5000 Oilfield Terms:
A Glossary of Petroleum Engineering Terms, Abbreviations and Acronyms

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US spelling used

A Annulus: the inside annulus; tubing-by-production casing annulus. (Note, there may be regional differences in the A, B, C annulus designations and some are reversed. Inside annuli (IA) and outside annuli (OA) are more universally descriptive.)

AAIOR: annualized average incremental oil rate.

AAODC: American Association of Oilwell Drilling Contractors.

AAPEA: Australian Petroleum Production and Exploration Association.

AAPG: American Association of Petroleum Geologists.

AAPL: American Association of Petroleum Landmen.

AAR: after action review.

AASP: allowable annular surface pressure.

AAV (subsea): annular access valve.

Abalation Debris (perforating): small pieces of rock broken up by the perforating process.

Abandon: typically means to cease efforts, either temporarily or permanently, to produce a well. Abandon may have a legal meaning in some locations.

Abandonment Cost: Costs associated with the abandonment of facilities or services, including costs for the removal of facilities and restoration of the land.

Abiogenic Theory: a theory of petroleum generation in which petroleum is thought to have formed from hydrocarbons trapped inside the earth's crust when the earth was forming. See also Biogenic and Organic theories.

Abject Failure (Risk): a failure mode that can cause the cancellation-of or immediate-halt-to a project or event. Generally expressed as a percent probability.

Abandon: to cease efforts to produce or inject fluids in a wells and to plug the well sufficiently to protect the environment and the ability to redrill and develop other reserves at a later date.

Abandonment Pressure: The minimum pressure of the reservoir when the wells are abandoned.

Abnormally Pressured: a pore pressure higher than a column of sea water for that true vertical depth.

Abrasion (geologic): a form of mechanical weathering where loose fragments are transported with water or wind.

Abrasion (mechanical): wearing away by friction.

Abrasive: particles propelled at a velocity sufficient to cause cleaning or wearing away of a surface.

Abrasive Jetting: a perforating process involving pumping a slurry of liquid and size particles through a nozzle to cut through steel and rock.

ABS: American Bureau of Shipping.

ABS (plastic): Acrylonitrile-Butadiene-Styrene.

Absolute Ages: estimation/measurement of age of a formation, fossil, etc., in years before the present.

Absolute Filter Level: a filter rating that purports to set the maximum size of an opening in a filter or the maximum size of the particle that can pass through the filter. The definition varies with use and company.

Absolute Open Flow (AOF): the maximum rate that a well can produce at the lowest possible bottom hole pressure.

Absolute Open Flow Potential: the theoretical maximum flow that a well could deliver with a zero backpressure at the middle of the perforations.

Absolute Permeability: permeability to a single phase fluid in a cleaned core.

Absolute Porosity: the percentage of the total bulk volume that is pore spaces, voids or fractures.

Absolute Pressure: the reading of gauge pressure plus the atmospheric pressure.

Absolute Temperature: temperature measurement starting at absolute zero (total absence of heat).

Absolute Viscosity: the measure of a fluid's ability to resist flow without regards to its density. It is defined as a fluid's kinematic viscosity multiplied by its density.

Absolute Volume: the volume a solid occupies when added to a fluid divided by its weight. m^3/kg or gal/lb.

Absolute Zero: zero point on the absolute temperature scale; equal to -273.16 degrees C, or 0 degrees K (Kelvin), or -459.69 degrees F, or 0 degrees R (Rankine).

Absorb: to fill part or all of the pore spaces.

Absorber: a vertical, cylindrical vessel that recovers heavier (longer carbon chain) hydrocarbons from a mixture of lighter hydrocarbons.

Absorptance (seismic): the ratio of the energy absorbed by a formation in relationship to the total energy passing through it.

Absorption (processing): the ability of one material to absorb another.

Absorption Gasoline: gasoline extracted from wet natural gas by putting the gas in contact with oil.

Absorption Oil (facilities): the wash oil used to remove heavier hydrocarbons from the gas stream.

Abyssal: depositional environment of the deepest areas of the oceans.

Abyssal Plain: large, flat ocean floor, usually near a continent and usually over 4km (13100 ft) ss.

ACA: after closure analysis; a fracture performance test method.

AC Test Dust™: a precision sized micron particle material used for testing the solids stopping capability of filters.

Accelerator (chemical): A chemical that speeds up the rate of a chemical reaction. Most common are the accelerators used in cementing.

Accelerator (drilling): an energy increasing device, with sudden energy release, used in a jarring string while fishing.

Accommodation: place where personnel spend their off-duty time on a rig.

Accretion: the action of particles forming adhering clumps on pipe.

Accumulation (reservoir): an economic quantity of hydrocarbon trapped in a permeable rock strata.

Accumulator (pressure control device): canisters of hydraulic fluid, pressurized with a nitrogen gas cap of sufficient pressure and volume to operate all the rams on a BOP in case of power failure to the BOP.

Accumulator (processing plant): a vessel that receives and temporarily stores a liquid used in the feed stock or the processing of a feed stream in a gas plant or other processing facility.

Accumulator Precharge: the initial nitrogen charge on a BOP accumulator that is placed before the fluid is pumped in to charge the accumulator.

Accuracy: the closeness of agreement between the measure value and the exact value.

Acetic Acid: a very weak organic acid used for minor and shallow damage removal. Also used as a moderately effective iron precipitation preventer. 4% acetic acid is vinegar.

ACFM: actual cubic feet per minute.

Acid: a reactive material with a low pH. Common oilfield mineral acids are HCl and HCl/HF.

Acid Brittleness: low ductility of a metal due to its adsorption of hydrogen. More commonly called hydrogen embrittlement.

Acid Effect: the change in pulsed neutron capture created by acidizing a carbonate. Acidizing increases interconnected porosity and strands chlorides and other ions in the rock.

Acid Flowback Analysis: chemical analysis of the acid concentration and other chemical and physical measurements in the returning acid.

Acid Fracture: to fracture stimulate a formation by injecting the acid over the parting pressure of the rock and using the acid to etch channels in the fracture face.

Acid Gas: any produced gas, primarily H_2S and CO_2 that form an acid when produced in water.

Acid Inhibitor: acid corrosion inhibitor. Slows the acid attack on metal.

Acid Solubility: the percent by weight loss of exposing a sample of material to an excess of acid.

Acid Stick: a solid stick of chloro-acetic or sulfamic acid for small scale removal of acid soluble deposits.

Acidizing: use of a mineral acid (typically HCl or HCl/HF) or an organic acid (typically acetic or formic) to remove damage or stimulate the permeability of a formation.

Acoustic Basement: formations below the deepest zones that can be imaged by an acoustic process.

Acoustic Impedance: the velocity of an imposed sound wave (acoustic velocity) through a rock times the density of the rock.

Acoustic Logging: a sonic travel time record of a formation using a tool with an emitter and a detector. Measures porosity and is useful to compare to other porosity longs to estimate pore filling. Also used to generate rock strength evaluations.

Acoustic Travel Time: the total time required for an acoustic wave to travel through a substance.

Acoustic Velocity: velocity of an imposed sound wave through a rock.

Acquisition Log: the raw, real time recording of the data, later formed into a digital or playback log.

Acreage: land leased for drilling exploration.

Acre-Ft: one acre (43560 ft^2) to a depth of one ft.

Acrylamide Polymer: a nonionic polymer (polyacrylamide) used in flocculation, clarifying and even gelling acids and other brines. Very stable, but difficult to effectively break.

Acrylic: a resin polymerized from one of several sources: acrylonitrile, acrylic acid, methacrylic acid, etc.

ACS: American Chemical Society.

Activated Carbon: a highly porous solid, usually a charcoal. Used for adsorption of unwanted materials.

Activation Logging: near formation area is irradiated with neutrons that transform some nuclei into isotopes. The isotopes produced can be detected by radioactive energy levels and decay time. The original elements can be described from this behavior.

Activator: a chemical, heat, radiation, or mechanical action that starts or accelerates a chemical reaction.

Active: A corrosion state where a metal is corroding without control by a reaction product (or corrosion product layer).

Actuator: a device that, by remote influence, can operate valves or other equipment.

ACV: annular safety valve.

AD: assistant driller.

Adaptor: a piece of equipment that connects pipe, flanges or other equipment with different root threads or connection mechanisms.

Adaptor Spool: an adaptor that allows BOP's to be connected to wellhead flanges of various sizes.

Additive: a compound incorporated into a gas, liquid, or solid system to alter the properties for a particular purpose.

Adhesion: attractive forces between unlike molecules or compounds. Example – the attractive forces between water molecules and the walls of a clean glass tube are stronger than the cohesive forces; this leads to an upward turned contact or meniscus at the wall.

Adiabatic: no exchange of heat with the surroundings.

Adjustable Choke: a pressure step-reduction choke that can be changed while actively flowing the well.

ADP (training): accelerated development program.

Adsorption: the attraction and holding of a layer of a chemical on the wall of a formation. Usually held by ionic charge or wetting preference.

Adsorption Band (seismic): the range of wavelength energy that can be adsorbed by a given formation.

Aeration: intoduction of air.

Aerobic (bacteria): bacteria that require oxygen to survive and multiply.

Aerosol: a suspension of fine liquid droplets or solid particles in a gas.

