



# Oil and Gas Well Drilling and Servicing eTool

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## Servicing

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.

Servicing is done by specialized crews and includes:

- [Transporting Rig & Rigging Up](#)
  - [Transporting Rig](#)
  - [Rigging up Service Rig](#)
  - [Set up Work Area](#)
- [General Servicing](#)
  - [Removing the Horsehead](#)
  - [Removing the Wellhead](#)
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  - [Wireline Operations](#)
  - [Well Logging](#)
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- [Workover](#)
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  - [Repairing Liners and Casing](#)
  - Well Recompletions
    - [Sidetracking](#)
    - [Plug-Back](#)

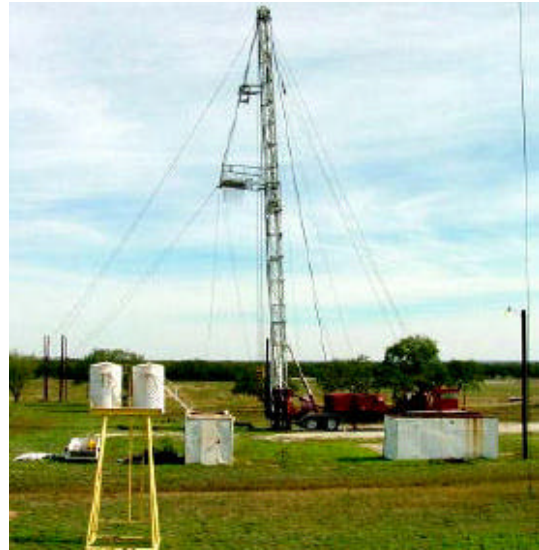


Fig. 1. Servicing rig

### [General Safety & Health](#)

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- [Hydrogen Sulfide Gas](#)
- [H<sub>2</sub>S Special Precautions](#)

### Related Safety and Health Topics

- [Powered Industrial Trucks](#)
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## [Servicing](#) >> [Transporting Rig & 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](#)



Fig. 1. Servicing rig

### Transporting Rig

[^ TOP](#)

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.



Fig. 2. Transporting Rig

- Ensure proper vehicle 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.

**Additional Information:**

- [AESC](#), Recommended Safe Procedures and Guidelines for Oil and Gas Well Servicing
- [Vehicle Operator Safety](#). AESC, 12 KB PDF, 2 pages.
- [AESC](#), Video, Workover Rig: Driver Safety Training

**Rigging Up Service Rig**

[^ TOP](#)

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. (See [Drilling-Rigging Up](#))

**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

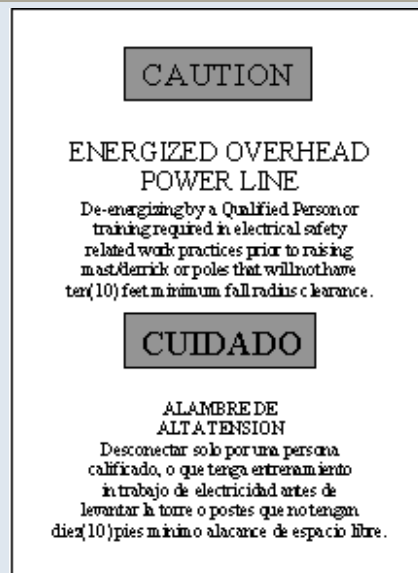


Fig. 3. Caution - Energized overhead power line



Fig. 4. Birds eye view

tangled in the mast.

**Possible Solutions:**

- Identify all electrical hazards and maintain adequate clearances. [[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 API specifications for loads and guying patterns. ([API](#), RP4G)
- Use proper lifting techniques.
- Use proper hand and foot placement. See general safety and health.
- Control the position of the counterweight by maintaining tension on the guywire to keep the weight away from the mast.



**Fig. 5. Service rig**



**Fig. 6. Installing guy line anchor**

**Additional Information:**

- [AESC](#), Recommended Safe Procedures and Guidelines for Oil and Gas Well Servicing
- [Use of Anchors and Guywires](#). AESC, 72 KB PDF, 12 pages.
- [API](#), RP4G, latest edition
- [1910.303 Table S3](#), Elevation of Unguarded Energized Parts Above Working Space

**Set Up the Work Area**

[^ TOP](#)

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.

