

# Audit Procedures for Oil and Gas Well Servicing

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# Preface

This manual has been written for the auditor. It is to be used as a training tool and as a reference guide. Any schedules included in the manual are for illustration purposes only and are not to be construed as the accepted format. Audit exams/schedules will need to be tailored to the audit situations encountered and to the auditors' needs. The intent of the manual is for the auditor to be familiar with the activities of a well servicing company and to outline the taxability of these activities. Knowledge of the oil and gas industry is essential to the understanding of the material in this manual, and the auditor should be familiar with the glossary at the end of the manual.

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## Chapter 1

# Introduction

Oil and gas well servicing companies may be subject to either Limited Sales, Excise and Use Tax, or the Miscellaneous Gross Receipts tax, or both. However, a single transaction will not be subject to both taxes. The labor to perform the services subject to the 2.42% oil well service tax (Tax Code, Chapter 191) is not taxable under the Limited Sales, Excise and Use Tax.

Generally, if the well servicing activity is performed on the oil and gas producing formation, the activity is subject to the Miscellaneous Gross Receipts Tax. If the activity is performed inside the casing of the well, or on equipment at the well site, the activity is subject to the Limited Sales, Excise and Use Tax. Some activities are not subject to either tax. This manual contains information concerning sales tax.

The total charges to repair, restore, remodel, or maintain tangible personal property is taxable per State Sales Tax Rule 3.292. The total charge to repair, remodel, or restore improvements to real property at a lease site is taxable per Rule 3.357. In addition, taxable services include, but are not limited to, real property services such as surveying and structural pest control at the lease site.

## Chapter 2

# Real Property vs. Tangible Personal Property

In an oil or natural gas field, the following items are considered real property:

- Pump stations, booster stations;
- Casing (in place);
- Enhanced production-injection and recovery systems which cannot be moved intact (does not include equipment on lease or water well pump);
- Storage facilities – tanks, standing alone or in batteries, each with a storage capacity of more than 500 barrels;
- Vapor recovery systems;
- Compressors at compressor stations other than leased compressors;
- Production platforms with their supports permanently embedded in the sea bed;
- Water disposal systems – same guidelines as storage facilities;
- Gathering lines that are totally underground except for road or water crossings, etc.;
- Gas processing plants – not easily movable.

Real property located elsewhere includes:

- Roads other than board roads and board road turnarounds;
- Pits (workover and reserve);
- Underground storage facilities;
- Pipeline transmission lines;
- Machinery, equipment, and fixtures that are attached components of processing or manufacturing facilities. Items that are free-standing or which are bolted down but are readily removed without damage are TPP;
- Permanent lighting;
- Meters located on transmission lines/pipelines.

In an oil or natural gas field, the following items are treated as tangible personal property:

- Christmas trees, wellheads, well components, line heaters, wellhead/suction/vacuum compressors;
- Storage facilities – tanks, standing alone or in batteries, that each have a storage capacity of 500 barrels or less;
- Separation and dehydration equipment;
- Gathering lines that are totally above the ground or that have sections under water;
- Flow lines that are above ground, below ground, partially above and below ground or under water;

- Artificial lift equipment and their power source;
- The rig or production package attached to offshore platforms;
- Electrical power systems that are easily removed;
- Compressors that are easily moveable and located in the field (between the wellhead and booster stations);
- Board roads and board turnaround areas;
- Everything inside the casing of a well. This includes, but is not limited to, tubing, pipe, pumps, rods, gas-lift equipment, and packers inside the casing;
- Meters at the lease site, well site, between the lease site and the transmission line/pipeline;
- Meters located on or attached to flow lines or gathering lines including injection meters, volume meters, test meters, and LACT units;
- Microwave facilities

## Chapter 3

# Nontaxable vs. Taxable Well Servicing Activities

### Nontaxable Services

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Nontaxable services include new construction activities for labor to start or stimulate production, or for the labor to work on the formation outside the well. Pumping the product is not considered to be stimulating production.

The following activities are not taxable for sales tax; however they may be taxable under Miscellaneous Gross Receipts tax. See Rule 3.324 for definitions.

- Fracturing (frac job)
- Perforating the well
- Squeeze Cement (taxable if to repair casing)
- Workover done on the formation – work done to stimulate production
- Acidizing the formation
- Logging the formation
- Drilling deeper
- Plug back
- Completion
- Plug and abandon, permanent (temporary is taxable)
- Pulling and resetting casing liner (taxable if to repair casing string)
- Installation of casing liner in well completion or workover
- Drilling out a plug
- Initial installation of artificial lift (changeover/re-installation is taxable)
- Running a bottom hole bomb
- Swabbing to stimulate production
- Jetting to enhance production or recovery
- Gravel packing
- Hot oil treatment of the formation
- Injection of chemicals to stimulate production or remove impurities from the product being removed such as acid, emulsifiers, or nitrogen

**NOTE:**

The service provider may submit documentation from the Texas Railroad Commission showing that the services performed are on the formation and, therefore, subject to the well servicing tax rather than sales & use tax.

### **Machinery and Equipment**

The provider of a nontaxable service must pay tax on any machinery or equipment purchased or rented to provide the service and on any materials (except cement) used, consumed, or expended in the well, including rubber goods such as stripper rubbers and swab cups. However, machinery, equipment, and replacement parts may qualify for the manufacturing exemption when used directly in processing oil or gas that will be resold, or if required by law or regulation to control pollution that results directly from the activity of processing oil or gas that will be resold. In addition, parts and labor to repair qualifying machinery or equipment also qualifies for the exemption.

Effective September 1, 2007, equipment used to process, reuse, or recycle wastewater for use at oil and gas wells for fracturing work is exempt from sales and use tax.

#### **NOTE:**

Compressors used to extract oil and gas and then increase the pressure for transportation through the pipeline are not part of the manufacturing process.

### **Taxable Services**

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Certain down-hole services are taxable. "Down-hole service" means service performed within or through the well bore and includes all associated activities of the well service company on or above the surface, at or away from the well site, such as preparation or transportation, which are a necessary part of the down-hole service being performed.

Taxable services include the repair, restoration, remodeling, or maintaining of tangible personal property or the repair, remodeling, or restoration or nonresidential improvements to real property.

Persons who provide taxable services must collect sales tax from their customers on the total charge (materials and labor) for the service. Charges for mileage, trip charges, standby charges, etc., connected with taxable services will also be taxable.

The following services are taxable. See Rule 3.324 for definitions.

- Pump change
- Rod/tubing job
- Fishing for rods/tubing
- Repair tubing leak
- Change packer or anchor
- Hot oil or water treatment of casing, tubing, or flow lines
- Injection of maintenance-type chemicals such as corrosion inhibitors or bactericides into the wellbore
- Paraffin removal from the inside of the casing or tubing
- Squeeze cement
- Pulling or resetting casing liner (if to repair casing string)
- Swabbing to clean casing
- Plug and abandon, temporary to stop corrosion while the well is not producing
- Changeover/conversion to different artificial lift method

**Note:**

Separately billed charges by nontaxable service providers to the owner of the flowline are not subject to sales tax even though the services are necessary for the taxable service provider to do the work. However, if the nontaxable service providers are actually performing the repair for the contracting entity doing the taxable repair, then the contracting entity will be billing the owner for the entire charge (plus sales tax) for the repairs and the other entities' work would be tied to the taxable repair. In this case, the contracting entity should provide a properly completed resale certificate to the sublet work service providers.

Items that become a component part of the items inside the wellbore are considered resold as an integral part of the taxable service and may be purchased tax-free for resale by the provider of the taxable service.

Because certain chemicals are oil soluble and remain in the product flow after injection, the well operator may issue a resale certificate to the service provider in lieu of tax on the separately stated charge for the chemicals. If the well operator is not permitted for sales tax, an exemption certificate may be issued claiming further processing exemption.

**Note:**

The General Chemistry Online Glossary at:

[antoine.frostburg.edu/chem/senese/101/glossary.shtml](http://antoine.frostburg.edu/chem/senese/101/glossary.shtml) defines soluble as "capable of being dissolved in a solvent." An oil soluble chemical would disperse and dissolve into the oil itself.

Taxable down-hole services may be performed in order to facilitate a nontaxable service, e.g., pull tubing to perform work on the formation; this will render the taxable service nontaxable. (However, a nontaxable down-hole service will not make above-ground taxable services nontaxable.) Any equipment incorporated into the well during the performance of the service is considered as sold to the operator. It is not unusual for two separate work crews to be used to maintain a well, e.g., one crew pulls the rods and another performs the workover. The charge for both crews' labor will be taxable or nontaxable depending upon the ultimate service is being performed. The act of replacing an item (supplied by the well owner) while performing a nontaxable service will not cause the labor to become taxable. A nontaxable down-hole service will not make above ground taxable services nontaxable.

It is important that the crews note on their invoices the exact service being performed and the amount of each service. If it cannot be determined which ultimate service is actually being provided, the total charge should be taxed including mileage, trip fees, and standby time. However, it is the auditor's responsibility to show and document that a taxable service was included in the charge.

***Machinery and Equipment***

The provider of a taxable service must pay tax on any machinery or equipment purchased or rented to provide the service and on any materials (except cement) used or consumed in providing the service that do not become a part of the items inside the wellbore, including rubber goods such as stripper rubbers and swab cups. However, machinery, equipment, and replacement parts may qualify for the manufacturing exemption when used directly in processing oil or gas that will be resold, or if required by law or regulation to control pollution that results directly from the activity of processing oil or gas that will be resold. Parts and labor to repair qualifying machinery or equipment also qualifies for the exemption.

## Chapter 4

# Taxability of Real Property Services

As they relate to the well servicing industry, the following services performed on real property services are taxable:

- Patching holes in road at the lease site;
- Lease road blading that does not qualify as maintenance per Rule 3.357;
- Structural pest control services at the well site by a licensed exterminator (including chemical weed spraying);
- Certain surveying charges associated with drill site preparation.

The following services performed on real property services are not taxable:

- Covering oil spills at the lease site;
- Reclamation services performed to restore oil and gas lease properties to their original condition;
- Removal of waste materials from the lease site that result from activities performed in the exploration and production process;
- Lease road blading that qualifies as maintenance per Rule 3.357;
- Land work at the lease site;
- Picking up trash;
- Cutting weeds or grass around the lease site.

## Chapter 5

# Miscellaneous Topics

### Repairs to Tangible Personal Property

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All repairs to tangible personal property are taxable, regardless if the charges for materials, labor, and any miscellaneous charges are separately stated.

**Chemical Pumps:** Pumps that inject chemicals into the well. The chemical pumps do not bring about a physical or chemical change to the product sold. The pump is utilized in injecting or moving the chemicals. Repairs to chemical pumps are taxable.

### Compressors

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151.318(a)(2) exempts tangible personal property directly used or consumed in or during the actual manufacturing or processing of tangible personal property for ultimate sale if the use is necessary or essential to the manufacturing or processing operation and directly makes or causes a chemical or physical change to the product being manufactured for ultimate sale. Compressor equipment necessary for the operation of field dehydrators, heater treaters, separators and scrubbers are qualifying processing equipment. Compressors used to extract oil and gas from the ground and to increase the pressure for transportation purposes are not exempt. Sections 151.318(c)(1) and (3) excludes from exemption intra-plant transportation equipment that is used incidentally in a manufacturing, processing, or fabrication operation.

A taxpayer claiming exemption has the burden of proof that the exemption is applicable and that no exclusion applies. A taxpayer that maintains auditable records to document exempt processing and taxable divergent use, on a compressor by compressor basis, is entitled to claim the exemption on the percentage of exempt use.

### Rental vs. Service

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If a company provides equipment and a supervisor, the presumption will be that the company is renting equipment rather than providing a service. The total charge to the customer for the rental is taxable regardless of the type of service the equipment provides. The company may issue a resale certificate in lieu of tax when purchasing equipment for bare rental or rental without an operator. The service company must keep rental tools/equipment separate from those it uses to perform services. If rental equipment from a tax-free inventory is used to provide a taxable or nontaxable service, the service company owes tax on the fair market value for the time of divergent use.

### Unprocessed Sand, Dirt, and Gravel

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Persons who furnish, sell, or deliver unprocessed sand, dirt, and gravel are providing a nontaxable service. Persons who sell processed materials are selling tangible personal property and must collect tax on charges for materials and delivery. Materials that have been only washed or sorted are considered unprocessed.

Processed materials include stone that has been crushed or cut into smaller sizes and materials that are mixed with others such as spud mud or ready mix concrete. Rock that has been blasted out of the earth or a hillside is considered processed, and the blasting company may purchase the explosives used to break up the rock tax free per Rule 3.300.

## Packer Sales and Rentals

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The total charge for the sale and installation of a packer is taxable. If the packer is later replaced, the total charge is taxable unless work is also being performed on the formation or casing string.

Packers rented to operators and other service companies are bare rentals unless the packer company is also providing other well-services down-hole. However, when the rods and/or tubing are pulled merely to install a rental packer and no other services are provided, they are not considered to be providing a well-service but providing a service that is part of the rental of TPP. The charges billed to pull the rods and/or tubing are taxable as a service connected with the rental of TPP.