AFD: authorization for definition.

AFE (expense): Authority for Expenditure on a well (authorized funds for drilling or workover).

AFE (well operation): annular fluid expansion.

AFLAS^{TM}: a high temperature seal elastomer.

After Cooler: heat exchangers for cooling gas after compression.

AFP: annular friction pressure.

AFUDC: allowance for funds used during construction.

AFV: annular flow valve.

AG: Arabian Gulf.

AGA: American Gas Association.

Agate: siliceous rock with alternating bands of chalcedony and colored chert.

Agglomerates: larger particles of material made up of small, independent pieces.

Agglomeration: forming larger droplets, bubbles, or particles from smaller droplets, bubbles, or particles.

Aggregate (cementing): an essentially inert mixture of particles of a particular size range.

Aggregation: attraction and adherence of clumps of small particles.

AHD (depth): along hole depth or measured depth.

AHV (subsea): anchor handling vessel.

AIME: American Institute of Mining, Metallurgical and Petroleum Engineers.

AIP: Australian Institute of Petroleum.

AIPG: American Institute of Professional Geologists.

Air: Standard density of dry air, free of CO_2 at 0^oC is 1.292 g/L.

Air Can: buoyancy device on a Spar.

Air Density: 0.763 lb/ft^3 at standard temperature and pressure.

Air Drilling: drilling with air instead of drilling mud (requires diverters at the surface to handle cuttings and formation fluids).

Air Gap: the clearance between the highest water surface that occurs during the extreme environmental conditions and the underside of the deck.

Air Gun: seismic source for ocean seismic work.

Air Lift: a surface piston driven pumping unit, similar to a beam lift unit.

Air Stripping: remediation technique to strip volitile contaminants from contaminated ground water after a spill. Works to oxidize components and to activate bacteria that can digest hydrocarbons.

Air Weight: the weight of a string in air without the effect of buoyancy provided by wellbore fluids.

AIS: annular isolation sleeve.

AL: artificial lift.

ALARA: as low as reasonably achievable.

Alarm Point: preset value of a monitored parameter at which an alarm is actuated to warn of a condition that requires corrective action.

Albian: the oldest terrain from the Cretaceous period.

ALG: Algerian.

Aliphatic: carbon and hydrogen compounds that may be branched of straight chained. Aliphatics may be paraffin (saturated) or olefinic (unsaturated).

Alkali: a strongly basic solution.

Alkali Metal: a strongly basic metal such as sodium or potassium.

Alkaline: basic or pH over 7.

Alkaline Flooding: large scale injection of pH>7 fluids. The basic materials may react with oils to form reactants that can reduce viscosity or affect wetting.

Alkanes: straight or branched chain hydrocarbons with single bonded carbon atoms. Describes most oils.

Alkenes: straight or branched chain chemicals with some double bonds between carbons.

Alkyd: a resin formed by reaction of polyhydric alcohols and polybasic salts. Saturated or unsaturated oils or fats are involved.

Alkylation: a reverse cracking process that convents hydrocarbon light ends (olefins) into longer chain, liquid fuels.

Allocated Pool: a pool in which the total oil or gas production is restricted and allocated to specific wells as defined in a proration agreement.

Allocation: the process of determining ownership of hydrocarbons delivered to the meter or LACT unit on a lease.

Allocation Method: a method of allocating volumes to affected parties when an imbalance occurs.

Allochthonous: formations transported by fault or similar earth shift movements.

Allogenic: rock constituents and minerals derived elsewhere from older formations and redeposited.

Allowable: the production limit set on a specific well by a government regulatory body. Rarely seen.

Allowable Working Pressure or Stress: the maximum stress allowed by code or other agreement or study as a fraction of test pressure. Design pressure of the system is related to hoop stress.

Alluvial Fan: land counterpart of a river delta. Characteristic of sediments that have been transported by a fast moving stream then dropped out of the flow as the stream velocity drops as it spreads out. Typical of zones of heavy water runoff such as found at the base of mountains in arid and semi arid climates where flash floods may be seen. Often poorly sorted with pebble to boulder sized sediments. Weak cementing typical.

Alluvium: unconsolidated to well sorted to poorly sorted (gravel to sand sized) particles transported by water.

Alpha Decay: radioactive decay process where the loss of an alpha particle from the nucleus lowers the atomic number by two and the atomic mass by four.

Alpha Wave: the initial wave of gravel transport when packing a well with a deviation over 55^{o}.

Alternate Path Technology: a patented screen design that allows gravel packing slurry to flow past an annular bridge point that would normally stop the placement of gravel.

Alum: aluminum and potassium sulfate compound. Used was water clairfying.

Aluminum Activation Log: an investigation that focuses on aluminum content, an indirect measurement of clay content.

Aluminum Stearate: a mud degasser chemical.

Ambient Temperature: the temperature of the surroundings, usually an average surface temperature or test surface temperature.

Amides: linear or ring compounds with a $CO^{-}NH_2$ attachment. Common in surfactants.

Amines: ammonia based materials (NH_3), in which one of more of the hydrogen atoms are replaced by hydrocarbons.

Amorphous: without crystal form.

Amorphous Kerogen: Kerogen that lacks distinct form or shape under microscopic exam. May describe oil prone Kerogen.

Amphoteric Metal: metal that may corroded in either acids or alkalines.

Amphoteric Surfactant: a surfactant whose charge is dependent on another variable, normally pH.

AMPS: a copolymer. Acrylamido-methyl-propane sulfonate polymer.

Anaerobic (bacteria): bacteria that can survive and multiply without oxygen.

Analogous Reservoir: a comparable reservoir with many similar characteristics (e.g., lithology, depositional environment, porosity, perm, drive mechanism, produced fluids, etc.) that can be used for behavior projections comparison studies.

Anchor: a device with slips that holds equipment in the wellbore.

Ancillary Component: a component (e.g., bend stiffeners and buoyancy modules) used to control flexible pipe behavior.

ANGA: American Natural Gas Association

Angle of Repose (sand in pipe): the deviation angle (from vertical) at which a solid material will no longer fall down the pipe, but will begin to accumulate on the pipe wall. The angle of repose for dry, round sand is about 62^o and for wet sand about 50^o to 60^o depending on size, shape and moisture.

Angstrom: 10^{-10} meter.

Angular Unconformity: An unconformity in which the beds below the unconformity dip at different angles than the beds above it.

ANGTS: Alaska Natural Gas Transportation System.

Anhydrite: $CaSO_4$ formation. Usually formed as an evaporite from a drying lake of trapped sea water.

Anhydrous: dry – without water.

Aniline Point: the aromatics content of a mixture.

Anion: an ion with a negative charge.

Anion Exchange: process where a special resin exchanges chloride or hydroxide for contaminant anions such as fluoride, nitrate, sulfate and bicarbonate. Water purification is the primary use.

Anionic Surfactant: a negatively charged surfactant. Normally water wets sands.

Anisotropy: differences in rock – segments showing different responses when measured.

Anithic Fault: a secondary fault, often in a set, with opposite direction to the primary fault.

Annubar: a gas flow rate measurement device using Pitot tubes. Common in pipelines.

Annular Blowout Preventer: a device installed above or below the BOP that is capable of sealing around any device, and even on itself if the wellbore is empty.

Annular Flow: using the annulus as the flow path.

Annular Injection: Injection of fluids down the annulus or "backside". Common as a gas supply path for gas lift. Also used in some fracturing operations, to spot fluids downhole when no packer is used or a type of injection valve is in the tubing to allow entry of chemicals, gas or water.

Annular Packoff: a device that seals the annulus to pressure or flow.

Annular Pressure: pressure in an annular area. May be a vented or trapped annuli.

Annular Preventer: a elastomer bag or donut type seal, pushed into contact with the pipe or tools in the blow out preventer (BOP). It is designed to seal around pipe or any other irregular surface tool (packers, guns, pumps, etc.) that may be in the BOP. May also be called a Hydril preventer.

Annular Safety Valve: a downhole safety valve that shuts off the annulus.

Annular Valve: the valve on the side of the tree that controls access to the annulus.

Annular Velocity: the velocity of fluids flowing in the annulus. Important in clean-up and displacement processes.

Annulus: The area between the O.D. of an inside string and the ID of an outside string.

Annulus Sea Assembly: the mechanism that provides pressure isolation between each casing hanger and the wellhead housing.

Anode: the positively charged site in a cell. Oxidation site. The site of metal loss in corrosion.

Anode, sacrificial: a formed metal bar (zinc, aluminum, etc.) attached by electrical wire to a structure to be protected and buried in conductive soil near that structure.

Anode Corrosion Efficiency: the ratio of the mass loss of actual corrosion of an anode to the theoretical corrosion mass loss calculated from the quantity of electricity that has passed between the anode and the cathode using Faraday's law (from NACE).

Anodic Inhibitor: a substance that slows the reaction at the anode.

Anodic Protection: polarization to a higher oxidizing potential to achieve a reduced corrosion rate (promotes passivity).

Anodizing: oxide coating of a metal surface to reduce corrosion.

Anomalous: unusual data or measurement that is away from or out of the range of other data.

Anoxic: conditions where concentration is very low, usually less than 0.1 mg/liter of water.

