in the course.

Beam Pumping Units

If the well doesn't produce adequately, a beam pumping unit may be installed.

A **beam pumping unit** is a machine designed specifically for sucker rod pumping used to lift fluid to the surface by the reciprocating action of the sucker rod string. An engine or motor (prime mover) is mounted on the unit to power a rotating crank. The crank moves a horizontal member (walking beam) up and down to produce reciprocating motion. This reciprocating motion operates the pump.

There are four basic types of beam pumping units. Three involve a walking beam, which seesaws to provide the up and down reciprocating motion to power the pump. The fourth reciprocates by winding a cable on and off a rotating drum. The job of all four types is to change the circular motion of an engine to the reciprocating motion of the pump.

The pump units are brought in disassembled on trucks and off-loaded onsite. The many parts of the pump unit include large heavy metal pieces that need to be assembled.

Potential Hazard:

- being pinched, struck, or crushed by falling or swinging parts during assembly

Possible Solutions:

- Ensure the work crew understands the assembly procedures and hazards involved in the tasks.
- Wear appropriate PPE.

Module 2 Quiz

1. **Which method of well stimulation pumps fluid under high pressure through the well casing to break up rock formations?**

   a. Hydraulic fracturing
   b. Matrix acidization
   c. Over-pressure pumping
   d. Under-pressure pumping

2. **The hazards encountered on a hydraulic fracturing site while performing Rig Up include all the following, except _____.**

   a. being caught in or between pinch points
   b. fires and explosions
   c. inhaling respirable crystalline silica
   d. exposure to confined spaces

3. **The process of _____ involves piercing the casing wall and cement of a wellbore to provide holes through which formation fluids may enter.**

   a. soil testing
   b. stimulation
   c. perforating
   d. masking

4. **The hazards encountered on a hydraulic fracturing site while conducting pressure tests include all the following, except _____.**

   a. rotating equipment hazards
   b. exposure to biological hazards
   c. inhaling diesel particulate
   d. being struck by high pressure lines

5. **After the entire well has been fractured, workers _____ and drill out the isolation plugs.**

    a. decrease the pressure at the wellhead
    b. tap the well for immediate use
    c. maintain high-pressure hydraulic fracturing fluid
    d. monitor pressure limits

Module 3 – Servicing Operations Safety

Introduction

Servicing operations assumes that the well has been completed and initial production has begun.

All servicing activity requires specialized equipment. The equipment is transported in and rigged up.

Transporting and Rigging Up

Transporting and rigging up the equipment is the first step in well servicing operations. After these steps, servicing activities commence.

- transporting rig
- rigging up service rig
- set up work area

Transporting Rig

After the drilling rig is removed, the well site is cleaned and re-leveled for the service rig. A workover rig is driven or transported to the site and positioned at the well.

Potential Hazards:

- working in unstable or slippery conditions on the lease road/drill site
- striking fixed objects such as power line poles
- contacting electrical service lines
- being involved in vehicular accidents
- getting caught between the rig and the wellhead
- being struck by a moving rig

Possible Solutions:

- Inspect the route in advance for adequate vehicle access and satisfactory surface conditions.
- Ensure adequate driver training.
- Ensure proper vehicle preventive and corrective maintenance.
- Establish and follow a specific procedure for positioning the rig.
- Use a ground guide while backing the rig.
- Keep all personnel clear of the moving rig.

Rigging Up the Service Rig

Before rigging up, guyline anchors are set into the ground and pull tested. The service rig is then spotted over the well.

The truck- or trailer-mounted rig is stabilized and leveled by manual or hydraulic jacks. All guy lines are uncoiled and laid out to remove kinks or knots.

The mast is readied for raising, then raised and guyed into place. The derrick emergency escape device is rigged up and the work platform is readied for service operations.

Potential Hazards:

- being electrocuted by overhead power lines
- slips, trips, and falls as a result of unstable or slippery conditions
- being caught between the mast and mast cradle or being struck by or caught in guy lines and cables when mast is being raised
- being struck by a toppling mast if the carrier shifts
- being sprayed with oil if the hydraulic cylinder or hoses fail as mast is being raised
- twisting and falling of the mast if a guy line or anchor breaks or fails

- receiving strains and sprains
- getting hand, finger, and foot injuries during rig up
- getting the climbing assist counterweight tangled in the mast

Possible Solutions:

- Identify all electrical hazards and maintain adequate clearances. [29 CFR 1910.303 Table S3]
- Take appropriate precautions to mitigate slip, trip, and fall hazards.
- Stay clear of the unit while the mast is being raised, lowered, or telescoped.
- Uncoil and visually inspect all cables before starting to raise the mast. Stand to the side of lines and cables as the mast is being raised.
- Inspect the well pad and set additional foundation materials as appropriate.
- Inspect all high-pressure hoses and fittings.
- Ensure that the unit operator assesses the wind speed and direction to determine if the mast can be raised safely.
- Allow no personnel on the unit, other than the operator working at the controls, when raising or lowering the mast. All others stand clear.
- Inspect all anchors before rigging up the mast. Anchors should meet American Petroleum Institute (API) specifications for loads and guying patterns. [2004 Publications, Programs, and Services. American Petroleum Institute (API), (2004)]
- Use proper lifting techniques.
- Use proper hand and foot placement.
- Control the position of the counterweight by maintaining tension on the guywire to keep the weight away from the mast.

Set Up Work Area

The work area is prepared by setting up all relevant equipment for the job, including the derrick emergency escape device.

Potential Hazards:

- being struck by or caught between equipment
- receiving strains and sprains
- getting hand, finger, and foot injuries
- slips, trips, and falls
- failing to properly install derrick emergency escape device when personnel may be expected to work in the derrick
- getting burned or exposed to respiratory hazards due to ignition of flammable liquids, vapors, and gases

Possible Solutions:

- Install guardrails as required. [29 CFR 1910.23]
- Inspect equipment integrity such as slings, tongs, and hand tools. [29 CFR 1910.184]
- Train crew to select and use the proper tools for the job.
- Instruct workers to stand clear of suspended loads.
- Use a tag line to guide equipment into position.
- Inspect hoses and connections before and after attaching to the tongs.
- Connect hoses after the tongs have been positioned.
- Properly install derrick emergency escape device in accordance with manufacturer's recommendations.

- Proper equipment type and placement.

Module 3 Quiz

1. **The hazards encountered associated with transporting the rig during servicing operations include all the following, except _____.**

   a. working in unstable or slippery conditions
   b. contacting electrical service lines
   c. being exposed to noise hazards
   d. getting caught between the rig and the wellhead

2. **The hazards encountered rigging up the service rig include all the following, except _____.**

   a. being electrocuted by overhead powerlines
   b. being pinched by rotating parts
   c. being caught between the mast and mast cradle
   d. being struck by a toppling mast if the carrier shifts

3. **To overcome the serious hazards associated rigging up the service rig, you can do all the following, except _____.**

   a. ensuring confined space entry is coordinated
   b. identifying electrical hazards
   c. taking action to mitigate slips, trips, and falls
   d. uncoiling and inspecting all cables

4. **The hazards associated with setting up the work area for well servicing include all the following, except _____.**

   a. being struck by or caught between equipment
   b. receiving strains and sprains
   c. slips, trips, and falls
   d. being pinched by rotating parts

5. **To overcome the serious hazards associated setting up the work area on the service rig, you can do all the following, <u>except</u> _____.**

   a. ensuring hazardous spaces are roped off
   b. inspecting slings, tongs, and hand tools
   c. installing guardrails as required
   d. training workers to select and use proper tools

Module 4 – General Services Safety

Introduction

Wells often need maintenance or service on surface or down-hole equipment. Working on an existing well to restore or increase oil and gas production is an important part of today's petroleum industry. A well that is not producing to its full potential may require service or workover.

Maintenance activities associated with the well when using a workover/service rig are:

- removing the horsehead (pumping unit only)
- removing the wellhead
- pulling and running rods
- pulling and running tubing

Removing the Horsehead (Pumping Unit Only)

Typically, the horsehead of a pumping unit must be removed to gain access to the wellhead equipment.

Potential Hazards:

- having the unit start up while working on equipment
- being struck by counterweights on the pumping unit
- being struck by dropped horsehead or caught between horsehead and walking beam
- getting fingers and hands pinched and caught between tools and/or equipment
- being struck by falling tools or equipment
- falling from an elevation

Possible Solutions:

- Use lockout/tagout, to include mechanically securing the flywheel.

- Inspect all slings before use.
- Use tag lines to position the horsehead when removing or lowering and to keep personnel clear of suspended load.
- Use the correct tools for each task.
- Inspect the tools before each use.
- Keep fingers and hands away from pinch points.
- Secure tools from falling and keep the area below clear of personnel.
- Use proper PPE and fall protection as required.

Removing the Wellhead

To begin the process, the wellhead must be removed from the casing flange.