## Intercorporate Services

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The intercorporate services exemption does not apply to most taxable well services because this exemption is limited to services that became taxable October 1, 1987, per Section 151.346. Nonresidential repair or remodeling (casing repair) and real property services (spraying weeds) are examples of common well-services that may qualify for the intercorporate services exemption.

## Drilling Mud

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Drilling mud or drilling fluid used during the drilling of an oil or gas well to circulate out cuttings and other functions while drilling a well is taxable. However, drilling mud additive (DMA) may or may not be subject to tax. If the DMA is crude oil, unrefined liquid petroleum, then it is not subject to sales tax. If the DMA is a refined petroleum product, the DMA is taxable.

If the DMA is crude oil, the source needs to be determined. Production needs to be paid on oil recovered from salt water disposal wells or other salvage operations.

## Miscellaneous

All welding in the field will be presumed to be taxable unless the welder clearly indicates on his billings that the work was performed as part of new construction (well completion) or third-party installation (initial only because subsequent welding is repair) of customer-owned equipment.

Sales tax must be collected on the rental of board roads and board turnaround areas. Board roads are temporary roadways constructed of wooden planks normally used on oil field leases in wet or marshy areas. Labor charges for assembly of board roads and turnaround areas are taxable even if separately stated.

Gathering Lines verses Flow Lines (9111T1141A07)

- Flow lines are the lines from a well to a storage tank;
- Gathering lines are the lines from lease tank batteries to the transmission or trunk pipeline; and
- Transmission or trunk lines carry the product from gathering lines to a refinery.

**Rule:** 3.324

**Accession Numbers:** 200711048H, 200507328H, 200412932L, 200209452L, 200107379L,  
9801203L, 9609L1435A12, 9506H1352B09, 9412H1327C11, 9311L1271E09,  
9305L1235G10, 9306L1247D07, 9306L1247D03, 9306L1244D03,  
9304L1234G12, 9212L1226E02, 9208L1186G13, 9202L1173D01,  
9204L1170F10, 9107H1120D01, 9105H1117F09, 9101L1066F03,  
9003L0994C01, 8910L0964C07, 8906L0944B08, 8903H0925D01,  
8809L0897F02, 8809L0894C07, 8802L0892D02, 8706L0818F05,  
8702L0798G09, 8501L0612E06

# Appendix

## Taxability of Well Service Activities

Description	NT	T	Comments
Assemble well head vs. installation		X	Re-installation not taxable
Blow Out Preventer (B.O.P.) rental		X	
Build catwalks		X	
Build cellar	X		New construction. Taxable if installation of TPP
Build fence			New construction – contract type controls the tax responsibility
Build pad for drilling rig			New construction – contract type controls the tax responsibility
Build pad for tank battery			New construction – contract type controls the tax responsibility
Build pit and line			New construction – contract type controls the tax responsibility
Build road to drill site (except board roads)			New construction – contract type controls the tax responsibility
Cattleguard repair		X	
Chemical squeeze	X		
Chemically treat well		X	Taxable if not treating formation
Chemicals used in transportation through a pipeline		X	
Chemicals used to remove impurities from natural gas to be sold	X		
Circulate packer fluid		X	
Circulate well		X	
Clean cellar		X	Not taxable if real property
Clean firewall		X	Not taxable if real property
Clean location		X	Not taxable if part of reclamation
Clean location (reclamation)	X		
Clean oil spill	X		If at wellsite or if restoring or remediating lost or damaged natural environments
Clean pit	X		Not building or grounds cleaning
Clean reverse pit	X		Real property
Clean sand off of road		X	May qualify as real property maintenance under certain circumstances

Description	NT	T	Comments
Clean steel pit		X	TPP
Clean tank (500 bbls. or less) at lease site*		X	TPP
Clean tanks (larger than 500 bbls.) at lease site*	X		Not building nor ground cleaning
Clean test tank		X	TPP
Cover pits	X		Taxable if an existing pit
Cromate well (packer fluid used to set packer)		X	See Rule 3.324(d)(1)(E)
Cut weeds at lease site	X		Not a lawn maintenance service
Dig rat hole or mouse hole	X		
DMA (drilling mud additives)		X	Taxable; not taxable if crude oil – subject to production tax
Drill plug out	X		
Drilling fluid		X	
Empty barrels (drip reservoir)	X		See Rule 3.356(a)(3)(B)
Empty dirt pit	X		See Rule 3.356(a)(3)(B)
Empty frac tank	X		Taxable if in connection with a repair or maintenance
Empty heater	X		Taxable if in connection with a repair or maintenance. Exempt if manufacturing equipment
Empty septic tank	X		Per Ruling 3.356
Empty slop tank	X		Taxable if in connection with a repair or maintenance
Empty sump	X		Taxable if in connection with a repair
Empty vessel	X		Taxable if in connection with a repair or maintenance. Exempt if manufacturing equipment
Fishing for casing	X		
Fishing for drill pipe	X		
Fishing for rods		X	Not taxable if in conjunction with a nontaxable service – Rule 3.324(b)(2)
Fishing for tubing		X	Not taxable if in conjunction with a nontaxable service – Rule 3.324(b)(2)
Flush casing		X	
Flush with KCL		X	
Formation services (not subject to G.R.T.)	X		No formation services are taxable
Frac job on disposal well	X		
Gun barrel	X		Exempt if manufacturing
Haul water to salt water disposal site by 3rd party	X		
Haul water from firewall by 3rd party	X		
Held pressure on backside	X		Testing
Highway permit (in connection with hauling) for taxable sale or service		X	

Description	NT	T	Comments
Hot oil casing		X	
Hot oil formation	X		
Hot oil tank bottoms (tanks over 500 bbls.*)	X		Not building or grounds cleaning
Hot oil tank bottoms (tanks under 500 bbls.*)		X	Cleaning TPP
Hot oil tubing		X	
Inspection and repair of tubing (in hole)		X	
Inspection of tubing	X		
Inspection of tubing (out of hole)	X		
Install cellar	X		Real property new construction--contract type controls tax responsibility.
Install cellar		X	Taxable if TPP
Install dead men	X		
Install flow line		X	
Janitorial		X	
Jet tank bottom -- Tanks of 500 bbls. or less*		X	
Jet tank bottom -- Tanks over 500 bbls.*	X		
Keep junction box empty while line being repaired		X	
Lay and pick up rental water line		X	
Load heater (separate charge after taxable service)		X	Exempt if manufacturing equipment
Load tubing and check pump	X		Taxable if in connection with a repair or maintenance of TPP
Load tubing and pressure up	X		Taxable if in connection with repair and maintenance of TPP
Load tubing and stroke pump	X		Taxable if in connection with repair and maintenance of TPP
Load tubing (separate charge w/hot oil of tubing)		X	
Locate dead men and bury	X		
Lost tool charge	X		
Meter repair		X	
Mud oil		X	
Paint tanks		X	If in conjunction with repair or remodel
Painting		X	Labor not taxable if new construction of realty
Perforate casing		X	Taxable if real property repair
Pick up cattleguard and take to welder for repairs		X	
Pick up oil and water from firewall	X		
Plant grass		X	Not taxable if restoring to original condition
Plug and abandon (in trade for salvage)	X		Salvage taxable at fair market value p&a charge
Plug and abandon	X		Temporary abandonment is taxable

Description	NT	T	Comments
Plug back	X		
Plug well	X		
Pressure tubing and check pump	X		
Pressure tubing and stroke pump	X		
Pressure tubing to find hole	X		
Pressure up and flush backside		X	Not taxable if to test casing, tubing or pump
Pressure up on standing valve	X		
Pressure up with water	X		
Pressure up with oil	X		
Profile caliper service	X		
Pull fluid from heater	X		Taxable if in connection with a repair or maintenance unless heater is exempt manufacturing equipment
Pull rods and lay down		X	Taxable if in connection with a repair or maintenance
Pulled oil pumped back hot		X	
Pump acid down casing		X	Taxable if maintenance inside casing or tubing
Pump brine to kill well		X	Taxable if killing well for maintenance or repairs
Pump brine to kill well	X		Not taxable if performing nontaxable service – Rule 3.324(b)(2)
Pump pig down line		X	Lease lines only, if gathering lines not taxable
Pump water and soap down casing		X	Not taxable if pumped into formation
Pump water down tubing		X	Not taxable if pumped into formation
Pumped packer fluid		X	See Rule 3.324(d)(1)(E)
Remove bridge plug	X		
Remove rods and tubing (temporarily abandoned)		X	
Repair inside casing		X	
Repair cattle guards		X	
Repair compressor (real property)		X	Certain compressors qualify as manufacturing equipment. Parts only would be exempt if a repair to real property.
Repair fence		X	
Repair flow line		X	
Repair heater-treater		X	Exempt if manufacturing equipment
Repair separator		X	Exempt if manufacturing equipment
Repair tubing leak		X	
Repair well guards		X	
Repairs to pipeline (trunk) (real property)		X	
Reverse units		X	Not taxable when performing formation services
Reworking pit and liner		X	

Description	NT	T	Comments
Roll tank	X		
Rubber goods		X	Taxable to service company
Set anchors	X		
Set frac tank		X	Part of transportation charge if sale or rental of tank
Set packer (pulling unit)		X	See Rule 3.324(d)(1)(E)
Stand by time		X	Taxable if service is taxable
Steam tanks		X	
Swabbing (paraffin removal)		X	
Swabbing (start production)	X		
Test tubing to find hole (not repair)	X		
Tool damage charge		X	
Tool rentals (to service company)		X	
Treat oil	X		
Treat stock tank	X		
Unit job (routine maintenance)		X	Periodic and scheduled maintenance of real property is not a taxable service.
Vacuum oil spill	X		
Vacuum pits	X		
Vacuum separator	X		Taxable if in connection with a repair or maintenance
Wash frac tank		X	Taxable if cleaning of TPP or in connection with rental of tank
Wash oil	X		
Wash out reverse pit		X	Not taxable if earth pit, taxable if steel
Wash unit and separator		X	Exempt if manufacturing equipment
Water – mixed with KCL		X	
Watered location	X		
Wire line services		X	Not taxable if directly related to starting or stimulating production per Rule 3.324(b)(2)
Work as needed or directed (roustabout crew)		X	Taxable when integral to a taxable service unless invoice reflects nontaxable service

\* The tank size (500 bbl.) test to determine if a tank is real property or TPP only applies at the lease site.

## Glossary of Terms

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**Abandon**

To temporarily or permanently cease production from a well or to cease further drilling operations.

**Accelerator**

A chemical which will reduce the setting time of cement, when added. See Cement Additive

**Acetic Acid**

A colorless acid used to acidize oil wells. Less corrosive than other commonly used acids in well treatment. See Acidizing.

**Acid Fracturing**

Opening cracks in hard limestone formations through the use of water and acid under high pressure or a combination of oil and acid under pressure. See Fracturing and Matrix Acidizing.

**Acidizing**

Injecting an acid under pressure into an oil-bearing formation to enlarge the pore spaces and passages in order to increase production. See Acetic Acid, Acid Stimulation, Formic Acid, Hydrochloric Acid, Matrix Acidizing, Wellbore Soak, and Well Stimulation.

**Acid Stimulation**

The stimulation of a well through the use of acid. See Acidizing.

**Acoustic Survey**

A well logging or well surveying method using sonic impulses to estimate the porosity of the rock and the amount of fluid in a formation. Also referred to as sonic logging. See Sonic Logging and Well Logging.

**Aeration**

The introduction of air or gas into a liquid.

**Air Hoist**

A hoist operated by compressed air – a pneumatic hoist. Air hoists are often mounted on the rig floor and may be used to lift joints of pipe and other heavy objects.

**American Association of Oilwell Drilling Contractors (AAODC)**

Now known as International Association of Drilling Contractors (IADC).

**American Petroleum Institute (API)**

A trade association and standards organization that represents the interests of the oil and gas industry. It offers publications regarding standards, recommended practices, and other industry related information.

**Artificial Lift**

Any method used to raise oil to the surface after a well ceases to flow.

**Association of Energy Service Companies (AESC)**

A trade association that represents the interests of members of the energy service segment of the oil and gas industry. It offers publications regarding recommended industry practices and training materials.

**Anchor**

A device to fasten or secure equipment. An example is a drill-stem test tool anchor

**Anchor Packer**

A packer which sits on a pipe which rests on the bottom. An example is a tail pipe.

**Annular Pressure**

Pressure within an annular space.

**Annulus**

The space surrounding a pipe in a wellbore, the outer wall of which may be the wall of the borehole or casing. Sometimes referred to as annular space.

**Back-In Unit**

A portable, self-propelled servicing or workover rig which must be backed into the wellhead because the driver's cab is mounted on the end opposite the mast support. See Carrier Rig.

**Bailer**

A long cylindrical container, with a valve at the lower end, which is used to remove water, sand, oil, and mud from a well.

**Ball-and-Seat Valve**

A device used to restrict fluid flow to one direction.

**Ball-Out**

To plug open perforations by using ball sealers.

**Barefoot Completion**

An open-hole completion without casing. See Wellbore.

**Barite**

Barium sulfate – a mineral frequently used to increase the weight or density of drilling mud. See Mud.