ANSI: American National Standards Institute.

Athie Wagon: a trailer or other vehicle, designed for soft ground, often used as the staging platform for fighting well fires.

Anthracite: the most highly metamorphosed form of coal.

Anti-agglomerants (hydrate control): chemicals which prevent hydrate crystals from sticking together and forming a larger mass.

Anticline: a convex-upward formation of rock layers (a fold with the strata sloping down on the sides from a common crest. In association with a sealing rock, an anticline may form a trap for hydrocarbons. Anticlines may be faulted or unfaulted. The majority of the hydrocarbons produced so far have been from anticlines.

Antifoamer: a material that can quickly destabilize foam in a production fluid treating facility. Commonly needed after treatment with foamers, diesel, some polymers, some acids and gasified fluids.

Antifouling: any action designed to reduce or prevent fouling (deposits) on a surface.

Antitheic Fault: a secondary fault, often in a set, with an opposite direction to the primary fault.

Antiwhirl Bit: a drill bit that, by its cutter placement, causes the bit to be forced against the side of the hole.

Anvil (perforating): the strike plate over a TCP, drop-bar firing system.

AOF: see Absolute Open Flow. The maximum rate that a well can produce at the lowest possible bottom hole pressure (usually figured with a gas gradient).

AOFP: absolute open flow potential.

AOR: authorized over-run.

APB: annular pressure build up.

APD: approved permit to drill.

APD (DOI) Appicaltion for Permit to Drill.

APE: area petroleum engineer.

APE: authorization for expenditure.

Aperture: the unobstructed opening size (diameter, length and width, or other shape factor).

API: American Petroleum Institute.

API Fluid Loss: a standard fluid leakoff test published by API.

API Gravity: the relative density of a hydrocarbon based on a scale of degrees API. Density in g/cc = (141 / (131 +API)).

API Monogram: a stamp indicating that the item is manufactured to API specifications.

API RP: a recommended practice published by the API.

API Unit: the unit of radioactivity used for natural gamma-ray logs.

Apparent Resistivity: resistivity recording where the measured value differs from the true or defined state by the influence of the mud column, invasion of a zone by fluids, or wellbore anomalies.

Apparent Viscosity: the viscosity at a given shear rate and a given temperature.

Appraisal Well: additional wells drilled after a discovery, to confirm the size of a hydrocarbon deposit. Normally used to run buildup tests, drill stem tests, top and bottom of formation, gather core or fluid samples or other evaluations.

APR: annular pressure relief valve. Used in reverse circulating to prevent pipe collapse.

APR: trademarked name for an annular pressure response valve – for a DST string.

APRV: annular pressure relief valve.

AQL: acceptance quality level.

Aquicide: a relatively impermeable stratum that does not transmit water fast enough to supply a well.

Aquifer: a water containing formation that may or may not be directly connected to the hydrocarbon bearing zone. A connected aquifer may or may not offer pressure support to the pay.

Aquitard: a geologic formation through which no water flows. It may be an effective seal to the movement of water.

Arch: a large, load supporting formation that may serve to reduce the total overburden load on a pay zone. These formations may cover hundreds of square miles over a basin. A second use is as a semi-stable structure of sand grains around a perforation or other opening that keeps sand from flowing so long as the flowing pressure holds the arch in place.

Archean: an eon of geologic time extending from about 3.9 billion to 2.5 billion years ago.

Archie Correlation: Empirical relationships between the formatu=ion resistivity factor, the porosity, water saturation and the restivity of the fluid in the pore in clean, granular rock.

Archie Equation: an empirical relationship between the formation resistivity, F, and porosity, Φ, in which $F=1/\Phi^m$, where the porosity exponent or cementing factor, m, is a constant for a particular formation. Typical m's are 1.8 to 2.0 for consolidated sandstones and 1.3 for poorly consolidated sandstones.

Area of influence (of a well): the area surrounding a well within which drawdown and production has changed the saturation and energy of the system.

Area Open To Flow: the flow area generated by perforations across a zone of interest. Typical calculated perforation entrance hole areas are 1% to 6% of the pipe body. Used in pressure drop calculations.

Area-to-Volume Ratio (mineral): the area of the surface of a grain to its physical volume.

Area-to-Volume Ratio (pore/frac volume): exposed area of a pore or fracture to the volume of fluid in the pore or fracture.

Arenaceous: sand particles, 0.625 to 2 mm on the Udden-Wentworth scale.

Argillaceous: rocks or substances composed of clay minerals, less than 0.625mm, or having a high proportion of clay in their composition such as shale

Arkose: A sandstone containing 25% or more of feldspar, usually derived from igneous rock.

Armor: shielding over a cable or other device that needs to be protected from crushing.

Aromatic (chemical): describing members of a family of chemicals with a ring structure of carbon chains. Normally xylene, toluene, etc. Benzene is a aromatic but is not used.

Arrest Marks: (failure/crack development): characteristic markings (ridges, tears, risers, etc.) on fracture surfaces after fatigue crack of fracture propagation (also known as beach marks, clamshell marks, and conchoidal marks).

Arryo: a steep sided gulley in arid areas that carries runoff, usually at high velocities, for very short times after a rain.

Artesian Water: water that is overpressured and may rise above the formation.

Artificial Lift: one of several methods that provide pressure assistance to increase flow from a well. The most common systems lighten (decrease density) of the flowing fluid (gas lift), or remove all or part of the liquid head from the reservoir (beam and electric submersible pumps).

ASME: American Society of Mechanical Engineers.

Asph: asphaltene.

Asphalt or Asphaltene: ring compound materials in the oil composed of carbon, hydrogen, sulfur, nickel and other trace materials. Asphaltenes are mostly very small platelets (35 A) suspended by micelles of maltenes and resins and carried through the oil. They precipitate by agglomeration as the micelles break apart on shear, mixing with acids, or other interruption of the micelle stability.

Assay: analyze.

Assemblage: the collection of minerals that characterize a rock or facies.

Associated Gas: the natural gas which occurs with crude oil. It may be free or dissolved. When it occurs as free gas, it may be called unassociated gas.

Associated Liquids: hydrocarbon condensates produced in conjunction with natural gas.

Associated Reservoir: Oil and gas reservoir with a gas cap. Gas production from these reservoirs may be restricted in order to preserve the gas cap energy and ultimate recovery.

Astenosphere: the weak section of soft rock in the upper mantle just below the lithosphere. It is involved in plate movement. Depth is 70 to 100 km below the surface.

ASTM: American Society of Testing Materials

ASV: annular safety valve.

ATP: advanced technology parts.

Attapulgite Clay: a colloidal, viscosity building clay used in water based muds. They generate viscosity due to the mechanical interference of their straw shaped bodies.

Attenuation: When a form of energy is propagated through a medium, its amplitude (energy level) is decreased. This decrease is termed attenuation.

ATV: all terrain vehicle.

Austenitic Steel: a steel with a microstructure consisting of austentite at room temperature.

Authigenic: a clay or other mineral that was formed within the pore spaces of the rock. The material is most often formed by reaction or precipitation from connate fluids.

Authochthonous: formations that formed in the present locations and have not been transported.

Automatic "J": a set or release mechanism where pickup or set down will release or set the tool.

AUV (subsea): autonomous underwater vehicle.

AV (fluids): apparent viscosity.

AV (flow): annular velocity.

Available Overpull: the amount of unused pull capacity of a rig after picking up the entire string weight.

AW Rod Thread: A thread for tools and equipment that has three parallel threads per inch (similar to a BW thread). Used in applications of 1.75" OD thread or less.

AWGRS: Alaska well's group reporting system.

AWV: annulus wing valve.

Axial Load: a tension or compression force, usually along the length of an object.

Azimuth (logging): in a horizontal plane, it is the angle (measured clockwise) of well path departure usually from true or magnetic north. It may also be expressed as the compass direction of the path of the well bore as measured by a borehole survey. (Note: check the specifics of the survey for the details).

B/D: barrels per day.

B Annulus: an outside annulus, one out from the A annulus, usually production casing x production casing or surface casing. (Note, there may be regional differences in the A, B, C annulus designations)

B Profile: seldom used name for a SSSV profile.

Babbitt: a soft metal alloy used in some seals and bearings.

Backbite: a backlash of tongs that results in a grip in the wrong direction.

Back Flow: return flow from injection of a fluid into a formation.

Back Flushing: reverse flow of a fluid, usually in a well treatment or injection well, where flow from the reservoir to the wellbore, often at high drawdown, is used to clean fluids and shallow particulate damage from the near-wellbore area.

Background Radiation: the radiation intensity existing in the environment before a specific radiation source is considered.

Back-Haul: an operation or transaction that results in movement of gas in a direction opposite of the normal flow direction in a pipeline.

Back-in (contract): a type of interest in a well or least that becomes active at a specified time or a specified event.

Back Off: unscrewing a tool or equipment. In pipe recovery, back-off of a joint precedes recovery of the upper section in a well. Common in plug and abandonment or sidetrack operations.

Back Pressure: a pressure caused by a restriction or fluid head that exerts an opposing pressure to flow.

Back Pressure Valve: a flow control valve that provides some control when running or pulling a string.

Back Reamer: a tool to enlarge a drilled hole.

Back Scuddling: reverse circulating.