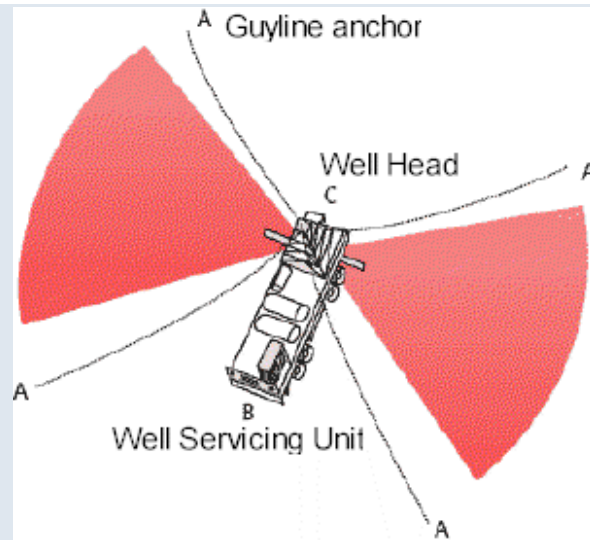


Fig. 7. Rig fall zone

#### Possible Solutions:

- Install guardrails as required. [[1910.23](#)], AESC, Recommended Safe Procedures and Guidelines for Oil and Gas Well Servicing.
- Inspect equipment integrity such as slings, tongs, and hand tools. [[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. See Well Site Ignition Sources.

#### Additional Information:

- [AESC](#), Recommended Safe Procedures and Guidelines for Oil and Gas Well Servicing
- [Cranes](#). AESC, 16 KB PDF, 4 pages.
- [Portable Ladders](#). AESC, 20 KB PDF, 4 pages.
- [Fall Protection](#). AESC, 16 KB PDF, 4 pages.
- [Scaffolding](#). AESC, 24 KB PDF, 7 pages.
- [API](#), RP4G
- OSHA, [[1910.23](#)]
- OSHA, [[1910.184](#)]



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## [Servicing](#) >> [General Servicing](#)

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](#)



Fig. 1. Service rig

### Removing the Horsehead (Pumping unit only)

[^ TOP](#)

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.

#### Possible Solutions:

- Use [lockout/tagout](#), to include mechanically securing the flywheel.

#### Potential Hazards:



Fig. 2. Servicing horsehead and bridle

- 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:

- 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.

#### Additional Information:

- [AESC](#) video (currently in production)
- [AESC](#), Recommended Safe Procedures and Guidelines for Oil and Gas Well Servicing
- [API](#) RP54

### Removing the Wellhead

^ TOP

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.



Fig. 3. Wellhead on flowing well

#### 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

^ TOP

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.

### Possible Solutions:

- Wear appropriate [fall protection](#) including a full body harness. For Fall Protection guidance, consult:
  - [\[1910.23\(c\)\(1\)\]](#), Fall Protection when working from platforms.
  - [\[1910.66 App \(C\)\]](#), Fall Protection guidelines.
  - [\[1910 Subpart D\]](#), Walking-Working Surfaces.
- Never disconnect personal fall arrest systems while working in the derrick.

### Potential Hazards:

- Getting fingers or hands pinched in or between rod wrenches, rod elevators, power tongs, rod hook, rod transfer, and rod fingers.

### Possible Solutions:

- Ensure that workers are instructed in proper hand and finger placement when making and



Fig. 4. Sucker rods



breaking rod connections or setting rods on the rod fingers.

- Ensure that workers are instructed in proper latching procedures while pulling and running rods.

#### Potential Hazards:

- Being struck by dropped objects.

#### Possible Solutions:

- Wear the proper [Personal Protective Equipment](#) such as:
  - Hard hat
  - Work gloves
  - Safety-toed footwear
- 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.

#### Additional Information:

- [API](#) RP54
- [AESC](#) Videos
  - Rod Wrenching: Safe and Sound
  - "Hand & Finger Safety"



Fig. 5. Rod elevator and tools



Fig. 6. Manual rod wrench



Fig. 7. Hydraulic tong operator

## Pulling and Running Tubing

^ TOP

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

#### *Raising or Lowering 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



Fig. 8. Tubing rig

when lowering the elevator and traveling block.

- Use handles on elevators as they are descending into place over the tubing.

#### *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.

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## [Servicing](#) >> [Special Services](#)

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](#)
- [Well Logging](#)
- [Perforating](#)
- [Cementing](#)
- [Stimulation](#)
- [Swabbing](#)
- [Hot Oiling](#)
- [Snubbing](#)
- [Coil Tubing](#)



Fig. 1. Servicing rig

### Wireline Operations

[^ TOP](#)

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.

**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 Hazard:

- Being struck by wireline due to line failure.