**Barrel**

A measure of volume for petroleum products in the United States. One barrel is the equivalent of 42 U.S. gallons or 0.15899 cubic meters (9,792 cubic inches).

**Basket**

A device placed in the drill or work string that catches debris when a drillable object is being drilled down-hole.

**Beam Pumping Unit**

A machine designed specifically for sucker rod pumping. An engine or motor (prime mover) is mounted on the unit to power a rotating crank. The crank moves a walking beam up and down to produce reciprocating motion. This reciprocating motion operates the pump.

**Bit**

The cutting or boring element used in drilling wells.

**Bleed**

To drain off liquid or gas, slowly, through a valve called a bleeder. To bleed down, or bleed off, means to release pressure slowly from a well or from pressurized equipment.

**Blowout**

An uncontrolled flow of gas, oil, or other well fluids from the well.

**Blowout Preventer (BOP)**

One or more valves installed at the wellhead to prevent the escape of pressure in the annulus or in an open hole during drilling or completion operations.

**Borehole**

The hole made by drilling a well. Also referred as Wellbore.

**Bottomhole**

The lowest or deepest part of a well.

**Bottomhole Assembly**

The portion of the drilling assembly below the drill pipe.

**Bottomhole Packer**

A packer at the bottom of a casing string used to exclude water, etc. See Packer.

**Bottomhole Plug**

A cement plug at the bottom of the hole – used to shut depleted, water-producing, or unproductive zone.

**Bottomhole Pump**

Any pump located at or near the bottom of the well used to lift well fluids. See Sucker Rod Pumping and Hydraulic Pumping.

**Bottom Plug**

A cement wiper plug that precedes cement slurry down the casing. The plug wipes drilling mud off the walls of the casing and prevents it from contaminating the cement. See Cementing, Wiper Plug.

**Brine**

Water that has a quantity of salt, especially sodium chloride, dissolved in it.

**Bullet Perforator**

A tubular device which fires projectiles (bullets) through the casing string to make holes through which the well fluids may enter. See Perforating.

**Bulk Tank**

On a drilling rig, a large metal bin that usually holds a large amount of a certain mud additive, such as bentonite, that is used in large quantities in the makeup of the drilling fluid.

**Calcium Chloride**

A chemical which absorbs moisture and which is used in cements as a drying agent.

**Caliper Log**

A record which indicates the diameter of the wellbore or pipe in order to indicate enlargement of the wellbore due to caving or washout, internal corrosion, or pitting of the pipes.

**Carrier Rig**

A specially designed, self-propelled workover or drilling rig that is driven directly to the well site. See Back-in Unit, Drive-in Unit, and Production Rig.

**Cased Hole**

A wellbore in which the casing has been run and which has been cemented.

**Casing**

Steel pipe lowered into the wellbore as drilling is completed and which is used to prevent the caving of the walls.

**Casing Cementing**

Filling the annulus between the casing and borehole wall with cement in order to support the casing and to prevent fluid migration between zones.

**Casing Centralizer**

A device secured around the casing at regular intervals to center it in the hole.

**Casing Cutter**

A heavy cylindrical body, fitted with a set of knives, used to cut and free a section of casing in a well.

**Casing Gun**

A perforating gun run into the casing string.

**Casinghead**

A heavy, flanged steel fitting connected to the first string of casing. It provides a housing for slips and packing assemblies, allows suspension of intermediate and production strings of casing, and supplies the means for the annulus to be sealed off.

**Casing Point**

The depth in a well at which casing is set.

**Cathead**

A spool-shaped attachment on the end of the catshaft, around which rope for hoisting and moving heavy equipment on or near the rig floor is wound.

**Catline Boom and Hoist Line**

A hoisting or pulling line powered by the cathead and used to lift heavy equipment on the rig.

**Catwalk**

The elevated work area adjacent to the v-door and ramp on a drilling rig where pipe is laid to be lifted to the derrick floor by the catline or by an air hoist.

**Cellar**

A pit in the ground to provide additional height between the rig floor and well head to accommodate the installation of blowout preventers, ratholes, mouseholes, etc. It may also collect drainage water and other fluids for subsequent disposal.

**Cement**

A powder consisting of alumina, silica, lime, and other substances that hardens when mixed with water. Extensively used in the oil industry to bond casing to the walls of the wellbore.

**Cement Additive**

Materials added to cement to change its properties. Some examples are chemical accelerators, chemical retarders, and weight-reduction materials. See Accelerator and Retarder.

**Cement Bond**

The adherence of casing to cement and cement to formation.

**Cement Casing**

To fill the annulus between the casing and wall of the hole with cement to support the casing and prevent fluid migration between permeable zones.

**Cementing**

Applying cement to various points in a well inside or outside the casing. See Squeeze Cementing.

**Cementing Pump**

A high-pressure pump used to force cement down the casing and into the annular space between the casing and the wall of the borehole.

**Cementing Time**

The total elapsed time needed to complete a cementing operation.

**Cement Plug**

A portion of cement placed at some point in the wellbore to seal it.

**Centrifugal Pump**

A pump with an impeller or rotor, an impeller shaft, and a casing, which discharges fluid by centrifugal force.

**Chain Tongs**

A hand tool used to tighten or loosen pipe, consisting of a handle and chain that resembles the chain on a bicycle.

**Chemical Cutoff**

A method of severing pipe in a well by applying high pressure jets of a very corrosive substance against the wall of the pipe.

**Chemical Cutter**

A fishing tool that uses high-pressure jets of chemicals to sever casing, tubing, or drill pipe stuck in the hole.

**Chemical Treatment**

A chemical-treating process – acidizing, paraffin removal, etc.

**Chlorine Survey**

A type of radioactivity logging survey used to measure the chlorine content of the formation. A formation with low chlorine content and low density probably contains oil or gas while a formation with high chlorine content probably contains salt water only.

**Choke**

A device with an orifice installed in a line to restrict the flow of fluids.

**Christmas Tree**

The control valves, pressure gauges, and chokes assembled at the top of a well to control the flow of oil and/or gas after the well has been drilled and completed.

**Circulation**

The movement of drilling fluid out of the mud pits, down the drill stem, up the annulus, and back to the mud pits.

**Circulation Valve**

An accessory employed above a packer, to permit annulus-to-tubing circulation or vice-versa.

**Cleanout**

Removal of sand, scale, and other deposits from a well in order to increase production.

**Cleanout Tools**

Tools or instruments, such as a fishing tool, swab, bailer, etc. used to clean out an oilwell.

**Collar**

A coupling device used to join two lengths of pipe, such as casing or tubing.

**Collar Locator**

A logging device used to determine accurately the depth of a well. The log measures and records the depth of each casing collar or coupling in a well.

**Compressor**

A device that raises the pressure of a compressible fluid such as air or gas. Compressors create a pressure differential to move or compress a vapor or gas.

**Conductivity**

The ability to transmit or convey (as heat or electricity).

**Conductor Casing**

Generally, the first string of casing in a well.

**Conductor Hole**

The hole where the crew start the top of the well.

**Conductor Pipe**

The largest diameter casing and the topmost length of casing.

**Cone**

A conical-shaped metal device into which cutting teeth are formed or mounted on a roller cone bit.

**Connection**

A section of pipe or fitting used to join pipe to pipe or to a vessel.

**Core**

A cylindrical sample taken from a formation for geological analysis.

**Core Analysis**

Laboratory of a core sample that may determine porosity, permeability, lithology, fluid content, angle of dip, geological age, and probable productivity of the formation.

**Core Barrel**

A tubular device, usually from 10 to 60 feet long, run in place of a bit and used to cut a core sample.

**Core Sample**

A small portion of a formation obtained by using a core barrel and core bit in an existing wellbore.

**Coring**

The process of cutting a vertical, cylindrical sample of the formations encountered as a well is drilled.

**Coring Bit**

A bit that does not drill out the center portion of the hole, but allows this center portion (the core) to pass through the round opening in the center of the bit and into the core barrel.

**Corrosion**

Chemical or electrochemical process, such as rust, whereby metal is destroyed through reaction with its environment.

**Corrosion Inhibitor**

A chemical substance that minimizes or prevents corrosion in metal equipment.

**Coupling**

In piping, a metal collar with internal threads used to join two sections of threaded pipe.

**Coupon**

Small metal strip which is exposed to corrosive systems for determining nature and severity of corrosion.

**Crankshaft**

A rotating shaft to which connecting rods are attached. It changes up and down (reciprocating) motion to circular (rotary) motion.

**Crooked Hole**

A wellbore that has been drilled in a direction other than vertical.

**Crown Block and Water Table**

An assembly of sheaves or pulleys mounted on beams at the top of the derrick. The drilling line is run over the sheaves down to the hoisting drum.

**Crude Oil**

Unrefined liquid petroleum.

**Cutout**

An area of deck grating removed to clear an obstruction or to permit pipes, ducts, columns and the like to pass through the grating.

**Cuttings**

The fragments of rock dislodged by the bit and brought to the surface in the drilling mud. Washed and dried cuttings samples are analyzed by geologists to obtain information about the formations drilled.

**Daily Drilling Report**

A record made each day of the operations on a working drilling rig and traditionally phoned, faxed, e-mailed, or radioed in to the office of the drilling company.

**Deadline**

The drilling line from the crown block sheave to the anchor. So called because it does not move.

**Degasser**

The equipment used to remove unwanted gas from a liquid, especially from drilling fluid.

**Derrick**

A large load-bearing structure, usually of bolted construction. In drilling, the standard derrick has four legs standing at the corners of the substructure and reaching to the crown block.

**Desander**

A centrifugal device for removing sand from drilling fluid to prevent abrasion of the pumps.

**Desilter**

A centrifugal device for removing very fine particles, or silt, from drilling fluid.

**Diamond Bit**

A drill bit that has small industrial diamonds embedded in its cutting surface.

**Dies**

A tool used to shape, form, or finish other tools or pieces of metal.

**Dipmeter Survey**

An oilwell-surveying method that determines the direction and angle of formation dip in relation to the borehole. It records data that permit computation of both the amount and direction dip relative to the axis of the hole and thus provides information about the geologic structure of the formation.

**Directional Hole**

A wellbore intentionally drilled at an angle from the vertical.

**Displacement Fluid**

In well cementing, the fluid, usually drilling mud or salt water, that is pumped into the well after the cement is pumped into it to force the cement out of the casing into the annulus.

**Dissolved Gas**

Natural gas that is in solution with crude oil in the reservoir.

**Doghouse**

A small enclosure on the rig floor used as an office and/or as a storehouse for small objects.

**Downhole**

Pertaining to the wellbore.

**Downhole Motor**

A drilling tool made up in the drill string directly above the bit. It causes the bit to turn while the drill string remains fixed.

**Drawworks**

The hoisting mechanism on a drilling rig. It is essentially a large winch that spools off or takes in the drilling line and thus lowers or raises the drill stem and bit.

**Drill Bit**

The cutting or boring element used in drilling oil and gas wells.

**Drill Collars**

A heavy, thick-walled tube used between the drill pipe and the bit in the drill stem. Used to stiffen the drilling assembly and put weight on the bit so that the bit can drill.

**Drilling Fluid**

Circulating fluid, one function of which is to lift cuttings out of the wellbore and to the surface. It also serves to cool the bit and to counteract downhole formation pressure.

**Drilling Mud**

A specially compounded liquid circulated through the wellbore during rotary drilling operations.

**Drill Pipe**

The heavy seamless tubing used to rotate the bit and circulate the drilling fluid.

**Drill Stem**

All members in the assembly used for rotary drilling from the swivel to the bit, including the Kelly, the drill pipe and tool joints, the drill collars, the stabilizers, and various specialty items.

**Drill-Stem Test (D.S.T.)**

A type of formation testing to measure potential productivity of the formation before the casing is set. See Formation Testing.

**Drilling Line**

A wire rope hoisting line, reeved on sheaves of the crown block and traveling block. The primary purpose is to hoist or lower drill pipe or casing from or into a well.

**Drill String**

The column, or string, of drill pipe with attached tool joints that transmits fluid and rotational power from the Kelly to the drill collars and the bit.

**Drive-in Unit**

A self-propelled workover rig which is driven straight to the wellhead. See Carrier Rig.

**Dry Hole**

Any well that does not produce oil or gas in commercial quantities.

**Dual Completion**

A single well that produces from two separate formations at the same time.

**Electric Submersible Pumping**

A form of artificial lift that utilizes an electric submersible multistage centrifugal pump. Electric power is conducted to the pump by a cable attached to the tubing.

**Electric Survey**

Abbreviated to ES. See Electric Well Log.

**Electric Well Log**

A recording of electrical characteristics (such as resistivity and conductivity) of the formation in order to measure the amount, location, and nature of the fluids. See Electric Survey and Well Log

**Elevators**

On rotary rigs and top drive rigs, hinged steel devices with manual operating handles that crew members latch onto a tool joint.

**External Cutter**

A fishing tool containing metal-cutting knives that is lowered into the hole and over the outside length of pipe in order to cut it.

**Fastline**

The end of the drilling line that is affixed to the drum or reel of the drawworks, so called because it travels with greater velocity than any other portion of the line.