Back-Side: the annulus above the packer.

Back Surge: sudden backflow of a well, usually to clean the perforations.

Back-Up Ring (seals): a ridged ring-like support next to a seal to provide higher pressure or temperature support.

Back-Up Wrench or Tong: the tool that keeps the pipe string from rotating while a joint is made up.

Back Wash: usually reverse circulation

Bactericide: a product that kills bacteria in the water or on the surface of the pipe.

Bacterial Degradation: breaking down alkanes by bacterial action. Common by psedomonis and ultramonis bacteria and other bacterial strains that digest parts of the crude oil structures. Useful for remediating oil spills or tank bottom residuals.

Bacterial Oxidation and Reduction: reactions involving aerobic decay, organic matter oxidation, fermentation, anaerobic decay, etc.

Bacterial Remediation: liquefaction or break down of oily waste or clean-up of oil spills by the use of the naturally occurring oil consuming bacteria, chiefly ultramonis and pseudomonis.

Bag-Off: inflatable devices in a pipeline meant to stop flow.

Baffles: plates in a separator on which the flow impinges and breaks out gas.

Bail: remove solids or fluids from a well.

Bailer: a hollow tube with a trap door or ball seat, run on wireline, which can be used to spot or remove solid material from a well bore.

Balance Point: that point at which forces acting on pipe in a well (usually while running) are equal.

Balance Point (coiled tubing or snubbing): Static condition of the length of tubing in the well, where buoyed tube weight (well fluid sensitive) equals the well pressure acting against the cross-sectional area of the tube. The balance point does not include any frictional forces exerted by friction with the well or the stripper assembly.

Balanced Plug: A cement plug, set with no downhole flow conditions, which allows temporary or permanent shut-off in a well. It takes into account the densities of all fluid columns, both in the string and in the annulus.

Balancing Agreement: contractual agreement between legal parties to account for differences between chart measured quantities and the total confirmed quantities at a measuring point such as a plant. They are used to track over/under production relative to entitlements between producers; over/under deliveries relative to measured volumes between operators of wells, pipelines and LDCs.

Ball (tool operation): a steel, aluminum, brass or plastic ball pumped or dropped downhole to shift or operate a tool.

Ball Catcher: a cylinder at surface to catch ball sealers before the fluid is routed through the choke.

Ball Diverter: ball sealer.

Ball Dropper: a device that injected balls into the flowing treating fluid downstream of the high pressure pump.

Ball Operated: mechanical device activated by pumping a ball of a certain size down the tubing in the injected or circulated fluid.

Ball-Out: When using ball sealers, to effectively shut-off the entire zone and cause pressure to rise sharply.

Ball Sealers: small, rubber-covered, hard centered balls that can seal individual perforations during a chemical treatment.

Ball Valve: any of several valves that rotate a ball with a flow passage to allow or deny flow.

Ballooning (drilling): a phenomenon in which fluids are lost to the rock during over-pressured operations, such as found in increased pressures from equivalent circulating density operations, and then flow back when pressure is reduced. This may be confused with a kick.

Ballooning (pipe): an increase in pipe O.D. as internal pressure is applied (shortens pipe) or a decrease in diameter (Reverse Ballooning: lengthens pipe) as external pressure is applied.

Banana Blade: a shape of a reamer blade that allow milling either up or down.

Band or Banded: an attachment strap to affix cable or capillary tube to the outside of the tubing.

Banded Iron Ore: a sediment with alternating layers of chert and iron rich minerals.

Bar (pressure): pressure in atmospheres, approx 14.7 psia.

Bar (geologic): a mass of sand or other materials deposited in the bed of a stream channel.

Bar-Finger sand: an elongated lens of sand formed during distribution of sediment in a delta.

Bar Hole: small diameter hole made in the ground to obtain a sample for the purpose of searching for a gas leak in a pipeline.

Bar-Vent (perforating): a vent in the tubing or treating string open by a drop bar used to fire a perforating gun.

Barchan: a crescent-shaped sand dune with a convex face upwind and a concave face downwind.

Barefoot Completion: a very simple, open hole pay zone completion with a minimum of downhole equipment. Also called an open hole completion. The casing is usually run to the top of the pay and is cemented above the pay only.

Barge: marine vessel without its own propulsion.

Barite: One of the many forms of the barium sulfate mineral. The $BaSO_4$ material is used in drilling mud as a weighting agent and can produce a slurry of over 20 lb/gal in water.

Barite Plug: : a settled plug made of particles or barite or even barite and sand that are placed to seal off a zone or the wellbore.

Barium Sulfate (scale): $BASO_4$ scale is produced in the well and in facilities as the result of precipitation when incompatible waters (one having Ba ion and the other SO4 ion) are mixed or when the equilibrium of the flowing fluid reduced and a precipitate is triggered by over saturation or a physical upset. May also be associated with radioactivity or NORM scale when a radium or uranium isotope is part of the crystalline lattice structure.

Barrel: an oilfield measurement barrel is 42 US gallons or 5.615 ft^3 or 6.28 barrels = 1 $meters^3$. Note that reservoir barrels undergo shrinkage by the reservoir volume factor as gas escapes. Stock tank barrels are measured after gas escapes.

Barrel Equivalent: a laboratory measuring scale for expressing mixtures of products used to formulate muds. One gram of material added to 350 cc of liquid is equivalent to 1 lb of material added to a 42 gallon barrel.

Barrel Pump: a small, usually hand driven pump with a long dip tube used to move chemicals from drums and barrels.

Barrels of Oil Equivalent, BOE: a method of equating the energy produced by a hydrocarbon gas to a standard oil measurement. One barrel of oil has about the same heat producing capacity as 6,000 ft^3 of gas at standard conditions.

Barrier (NORSOK definition): One of several dependent barrier elements, which are designed to prevent unintentional flow of a formation fluid. A barrier is an envelope preventing hydrocarbons from flowing unintentionally from the formation, into another formation or, to surface. Barrier elements that make up the Primary barrier are those elements, which are or might be in direct contact with well pressure during normal operation. These elements provide the initial and inner envelope preventing unintentional flow of reservoir fluid to surface, or another zone. Barrier elements that make up the secondary barrier are those, which are or might be exposed to contact with well pressure should any of the elements described as a Primary barrier fail. These elements provide an envelope outside the Primary barrier envelope providing a second barrier preventing unintentional flow of reservoir fluid to surface, or another zone.

Barrier Coating (corrosion): a coating with a high resistance to permeation of liquids/gasses.

Barrier Coating (protective): a coating applied over a surface to prevent handling damage.

Barrier Island: a long thin sandbar parallel to shore formed by wave action.

Basalt: the most common volcanic rock. Usually fine grained.

Base Fluid: the starting fluid for a pill or a treatment. Before additives.

Base Gas: the gas required in a storage reservoir to cycle the working gas volume.

Base Management: the efficient delivery of proved developed reserves through excellence in Reservoir, Well and System management.

Base Map: a map containing boundaries, locations and survey points.

Base Pipe: The inside pipe of a sand screen or other equipment on which other equipment or parts are added.

Basement Rocks: unproductive rocks, usually igneous or metamorphic, at the bottom of a sedimentary rock sequence.

Basic Sediment and Water or BS&W: the solids and water entrained in crude oil.

Basin: a large area with a general containment and an often thick accumulation of rock.

Basket or Basket Sub: a device used to catch debris in the wellbore. Often a part of the string.

$BaSO_4$: barium sulfate.

BAST (DOI) Best And Safest Technology.

Batch Mixing: mixing a specific volume of a treating fluid in a properly sized tank – as opposed to mixing-on-the-fly.

Batch Treating (chemical treating): slugging a chemical such as a biocide or a corrosion inhibitor in high concentration to accomplish either placement or super concentrated treating.

Batholith: an irregular intrusion of an igneous rock into another rock.

Bathymetry: the study and mapping of ocean floor topography.

Battery (fluid treating): the separation facilities.

Baume (density): a density scale used in mineral acid strength measurement.

Bauxite: a sintered aluminum based proppant with very high strength, 3.2 g/cc density and high abrasion characteristics.

Bayrite: a clay-based drilling mud gelling agent.

Bbl: a Standard Oil measure of 42 gallons, originally known as a blue barrel and abbreviated bbl. 0.16 m^3.

B_c (drilling): Bearden units of consistency.

Bcf: billions of cubic feet.

Bead Tracer: an isotope tracer in a bead with the same density of the flowing fluid that is used to track fluid flow rates and therefore fluid entry and exit points along the wellbore.

Beam Pump: an artificial lift system, common to low pressure, lower rate oil wells, with a plunger type bottom hole pump operated from the surface by a rod string.

Bean: a flow restriction common in downhole chokes, surface chokes and some SSSVs.

Bean-Up Strategy: an engineered sequence of choke settings in the start-up of a well to apply stresses in the formation in a manner that will strengthen the formation and avoid failure.

Bearden Unit of Consistency: an estimation of the pumpability of a slurry. Has no direct correlation to viscosity.

Beach Marks (failure/crack development): characteristic markings (ridges, tears, risers, etc.) on fracture surfaces after fatigue crack of fracture propagation (also known as clamshell marks, conchoidal marks and arrest marks).