Potential Hazards:

- being struck by released pressure or flying particles
- being struck by the wrench or hammer while removing bolts and fittings
- getting caught between wellhead, hydraulic wrenches, and wellhead fittings
- getting fingers and hands pinched and caught between flanges or valves
- slips, trips, and falls
- entering into well cellars

Possible Solutions:

- Stand clear of valves and fittings when removing fitting or bleeding off pressure.
- Check wellhead pressure and bleed pressure off before removal.
- Use the correct tools for each task.

- Inspect the tools before each use.
- Wear proper PPE including safety glasses.
- Keep fingers and hands away from pinch points.
- Cover open cellars.
- Wear fall protection as appropriate.
- Implement a confined space entry program.

Pulling and Running Rods

To service, repair, or replace the rods or pump, the sucker rod string must be pulled out of the hole.

Pulling rods refers to the process of removing rods from the well. Running rods refers to the process of replacing rods in the well.

Potential Hazards:

- falling from heights
- being struck by dropped objects
- getting fingers or hands pinched in or between rod wrenches, rod elevators, power tongs, rod hook, rod transfer, and rod fingers

Possible Solutions:

- Wear appropriate fall protection including a full body harness.
- Never disconnect personal fall arrest systems while working in the derrick.
- Ensure that workers are instructed in proper hand and finger placement when making and breaking rod connections or setting rods on the rod fingers.
- Ensure that workers are instructed in proper latching procedures while pulling and running rods.

- Wear the proper personal protective equipment.
- Use extra caution while people are working overhead.
- Avoid carrying tools while climbing the derrick ladder. Raise tools with a line to any worker above the derrick floor.
- Ensure that all tools and equipment being used are secured with the proper safety lines.

Pulling and Running Tubing

Among the reasons for pulling tubing includes replacing a packer, locating a tubing leak, or plugged tubing.

Hazards and solutions when raising or lowering the traveling block and elevator.

Potential Hazards:

- Being struck by the elevators and traveling block as they are raised or lowered.
- Getting fingers and hands pinched between elevators and tongs or tubing collar.

Possible Solutions:

- Instruct workers to stand clear of tong and slip area when lowering the elevator and traveling block.
- Use handles on elevators as they are descending into place over the tubing.

Hazards and solutions when latching or unlatching elevators onto the tubing.

Potential Hazards:

- Pinching hands or fingers in the elevators.
- Being struck by elevators not securely latched.

Possible Solutions:

- Ensure that workers are instructed in proper latching procedure.
- Inspect and maintain elevators.

Module 4 Quiz

1. **The hazards associated with removing the horsehead to gain access to the wellhead equipment include all the following, except _____.**

   a. having the unit start up while working on equipment
   b. being struck by counterweights on the pumping unit
   c. being struck by circulating fans
   d. being struck by dropped horsehead

2. **To overcome the serious hazards associated with removing the horsehead when using a workover/service rig, you can do all the following except _____.**

   a. using lockout/tagout procedures
   b. ensuring the wellhead is roped off
   c. inspecting all slings before use
   d. using tag lines to position the horsehead

3. **The hazards associated with removing the wellhead include all the following, except _____.**

   a. being struck by ferrel materials
   b. being struck by released pressure or flying particles
   c. being struck by the wrench or hammer while removing bolts
   d. getting caught between wellhead and wrenches/fitting

4. **To overcome the serious hazards associated with removing the wellhead, you can do all the following, except _____.**

   a. using the correct tools for the task
   b. covering open cellars
   c. wearing fall protection as appropriate
   d. ensuring biological hazard testing is completed

5. **The hazards associated specifically with pulling and running rods on a well site include all the following, <u>except</u> _____.**

   a. exposure to environmental factors
   b. falling from heights
   c. being struck by dropped objects
   d. getting fingers or hands pinched

Module 5 – Special Services Operations Safety

Introduction

Special services are operations that use specialized equipment and workers who perform support well drilling and servicing operations.

Coordination between all personnel is critical for site safety. Therefore, all special services operations should conduct a pre-job safety meeting to include all personnel on the job site.

Wireline Operations

A **wireline** is a slender, rod-like or threadlike piece of metal, usually small in diameter, which is used for lowering special tools (such as logging sondes, perforating guns, and so forth) into the well. It is also called slick line.

All wireline operations require special precautions. Wireline operations may include slick line and electric line operations. Operations completed through the use of wireline include logging, perforating, setting of downhole tools, fishing, bailing, and swabbing.

The special service supervisor should hold a pre-job meeting with the special service crew and other involved personnel to review responsibilities and to coordinate the operations to be performed.