**Fingerboard**

A rack that supports the stands of pipe being stacked in the derrick or mast.

**Fire Flooding**

A thermal recovery method in which the oil in the reservoir is ignited. The heat vaporizes lighter hydrocarbons and water pushes the warmed oil toward a producing well.

**Fire Wall**

A wall of earth built around an area to hold fluids if there is a leak.

**Fish**

An object accidentally left in the wellbore during workover or drilling. Examples are a piece of scrap metal or part of the drill stem – must be recovered before work can proceed. See Fishing.

**Fishing**

Recovering an object accidentally left in a well during drilling or workover. See Fish.

**Fitting**

A small, often standardized part, such as a coupling, valve, or gauge, installed in a larger apparatus.

**Float Collar**

A special coupling device inserted one or two joints above the bottom of the casing string that contains a check valve to permit fluid to pass downward but not upward through the casing. The float collar prevents drilling mud from entering the casing.

**Flood**

To drive oil from a reservoir into a well by injecting water under pressure into the reservoir formation.

**Flowing Well**

A well that produces oil or gas by its own reservoir pressure rather than by using artificial means, such as by pumps.

**Flow Line**

The surface pipe through which oil or gas travels from a well to processing equipment or to storage.

**Flow Rate**

The speed, or velocity, of fluid or gas flow through a pipe or vessel.

**Fluid Injection**

Injection of gases or liquids into a reservoir to force oil toward and into producing wells.

**Fluid Loss**

The unwanted migration of the liquid part of the drilling mud or cement slurry into a formation, often minimized or prevented by the blending of additives with the mud or cement.

**Formation Fluid**

Fluid, such as gas, oil, or water, that exists in a subsurface formation.

**Formation Gas**

Gas initially produced from an underground reservoir.

**Formation Pressure**

The force exerted by fluids or gas in a formation, recorded in the hole at the level of the formation with the well shut in.

**Formation Testing**

Testing of the formation to measure the potential productivity of the well before the casing is set. Also commonly referred to as the drill-stem test. See Drill-stem Test.

**Formic Acid**

A chemical used in acidizing oil wells which is less corrosive than hydrofluoric acid or hydrochloric acid. Usually used on high-temperature wells. See Acidizing.

**Frac Fluid**

A fluid used in the fracturing process.

**Fracturing**

Sometimes referred to as “frac”. A method of well stimulation. High hydraulic pressure is used to pump a fluid (hydrochloric acid, water, kerosene, etc.) into the formation to create fissures or cracks. Propping agents such as sand grains, walnut shells, glass beads, etc. are carried in the fluid and lodge in the cracks. When the fluid is removed, the propping agents keep the fissures open, thus leaving channels through which oil can flow. See Acid Fracturing, Frac Job, Hydraulic Fracturing, Nitro Shooting, Propping Agent, Shooting, and Well Stimulation.

**Fracture**

A crack or device in a formation, either natural or induced.

**Fracture Acidizing**

A procedure by which acid is forced into a formation under pressure high enough to cause the formation to crack. The acid acts on certain kinds of formations, usually carbonates, to increase the permeability of the formation. See Acid Fracturing.

**Fracture Pressure**

The pressure at which a formation will break down, or fracture.

**Fracturing Fluid**

A fluid, such as water, oil, or acid, used in hydraulic fracturing. The fluid carries propping agents that hold open the formation cracks after hydraulic pressure dissipates.

**Free-Point Indicator**

A device run on wireline into the wellbore and inside the fishing string and fish to locate the area where a fish is stuck.

**Friction**

Resistance to movement created when two surfaces are in contact. When friction is present, movement between the surfaces produces heat.

**Gamma-Ray Log**

A type of well logging device utilizing gamma rays. See Radioactivity Well Logging.

**Gas Anchor**

A tubular, perforated device attached to the bottom of a suckerrod pump that helps to prevent gas lock. The device works on the principle that gas, being lighter than oil, rises. As well fluids enter the anchor, gas breaks out of the fluid and exits from the anchor through perforations near the top. Remaining fluids enter the pump through a mosquito bill (a tube within the anchor) which has an opening near the bottom. In this way, all or most of the gas escapes before the fluids enter the pump.

**Gas Drive**

The use of the energy that arises from the expansion of compressed gas in a reservoir to move crude oil to a wellbore. Also called Depletion Drive. See Dissolve-Gas Drive, Gas-Cap Drive, and Reservoir Drive Mechanism.

**Gas Injection**

The injection of gas into a reservoir to maintain formation pressure by gas drive and to reduce the rate of decline of the original reservoir drive. One type of gas injection uses gas that does not mix (is not miscible) with the oil. Examples of these gases include natural gas, nitrogen, and flue gas. Another type of gas injection uses gas that does mix (is miscible) with the oil. The gas may be naturally miscible under high pressure. Examples of miscible gases include propane, methane enriched with other light hydrocarbons, methane under high pressure, and carbon dioxide under pressure. Frequently, water is also injected in alternating steps with the gas.

**Gas Injection Well**

A Well into which gas is injected for the purpose of maintaining or supplementing pressure in an oil reservoir.

**Gas Lift**

The process of raising or lifting fluid from a well by injecting gas down the well through tubing or through the tubing-casing annulus. Injected gas aerates the fluid to make it exert less pressure than the formation does. The resulting higher formation pressure forces the fluid out the wellbore.

**Gas-Lift Mandrel**

A device installed in the tubing string of a gas-lift well onto which or into which a gas-lift valve is fitted.

**Gas-Lift Valve**

A device installed on a gas-lift mandrel, which in turn is put on the tubing string of a gas-lift well. Tubing and casing pressures cause the valve to open and close, thus allowing gas to be injected into the fluid in the tubing to cause the fluid to rise to the surface.

**Gas-Lift Well**

A well in which reservoir fluids are artificially lifted by the injection of gas.

**Gas Lock**

A condition sometimes encountered in a pumping well when dissolved gas, released from solution during the upstroke of the plunger, appears as free gas between the valves. If the gas pressure is sufficient, the standing valve is locked shut, and fluid cannot enter the tubing.

**Gas Well**

A well that primarily produces gas.

**Gathering Line**

The line from lease tank batteries to the transmission or trunk pipeline.

**Geologist**

A scientist who gathers and interprets data pertaining to the formations of the earth's crust.

**Go in the Hole**

To lower the drill stem, the tubing, the casing, or the sucker rods into the wellbore.

**Gone to Water**

Pertaining to a well in which production of oil has decreased and production of water has increased.

**Gooseneck**

The curved connection between the rotary hose and the swivel.

**Gravel**

Sand or glass beads of uniform size and roundness used in gravel packing.

**Gravel Packing**

A method of well completion in which a slotted or perforated liner, often wire-wrapped, is placed in the well and surrounded by gravel. The gravel excludes sand from the wellbore but allows continued production.

**Guide Shoe**

A short, heavy, cylindrical section of steel filled with concrete and rounded at the bottom, which is placed at the end of the casing string. It prevents the casing from snagging on irregularities in the borehole as it is lowered.

**Gun Perforating**

Perforating the casing with a device which is lowered into the well and which fires steel projectiles through the casing in order to create holes through which the fluids pass to the wellbore. See Perforating.

**Guy Line Anchor**

A buried weight or anchor to which a guy line is attached.

**Guy Wire**

A rope or cable used to steady a mast or pole.

**Header**

A pipe arrangement that connects flow lines from several wellheads into a single line. A header has production and testing valves to control the flow of each well, thus directing the produced fluids to production or testing vessels.

**Hoist**

An arrangement of pulleys and wire rope used for lifting heavy objects.

**Hoisting Components**

Drawworks, drilling line, and traveling and crown blocks.

**Hoisting Drum**

The large, flanged spool in the drawworks on which the hoisting cable is wound.

**Hoisting Line**

A wire rope used in hoisting operations.

**Hoisting System**

The system on the rig that performs all the lifting on the rig, primarily the lifting and lowering of drill pipe out of and into the hole.

**Hook**

A large, hook-shaped device from which the elevator bails or the swivel is suspended.

**Horsepower**

A unit of measure of work done by a machine.

**Horizontal Drilling**

Deviation of the borehole from vertical so that the borehole penetrates a productive formation in a manner parallel to the formation.

**Hydraulic**

Of or relating to water or other liquid in motion. Operated, moved, or effected by water or liquid.

**Hydraulic Fluid**

A liquid of low viscosity (such as light oil) that is used in systems actuated by liquid – such as the brake system in an automobile.

**Hydraulic Force**

Force resulting from pressure on water or other hydraulic fluid.

**Hydraulic Fracturing**

Pumping a specially blended liquid into a well and into a formation under high pressure in order to cause the formation to crack and allow fluids to flow into the wellbore. See Fracturing.

**Hydraulic Pumping**

A method of pumping oil from wells by using a downhole pump without sucker rods.

**Hydrocarbons**

Organic compounds of hydrogen and carbon whose densities, boiling points, and freezing points increase as their molecular weights increase.

**Hydrochloric Acid**

A chemical commonly used in acidizing. See Acidizing.

**Hydrofluoric – Hydrochloric Acid**

A mixture of chemicals used in the removal of mud from the well. See Mud Acid.

**Hydrogen Sulfide Cracking**

A type of corrosion that occurs when metals are exposed to hydrogen sulfide gas.

**Hydrostatic Pressure**

The force exerted by a body of fluid at rest – it increases directly with density and the depth of the fluid. Is expressed as pounds per square inch.

**Impeller**

A set of mounted blades used to impart motion to a fluid, air, or gas.

**Impermeable**

Preventing the passage of fluid.

**Impression Block**

A block with lead or another relatively soft material on its bottom. It is run into a well and set down on an object that has been lost in the well. The block is retrieved, and the impression is examined. The impression is a mirror image of the top of the fish, and it indicates the fish's position in the hole. From this information, the correct fishing tool may be selected.

**Induction Log**

An electric well log in which the conductivity of the formation rather than the resistivity is measured. This log aids in the determination of oil and water zones.

**Inflatable Packer**

A packer with an element that inflates by means of gas or liquid pumped from the surface through a line. It is deflated by means of slots that can be opened to allow the gas or liquid to flow out. They are used when a temporary packer is needed in a hole.

**Injection Gas**

A high-pressure gas injected into a formation to maintain or restore reservoir pressure.

**Injection Log**

A survey used to determine the injection profile, that is, to assign specific volumes or percentages to each of the formations taking fluid in an injection well. The injection log is also used to check for casing or packer leaks, proper cement jobs, and fluid migration between zones.

**Injection Water**

Water that is introduced into a reservoir to help drive hydrocarbons to a producing well.

**Injection Well**

A well through which fluids are injected into an underground stratum to increase reservoir pressure and to displace oil. Also called Input Well.

**Injector Head**

A control head for injecting coiled tubing into a well that seals off the tubing and makes a pressure-tight connection.

**Intake Valve**

The mechanism on an engine through which air and sometimes fuel are admitted to the cylinder. On a mud pump, it is the valve that opens to allow mud to be drawn in the pump by the pistons moving in the liners.

**Intermediate Casing String**

The string of casing set in a well after the surface casing but before production casing is set to keep the hole from caving and to seal off formations.

**Internal Cutter**

A fishing tool containing metal-cutting knives that is lowered into the inside of a length of pipe stuck in the hole in order to cut the pipe.

**International Association of Drilling Contractors (IADC)**

Formerly the American Association of Oilwell Drilling Contractors. A trade association that represents the interests of members of the drilling segment of the oil and gas industry. It offers publications regarding recommended industry practices and training materials.

**Jar**

A percussion tool operated manually or hydraulically to deliver a heavy upward or downward blow to fish stuck in the borehole.

**Jar Accelerator**

A hydraulic tool used in conjunction with a jar and made up on the fishing string above the jar to increase the power of the jarring force.

**Jerk Line**

A wire rope, one end of which is connected to the end of the tongs and the other end of which is attached to the cathead.

**Jet**

A hydraulic device operated by a centrifugal pump used to clean the mud pits, or tanks, and to mix mud components.

**Jet Cutoff**

A procedure for severing pipe stuck in a well by detonating special shaped-charge explosives similar to those used in jet perforating. The explosive is lowered into the pipe to the desired depth and detonated. The force of the explosion makes cuts around the pipe, and the severed portion of the pipe is retrieved.

**Jet Gun**

The device used in jet perforating which carries the shaped charges. See Jet Perforating, Perforating, and Shaped Charge.

**Jet Perforating**

Perforating the casing with a device using shaped charges of high explosives in order to burn a hole in the casing, allowing fluids to flow into the wellbore. See Perforating, Gun Perforating, and Bullet Perforator.

**Joint of Pipe**

Length of drill pipe or casing.

**Junk**

Metal debris lost in the wellbore – bits, wrenches, or other small objects which must be fished out before further work can continue. See Junk Basket.

**Junk Basket**

A fishing tool used in a well to remove junk. See Junk.

**Junk Mill**

A mill used to grind up junk in the hole. See Mill.

**Junk Retriever**

A special tool made up on the bottom of the drill stem to pick up junk from the bottom of the hole.