Bed: a subdivision of the classification of a sequence of rocks. A bed usually has similar lithographic features and is separated from other groupings by recognizable boundaries.

Bed Filtration: a build-up of particles on the upstream side of a filter that improves the filter's ability to remove particles from fluid (will also raise the differential pressure across the filter).

Bed Load: the sediment that moves slowly along the bottom of a river channel.

Bed Rock: the first solid rock under loose sediments.

Bed Wrap: the innermost wrap of coil or cable on a spool or reel.

Bedding Plane: surface separating layers in a sandstone. Usually bedding planes mark the transition of the particle transport event. An accumulation of minerals or other materials laid down at the time of rock deposition or generated by reworking, that may create significant vertical permeability barriers in a sedimentary rock.

Behind Pipe Reserves: Behind-pipe reserves are expected to be recovered from zones in existing wells, which will require additional completion work or future recompletion prior to the start of production.

Belching: flowing slugs of material.

Bell Nipple: a funnel shaped pipe at the top of the casing that guides tool string entry and may have a side port for fluid pumping.

Below Rotary Time (drilling): a time that reflects the slide time in which the pipe is not rotating and drilling.

Belt Effect: added friction in a deviated well as wireline or coil rubs against the top of the deviated section as the tube or cable is pulled out of a well.

Benchmark: a selected reference point for comparing performance.

Bend Radius: radius of curvature of flexible pie measured to the pipe centerline.

Bending Cycle (coiled tubing): cycling coiled tubing from a yielded position, through a transition region, and back again. Running coiled tubing from the reel into a well and back to the reel involves six bends or three cycles.

Beneficiation: a chemical process that changes the state of a clay or other mineral to make it meet specific performance levels.

Bent Sub: a short section of a tool or pipe that is formed at an angle or is modified downhole by a motor to assist in entering deviated wellbores or drilling off the path of the wellbore.

Bentonite: a reference to colloidal clay (generally montmorillinite or smectite), generates plastic viscosity due to clay behavior, size and electrostatic layer. A slurry of which used for P&A Purposes will weigh no less than 9 ppg.

Benzene: an aromatic (cyclic or ring structure) compound, present in very minor quantities in many crude oils.

Benzoic Acid Flakes: a common diverter. It can sublime, or go directly from a solid to a gas.

Berea Sandstone: a quarried sandstone with from 4500 to 9000 psi UCS, used commonly in laboratory flow testing.

Bernoulli's Equation: the equation is used in the design of chokes and explains the manner in which pressure in the body in the body of the choke, downstream of the first pressure drop, is lower than the eventual recovery pressure at the end of the choke.

Beta Particle: an electron emitted with high energy and velocity from a decaying nucleus.

Beta Factor (flow): a correction factor for the Darcy Equation to account for changes in pressure and fluid saturation along a fracture.

Beta Rating (filtration): a conditional ratio requirement on a filtering system that compares the number of particles of a certain size in the unfiltered and filtered fluid. A beta rating of 1000 at 5 microns means that there is one particle of 5 micron or greater size in the filtered fluid for every 1000 particles of 5 micron or greater size in the unfiltered fluid.

Beta Wave (gravel packing): the returning wave of gravel after the alpha wave when packing a well over about 55^{o} deviation.

BF: base flange.

BFE: base flange elevation.

BG: bell guide.

BH (perforating): big hole charge.

BH (well position): bottom hole.

BHA: bottom hole assembly.

BHCIP: bottom hole closed in pressure.

BHCP: bottom hole circulating pressure.

BHCS: bottom hole compensated sonic.

BHCT: bottom hole circulating temperature.

BHFP: bottom hole flowing pressure.

BHFT: bottom hole flowing temperature.

BHG: bottom hole gauge.

BHI: Baker Hughes INTEQ.

BHIP: bottom hole injection pressure.

BHL: bottom hole location.

BHP: bottom hole pressure.

BHp: brake horsepower.

BHPI: borehole pressure integrity.

BHS: bottom hole seismic.

BHSIP: bottom hole shut-in pressure.

BHST: bottom hole static temperature.

BHT: bottom hole temperature.

BHTP: bottom hole treating pressure.

BHTV: bottom hole televiewer – a sonic caliper tool, not a television.

Bholin: a specialized viscosimeter.

BHS: bottom hole sample.

Bias Weld: a weld technique on diagonal cut strips of steel, superior to the butt weld process for joining flat strips of metal together before rolling into coiled tubing.

BiC: Best in Class.

Bicarb: bicarbonate of soda, used in acid neutralization operations.

Bicarbonate: a compound containing the $HCOO^-$ ion.

Bi-Center Bit: a bit that, when rotated, drills a hole larger than its diameter.

Bi-Directional Valve: valve designed for blocking the fluid in upstream and downstream directions.

Big Hole Charge (perforating): a perforating charge with the liner shaped to create a large entrance hole but a shallow penetration. See Deep Penetrating Charge.

Bi-Metal Corrosion: a type of corrosion found when dissimilar metals are joined. One part becomes the cathode and the other the anode where accelerated corrosion may be seen.

Binder (coating): the nonvolatile portion of a coating.

Bingham Plastic: a rheological model used to describe flow in some fluids. Bingham fluids have a linear shear stress, shear-rate behavior after an initial shear-stress boundary has been crossed. Plastic viscosity or PV is the slope of the line. Yield Point is the threshold.

Bioaccumulation: a test measuring the concentration or build-up of potential harmful chemicals in a living organism.

Bioaugmentation: remediation technique that introduces natural hydrocarbon digesting bacteria and materials such as enzymes to remove hydrocarbons from soil, water or even air.

Biocide: a chemical or treatment that bills bacteria.

Biodegration: breakdown of a heavier oil to a lighter hydrocarbon by bacterial action.

Biogenic Gas: bacteria generated natural gas, found at shallow depths and in many water wells. Usually contains C14 isotope. See also thermogenic gas as a gas that has a biological origin but has been modified from the original organic state by time at temperature and other effects to produce a gas with no C14.

Biogenic Source (sedimentary rocks): rocks such as coal resulting from decomposition of animal or plant deposition.

Biogenic Theory: a theory of petroleum formation in which the petroleum is thought to have originated from plant and animal material that has undergone transformation from deep burial.

Biological Marker: compounds found in petroleum or rock extracts that possess a carbon chain or skeleton that contains a link with a natural product. Common biomarkers in petroleum include isoprenoids, triterpanes and steranes.

Biomass: any organic material.

Biophasic: the simultaneous flow of two immiscible fluids.

Biopolymer: water soluble polymers produced by bacterial action on carbohydrates.

Biostratigraphy: a segment of geoscience where fossils are used to date or identify a reservoir.

Biot: a theory of acoustic propagation in porous and elastic media that taken into account fluid behaviors.

Biot's Constant: describes the relationship between pore pressure and stress

Bioturbation: Reworking of the sediment by burrowing animals.

Bioventing: remediation technique that provides air to increase bacterial growth.

Bird: a device with moveable vanes attached to an under water seismic streamer.

Bit: a drill bit, commonly either a roller cone, button bit, PDC, diamond or drag bit, used with a rotary string or a mud motor to drill through rock.

Bit Breaker: a heavy plate that can hold the bit in the rotary table to make or break it from the drill string.

Bit Record: a record of bit run, depth, rate of penetration, etc., in a wellbore.

Bit Sub: a short section inserted between the drill bit and the drill collar.

Bit Weight (drilling): the applied downhole axial force component from the string weight.

Bit Whirl (drilling): the motion that a bit makes when it does not rotate about its center. This may manifest itself in out of round holes and severe bit damage. Generally a poor drilling performance.

Bitumen: pyrogeneous, essentially non reactive, hydrocarbon. Most bitumen is not considered as movable through the reservoir under normal conditions of flow unless heated.

Bituminous Coal: a soft coal, intermediate in coal development, containing 15 to 20% volatiles.

Bituminous Coating: an asphatic or tar based protective surface coating.

BJ: Byron Jackson Service Company.

BKB: base Kelly bushing.

BL: balance line.

Black Oil: a traditional crude oil, containing alkanes (straight carbon chains) of C5 to C30+ liquids.

Black Shale: an in determinant term generally meaning a shale with a higher organic content than a brown or gray shale.

Blaine Fineness: a measure of the particle size of a cement.

Blank: an unperforated piece of casing or tubing in an otherwise perforated section. Used for isolation.

Blank Off: to close in the end.

Blanking Plug: a plug run to seal off tubing.

Blast Joint: an abrasion and erosion resistant tube that is run where ever direct sand impingement is a problem.

Blasting Cap: an initiating or detonating device in an explosive.

Bleed Off: to vent or drain of fluids from a pressured well.

Bleeding Core: a permeable core from which hydrocarbon escapes without differential pressure application.

Blender: the device that takes in fluid feed, mixes in sand and then outputs to the pump truck.

Blind Box: a flat bottom, short steel tool run on wireline to tag the surface of water or solids in the well. It is nearly the drift diameter of the tubular.

Blind Flange: a flange plate without an opening, normally used as seal-off assurance over an unused line.

Blind Nipple: nipple that can be blocked off from formation pressure and give a false pressure measurement.

Blind Pool: an oil and gas partnership that has not committed to a specified project at the time of amassing capital.