Potential Hazards:

- being struck by wireline due to line failure
- being struck by wireline, lubricator, sheaves, or other equipment
- getting caught in wireline
- pinching hands and fingers
- getting sprains, strains or suffering from overexertion
- falling from a height
- receiving burns or being exposed to a respiratory hazard due to a fire
- being exposed to an unexpected release of pressure

- toppling mast or boom

Possible Solutions:

- Keep all non-essential workers out of the immediate work area.
- Inspect wireline, rope sockets, and cable heads for defects before use.
- Operate the wireline at a safe speed.
- Use an appropriate method to determine the end of line location.
- Inspect all slings, chains, pins or other attachment devices before lifting or suspending tools or equipment.
- Minimize manual handling of lubricators and other equipment.
- Use proper hand placement and tag lines to avoid pinch points.
- Use proper fall protection.
- Position the unit properly with respect to wind direction and distance from potential gas or vapor sources.
- Install a pressure release valve in the lubricator sub.
- Bleed pressure from lubricator sub before breaking connections.
- Check for an unusually tight connection that may indicate that pressure has not been released.
- Install foundation, outriggers, and guying according to the manufacturer's recommendations.

Well Logging

Well logging is the recording of information about subsurface geologic formations, including records kept by the driller and records of mud and cutting analyses, core analysis, drill stem tests, and electric, acoustic, and radioactivity procedures.

The purpose of well logging is to identify formation and other downhole properties of the well bore.

Well logging tools can include radioactive, electric, mechanical, and sonic tools, among others.

Potential Hazards:

- being exposed to radiation
- getting injured due to an unexpected release of pressure

Possible Solutions:

- Keep non-essential workers away from the rig floor and marked-off areas where radiation hazards may be present.
- Wear appropriate personnel protective equipment (PPE).
- Allow only authorized and qualified logging company personnel to handle the logging tools.
- Report any damage to radioactive logging tools.
- Check for the presence of trapped pressure before opening the tool housing.

Perforating

On a well site, to perforate means to pierce the casing wall and cement of a wellbore to:

- provide holes through which formation fluids may enter, or
- to provide holes in the casing so that materials may be introduced into the annulus between the casing and the wall of the borehole.

Perforating is accomplished by lowering a perforating gun, or perforator into the well.

A specialized crew transports and operates the perforating equipment. Upon arrival to the site, the tools are assembled, then lowered into the well by a wireline unit or conveyed by tubing. Then, the perforating gun shoots small holes using shaped charges or bullets into the casing of the producing zone.

The perforations allow the oil or gas to flow into the casing or liner. If pressure is sufficient, the oil or gas will rise to the surface.

Detailed operational procedures and trained personnel are necessary for the safe handling of explosives. The solutions below illustrate possible solutions.

Potential Hazard:

- surface detonation of explosives

Possible Solutions:

- Keep all non-essential personnel out of the immediate work area.
- Post warning signs and prohibit the use of radios, telephones, or navigational systems.
- Shut down non-essential electrical systems during gun-arming operations.
- Perform operations involving explosives under the direct supervision of the special services supervisor.
- Report any suspected remnants of explosives to the special services supervisor.

Cementing

Cementing is the application of a liquid slurry of cement and water to various points inside or outside the casing.

Cementing and pumping operations may be performed by specialized pumping services or in conjunction with well servicing operations (such as, casing, squeezing, and zone isolations).

The hazards involved will vary with mode of dry cement delivery and mixing as well as the primary designed function of the pumping equipment.

Rig Up

This phase of the cementing process includes spotting and the assembly of equipment to perform cementing or pumping operations.

Potential Hazards:

- being struck by moving vehicles
- being exposed to potential ignition and respiratory hazards
- overexerting, or getting sprains and strains
- being exposed to pinch points (for example, hammer union wings and hammers, pump iron and racks)
- being hit by flying particles
- slips, trips, and falls
- being struck by falling equipment

Possible Solutions:

- Preplan equipment locations and use a spotter(s) to position equipment out of fall lane of the derrick and upwind of vapor and gas sources.
- Use mechanical lifting aids, proper lifting techniques, and team lifting where appropriate.
- Use proper hand and body positioning.
- Wear proper PPE including fall protection and respiratory protection where appropriate.
- Conduct a pre-job inspection to identify, then eliminate or correct hazardous work surfaces.
- Require all non-essential personnel to stand clear.
- Secure all elevated lines.

Pumping

In this phase of the cementing process, a high-pressure pump is used to force cement down the casing and into the annular space between the casing and the wall of the borehole.