**Kelly**

The heavy square or hexagonal steel member suspended from the swivel through the rotary table and connected to the topmost joint of drill pipe to turn the drill stem as the rotary table turns.

**Kelly Driver**

A device that fits inside the head and inside of which the Kelly fits. The Kelly driver rotates with the Kelly.

**Kelly Spinner**

A pneumatically operated device mounted on top of the Kelly that, when actuated, causes the Kelly to turn or spin.

**Kick**

An entry of water, gas, oil, or other formation fluid into the wellbore during drilling. If prompt action is not taken to control the kick, a blowout may occur.

**Kick Fluids**

Oil, gas, water, or any combination that enters the borehole from a permeable formation.

**Kick Off**

To bring a well into production. In workover operations, to swab a well to restore it to production.

**Kickoff Point (KOP)**

The depth in a vertical hole at which a deviated or slant hole is started – used in directional drilling.

**Kill**

In drilling, to control a kick by taking suitable preventive measures. In production, to stop a well from producing oil and gas so that reconditioning of the well can proceed.

**Land Rig**

Any drilling rig that is located on dry land.

**Lay Down Pipe**

To pull drill pipe or tubing from the hole and place it in a horizontal position on a pipe rack.

**Lead Tongs**

The pipe tongs suspended in the derrick or mast and operated by a chain or a wire rope connected to the makeup cathead or the breakout cathead.

**Limited-Entry Technique**

A type of fracturing method where fracturing fluid is injected through only a limited number of perforations in the casing rather than all the perforations at once.

**Liner**

A relatively short length of pipe with holes or slots that is placed opposite a producing formation. Usually, such liners are wrapped with specially shaped wire that is designed to prevent the entry of loose sand into the well as it is produced. They are also often used with a gravel pack.

**Liner Hanger**

A slip device that attaches the liner to the casing.

**Log**

A record of the well characteristics through the use of measurement equipment – driller’s log, mud log, electrical well log, or radioactivity log. See Mud Logging, Sonic Logging, and Well Logging.

**Long String**

The last string of casing set in a well.

**Lost Pipe**

Drill pipe, drill collars, tubing, or casing (fish) that has become separated in the hole from the part of the pipe reaching the surface, necessitating its removal before normal operations can proceed.

**Lubricator**

A specially fabricated length of casing or tubing usually placed temporarily above a valve on top of the casinghead or tubing head. It is used to run swabbing or perforating tools into a producing well, and it provides a method for sealing off pressure.

**Make a Connection**

To attach a joint or stand of drill pipe onto the drill stem suspended in the wellbore to permit deepening the wellbore by the length of the pipe.

**Make Up**

To assemble and join parts to form a complete unit.

**Make Up a Joint**

To screw a length of pipe into another length of pipe.

**Makeup Tongs**

Tongs used for screwing one length of pipe into another form making up a joint.

**Male Connection**

A pipe, coupling, or tool that has threads on the outside so that it can be joined to a female connection.

**Mandrel**

A cylindrical bar, spindle, or shaft around which other parts are arranged or attached or that fits inside a cylinder or tube.

**Manifold**

An accessory system of piping to a main piping system – serves to divide a flow into several parts, to combine several flows into one, or to reroute a flow to any one of several possible destinations.

**Mast**

A portable derrick that is capable of being raised as a unit.

**Master Valve**

A large valve located on the Christmas tree used to control the flow of oil and gas from a well.

**Matrix Acidizing**

Acidizing whereby the acid is restricted to the natural porosity of the formation as opposed to acidizing into induced fractures. See Acid Fracturing and Acidizing.

**Micro Log**

A type of electrical survey method using electrodes on the wall of the borehole.

**Mill**

A downhole tool with rough, sharp, extremely hard cutting surfaces for removing metal, packers, cement, sand, or scale by grinding or cutting.

**Mixing Tank**

Any tank or vessel used to mix components of a substance – as in the mixing of additives with drilling mud.

**Mousehole**

Shallow bores under the rig floor, usually lined with pipe, in which joints of drill pipe are temporarily suspended for later connection to the drill string.

**Mousehole Connection**

The procedure of adding a length of drill pipe or tubing to the active string.

**Mud Acid**

A mixture of chemicals used to remove mud from the well – hydrochloric acid, hydrofluoric acid, and surfactants are used. See Hydrofluoric – Hydrochloric Acid.

**Mud Cake**

The sheath of mud solids that forms on the wall of the hole when liquid from mud filters into the formation.

**Mud Cleaner**

A cone-shaped device designed to remove very fine solid particles from the drilling mud.

**Mud-Gas Separator**

A device that removes gas from the mud coming out of a well when a kick is being circulated out.

**Mud Logging**

A method of testing the drilling during the drilling process to determine the amount of natural gas that has escaped from the formation.

**Mud Pump**

A large, high-pressure reciprocating pump used to circulate the mud on a drilling rig.

**Mud Return Line**

A trough or pipe that is placed between the surface connections at the wellbore and the shale shaker.

**Mud Tank**

One of a series of open tanks, usually made of steel plate, through which the drilling mud is cycled to remove sand and fine sediments.

**Mud Weight**

A measure of the density of a drilling fluid expressed as pounds per gallon, pounds per cubic foot, or kilograms per cubic meter.

**Multiple Completion**

An arrangement for producing a well in which one wellbore penetrates two or more petroleum-bearing formations.

**Natural Gas**

A highly compressible, highly expansible mixture of hydrocarbons with a low specific gravity and occurring naturally in a gaseous form.

**Neutron Log**

Part of the radioactivity well logging process – used to determine formation porosity. See Radioactivity Well Logging.

**Nipple**

A tubular pipe fitting threaded on both ends used for making connection between pipe joints and other tools.

**Nitro Shooting**

A well stimulation process using nitroglycerine. See Formation Fracturing.

**Normal Circulation**

The smooth, uninterrupted circulation of drilling fluid down the drill stem, out the bit, up the annular space between the pipe and the hole, and back to the surface.

**Nozzle**

A passageway through jet bits that causes the drilling fluid to be ejected from the bit at high velocity.

**Nuclear Tracer**

A gas, liquid, or solid material that emits gamma rays.

**Oil**

A simple or complex liquid mixture of hydrocarbons that can be refined to yield gasoline, kerosene, diesel fuel, and various other products.

**Oilfield**

The surface area overlying an oil reservoir or reservoirs. The term usually includes not only the surface area, but also the reservoir, the wells, and the production equipment.

**Oil String**

The final string of casing set in a well after the productive capacity of the formation has been determined to be sufficient.

**Oilwell**

A well from which oil is obtained.

**Open Formation**

A petroleum-bearing rock with good porosity and permeability.

**Open Hole**

Any wellbore in which casing has not been set.

**O-Ring**

A circular seal common in the oil field.

**Packer**

A downhole device used to seal the annular space between two strings of pipe and the wall of the borehole.

**Packer Fluid**

A liquid, usually salt water, oil, or mud, used in a well when a packer is between tubing and the casing. The fluid must be heavy enough to shut off the pressure of the formation being produced.

**Packer Squeeze Method**

A squeeze cementing method in which a packer is set to form a seal between the working string (the pipe down which cement is pumped) and the casing. Another packer or a cement plug is set below the point to be squeeze-cemented. By setting packers, the squeeze point is isolated from the rest of the well.

**Packing**

A material used in a cylinder on rotating shafts of an engine or pump in the stuffing box of a valve or between flange joints to maintain a leak-proof seal.

**Pack Off**

To place a packer in the wellbore and activate it so that it forms a seal between the tubing and the casing.

**Paraffin**

Petroleum wax which accumulates on the wall of tubing and well equipment which needs to be removed periodically in order to prevent restriction of the flow.

**Paraffin Scraper**

A tube with guides around it to keep it centered in the hole, and a cylindrical piece with blades attached. Spaces between the blades allow drilling fluid to pass through and carry away the scrapings.

**Perforated Completion**

A well completion method in which the producing zone or zones are cased through, cemented, and perforated to allow fluid flow through the wellbore.

**Perforated Liner**

A liner that has had holes shot in it by a perforating gun.

**Perforated Pipe**

Sections of pipe, such as casing, liner, and tail pipe, in which holes or slots have been cut before it is set.

**Perforating**

Piercing the casing wall to provide holes through which the formation fluids can flow. This service is accomplished with the use of a gun perforator or a jet perforator. See Gun Perforating, Jet Perforating, Perforating Gun, and Shaped Charge.

**Perforating Gun**

A device for perforating the casing, which carries the shaped charges or bullets. See Gun Perforating, jet Gun, Jet Perforating, and Perforating.

**Perforation**

A hole made in the casing, cement, and formation through which formation fluids enter a wellbore.

**Perforation Depth Control Log (PDC Log)**

A special type of nuclear log that measures the depth of each casing collar.

**Permanent Packer**

A nonretrievable type of packer that must be drilled or milled out for removal.

**Permeability**

A measure of the ease with which a fluid flows through the connecting pore spaces of a formation or cement.

**Petroleum**

A substance occurring naturally in the earth in solid, liquid, or gaseous state and composed mainly of mixtures of chemical compounds of carbon and hydrogen. In some cases, especially in measurement of oil and gas, petroleum refers only to oil, a liquid hydrocarbon, and does not include natural gas or gas liquids such as propane and butane.

**Pick Up**

To use the drawworks to lift the bit (or other tool) off bottom by raising the drill stem.

**Pilot**

A rodlike or tubelike extension below a downhole tool, such as a mill, that serves to guide the tool into or over another downhole tool or fish.

**Pilot Bit**

A bit placed on a special device that serves to guide the device into an already existing hole that is to be opened – made larger in diameter.

**Pilot Mill**

A special mill that has a heavy tubular extension below it called a pilot or stinger. The pilot, smaller in diameter than the mill, is designed to go inside drill pipe or tubing that is lost in the hole.

**Pipe**

A long, hollow cylinder, usually steel, through which fluids are conducted.

**Pipe Racks**

Horizontal supports for tubular goods (pipe).

**Pipe Ramp**

An angled ramp for dragging drill pipe, casing, and other materials up to the drilling floor or bringing such equipment down.

**Plug**

Any object or device that blocks a hole or passageway.

**Plug and Abandon**

To close a well by placing cement plugs in the borehole.

**Plunger**

A basic component of the sucker rod pump that serves to draw well fluids into the pump.

**Porosity**

The ratio of the volume of empty space to the volume of solid rock in a formation, indicating how much fluid a rock can hold.

**Power Generating System**

A diesel, LPG, natural gas, or gasoline engine along with a mechanical transmission or generator for producing power for the drilling rig.

**Production**

The phase of the petroleum industry that deals with bringing the well fluids to the surface and preparing the product for delivery. The amount of oil or gas produced in a given period.

**Production Packer**

Any packer designed to make a seal between the tubing and the casing during production.

**Production Rig**

A portable, self-propelled piece of equipment which may be of two basic types. A well-servicing unit which has a hoist and an engine with a self-erecting mast. A workover rig has, in addition, a substructure with a rotary, pump, pits, and facilities to work a drill string. See Carrier Rig.

**Production Test**

A test of the well's producing potential usually done during the initial completion phase.

**Propping Agent**

A small granular substance carried in the fracturing fluid and used to keep the fractures open – Examples are sand grains, walnut shells, and glass fragments. See Formation Fracturing.

**Pulling Unit**

A type of well servicing equipment used in pulling rods and tubing from the well. See Production Rig.

**Pulsed Neutron Logging Device**

A measuring instrument run inside casing to obtain an indication of the presence or absence of hydrocarbons outside the casing, to determine water saturation in a reservoir behind casing, to detect water movement in the reservoir, to estimate porosity, and to estimate water salinity.

**Pulsed-Neutron Survey**

A special cased hole logging method that uses radioactivity reaction time to obtain measurements of water saturation, residual oil saturation, and fluid contacts in the formation outside the casing of an oil well.

**Pump**

A device that increases the pressure on a fluid or raises it to a higher level.

**Pump Rate**

The speed, or velocity, at which a pump is run. In drilling, the pump rate is usually measured in strokes per minute.

**Pumping Unit**

The machine that imparts reciprocating motion to a string of sucker rods extending to the positive displacement pump at the bottom of a well.

**Radioactivity Well Logging**

A type of well logging method using both gamma-ray curves and neutron curves. Also referred to as nuclear log. This activity indicates the type of rocks and/or fluids in the formation. See Gamma-ray Log, Neutron Log, and Well Logging.

**Ram**

The closing and sealing component on a blowout preventer.

**Ram Blowout Preventer**

A blowout preventer that uses rams to seal off pressure on a hole that is with or without pipe.

**Rate of Penetration (ROP)**

A measure of the speed at which the bit drills into formations, usually expressed in feet or meters per hour or per minute.

**Rathole**

A hole in the rig floor, some 30 to 40 feet (9 to 12 meters) deep, which is lined with casing that projects above the floor, into which the Kelly and the swivel are placed when hoisting operations are in progress.

**Rathole Rig**

A small, usually truck-mounted rig, the purpose of which is to drill ratholes for regular drilling rigs that will be moved in later. A rathole rig may also drill the top part of the hole before the main rig arrives on location.