Blind Rams: The ram sections in a BOP that are used to close against each other and isolate the well when no pipe is in the well.

Blind Zone: a layer of rock that cannot be detected by seismic or in logging where the recorded resistivity is too low..

Blinding (screen): obstructing an aperture or opening by particles or debris.

Blistering (elastomer): a surface deterioration caused by gas trying to escape too rapidly from a elastomer and tearing the surface of the material.

Blistering (steel): surface corrosion associated with gas adsorption.

BLM: US Bureau of Land Management.

BLM (wireline): braided line measurement

Block (flow): an obstruction to flow, either partial or full.

Block (lease): a large geographical lease area that may contain separate structures, proven fields or other interests.

Block (rigging): a pulley (sheave) or set of pulleys, mounted in a housing. The blocks on a rig are the crown (stationary) block at the top of the derrick and the traveling block.

Block Fault: a set of formation blocks, separated by normal faults into different elevations.

Block Squeeze: a cement squeeze into a area of perforations. Often done initially over the frac pressure.

Block Valve: valve that blocks flow into the downstream conduit when in the closed position.

Blooie Line: a straight through flow line from the wellhead to a flare pit. Often used in diverting flow during a well control incident.

Blow Down: to release gas pressure. In a reservoir, blow down is often after the oil recovery phase has been complete and the majority of the gas from the gas cap needs to be recovered.

Blowdy: free gas separating from the liquid at the bottom of the separator. Generally indicates poor separator performance.

Blowout: an uncontrolled release of fluids from a well.

Blowout Preventer or BOP: a conditional surface pressure barrier often consisting of a set of hydraulically operated rams containing equipment designed to grip pipe, seal around pipe, shear off pipe or seal an open hole during drilling or a workover. It may also contain an annular preventer.

BLPD: barrels of liquid per day.

Blue Gas: gas volume that separates from produced water.

BM: benchmark.

BML (subsea): below mud line.

BMP: best management practice.

BMT: base management team

BMX: base management excellence.

B_o: formation oil volume factor.

BOC: base operations camp.

BOD (design): basis of design.

BOD (reaction): biochemical oxygen demand.

Body: any portion of the wellhead or tree that contains wellbore pressure.

Body Lock Rig: locks slips, mandrels or cones in place in a downhole tool.

BOE: barrels of oil equivalent. A method of equating the energy produced by a hydrocarbon gas to a standard oil measurement. One barrel of oil has about the same heat producing capacity as 6,000 ft^3 of gas at standard conditions.

Boiling Point: the temperature at which the vapor pressure of the liquid is equal to the pressure exerted on it by the surrounding atmosphere.

Boll Weevil (various): a solid hanger or test cup in a BOP. A retrieval plug attached to drill pipe. An inexperienced worker.

BOMA: ball out mud acid.

Bomb: a thick walled pressure container of pressure measuring instruments or a sample container.

Bomb Hanger: hanger for bottom-hole pressure recorder (bombs).

Bond: the level of adherence of one substance to another.

Bonnet: the section of the valve housing that covers the stem and protects the seals.

Bonus Money (contract): any funds paid to a mineral owner in addition to least of royalties.

Booster Cap: a detonating cap between two detonating cords in a series of perforating guns.

Booster Pump (pipeline): a pump located along the length of a pipeline to raise the pressure and overcome friction or elevation losses.

Boot Sub: a device run in the drill string just above the mill to catch cuttings.

BOP: blow out preventer.

Borate: a crosslinker for guar based gels.

Borax Logging: a test technique using an injected solution of borax and a detection tool to spot channels.

Bore: the inside diameter of a tool or pipe.

Borehole: the drilled hole.

Borehole Compensated Sonic: a log that measures the interval transit time for a compression wave to move a unit of distance, usually one foot.

Borehole Televiewer: a sonic caliper, developed in the late 1960's, which generated a sonar picture of the wellbore.

BOSS: ball operated shear sub.

BOT: Baker Oil Tools.

Bottle Neck: a restriction in a flow path.

Bottom Casing Packoff: the seal in the annulus between a hanging pipe and the next pipe outward.

Bottom Hole Assembly or BHA: the equipment or tools at the bottom of the tubing or drill string. The BHA is changed to achieve a certain result.

Bottom Hole Choke: a restriction in a profile near the bottom of the well that allows some gas expansion and holds a backpressure on the formation. Rarely used, but considered for hydrate control.

Bottom Hole Gas Separator: gas anchor or a separator used in front of a pump to deflect most of the free gas to improve pump efficiency.

Bottom Hole Pressure or BHP: The pressure at the bottom of the well. In a producing well the BHP may be the bottom hole flowing pressure or the bottom hole shut-in pressure. In a drilling or workover environment, the BHP is exerted by the column of fluid in the hole.

Bottom Hole Sampler: a tool that takes bottom hole samples of fluids or solids.

Bottom Hole Temperature: either static (non circulating, non flowing and stable), flowing, or circulating) – temperature at the bottom of the well.

Bottom Out: reach final drilling depth.

Bottom Plug: in cementing, the first plug pumped in cementing with the two plug system. It isolates the mud and cement slurry and allows passage of the cement slurry when the plug "bumps" or reaches the float shoe or float collar. It is hollow with a diaphragm that is ruptured by pressure.

Bottom Shot Detector: a device in a perforating gun that signals through a delayed shot or sound that the detonating cord has fired to the bottom of a gun.

Bottoms Up: circulating the bottom hole fluid to the top of the well.

Bound Fluid Log: an NMR log that measures bound fluid volume.

Bound Water: water that is trapped in or on the matrix minerals and cannot move.

Bow Spring Centralizer: a low to moderate strength centralizer formed by arched spring-like straps of metal.

Bowl: a section of the wellhead or of a tool what allows slips to be inserted to hold pipe or equipment.

Box: the female part of the connection.

Box Tap: another name for a tapered tap. Used to screw into boxed of connections.

Box Threads: the treats in the box or female connection.

Boycott Settling Range: the deviation between 30^{o} and 60^{o} where refluxing (dropout and reverse flow) of particles and heavier liquid occurs in a lower rate well. The area in which gas bubbles may rise through fluid at 4 to 7 times that in a vertical well.

BP: formerly British Petroleum.

BP (well plugging): Bridge Plug.

BPD: barrels per day.

BPFlux^{TM}: a flux damage estimating system.

BPM: barrel per minute.

BPV: back pressure valve.

BR: Petrobras.

Brackish Water: indefinite term meaning water with small amounts of salt. Saltier than fresh water.

Bracelet Anodes: clamshell-type rings of anodes that clamp around a pipeline.

Braden Head: an older (actually trademarked name) for the wellhead.

Bradenhead: a packer or packoff installed at surface on a well that enables the use of one size pipe inside another and allows flow into or out of each pipe separately.

Braided Stream: a depositional environment with several channels that may or may not be connected.

Braided Wireline: a strong, braided wireline of various sizes used in retrieving tools heavier than slickline can handle. Electrical line is a braided line with a center conductor.

Brake (drilling): the main device for stopping the travel of the drawworks of a rig when running or pulling a drill string.

Branch Connection: a pipe connection.

Break an Emulsion: separate the emulsion into its components.

Break Circulation – start circulating fluid from a static condition.

Break-out: unscrewing a joint of pipe of part of a BHA.

Break Tour: to start a work shift.

Breakout (drilling): an enlargement of the borehole.

Breakdown: fracture.

Breaker: a chemical added to a gel that breaks down the gellant structure.

Breaking Down (drill string): to separate the stands into single joints.

Breakthrough: a flood front breaking through into a producing well.

Breccia: fragmented (not wear rounded) grains. Rock along moving faults may have this texture.

Brent: a North Sea field with a light crude oil used for cost comparisons.

Bridge: a blockage in the wellbore caused by a mass of particles that lock together and prevent pipe movement or flow.

Bridge Plug: a permanent or retrievable plug set typically on wireline to isolate a section of the well.

Bridging: collection of materials, usually from the formation that interlocks at some point in the well, often in the annulus and may stop flow or stick the pipe in place.

Bridging Material: fluid loss control material that bridges against the leakoff site.

Bridle (beam lift): the wire rope attachment of the horses head to the polish rod on a beam lift pump jack.

Bridle (logging): the insulated, downhole end of a logging cable.

Bright Spot: a specific seismic reflection that may indicate gas.

Bright Water^{TM}: a water control product.

Brine: a mixture of water and a soluble salt. Most common brines are sodium chloride NaCl, potassium chloride KCl and calcium chloride $CaCl_2$. Brine densities may range from 8.33 to > 19 lb/gal (1 to >2.28 g/cc). The USGS definition of a brine is a salinity of more than 35,000 mg/L (after USGS, 1984).

Brinell Hardness: a measure of the hardness of the material, generally measured by pushing a small ball into the surface and measuring the force used to displace the ball to a set depth.

British Thermal Unit or BTU: the amount of heat input required to raise the temperature of one pound of water by 1^oF at water's maximum density at 39^oF. It is approximately equal to 1 kilojoule.

Brittle Fracture: a fracture created with little or no plastic deformation.

Broach: a device used to reround slightly collapsed tubulars.