#### Possible Solutions:



Fig. 2. Wireline hazard zone

- 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.

**Potential Hazards:**

- Being struck by wireline, lubricator, sheaves, or other equipment.
- Getting caught in wireline.

**Possible Solutions:**

- Keep all non-essential workers out of the immediate work area.
- Inspect all slings, chains, pins or other attachment devices before lifting or suspending tools or equipment.

**Potential Hazards:**

- Pinching hands and fingers.
- Getting sprains, strains or suffering from overexertion.

**Possible Solution:**

- Minimize manual handling of lubricators and other equipment.
- Use proper hand placement and tag lines to avoid pinch points.

**Potential Hazards:**

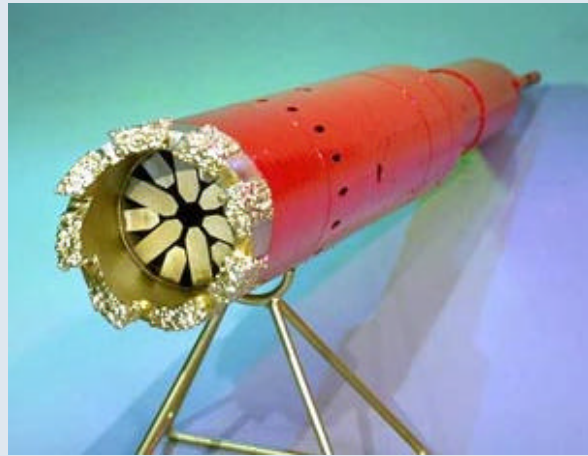
- Falling from a height.
- Receiving burns or being exposed to a respiratory hazard due to a fire.

**Possible Solutions:**

- Use proper fall protection.
- Position the unit properly with respect to wind direction and distance from potential gas or vapor sources. [API RP54](#)

**Potential Hazard:**

- Being exposed to an unexpected release of pressure.



**Fig. 3. Fishing junk basket**



**Fig.4. Fishing magnet**



**Fig. 5. Fishing overshot**

### Possible Solutions:

- 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.

### Potential Hazard:

- Toppling mast or boom.

### Possible Solution:

- Install foundation, outriggers, and guying according to the manufacturer's recommendations.

### Additional Information:

- [API RP54](#)

## Well Logging

^ TOP

Well logging is used to identify formation and other downhole properties of the well bore.

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

**Note:** See also [Wireline Operations](#) and [Perforating](#) for descriptions of additional hazards.

### Potential Hazards:

- Being exposed to radiation.

### 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.

### Potential Hazard:

- Getting injured due to an unexpected release of pressure.

### Possible Solutions:

- Check for the presence of trapped pressure before opening the tool housing.

### Additional Information:



Fig. 6. Radioactive logging tool



Fig. 7. Radiation symbol

- [Ionizing Radiation](#), OSHA Safety and Health Topic.
- AESC, Recommended Safe Procedures and Guidelines for Oil and Gas Well Servicing
- [10 CFR 39](#), Nuclear Regulatory Commission, Licenses and Radiation Safety Requirements for Well Logging.

## Perforating

^ TOP

A specialized crew transports and operates the perforating equipment. Upon arrival at the site, the tools are assembled, then lowered into the well by a wireline unit or conveyed by tubing. Then, a specialized gun shoots small holes 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; for more detailed information see Additional Information below.

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

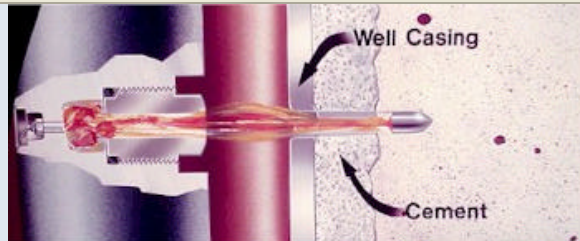


Fig. 8. Perforation of casing and formation



Fig. 9. Perforating gun

### Potential Hazards:

- 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.

### Additional Information:

- [API RP54](#), [RP67](#)

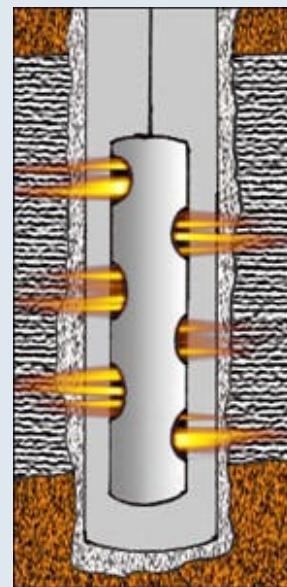


Fig. 10. Charges perforating the casing

- [AESG](#), Recommended Safe Procedures and Guidelines for Oil and Gas Well Servicing
- [API](#) Publication, "Wireline Operations and Procedures"
- [IME](#) (Institute for the Makers of Explosives)

## Cementing

^ TOP

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.