**Reamer**

A tool used in drilling to smooth the wall of a well, enlarge the hole to the specified size, help stabilize the bit, straighten the wellbore if kinks or doglegs are encountered, and drill directionally.

**Reciprocating Motion**

Back-and-forth or up-and-down movement, such as that of a piston cylinder.

**Reciprocating Pump**

A pump consisting of a piston that moves back-and-forth or up-and-down in a cylinder. The cylinder is equipped with inlet (suction) and outlet (discharge) valves. On the suction stroke, fluid is drawn into the cylinder, and on the discharge stroke, fluid is forced out of the cylinder.

**Recompletion**

After the initial completion of a well, the action and techniques of reentering the well and redoing or repairing the original completion in order to restore the well's productivity.

**Reeve (the line)**

To string a wire rope drilling line through the sheaves of the traveling and crown blocks to the hoisting drum.

**Refracturing**

Performing fracturing again. See Formation Fracturing.

**Reserves**

The unproduced but recoverable oil or gas in a formation that has been proved by production.

**Reserve Tank**

A special mud tank that holds mud that is not being actively circulated. A reserve tank usually contains a different type of mud from that which the pump is currently circulating.

**Reservoir**

A subsurface, porous, permeable, or naturally fractured rock body in which oil or gas are stored. Most reservoir rocks are limestones, dolomites, sandstones, or a combination of these.

**Reservoir Drive Mechanism**

The process in which reservoir fluids are caused to flow out of the reservoir rock and into a wellbore by natural energy.

**Reservoir Oil**

Oil in place in the reservoir.

**Reservoir Rock**

A permeable rock that may contain oil or gas in appreciable quantity and through which petroleum may migrate.

**Resistivity**

The electrical resistance offered to the passage of current. The opposite of conductivity.

**Resistivity Well Logging**

The recording of the resistance of formation water to natural or induced electric current. This is a very useful tool in formation evaluation.

**Retarder**

A chemical to delay the setting time of cement. See Cement Additive.

**Retrievable Packer**

A packer that can be pulled out of the well to be repaired or replaced.

**Reverse Circulation**

The course of drilling fluid downward through the annulus and upward through the drill stem, in contrast to normal circulation in which the course is downward through the drill stem and upward through the annulus. This method is frequently used in workover operations.

**Rework**

To restore production from an existing formation when it has fallen off substantially or ceased altogether.

**Rig**

The derrick, draw work, and other surface equipment of a workover unit.

**Rig Down**

To dismantle a drilling rig and auxiliary equipment following the completion of drilling operations. Also called tear down.

**Rig Floor**

The area immediately above the substructure of the derrick on which the rotary table and so forth rest.

**Rig Up**

To prepare the drilling rig for making a hole – to install tools and machinery before drilling is started.

**Rod Blowout Preventer**

A ram device used to close the annular space around the polished or sucker rod in a pumping well.

**Rod Hanger**

A device used to hang sucker rods on the mast or in the derrick.

**Rod String**

The entire length of sucker rods, which usually consist of several single rods screwed together. The rod string serves as a mechanical link from the beam pumping unit on the surface to the sucker rod pump near the bottom of the well.

**Roller Chain**

A type of chain that is used to transmit power by fitting over sprockets attached to shafts, causing rotation of one shaft by the rotation of another.

**Rotary**

The machine used to impart rotational power to the drill stem while permitting vertical movement of the pipe for rotary drilling.

**Rotary Drilling**

A drilling method in which a hole is drilled by a rotating bit to which a downward force is applied. The bit is fastened to and rotated by the drill stem, which also provides a passageway through which the drilling fluid is circulated.

**Rotary Hose**

The hose on a rotary drilling rig that conducts the drilling fluid from the mud pump and standpipe to the swivel and the Kelly.

**Rotary Shoe**

A length of pipe whose bottom edge is serrated or dressed with a hard cutting material that is run into the wellbore around the outside of stuck casing, pipe, or tubing in order to mill away the obstruction.

**Rotary Speed**

The speed, measured in revolutions per minute, at which the rotary table is operated.

**Rotary Table**

The principal component of a rotary, or rotary machine, used to turn the drill stem and support the drilling assembly.

**Round Trip**

The procedure of pulling out and subsequently running back into the hole a string of drill pipe or tubing. Also called tripping.

**Run Casing/Run Pipe**

To lower a string of casing into the hole.

**Run In**

To go into the hole with tubing, drill pipe, and so forth.

**Safety Clamp**

A clamp placed tightly around a drill collar that is suspended in the rotary table by drill collar slips.

**Safety Joint**

An accessory to a fishing tool, placed above it. If the tool cannot be disengaged from the fish, the safety joint permits easy disengagement of the string of pipe above the safety joint.

**Salinity Log**

A special nuclear well log that produces an estimate of the relative amounts of oil, gas, or salt water in a formation.

**Sand**

An abrasive material composed of small quartz grains formed from the disintegration of pre-existing rocks.

**Sand Consolidation**

Any one of several methods by which the loose, unconsolidated grains of a producing formation are made to adhere to prevent a well from producing sand but permit it to produce oil and gas.

**Sand Control**

Any method by which large amounts of sand in a sandy formation are prevented from entering the well-bore.

**Sandfrac**

A method of fracturing subsurface rock formations by injecting fluid and sand under pressure to increase permeability.

**Sandline**

A wireline used on drilling rigs and well-servicing rigs to operate a swab or bailer, retrieve cores, or to run logging devices.

**Sandstone**

A sedimentary rock composed of individual mineral grains of rock fragments between 0.06 and 2 millimeters (0.002 and 0.079 inches) in diameter and cemented together by silica, calcite, iron oxide, etc.

**Scale**

A mineral deposit that precipitates out of water and adheres to the inside of pipes, heaters, and other equipment.

**Schlumberger**

Pronounced “Slumberjay” – a pioneer company in electric well logging named for the French scientist who developed the method.

**Scraper**

Any device that is used to remove deposits (such as scale or paraffin) from tubing, casing, rods, flow lines, or pipelines.

**Scratcher**

A device that is fastened to the outside of casing to remove mud cake from the wall of a hole in order to condition the hole for cementing.

**Secondary Recovery**

The use of water-flooding or gas injection to maintain formation pressure during primary production and to reduce the rate of decline of the original reservoir drive.

**Service Well**

A nonproducing well used for injecting liquid or gas into the reservoir for enhanced recovery.

**Set Casing/Set Pipe**

To run and cement casing at a certain depth in the wellbore.

**Shale**

A fine-grained sedimentary rock composed mostly of consolidated clay or mud. Shale is the most frequently occurring sedimentary rock.

**Shale Shaker**

A vibrating screen used to remove cuttings from the circulating fluid in rotary drilling operations.

**Shaped Charge**

A type of perforating device used in a jet gun to perforate the casing. See Jet Gun, Jet Perforating, and Perforating Gun.

**Shear Ram**

The component in a blowout preventer that cuts, or shears, through drill pipe and forms a seal against well pressure.

**Sheave**

A grooved pulley. A support wheel over which tape, wire, or cable rides.

**Shooting**

Exploding nitroglycerine or other explosives in a formation in order to increase the flow oil. See Formation Fracturing, Nitro Shooting, and Well Stimulation.

**Shoulder**

The flat portion machined on the base of the bit shank that meets the shoulder of the drill collar and serves to form a pressure-tight seal between the bit and drill collar.

**Shut In**

To close the valves on a well so that it stops producing

**Sonic Logging**

A type of well logging method done in an uncased hole – may be run simultaneously with a potential test or a gamma-ray log. See Log and Well Logging.

**Squeeze Cementing**

Sealing specific points in a well through the use of cement and pressure. See Workover.

**Stimulation**

A process to obtain a higher producing rate in a well. Examples are acidizing, fracturing, and shooting. See Well Stimulation.

**Sucker Rod**

Special steel rods threaded on each end and screwed together to reach from the beam pumping unit to the sucker-rod pump at the bottom of a well.

**Swab**

A device used in swabbing. See Swabbing.

**Swabbing**

A temporary operation to bring well fluids to the surface when a well does not flow. This operation can determine whether or not the well can be made to flow or if artificial life is necessary.

**Swage**

A hook used to straighten damaged or collapsed casing in a well.

**Tally**

To measure and record the total length of pipe, casing, or tubing that is to be run in a well.

**Taper Tap**

A tap with a gradually decreasing diameter from the top. It is used to retrieve hollow fish, such as a drill collar, and is the male counterpart of a die collar.

**Temperature Log**

A survey run in cased holes to locate the top of the cement in the annulus. Since cement generates a considerable amount of heat when setting, a temperature increase will be found at the level where cement is found behind the casing.

**Temperature Survey**

An operation used to determine temperatures at various depths in the wellbore. It is also used to determine the height of cement behind the casing and to locate the source of water influx into the wellbore.

**Thermal Recovery**

A type of improved recovery in which heat is introduced into a reservoir to lower the viscosity of heavy oils and to facilitate their flow into producing wells.

**Tongs**

The large wrenches used for turning when making up or breaking out drill pipe, casing, tubing, or other pipe.

**Torque**

The turning force that is applied to a shaft or other rotary mechanism to cause it to rotate or tend to do so. Torque is measured in foot-pounds, joules, or Newton-meters.

**Total Depth**

The maximum depth reached in a well.

**Tracer**

A substance added to reservoir fluids to permit the movements of the fluid to be followed or traced.

**Tracer Log**

A survey that uses a radioactive tracer such as a gas, liquid, or solid having a high gamma ray emission. When the material is injected into any portion of the wellbore, the point of placement or movement can be recorded by a gamma ray instrument. The tracer log is used to determine channeling or the travel of squeezed cement behind a section of perforated casing.

**Trailer Rig**

A rig mounted on a wheeled and towed trailer.

**Transmission (or Trunk) Line**

Line that carries the product from a gathering line to a refinery.

**Traveling Block**

An arrangement of pulleys, or sheaves, through which drilling cable is reeved, which moves up or down in the derrick or mast.

**Trip**

To insert or remove the drill stem into or out of the hole.

**Truck-Mounted Rig**

A well-servicing and workover rig that is mounted on a truck chassis.

**Tubing**

The smaller pipe within the casing which serves as the conduit for the passage of oil and gas to the well-head.

**Tubing Coupling**

A special connector used to connect lengths of tubing.

**Tubing Head**

A flanged fitting that supports the tubing string, seals off pressure between the casing and the outside of the tubing, and provides a connection that supports the Christmas tree.

**Tubing Job**

The act of pulling out and running tubing into a wellbore.

**Tubing Pump**

A sucker rod pump in which the barrel is attached to the tubing.

**Tubular Goods**

Any kind of pipe. Oilfield tubular goods include tubing, casing, drill pipe, drill collars, and line pipe.

**Unit Operator**

The oil company in charge of development and production in an oilfield in which several companies have joined to produce the field.

**Unloading a Well**

Removing fluid from the tubing in a well, often by means of a swab, to lower the bottomhole pressure in the wellbore at the perforations, and to induce the well to flow.

**Valve**

A device used to control the rate of flow in a line to open or shut off a line completely or to serve as an automatic or semiautomatic safety device. Those used extensively include the check valve, gate valve, globe valve, needle valve, plug valve, and pressure relief valve.

**V-Belt**

A belt with a trapezoidal cross section, made to run in sheaves or pulleys, with grooves of corresponding shape.

**V-Door**

An opening at floor level in a side of a derrick or mast. The V-door is opposite the drawworks and is used as an entry to bring in drill pipe, casing, and other tools from the pipe rack.

**Waiting on Cement**

Standing time while waiting for cement in a well to harden. Abbreviated to W.O.C.

**Walking Beam**

The horizontal steel member of a beam pumping unit that has rocking or reciprocating motion.

**Wash Over**

To release pipe that is stuck in the hole by running washover pipe.

**Washover Pipe**

An accessory used in fishing operations to go over the outside of tubing or drill pipe stuck in the hole because of cuttings, mud, etc. that have collected in the annulus. The washover pipe cleans the annular space and permits recovery of the pipe.

**Washover String**

The assembly of tools run into the hole during fishing to perform a washover. A typical washover string consists of a washover back-off connector, several joints of washover pipe, and a rotary shoe.

**Water Drive**

The reservoir drive mechanism in which oil is produced by the expansion of the underlying water and rock, which forces the oil into the wellbore.

**Water Pump**

On an engine, a device, powered by the engine, that moves coolant (water) through openings in the engine block, through the radiator or heat exchanger, and back into the block.

**Water Tank**

Tank used to store water that is used for mud-mixing, cementing, and rig cleaning.

**Water Well**

A well drilled to obtain a fresh water supply in order to support drilling and production operations or to obtain a water supply to be used in connection with an enhanced recovery program.

**Weight on Bit (WOB)**

The amount of downward force placed on the bit.

**Well**

The hole made by the drilling bit, which can be open (uncased) or cased. Also called borehole, hole, or wellbore.

**Wellbore**

The borehole or hole drilled for the well. It may be opened (uncased) or cased (with casing inserted). Also called a borehole or hole.

**Wellbore Soak**

A type of acidizing method whereby acid is poured into the borehole and allowed to soak into the formation. This is a very slow process. Also called wellbore cleanup.