Potential Hazards:

- being struck by high-pressure lines or unexpected release of pressure (due to, mismatched or excessively worn hammer unions, line failure)
- being exposed to chemical hazards (such as, silica, toxic liquids, and gases)
- being exposed to high noise levels
- slips, trips, and falls
- overexerting, or receiving sprains and strains while handling materials (such as sacks and buckets)

Possible Solutions:

- Direct all non-essential personnel to stand clear.
- Require pump operator to stay by the controls.
- Conduct adequate pressure tests on pump(s) and lines before pumping.
- Hobble high-pressure lines properly.
- Use proper equipment inspection techniques to include hammer unions.
- Wear proper personal protective equipment (for example, respiratory, skin, and hearing) as appropriate for the hazards present.
- Conduct a pre-job inspection to identify, then eliminate or correct hazardous work surfaces.
- Use mechanical lifting aids, proper lifting techniques, and team lifting where appropriate.

Rig Down

During the rig down phase of the cementing operations process, the crew dismantles the equipment. The hazards are similar to the rig up phase.

Potential Hazards:

- being struck by moving vehicles
- being exposed to potential ignition and respiratory hazards
- overexerting or receiving sprains and strains
- being exposed to pinch points (such as, hammer union wings and hammers, pump iron and racks)
- being hit by flying particles
- slips, trips, and falls
- being struck by falling equipment

Possible Solutions:

- Use a spotters when moving equipment.
- Use mechanical lifting aids, proper lifting techniques, and team lifting where appropriate.
- Use proper hand and body positioning.
- Wear proper PPE including fall protection and respiratory protection where appropriate.
- Conduct a post-job inspection to identify, then eliminate or correct hazardous work surfaces.
- Require all non-essential personnel to stand clear.

Module 5 Quiz

1. **All special services operations supervisors should conduct a _____ to include all personnel on the job site.**

   a. news brief
   b. job assignment meeting
   c. pre-job safety meeting
   d. workers compensation review meeting

2. **The hazards associated specifically with wireline operations on a well site include all the following, except _____.**

   a. getting sprains and strains
   b. exposure to environmental factors
   c. overexertion
   d. falling from a height

3. **The hazards associated specifically with the rig up phase prior to cementing operations on a well site include all the following, except _____.**

   a. being struck by vehicles
   b. falling from heights
   c. exposure to radiation
   d. slips trips and falls

4. **During which phase of the cementing operations process, does the crew dismantle the equipment?**

   a. Rig down
   b. Perforation
   c. Stimulation
   d. Rig up

5. **Which of the following is a special services operation using radioactive, electric, mechanical, and sonic tools, to identify formation and other downhole properties of the well bore?**

    a. Slick cabling
    b. Perforating
    c. Wireline operations
    d. Well logging

Module 6 – Special Services Operations Safety (Continued)

Stimulation

Well **stimulation** involves techniques to optimize well performance. This may include pumping of acids, energized fluids, and various other chemicals to improve formation flow characteristics.

Rig Up

Rig up is the process of spotting and assembly of equipment to perform stimulation operations.

Potential Hazards:

- being struck by moving vehicles
- being exposed to potential ignition and respiratory hazards
- overexerting or receiving sprains and strains
- being exposed to pinch points (such as, hammer union wings and hammers, pump iron and racks)
- being hit by flying particles
- falling from heights
- slips, trips, and falls
- being struck by falling equipment
- being injured due to potential ignition of flammable or combustible carrier or base fluids

Possible Solutions:

- Preplan equipment locations and use a spotter(s) to position equipment out of fall lane of the derrick and upwind of vents, vapor and gas sources.
- Use mechanical lifting aids, proper lifting techniques, and team lifting where appropriate.

- Use proper hand and body positioning.
- Wear proper PPE including fall protection and respiratory protection where appropriate.
- Conduct a pre-job inspection to identify, then eliminate or correct hazardous work surfaces.
- Require all non-essential personnel to stand clear.
- Secure all elevated lines.
- Provide adequate bonding and grounding for blending, pumping and sand transfer equipment.
- Use hose covers or shielding for transfer or suction lines containing flammable liquids.

Pumping

This process may include pumping of acids, energized fluids, and various other chemicals to improve formation flow characteristics.