Fig. 11. Cementing truck

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

*Rig Up - Spotting and 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.
- Falling from heights.
- 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 - Executing the job*

#### **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. [API](#) RP54
- Hobble high-pressure lines properly.
- Use proper equipment inspection techniques to include hammer unions (Note: This is a particular problem with 602 and 1502, as they will couple but will not hold beyond the lower pressure rating number).
  - See [IADC Alert 98-01](#), High Pressure Lines And Hammer Unions.
  - See [IADC Alert 99-33](#), More On Mismatched Hammer Unions.
  - See [IADC Alert 00-15](#), Additional Serious Incidents With Mismatched Hammer Unions.
  - See [IADC Meeting Minutes](#), 02 November 1999, Mismatched Hammer Unions, Industry wide meeting.
- 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 - Disassembly and demobilization of equipment*

#### **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.

#### 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 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.

#### Additional Information:

- See [PPE](#) and [Skin Exposure](#) Safety Health Topics

## Stimulation

^ TOP

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.

**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.

**Note:** When pumping energized fluids (such as, carbon dioxide or liquid nitrogen) substantial increased hazards exist related to asphyxiation, temperature extremes, and unexpected pressure releases. Use special procedures to ensure the safety of personnel.

*Rig Up - 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.



Fig. 12. Hobbled high-pressure line

- 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.



**Fig. 13. Connecting blender up to manifold**

**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.



**Fig. 14. Frac Equipment**



**Fig 15. Frac truck**

*Pumping - Executing the job*

**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, asphyxiants).
- 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. API RP54
- Hobble high pressure lines properly.
- Use proper equipment inspection techniques to include hammer unions (Note: This is a particular problem with 602 and 1502, as they will couple but will not hold beyond the lower pressure rating number).
  - See [IADC Alert 98-01](#), High Pressure Lines And Hammer Unions.
  - See [IADC Alert 99-33](#), More On Mismatched Hammer Unions.
  - See [IADC Alert 00-15](#), Additional Serious Incidents With Mismatched Hammer Unions.
  - See [IADC Meeting Minutes](#), 02 November 1999, Mismatched Hammer Unions, Industry wide meeting.
- 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 densimeters.
- Prevent contamination and exercise proper personal hygiene when working around radioactive materials.

*Rig Down - Disassembly and demobilization of equipment*

**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.
- Falling from heights.
- 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.

**Additional Information:**

- See [PPE](#) and [Skin Exposure](#) OSHA Safety and Health Topics.

**Swabbing**

[^ TOP](#)

Swabbing is the act of pulling fluid from the well bore through the use of wire rope and cup assembly. 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 Hazard:**



**Fig. 16. Swabbing operation**



**Fig. 17. Swabbing rigs**

- Loss of well control.

**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.

**Potential Hazard:**

- Fire, explosive, or respiratory hazard from leakage or venting of oil or gas from tanks, lines or lubricator.

**Possible Solutions:**

- 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.

**Potential Hazard:**

- Being struck by a pressurized line.
- Being exposed to a high-pressure connection failure caused by mismatched or excessively worn hammer unions.

**Possible Solutions:**

- 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 (Note: This is a particular problem with 602 and 1502 and others, as they will couple but will not hold beyond the lower pressure rating number).
  - See [IADC Alert 98-01](#), High Pressure Lines And Hammer Unions.
  - See [IADC Alert 99-33](#), More On Mismatched Hammer Unions.
  - See [IADC Alert 00-15](#), Additional Serious Incidents With Mismatched Hammer Unions.

- See [IADC Meeting Minutes](#), 02 November 1999, Mismatched Hammer Unions, Industry wide meeting.

#### Potential Hazard:

- Being struck by pressurized fluids or the lubricator when removing the lubricator from the well.
- Getting strains and sprains from handling the lubricator.

#### Possible Solutions:

- 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.

#### Potential Hazard:

- Pinching fingers between swab assembly and lubricator when changing swab cups or mandrels.

#### Possible Solutions:

- Use a winch line, where available, not the swab line, to handle the lubricator.
- Use a lubricator that will allow removal of the swab or other tools with the well shut in (valve closed).