**Well Completion**

The completion of bringing a well to productive status.

**Well Fluid**

The fluid, usually a combination of gas, oil, water, and suspended sediment, that comes out of a reservoir. Also call well stream.

**Wellhead**

Equipment at the surface of a wellbore, usually consisting of the casing head, tubing head, and Christmas tree.

**Well Logging**

Recording information about the characteristics of the formation. Some examples are electric well logging, mud logging, radioactivity well logging, and sonic logging. See Acoustic Survey, Electric Well Logging, Gamma-ray Log, Log, Microlog, Mud Logging, Neutron Log, Radioactivity Well Logging, and Sonic Logging.

**Well Puller**

A member of a well servicing company crew.

**Well Servicing**

Performing maintenance work on an oil or gas well in order to improve or maintain the producing rate from a formation. Involves repairs to the pump, tubing, sucker rods, etc.

**Well-Servicing Rig**

A portable rig, truck-mounted, trailer-mounted, or a carrier rig, consisting of a hoist and engine with a self-erecting mast.

**Well Stimulation**

An operation to increase the producing rate of a well or to force the well to begin producing when drilled. Examples are acidizing, fracturing, and shooting. See Acidizing, Formation Fracturing, Shooting, and Stimulation.

**Wildcat**

A well drilled in an area where no oil or gas production exists.

**Wireline**

A slender, rod-like or threadlike piece of metal usually small in diameter, that is used for lowering special tools into the well.

**Wireline Operations**

The lowering of mechanical tools, such as valves and fishing tools, into the well for various purposes.

**Workover**

A remedial operation to try to increase production from a well. To repair or stimulate an existing production well to restore or increase production.

**Workover Fluid**

A special drilling mud used to keep a well under control while it is being worked over.

**Workover Rig**

A portable rig used for working over a well.

**Work String**

In drilling, the string of drill pipe or tubing suspended in a well to which is attached a special tool or device that is used to carry out a certain task, such as squeeze cementing or fishing.

## Common Oil & Gas Well Industry Abbreviations

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### A

API – American Petroleum Institute

AFE – authorization for expenditure

ANC – anchor

AOF – Absolute Open Flow potential (gas well)

ARO – at the rate of

ASV – Annular Safety Valve

### B

BAT – Before acid treatment

B/B – back to back

B/D – barrels per day

B/H – barrels per hour

bbl – barrel

BBL – barrel (42 US gallons)

BBLS – barrels

bcf – billion cubic feet (of natural gas)

BHA – Bottom Hole Assembly (toolstring on coiled tubing or drill pipe)

blg – bailing

BLO – blow

blr – bailer

BO – barrels of oil

boe – barrel of oil equivalent

boed – barrel of oil equivalent per day

BOP – blowout preventer

bopd – barrel of oil per day

BOPD – barrels oil per day

BOPH- barrels oil per hour

BOPS – blowout preventer string

bpd – barrel per day

BPM – barrel per minute

BPV – Back Pressure Valve (end of coiled tubing a drill pipe tool strings to prevent fluid flow in the wrong direction)

BRT – Below Rotary Table (used a datum for depths in a well)

BS&W – Basic Sediments and Water

BSW – bottom sediment water

BU – build up

BW – barrels of water

bwd – barrel of water per day (often used in reference to oil production)

bwpd – barrel of water per day

BWTA – blow well to atmosphere

## C

cal – Caliper survey, calorie, calcite, calcitic, caliche

CBL – Cement Bond Log (measurement of casing cement integrity)

CF – casing flange

CHK – choke

CHP – Casing Hanger Pressure (pressure in an annulus as measured at the casing hanger)

CIBP – Cast Iron Bridge Plug

CIP – Cement in place

CIRC – Circulate

CITHP – Closed In Tubing Hanger Pressure (THP when the well is shut in)

CLR also COLR – collar

cmt (d) (g) – Cement (ed) (ing)

comp – Complete, completed, completion

compr – compressor

condr – conductor pipe

CO & S – clean out and shoot

COTD – clean out to total depth

CP – casing pressure

CS – Cast steel

CS – Casing seat

CSG – casing

CT – Coiled Tubing

C/W – completed with

## **D**

D & A – dry and abandoned

D&C – Drilling and Completions

DFP – Date of first production

DHSV – Downhole Safety Valve

DHR – Dry hole reentered

dir – direction

dir sur – directional survey

displ – displaced, displacement

D/L – Density log

DN – down

DO – drill (ed) (ing) out, development of well

D/P – drill (ed) (ing) plug

dpg – deepening

dpt – Depth

DPU – drill pipe unloaded

drk – derrick

drl – drill

drlld – drilled

drlg – drilling

DS – directional survey

DS – drill stem

DST – drill stem test

DWA – drilling with air

DWM – drilling with mud

DWO – drilling with oil

## **E**

ESP – Electric Submersible Pump

## **F**

F/ – flowed, flowing

FB – fresh break

FBHP-flowing bottom hole pressure

FCP – flowing casing pressure

FDL- formation density log

FF- frac finder (log) full of fluid, fishing for

FGIH – finish going in hole

fl/ – flowed or flowing

fl – fluid

FIV – Formation Isolation Valve

FTP – flowing tubing pressure

FTS – fluid to surface

FW – fresh water

FWV – Flow Wing Valve (also known as Production Wing Valve on a Xmas tree)

**G**

G – gas

GA – gallons acid

GB – gun barrel

GBT – Gravity Base Tank

GI – gas injection

GIH – going in hole

GIW – gas injection well

GL – gas lift, ground level

G/L – gathering line

GIIP – Gas Initially In Place

GLM – Gas Lift Mandrel (alternative name for Side Pocket Mandrel)

GLV – Gas Lift Valve

GOR – Gas Oil Ratio

GR – gamma ray tool

GSI – gas well shut-in

gvl – gravel

GVLPK – gravel packed

**H**

HP – High Pressure

HPF – holes per foot

HYD – hydril thread, hydraulic

**I**

IAB – initial air blow

IBHP – initial bottom hole pressure

ID – Inner Diameter (of a tubular component such as a casing)

IGOR – injection gas-oil ratio

INJ – inject

IPC – Installed Production Capacity

IR – injection rate

ISITP – initial shut-in tubing pressure

IW – injection well

## **J**

J&A – junk and abandoned

JB – junk basket

JP – jet perforated

JTS – joints

## **K**

K – thousand

KB – kelly bushing

KCL WTR – potassium chloride water

KO – kicked off, knock out

## **L**

LC – lost circulation

LCM – lost circulation material

LD – lay down

LIH – left in hole

lk – leak, lock

LMV – Lower Master Valve (on a Xmas tree)

LN – line

lnr – liner

LO – load oil, lube oil

LNG – Liquefied Natural Gas

LP – Low Pressure

L.P. – line pipe

lse – lease

LTD – log total depth

LVL – level

## **M**

m – meter

MAW – mud acid wash

mbd – thousand barrels per day

mbod – thousand barrels of oil per day

MCF – thousand cubic feet

MCFD – thousand cubic feet per day

MD – Measured Depth

MDT – Modular formation Dynamic Tester

MI – move in

MICT – move in cable tools

MICU – moving in completion unit

millg – milling

MIRU – move in and rig up

mmbd – million barrels per day

mmbod – million barrels of oil per day

MMCF – million cubic feet

MMCFD – million cubic feet per day

mmscfd – million standard cubic feet per day

mmstb – million stock barrels

MO – moving out, motor oil

MWD – Measurements while drilling

MTD – measure total depth

## **N**

NRV – Non Return Valve (Chicksan valve that only allows flow in one direction)

NTD – new total depth

## **O**

O – oil

OBM – oil base mud

OD – Outer Diameter (of a tubular component such as a casing)

OSA – oil soluble acid

OTD – old total depth

OWDD – old well drilled deeper

## **P**

P – pump

P&A – plugged and abandoned

PB – plug back

PBR – Polished Bore Receptacle (component of a completion string)

PBTD – plugged back total depth

PBU – Pressure Build Up (applies to integrity testing on valves)

PERF – perforate

perf csg – perforated casing

PGOR – Produced Gas Oil Ratio

PKR – packer

PLT – Production Logging Tool

pmp (d) (g) – pump, pumed, pumping

POB – plug on bottom

POOH – Pull Out Of Hole

PR&T – pulled rods and tubing

PSA – packer set at

PTG – pulled tubing

PU – Pumping Unit, also “pick up”

PWV – Production Wing Valve (also known as a flow wing valve on a Xmas tree)

## **R**

RBP – retrievable bridge plug

RD – rig down

rec – recover. Recovery, recorder, recording

REL – running electric log

REP – repair, replace, report

rev/O – reversed out

RFT – Repeat Formation Tester

RH – rat hole

RIH – Run In Hole

RKB – Rotary Kelly Bushing (a datum for measuring depth in an oil well)

RKX – Rock Salt

RLS – release

rmv – removable

R&T – rods and tubing

RU – rig up

## **S**

S&F – swab and flow

scf – standard cubic feet (of natural gas)

SD – sand

SD -shut down

SFC – surface

SI – shut in

SIBU – shut in for build up

SICP – shut in casing pressure

SITHP – Shut In Tubing Hanger Pressure (another term for CITHP)

SITP – shut in tubing pressure

SLV – sleeve

SN – seating nipple

SPF – shots per foot

sqz – squeeze (d) (ing)

SS – stainless steel

SSSV – Sub-Surface Safety Valve

ST – start

stb – stock tank barrel

SW – salt water

SWB – swab

SWD – salt water disposal

SWDW – salt water disposal well

SX – sacks

## T

TA – temporarily abandoned

TB – tank battery

TBF – total barrels of fluid

TBG – tubing

TD – Target Depth

TD – total depth

TGOR – Total Gas Oil Ratio (GOR correct for gas lift gas present in the production fluid)

TH – tight hole

THP – Tubing Hanger Pressure (pressure in the production tubing as measured at the tubing hanger)

TIH – trip in the hole

TKS – tanks

TOC – Top of Cement

TOF – Top of fish, top of fluid

TOH – trip out of hole

TR – Temporary Refuge

TRSCSSSV – Tubing Retrievable Surface Controlled Sub-Surface Safety Valve

TRSCSSV – Tubing Retrievable Surface Controlled Sub-Surface Valve

TRT – treat

TRTD – treated

TVD – True Vertical Depth

UMV – Upper Master Valve (from a Xmas tree)

## **W**

WAG – Water Alternating Gas (describes an injection well which alternates between water and gas injection)

WCM – water-cut mud

WEG – Wireline Entry Guide

WF – water flood

WH – well head

whip – whipstock

WHM – Wellhead maintenance

WHP – Wellhead Pressure

WKOR – Work Over Rig

WL – wireline

WLBR – Wellbore

WO -workover

WOB – Weight on bit

WOC – Waiting on Cement (to cure)

WOCR – Waiting on Completion Rig

WOE – Well Operations Engineer (a key person of Well services)

WOS – washover string

WRSCSSV – Wireline Retrievable Surface Controlled Sub-Surface Valve

WS – whipstock

WSS – Well Services Supervisor (leader of Well services at the wellsite)

WTR – water

**X**

X-O – turn around

**Z**

Z – zone

## Offshore Block Areas

There are seven distinct areas that may be included in Texas waters: High Island Area, Galveston Island Area, Brazos Area, Mustang Island Area, Matagorda Island Area, North Padre Island Area, and South Padre Island Area. These areas are divided into blocks. The following information should be used to determine whether or not a numbered block area is in Texas waters. There are two types of blocks: (1) Large block areas in Texas and/or federal waters, and (2) small block areas in Texas waters only. Large block areas will have an “L” designation following the number, and small block areas will have an “S” designation following the number.

If the block number is not listed below, then that area is in federal waters only.

### **Examples of How to Use This List**

Block 836L is not listed, which means this block is in federal waters.

Block 836S is in Texas waters (all S blocks are in Texas waters).

Block 838L is listed partially in Texas and Federal waters. To determine which waters, the well number is needed. Wells in Federal waters are designated by “OCSGXXXX.” Wells in Texas waters are designated by “State Tract XXXXX.”