Potential Hazards:

- being struck by high-pressure lines or unexpected release of pressure (for example, mismatched or excessively worn hammer unions line failure)
- being exposed to chemical hazards (such as, silica, toxics, and asphyxiates)
- being exposed to high noise levels
- slips, trips, and falls
- overexerting or receiving sprains and strains while handling materials (such as sacks and buckets)
- being exposed to temperature extremes
- being exposed to radiation associated with radioactive tracer materials

Possible Solutions:

- Require all non-essential personnel to stand clear.
- Direct equipment operators to stay by their controls.
- Conduct adequate pressure tests on pump(s) and lines and ensure proper valve alignment before pumping. Install a check valve as close to the well head as possible.
- Hobble high pressure lines properly.
- Use proper equipment inspection techniques to include hammer.
- Wear proper personal protective equipment (such as respiratory, skin, and hearing) as appropriate for the hazards present.
- Conduct a pre-job inspection to identify, then eliminate or correct hazardous work surfaces.
- Use mechanical lifting aids, proper lifting techniques, and team lifting where appropriate.
- Keep non-essential personnel away from marked-off areas where radiation hazards may be present.
- Allow only authorized and qualified company personnel to handle radioactive tracer materials or radioactive densiometers.
- Prevent contamination and exercise proper personal hygiene when working around radioactive materials.

Rig Down

During the rig down phase of the well site stimulation operations process, the crew dismantles the equipment. The hazards are similar to the rig up phase.

Potential Hazards:

- being struck by moving vehicles

- being exposed to potential ignition hazards, including flammable or combustible liquids or gases
- being exposed to potential skin and respiratory hazards
- overexerting or receiving sprains and strains
- being exposed to pinch points (such as, hammer union wings and hammers, pump iron and racks)
- being struck by particles or fluid
- slips, trips, and falls
- being struck by falling equipment
- being injured due to the unexpected release of trapped pressure

Possible Solutions:

- Use a spotter(s) to direct equipment movement.
- Use mechanical lifting aids, proper lifting techniques, and team lifting where appropriate.
- Use proper hand and body positioning.
- Wear proper personal protective equipment (such as fall protection, respiratory, skin, and hearing protection) as appropriate for the hazards present.
- Conduct a post-job inspection to identify, then eliminate or correct hazardous work surfaces.
- Direct all non-essential personnel to stand clear.
- Follow procedures to release trapped pressure safely.

Swabbing Operations

Swabbing is a temporary special services process to pull fluid from the well bore through the use of wire rope and cup assembly. Swabbing is a temporary operation to determine whether the well can be made to flow.

During the process of swabbing, a swab on a wireline is used to lower the pressure in the well bore and bring well fluids to the surface when the well does not flow naturally.

A **swab** is a hollow mandrel fitted with swab cups used for swabbing. A **swab cup** is a rubber or rubberlike device on a special rod (a swab), which forms a seal between the swab and the wall of the tubing or casing.

If the well does not flow after being swabbed, a pump is installed as a permanent lifting device to bring the oil to the surface.

Swabbing equipment includes a swabbing assembly, lubricator with an oil saver, and shut-off valve on the well, also called a swabbing valve. General precautions during all swabbing operations:

- Conduct swabbing operations during daylight hours.
- Keep all personnel clear of the derrick or within six feet (two meters) of the wellhead during swabbing operations.
- Locate swab tanks at least 100 feet (30 meters) from the well, where location allows.

Potential Hazards:

- loss of well control
- fire, explosive, or respiratory hazard from leakage or venting of oil or gas from tanks, lines or lubricator
- being struck by a pressurized line
- being exposed to a high-pressure connection failure caused by mismatched or excessively worn hammer unions

- being struck by pressurized fluids or the lubricator when removing the lubricator from the well
- getting strains and sprains from handling the lubricator
- pinching fingers between swab assembly and lubricator when changing swab cups or mandrels

Possible Solutions:

- Use appropriate equipment, rated for the expected pressures, to shut in the well.
- Inspect lubricators, swages, and unions for defects such as cuts, corrosion, and thread damage before use.
- Adjust oil savers by remote control with a hydraulic pump placed safely away from the wellhead.
- Train all personnel in emergency evacuation procedures.
- Place fire extinguishers in accessible positions.
- Move sources of potential ignition (such as, open fires for melting of babbitt) to designated areas at a safe distance from the wellhead or flammable liquid storage areas such as the swab tank before swabbing.
- Make provisions to contain spilled flammable liquids.
- Monitor the oil saver for wear and potential leakage.
- Remove all spillage of flammable liquids from equipment, cellars, rig floor, and ground area adjacent to the wellhead.
- Wear proper PPE, including respiratory protection, as required.
- Avoid approaching, walking over or standing near pressurized lines.
- Securely anchor pressurized lines to prevent whipping or bouncing caused by pressure surges.

- Use proper equipment inspection techniques to include hammer unions.
- Close the shut-off valve and bleed the pressure from the lubricator before removing it.
- Use a lubricator that will allow removal of the swab or other tools with the well shut in (valve closed).
- Use a dolly or other method to minimize manual handling of the equipment.
- Use a winch line, where available, not the swab line, to handle the lubricator.