#### Additional Information:

- [IADC](#) Accident Prevention Guide, Swabbing
- [AESG](#) Recommended Safe Procedures and Guidelines for Oil and Gas Well Servicing. Swabbing and other Wireline Operations
- [API](#) RP54, Recommended Practice for Occupational Safety for Oil and Gas Well Drilling and Servicing Operations, Wireline Service

## Hot Oiling

^ TOP

A hot oil unit is designed to circulate heated fluid into piping, tubing, casing, or tanks for a variety of reasons, including the removal of paraffin and tar-based oils.

#### Potential Hazard:

- Fire or explosion hazard from contact with flammable liquids, vapors, or gases.

#### 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



Fig. 18. Hot oiling truck

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.

**Potential Hazard:**

- Being burned by hot oil or hot oil line or frostbite injuries from contact with propane or propane lines.

**Possible Solution:**

- Wear proper personnel protective equipment such as heavy padded, insulated, leather gloves

**Potential Hazards: Expert Review**

- Unexpected release of pressure

**Possible Solutions:**

- Do not connect heavy joints of pipe to the small nipples on the pumping T.
- 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**

[^ TOP](#)

Snubbing is the control of a tubing string while running it in or out of a well bore under pressure.

**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 method. API RP54
- Rig all equipment in accordance with equipment recommendations.
- Ensure proper body and hand placement.



**Fig. 19. Snubbing rig**



**Fig. 20. Snubbing operations**



**Fig. 21. Snubbing rig with blow out preventer (BOP)**



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, injector head).
- Inspect the tools and equipment before use.
- Rig up boom trucks in accordance with manufacturer's recommendations.
- Use fall protection.



Fig. 22. Installing coil tubing



Fig. 23. Coil tubing unit

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# Oil and Gas Well Drilling and Servicing eTool

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## [Servicing](#) >> [Workover](#)



Workover activities include one or more of a variety of remedial operations on a producing well to try to increase production.

- [Sand Cleanout](#)
- [Repairing Liners and Casing](#)
- Well Completions
  - [Sidetracking](#)
  - [Plug-Back](#)

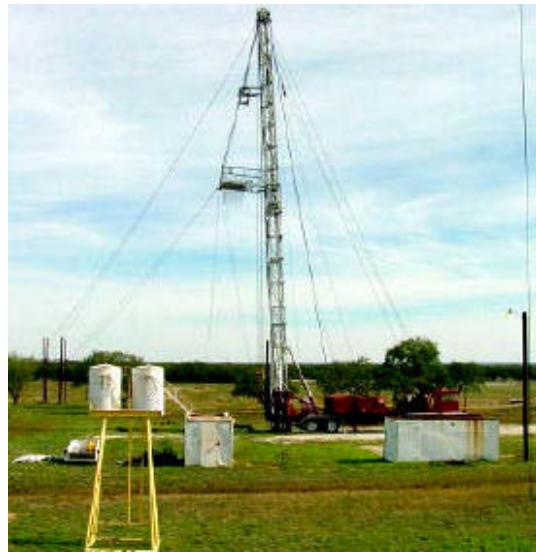


Fig. 1. Example of a workover rig

### Sand Cleanout

[^ TOP](#)

Sand cleanout operations are performed to remove buildup of sand in the wellbore. Hazards are

#### Potential Hazard:

- Hazards are similar to those for well servicing. See [Wireline Operations](#).

#### Additional Information:

- [API](#) RP54

### Repairing Liners and Casing

[^ TOP](#)

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 is pumped into the casing above the packer. A loss of pressure indicates a hole in the casing. The following are the principal methods for repairing casing:

- Squeeze cementing.

- Patching a liner.
- Replacing casing.
- Adding a liner.
- Opening collapsed casing.

**Potential Hazard:**

- Hazards are similar to those for installing casing. See [Casing](#) and [Cementing](#).

## Sidetracking

[^ TOP](#)

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 whipstock, 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 Hazard:**

- The hazards associated with sidetracking are similar to [Drilling](#).

## Plug-Back

[^ TOP](#)

Plug-back places a cement plug at one or more locations in a well to shut off flow from below the plug. Plug-back is also used before abandoning a well or before sidetracking is done.

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

- Plug-back using tubing.
- Plug-back using a dump bailer (see [Wireline Operations](#)).

**Potential Hazard:**

- The hazards associated with plug-back are similar to [Drilling](#) and [Cementing](#).

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