### **Large Block Areas in Texas Waters**

1L to 13L | 440L to 446L | 839L to 841L | 1106L to 1109L  
 23L to 30L | 481L to 486L | 860L to 862L | 1127L to 1129L  
 56L to 62L | 521L to 525L | 881L to 882L | 1148L to 1150L  
 99L to 102L | 559L to 563L | 900L to 903L | 1167L to 1170L  
 146L to 150L | 593L to 598L | 920L to 923L |  
 184L to 187L | 627L to 630L | 940L to 943L |  
 215L to 219L | 659L to 662L | 960L to 963L |  
 246L to 249L | 691L to 694L | 982L to 984L |  
 276L to 279L | 720L to 722L | 1024L to 1005L |  
 306L to 310L | 746L to 749L | 1023L to 1026L |  
 335L to 340L | 771L to 774L | 1045L to 1048L |  
 368L to 373L | 794L to 797L | 1065L to 1068L |  
 403L to 409L | 818L to 820L | 1086L to 1089L |

### **Large Block Areas Partially in Texas and Partially in Federal Waters**

17L 103L 275L 410L 558L 695L 843L 1022L 1171L  
 18L 104L 280L 411L 564L 696L 859L 1023L  
 19L 105L 281L 438L 565L 718L 863L 1027L  
 20L 145L 304L 439L 591L 719L 864L 1043L  
 21L 151L 305L 447L 592L 723L 880L 1044L  
 22L 182L 311L 448L 599L 724L 883L 1049L  
 31L 183L 312L 449L 600L 745L 899L 1064L  
 32L 188L 333L 450L 601L 750L 904L 1069L  
 33L 189L 334L 478L 624L 751L 919L 1085L  
 34L 213L 341L 479L 625L 770L 924L 1090L  
 53L 214L 342L 480L 626L 775L 939L 1105L  
 54L 220L 365L 487L 631L 776L 944L 1110L

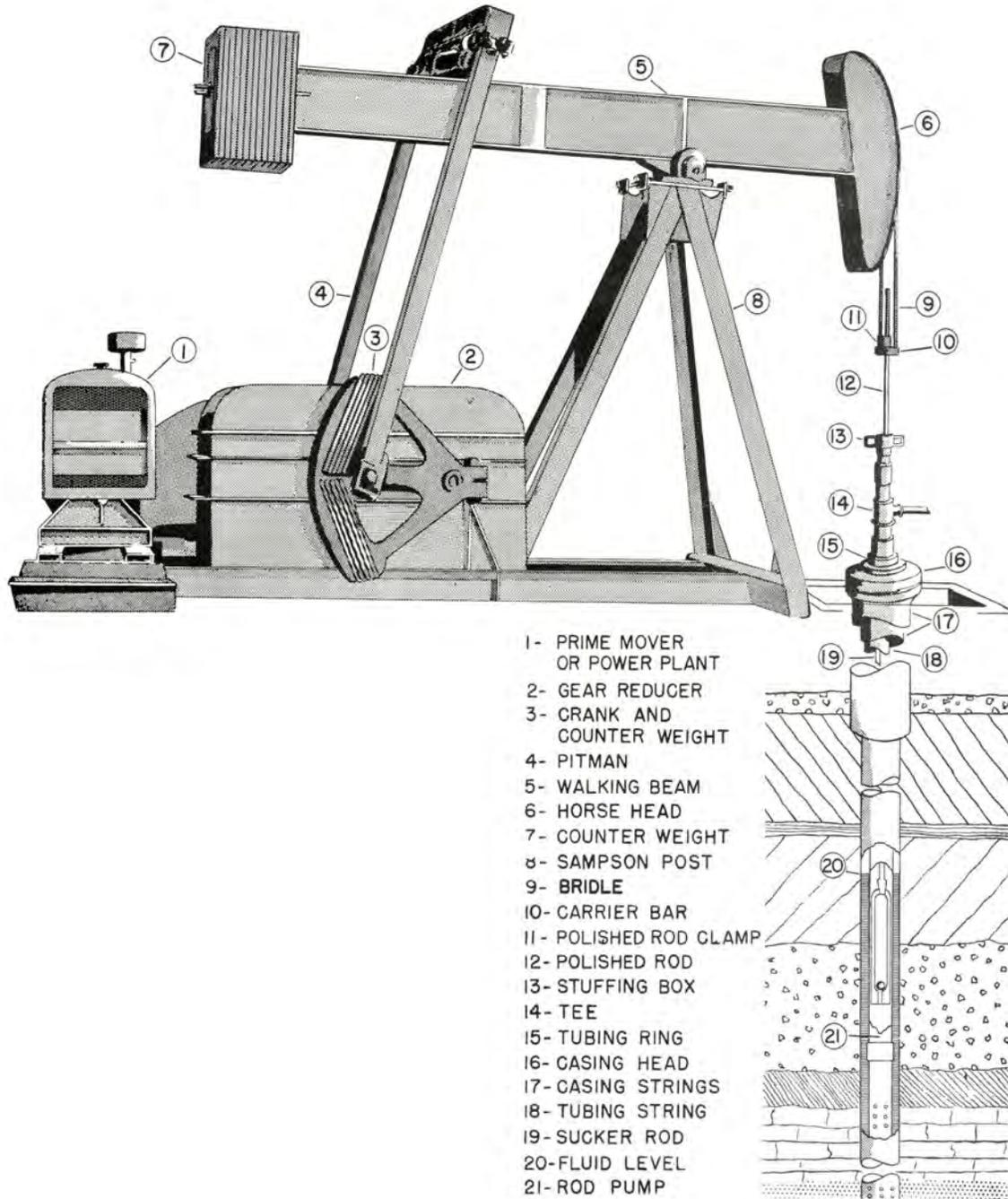
55L 221L 366L 488L 632L 793L 959L 1126L  
63L 222L 367L 518L 657L 798L 964L 1130L  
64L 244L 374L 519L 658L 816L 980L 1131L  
65L 245L 375L 520L 663L 817L 981L 1146L  
96L 250L 400L 526L 664L 821L 985L 1147L  
97L 251L 401L 527L 689L 838L 1001L 1151L  
98L 274L 402L 557L 690L 842L 1006L 1166L

**Small Block Areas in Texas Waters – (Just off Texas coastline)**

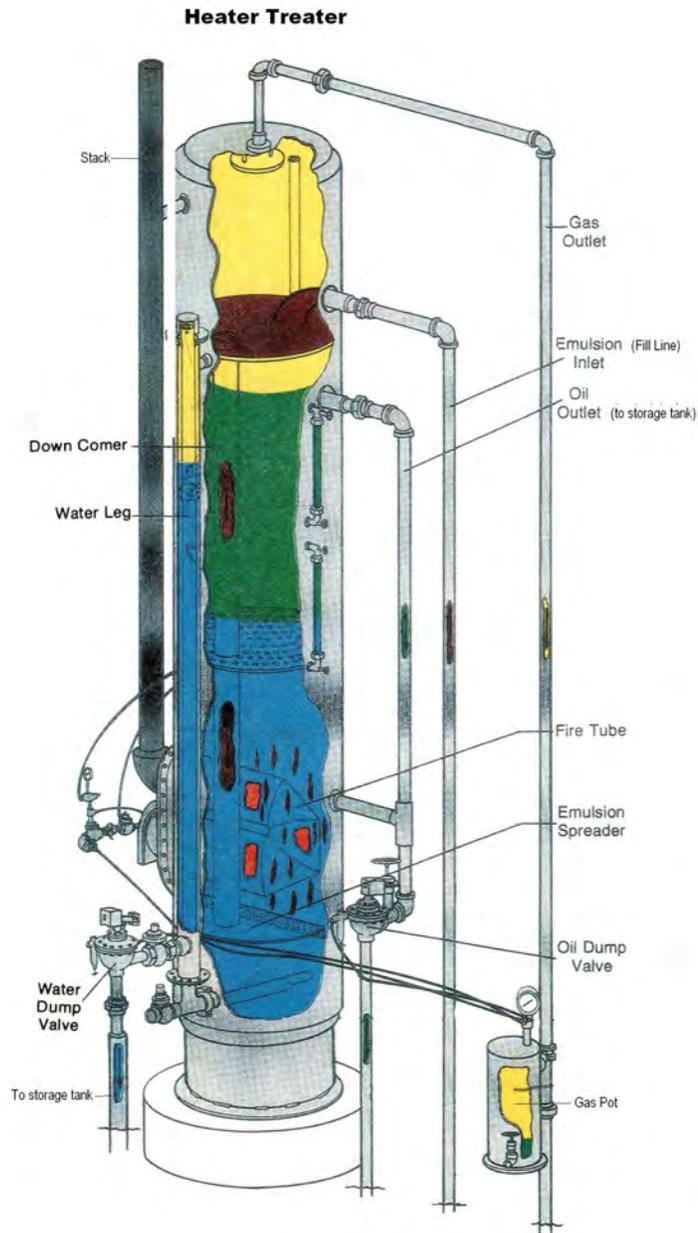
1S-1240S

**Illustrations**

**Pumping Unit**



- 1- PRIME MOVER OR POWER PLANT
- 2- GEAR REDUCER
- 3- CRANK AND COUNTER WEIGHT
- 4- PITMAN
- 5- WALKING BEAM
- 6- HORSE HEAD
- 7- COUNTER WEIGHT
- 8- SAMPSON POST
- 9- BRIDLE
- 10- CARRIER BAR
- 11- POLISHED ROD CLAMP
- 12- POLISHED ROD
- 13- STUFFING BOX
- 14- TEE
- 15- TUBING RING
- 16- CASING HEAD
- 17- CASING STRINGS
- 18- TUBING STRING
- 19- SUCKER ROD
- 20- FLUID LEVEL
- 21- ROD PUMP



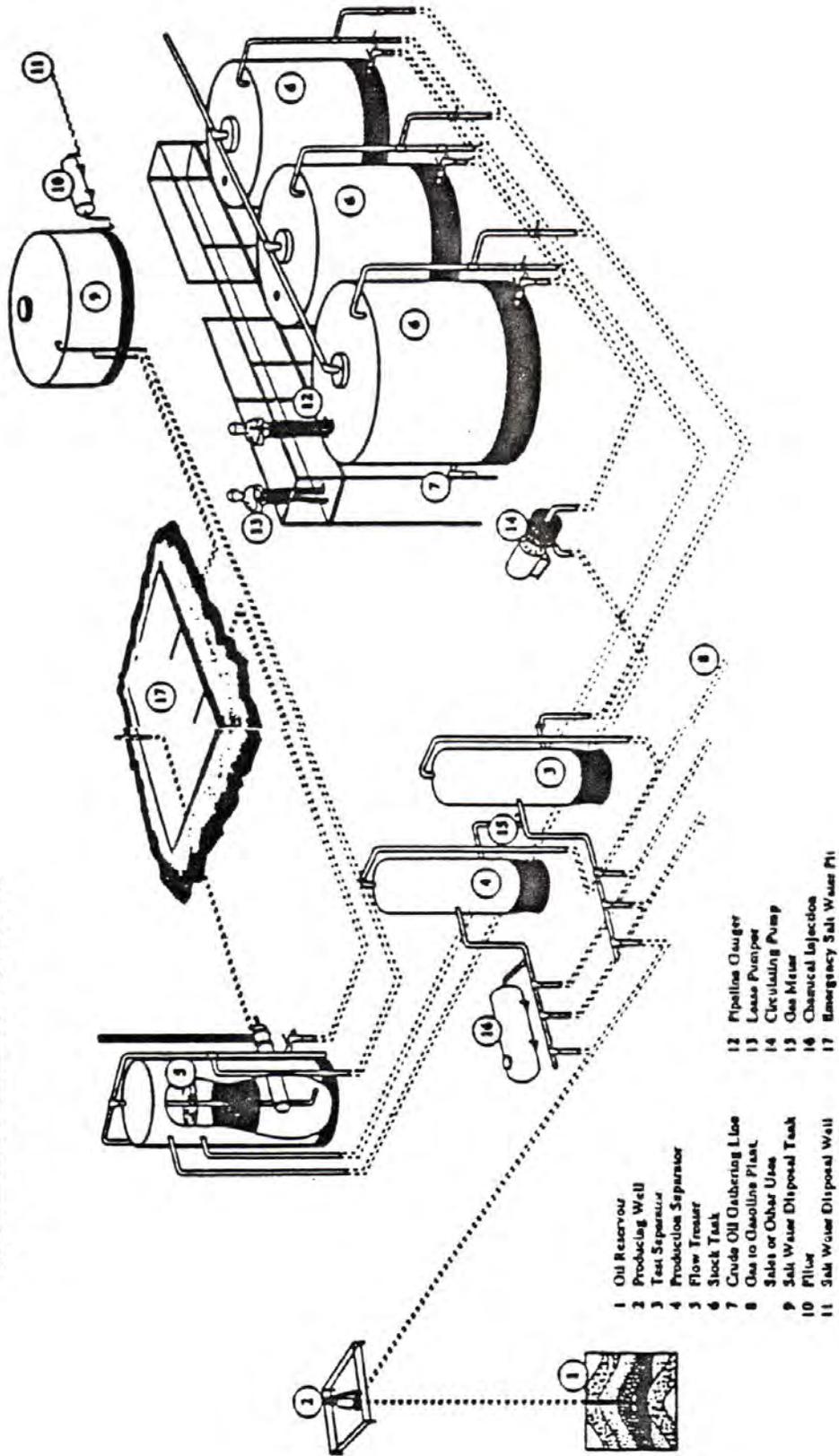
**VESSEL SIZE**

Diameter x Height	3 x 15	4 x 20	6 x 20
Max. BTU/Hr.	208000	350000	500000
Capacity Oil Bbl./Day	35 - 150	95 - 430	190 - 600
Capacity Water Bbl./Day	175 - 350	300 - 600	700 - 1300
Gas Oil Ratio	1000:1	1000:1	1000:1

**LEGEND**

	RAW EMULSION
	CLEAN OIL
	WATER
	GAS
	HEAT AND FIRE

**OIL LEASE FACILITY DIAGRAM**



TYPICAL GAS LEASE