Hot Oiling Operations

In hot oiling operations, a hot oil unit circulates heated oil or similar fluids down a well bore where it dissolves and dislodges paraffin, tar-based oils and other hydrocarbon deposits. The heated oil is circulated into piping, tubing, casing, or tanks. The image to the right displays a hot oiling truck.

Potential Hazard:

- fire or explosion hazard from contact with flammable liquids, vapors, or gases
- being burned by hot oil or hot oil line
- frostbite injuries from contact with propane or propane lines
- unexpected release of pressure

Possible Solutions:

- Locate hot oil trucks and tanks a safe distance (100 feet is recommended) from the well and out of the fall line of the derrick, if it is on site. Where impractical, use additional safety measures.
- Position hot oil units upwind or crosswind from potential sources of flammable liquids, vapors, or gasses. Wind direction indicator should be present and visible to the operator.
- Shut down hot oiling operation immediately if a leak occurs.

- Make fire extinguishers readily accessible to the hot oil operator.
- Avoid parking over or placing lines containing flammable fluids under trucks or other vehicles.
- Install check valve in the pump line as close to the well head as possible.
- Inspect all components of the hot oil unit before each use.
- Shut the burner down if the wind dies.
- Shut the burner down and reposition equipment if the wind changes direction so as to create a hazard.
- Wear proper personnel protective equipment such as heavy padded, insulated, leather gloves.
- Do not connect heavy joints of pipe to the small nipples on the pumping.
- Secure all hot oil and discharge lines.
- Connect the hot oil line directly to the flow line if pump pressure exceeds safe limits (500 psi).
- Remain clear of pressurized lines.

Snubbing

Snubbing is the control of a tubing string while running it in or out of a well bore under pressure. A snubbing rig is used to conduct this operation. When snubbing is performed while the well is under pressure, it's called "hydraulic workover." See the image to the right.

Note: The special service supervisor should hold a pre-job meeting with the special service crew and other involved personnel to review responsibilities and to coordinate the operations to be performed.

Potential Hazards:

- falling from heights

- being exposed to an unexpected release of pressure, and loss of well control
- being burned by a fire and explosion
- having limited ingress and egress
- working in an unstable basket due to lack of guy wires
- being caught between the rig assist pull down and crows nest

Possible Solutions:

- Ensure proper fall protection.
- Inspect and maintain all pressure control equipment prior to operations.
- Provide adequate means of access to and exit from the basket.
- Provide emergency escape methods.
- Rig all equipment should be in accordance with equipment recommendations.
- Ensure proper body and hand placement.

Coil Tubing

Technology allows tubing to be manufactured in a continuous coil without joints. Coiled tubing is inserted into the well down the production casing without the need for tongs, slips, or elevators.

Potential Hazards:

- pinching fingers and hands
- being exposed to an unexpected release of pressure
- getting struck by falling or shifting objects (such as suspended injector heads)
- falling from heights

Possible Solutions:

- Keep all fingers and hands away from pinch points (such as tubing spool, rollers, and injector head).
- Inspect the tools and equipment before use.
- Rig up boom trucks in accordance with manufacturer's recommendations.
- Use fall protection.

Module 6 Quiz

1. **The hazards associated specifically with the pumping phase of the well site stimulation process on a well site include all the following, except _____.**

   a. exposure to radiation
   b. overexertion while handling equipment
   c. exposure to epidemiological hazards
   d. slips, trips, and falls

2. **To overcome the serious hazards associated with the rig down phase of the well site stimulation process on the well site, you can do all the following, except _____.**

   a. use spotters when moving equipment
   b. being aware of weather hazards
   c. use mechanical lifting aids and proper techniques
   d. wear appropriate PPE

3. **Which of the following is one of the primary hazards specifically related to hot oiling operations on a well site?**

   a. Being burned by hot oil on oil lines
   b. Pinching fingers between the swab assembly and lubricator
   c. Being struck by pressurized lubricator
   d. Falling into the flare pit

4. **Hazards specifically related to hot oiling operations on a well site include all the following, except _____.**

   a. exposure to biological hazards
   b. fire or explosion hazard from contact with flammable materials
   c. being burned by hot oil
   d. exposure to unexpected release of pressure

5. **Which of the following can be inserted into the well down the production casing without the need for tongs, slips, or elevators?**

    a. Muddied tubing
    b. Cemented tubing
    c. Non-jointed tubing
    d. Coiled tubing

Module 7 – Workover and Abandonment Operations Safety

Introduction

Workover activities include one or more of a variety of remedial operations on a producing well to try to increase production. Four or more people will work on the workover rig site. The rig is used to complete and stimulates, repairs and maintains an existing well.