Broaching (flow): venting of fluids to surface through channels in cement or behind pipe (well control barrier failure) or unintended fracturing into a adjacent formation.

Brookfield Rheometer: a viscosimenter use for some fluid measurements, particularly when solid suspension properties are needed.

Brownfield: a mature field on decline or in the final stages of productive life.

Brownian Motion: irregular motion of colloidal sized particles when suspended in a fluid. The effect in simplest terms is caused by thermal driven motions.

BRT (drilling): below rotary table.

BS: Basic Sediment and Water or BS&W: the solids and water entrained in crude oil.

BS&W: Basic Sediment and Water. The solids and water entrained in crude oil.

BSI: British Standards Institute.

BSR: bending strength ratio.

BtB: beyond the best.

BtBcp: beyond the best common process.

BTMS: bottoms.

BTU: British Thermal Unit.

BTX: benzene, toluene, xylene.

BU: business unit.

Bubble Flow: flow of liquids enabled by the rise of gas bubbles in a well.

Bubble Point: the pressure at which gas begins to break out of an under saturated oil and form a free gas phase in the matrix or a gas cap.

Buck Up: to tighten a connection.

Buckling: the deformation of pipe in compression as it moves from straight to sinusoidal to helical shapes in the hole. Usually in the elastic range.

Buckling Point: the point in the well or the weight applied where the pipe buckles (sinusoidal bending) and stops or significantly slows during pipe running in a horizontal well.

Buffer: a chemical used to keep the pH in a certain range without extremes of high or low pH.

Build Angle: the angle of the inclination in the kickoff section when describing a deviated well.

Build Ramp: the rate of increase of the deviation of a well.

Buid Section: the part of the wellbore that is changing deviation, usually building toward a maximum deviation angle.

Bulk Density: the density of a rock as it naturally occurs (as compared to specific density of the grains). Includes the pore structure.

Bulk Modulus (K): applied stress over change in volume.

Bull Plug: a screw-in plug, normally used at the bottom of a string if no fluid entry is desired.

Bull Wheel: old term for a large, often wooden wheel, in a cable tool rig.

Bullet Gun: an older perforating method where hardened steel bullets were fired from short barrels and designed to penetrate the casing, cement and formation.

Bullheading: forcing fluids in the pipe into the formation at a pressure higher than the pore pressure and sometimes higher than the fracturing breakdown pressure. Used to displace a kick out of the pipe when wellbore and wellhead pressure limits permits.

Bump Down: rod string stoke too long and hitting the bottom of the pump.

Bump The Plug: reaching bottom with the plug during a cementing operation or fluid displacement operation.

Bunker C Oil: a fuel oil, normally with high sulfur and high viscosity. API gravity of about 10.5^{o}. Also called Navey Heavy and Number 6 fuel oil.

Buoyancy: the amount of weight that is offset by lift from the fluid when the piece of equipment is immersed in the fluid.

Buoyed Weight: the weight of a string or piece of equipment immersed in the wellbore fluid. It is strongly dependent of the density of the wellbore fluid.

BUR (drilling): build up rates, increase in well inclination during drilling.

Burn Over: to mill a piece of equipment (and often to catch it with an overshot).

Burner Capacity or Rating (flare): the maximum BTU's that can be released from a burner while burning with a stable flame and satisfactory combustion.

Burning Shoe: usually a flat bottom mill.

Burr: a raised metal lip, e.g.; around a perforation.

Burst: the internal fluid pressure that will cause the onset of pipe yield.

Burst Disk: a frangible disk designed to release pressure at a specific level.

Burst Rating: the actual minimum burst pressure derated by a safety factor. The derated burst is used as a maximum when pumping.

Butadiene: a butane derivative used in manufacture of synthetic rubber (elastomers).

Butane: a four carbon chain alkane, may be a liquid in the reservoir, but vaporizes as pressure is released. Part of the natural gas liquid components.

Butt Cleat (coal): a transverse fracture.

Butt Fracture (in coal): a secondary, discontinuous fracture.

Butt Weld: a welded connection using two pipe ends, cut straight across and welded together with minimum circumferential contact.

Butterfly Valve: a quick opening, low pressure valve, common on large openings through which solids will move, that allows high flow rate when open.

Button: a small disc-shaped electrode used in micro-resistivity pads.

Button Slip: a slip for high alloy (hard) casing.

Button-Up: secure the well or close in.

Buy Back Agreement: agreement between a host and a contract lease holder under which the host pays the contractor an agreed price for all or part of the produced hydrocarbons.

BV: ball valve.

BVI (logging): proportion of capillary bound fluids occupying effective porosity.

BW Rod Thread: A thread for tools and equipment that has three parallel threads per inch (similar to a AW thread). Used in applications greater than 1.75" OD.

BWOB: by weight of the blend.

BWOC: by weight of cement.

BWOW: by weight of water.

BWPD: barrels water per day.

BX Ring: a metal-to-metal seal for a flange.

Bypass (piping): a secondary flow path that goes around a repair point or other feature.

Byproduct (reaction): a product, sometimes undesirable, of a reaction designed to create something else.

C&P: cased and perforated.

C/K (drilling): choke and kill line.

C Annulus: an outside annulus, next out from the B annulus, usually production casing x production casing or surface casing. (Note, there may be regional differences in the A, B, C annulus designations)

C Factor: a selected constant in the API 14-E equation on fluid erosion.

CAA: Clean Air Act.

Cable: one of various braided cables, with or without isolated conductance wires, used for well operations.

Cable Head: the connection of the braided cable to the rope socket or attachment to the tool string in a wireline conveyed BHA.

Cable Tool Rig: an early drilling rig that uses a heavy chisel bit on a cable, dropped vertically, to pound through rocks.

$CaBr_2$: calcium bromide.

$CaCl_2$: calcium chloride salt.

$CaCO_3$: calcium carbonate.

Cage Wrench: a wrench for connecting the cage of a sucker rod pump to the rod string.

Caisson (pipe): large outer pipe, often a form or a barrier.

Cake: filter or mud cake, stranded by dehydration on the face of a permeable formation by fluid loss.

Calcareous Coating: a calcium carbonate coating.

Calcite: calcium carbonate, $CaCO_3$. May be rock (limestone) or a scale formed from super saturated solution at the site of a chemical or physical upset.

Calcium Bromide: $CaBr_2$, water soluble brine weighting agent.

Calcium Carbonate: $CaCO_3$, limestone, a common formation or when in particles, a weighting or fluid loss agent.

Calcium Chloride: $CaCl_2$, a water soluble brine weighting agent.

Calcium Hydroxide: $Ca(OH)_2$, slaked lime.

Calcium Oxide: CaO, quick lime.

Calcium Reducers: Soda ash, bicarbonate of soda, caustic soda and some phosphates. Act to reduce the effects of calcium in a fluid.

Calcium Sulfate: gyp or anhydrite, $CaSO_4$.

Calcium Treated: calcium or other divalent ion added to a fluid to inhibit shale or clay dispersement.

Calibration: comparison to a standard and adjustment to fit.

Caliche: a calcium rich surface soil.

Caliper Log: a recording of the diameter changes in a well made by a tool with mechanical arms that touch the wellbore or a sonic signal bouncing off the borehole wall.

Cambrian: a geological time from 500 million to 570 million years ago. Often signals the earliest hydrocarbon productive rocks.

CAOF: calculated absolute open flow. A theoretical figure of a wells maximum production.

CAP: capacity.

Cap A Well: control a blow out or seal at the surface after a P&A.

Cap Rock: a sealing formation of very low permeability that forms the top or the seal in a reservoir.

Capacitance Tool: Measures the fluids capacitance – uses the wellbore fluid as the fluid between plates of a capacitor.

CAPEX: capital expenditure.

Capillary: a small passage, usually between rock grains. These passages may have ability to absorb fluids and the pressures necessary to expel the fluids may vary inversely with capillary diameter.

Capillary Action: a complex force governing some fluid movements, especially in smaller pores. Capillary action is the result of adhesion and surface tension forces. Adhesion (or attraction) by a fluid to the walls of a pore creates an attracting (or repelling) force, which along with surface tension and cohesion, keep the fluid together. Thus in a capillary or small pore, the level of the fluid may be above or below the surrounding level in larger pores. This helps explain water blocks.

Capillary pressure: pressure differential between two immiscible fluid phases occupying the same pores caused by interfacial tension between the two phases that must be overcome to initiate flow.

Capillary Pressure Curve: the pressure necessary to achieve a given non-wetting fluid saturation of a rock.

Capillary String: a very small string, usually run along the outside of the tubing and banded to the tubing. Commonly used for hydraulic control of safety valves and sliding sleeves. May also transmit bottom hole gauge data.

Capital Asset: an investment or asset that can create a produce or service that will produce income.

Capital cost or expenditure: costs that apply to building or acquiring a capital asset.

Carbide Blast Joint: a erosion resistant covering or main pipe that is used when tubing is set deeper than the perforations or on the long string across from the upper perforations in a side-by-side completion.

Carbon 14 isotope: one of three naturally occurring isotopes of carbon. The half life of the C14 isotope makes it idea for determining the difference between thermogenic methane (C14 absent) and biogenic gas.

Carbon Dioxide: a colorless gas. Corrosive when occurring with water. An acid gas. The most common cause of corrosion in the oil industry.