Potential Hazards:

- guy wires
- live gas production lines (high pressure) from existing well
- liquid fuels, hydraulic fluids,
- existing producing gas wells
- tanks & pits with flammable liquids, chemicals
- single egress/ingress access road

Sand Cleanout

Sand cleanout operations are performed to remove buildup of sand in the wellbore. Potential hazards and solutions are similar to those for well servicing.

Repairing Liners and Casing

Liners and casing are essentially the same and repair procedures are the same for both. Casing can be damaged by corrosion, abrasion, pressure, or other forces that create holes or splits.

A **packer** is run down the well to locate the hole in the casing. Fluid, usually salt water or oil, but sometimes mud, is pumped into the casing above the packer. A packer is a piece of downhole equipment that consists of a sealing device, a holding or setting device, and an inside passage for fluids.

A loss of pressure indicates a hole in the casing.

Potential Hazards:

- getting pinched fingers and hands from tongs and slips
- being struck by swinging tubing and tubing elevators
- getting caught between the joint and tongs or stump
- being struck by the tubing hanger wrench if it should slip
- getting fingers and hands pinched and caught between tubing hanger and tubing head

Possible Solutions:

- Keep all fingers and hands away from pinch points.
- Instruct workers to be on alert when on the rig floor and pipe racking area.
- Avoid placing hands on the end of the tubing stump.
- Use the correct tools for each task.
- Inspect the tools before use.
- Use coiled tubing.

Sidetracking

Sidetracking is the workover term for drilling a directional hole to bypass an obstruction in the well that cannot be removed or damage to the well, such as collapsed casing that cannot be repaired.

Sidetracking is also done to deepen a well or to relocate the bottom of the well in a more productive zone, which is horizontally removed from the original well.

To sidetrack, a hole (called a window) is made in the casing above the obstruction. The well is then plugged with cement below the window. Special drill tools, such as a whip stock, bent housing, or bent sub are used to drill off at an angle from the main well. This new hole is completed in the same manner as any well after a liner is set.

Potential Hazards and Solutions:

- The hazards and solutions associated with sidetracking are similar to drilling.

Abandoning the Well

A well is abandoned when it reaches the end of its useful life or is a dry hole.

- The casing and other equipment is removed and salvaged.
- Cement plugs are placed in the borehole to prevent migration of fluids between the different formations.
- The surface is reclaimed.

Removing Casing

The rig is used to remove the casing and plug the well. The wellhead is removed. After the casing is cut off, it is removed.

Potential Hazards:

- Being struck by rig equipment (such as casing jacks, power tongs, and casing elevators).
- Being exposed to other hazards similar to those encountered during regular drilling or workover operations.

Possible Solutions:

- Solutions are similar to those found in tripping out/in and casing operations.

Plug-Back

Plug-back is used before abandoning a well or before sidetracking is done.

Plug-back is the process of placing a cement plug at one or more locations in a well to shut off flow from below the plug. Cement plugs are placed in the borehole to prevent migration of fluids between the different formations. This also prevents the migration of gas or fluids to the surface.

There are two methods for placing a cement plug in a well:

- plug-back using tubing

- plug-back using a dump bailer

Potential Hazard:

- being struck by pressured lines when pumping cement

Possible Solution:

- Instruct personnel to stand clear of pressurized lines.

Module 7 Quiz

1. **Which of the following activities include one or more of a variety of remedial operations on a producing well to try to increase production?**

   a. Cementing Operations
   b. Mudding Operations
   c. Workover Operations
   d. Tubing Operations

2. **The potential hazards associated with workover activities on a well site include all the following, except _____.**

   a. guy wires
   b. dissimilar metals
   c. live gas production lines
   d. liquid fuels

3. **Which of the following activities are performed to remove buildup of sand in the wellbore?**

   a. Cementing Operations
   b. Sand cleanout operations
   c. Sanding Operations
   d. Tube-sanding Operations

4. **Which of the following activities is the term for drilling a directional hole to bypass an obstruction in the well that cannot be removed or damage to the well, such as collapsed casing that cannot be repaired?**

   a. Sidetracking
   b. Cementing
   c. Blasting
   d. Go-around

5. **Which of the following activities is used before abandoning a well or before sidetracking is done?**

    a. Sidetracking
    b. Cementing
    c. Blasting
    d. Plug-back

Endnotes

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