Carbon/Hydrogen Ratio: the ratio, either on a weight or on a molecular basis, of carbon-to-hydrogen in a hydrocarbon material. Materials with a high carbon/hydrogen ratio (e.g., coal) are solid. The ratio is useful as a preliminary indication of the hydrogen quantity needed to convert the hydrocarbon to a gas and/or liquid (AGA).

Carbon-Oxygen Log: a log that measures the ratio of carbon-to-oxygen within the formation. Useful for spotting oil.

Carbon Sequestration: long term storage of carbon dioxide under ground.

Carbon Steel: a low alloy steel, containing a mass fraction maximum of 2% carbon, 1.65% manganese and residual quantities of other materials. Common in pipe manufacture.

Carbonate: any of the many rocks composed of calcium carbonate (limestone) or magnesium carbonate (dolomite) or other acid soluble rocks with a common $CO3^{-2}$ ionic charge. The pores may be poorly connected and matrix permeability (non fractures) are often much lower than sandstones.

Carbonic Acid: CO_2 and water. A common corrosion source in wells.

Carboniferous: a geologic time of 290 million to 365 million years ago.

CarboProp™: a trademarked name for ceramic (man made) proppant.

Carboxymethyl Starch: a natural starch used in drilling fluids.

Carboxyl Methyl, Hydroxy Methyl Cellulose: HEC, an anionic water soluble polymer used in various fluids. Can be relatively clean breaking under the right conditions.

Carboxy Methyl Cellulose: CMC, a modified cellulose polymer used in drilling fluids.

Carburizing: heat-treating process where carbon is introduced into a solid iron alloy by heating above transformation temperature range while in contact with a carbonaceous material (solid, liquid, or gas form of carbon). Usually quenched to produce a hardened outer shell.

Carried Interest: a fractional working interest in an oil and gas lease that arises from a deal between co-owners.

Carrier Fluid: the fluid that carries proppant or other material into the well.

Carrier rig: a self propelled drilling or workover rig.

Carrying Capacity: the capacity of an injected or circulated fluid to transport a given sized and density solid into a zone or from a well.

Cartridge Filter: a filtering device that uses replaceable cartridge elements to filter liquids to a required level.

Case Hardened: a hardening process that hardens only the outer surface of a metal. Processes include carburizing, nitriding, flame hardening, etc.

Cased and Perforated: a completion technique where casing is cemented in the drilled hole and perforations are placed at the most promising flow points based on log interpretations.

Cased Hole Gravel Pack: a sand control completion that uses a screen and a gravel pack to stop formation sand production.

Cased Hole Log: any of several radioactive, chemical or physical properties logs that are run in a cased hole environment. May be conveyed by electric line, coiled tubing, slick line (memory logs) or drill pipe (LWD).

Casing: one of several strings of steel pipe in a well design that, together with cement, forms a barrier to fluid movement along the drilled hole. It is commonly at least partly cemented in the wellbore.

Casing-Annular Pressure: Pressure in the annulus between the tubing O.D. and the casing I.D.

Casing Centralizer: one of several centralizer designs intended to keep the casing better centered in the borehole to get better cement jobs.

Casing Cladding: expanding pipe installed in production casing or tubing to seal perforation holes or leaks caused by corrosion or erosion. Can be metal or plastic.

Casing Collar Log: CCL, a downhole log recording, given by magnetic deflection, of the location of couplings or other equipment.

Casing Coupling: the threaded connection, almost always upset to the outside.

Casing Crew: the personnel that specialize in handling and running casing.

Casing Cutter: a mechanical, chemical or explosive device that cuts the casing at a specific point.

Casing Grade: a generic grade classifying the strength of the pipe: L80, P-110, etc. The numbers are the minimum yield of the steel in 1000's of psi.

Casing Gun: a large perforating gun, run into a well without tubing.

Casing Hanger: a support that is screwed onto the casing and fits into the casing head.

Casing Head: a term that applies to the wellhead flange that forms the transition between pipe and the flange-build tree. It may be attached by threads, welding, pressure forming or lock-ring/screw devices.

Casing Head Gas and Gasoline: natural gas condensate, usually C2 to C8+. The C5-C8 components condense to a very volatile liquid when the temperature decreases near the wellhead.

Casing Inspection Log: uses eddy currents in a magnetic field to estimate casing thickness and anomalies.

Casing Jacks: a set of hydraulic lift cylinders that can be used to lift casing strings.

Casing Joint: typically a length of casing with a connection on each end. Length may vary from less than 30 ft (9 m) to about 40 ft (12 m).

Casing Liner: a length of casing that runs from a set point to a point part way up in the previously set casing string, but usually not to surface. A liner may be used instead of a full casing string to save money, to maintain a larger ID for well equipment or to prevent creating a trapped annular space.

Casing Patch: any of several repair systems designed to set a patch over a leak in a well.

Casing Plunger: a larger plunger designed to lift fluids when flowing gas up casing without presence of tubing

Casing Point: the depth at which a casing string is set, either by design or because the mud can no longer control the pressure of the next deeper zone without adding weighting agents that would break down upper intervals.

Casing Pressure: pressure (intended or not) that occurs on the various outside annuli.

Casing Reciprocation: movement of casing up and down to help remove mud and replace it with cement slurry.

Casing Roller: a downhole tool, commonly run on pipe to try to reform the casing after a partial collapse.

Casing Rotation: rotating the casing string during primary cementing to remove mud and improve primary cement bonding and isolation.

Casing Scraper: a downhole tool with scraping teeth and brushes that is used to remove perforating burrs, "lipped down" areas in connection pins and remove mill scale, dried mud or cement, pipe dope and other well completion debris.

Casing Seat: the set point of the end of casing. Should be in an impermeable, stable formation.

Casing Seat Test: a LOT or an FIT test (check specifics for details), a pressurized test after primary cementing to make sure the bottom most seal with the formation will handle pressures needed for drilling the rest of the well.

Casing Shoe: a tapered guid shoe on the bottom of a casing string to assist in passing ledges and dog-legs in the wellbore.

Casing Shoe Test: a pressure test of the casing seal, after the cement job, to the pressures necessary to safely control the pressure of the deeper zones.

Casing String: a continuous string of casing, usually cemented over at least part of its length and usually extending back to surface from the set point.

Casing Swage or Broach: a hardened steel tool, commonly run on wireline, which is used to reshape the casing.

Casing Tongs: wrenches specifically made for making up casing joints.

Casing Valve: a gas lift valve that is controlled by the casing or annulus gas supply pressure.

Casing Tongs: pipe tongs used to make connections.

Casing Wear: reduction in thickness x 100 / original thickness. Most common wear is from rotating strings during drilling.

Casing Weight: the nominal weight per foot of the casing. Heavier weight casings of the same size are necessarily smaller I.D.

$CaSO_4$: calcium sulfate

Cast Iron Bridge Plug: a drillable plug that can be quickly and reliable set to isolate a section of the well.

Cat Head: a small drum on a winch on which a hoisting cable or rope can be wrapped.

Cat Line: a small hoisting rope or cable.

Cat Walk: a tool assembly/staging area before the Vee Door on a rig.

Cataclastic Rock: powdered rock created by crushing and shearing of tectonic movements.

Catenary Riser: a subsea riser with a large "S" that allows flexing and movement of the line.

Catalyst: a chemical that enables or speeds up a chemical reaction without being consumed by the reaction.

Cathode: the negative site of a corrosion cell. Reduction reactions are typical.

Cathodic Corrosion: corrosion, usually of an amphoteric metal, with a basic fluid.

Cathodic Protection: impressed current that offsets the current produced in a corrosion cell and reduces corrosion.

Cation: an ion with a positive charge.

Cation Exchange Capacity: related to concentration of cations on negatively charged clay surfaces that, when brine is present, can be exchanged/satisfied for/by cations in the brine. The total of exchangeable cations that a porous medium can absorb, expressed in moles of ion charge per kilogram of clay or mineral.

Cationic Surfactant: a positively charged surfactant, normally oil wets sands.

CATs (subsea): connection actuation tool.

Caustic: a strong base chemical. Caustic soda is sodium hydroxide.

Cavings: loose formation materials that falls into the wellbore.

Cavitation: the creating of a high speed, very low pressure vapor bubble that quickly and violently collapses. Very detrimental to surfaces in the near proximity. Often seen in severe turbulent flow.

Cavity Completion: a completion that uses flow to purposely increase the size of the open hole wellbore.

Cavings Rock: rock fragments that spall or break off the wellbore walls. Usually found as fill in the hole.

CBHFP (rock mechanics): critical bottom hole flowing pressure; a measurement of sanding potential of the formation.

CBHT: circulating bottom hole temperature.

CBJ: carbide blast joint.

CBL: cement bond log.

CBM: coal bed methane.

CBNG: coal bed natural gas.

CBT: cement bond tool.

CCDST: closed chamber DST.

CCL: casing collar locator log.

CCP (completion): cased, cemented and perforated.

CCP (compression): gas compression plant.

CCT: concentric coiled tubing.

CD (contract): contract demand.

CDL: compensated formation density log.

CDP: common depth point.

CDP (rock mechanics): critical drawdown pressure; maximum drawdown pressure for sand free rate.

CDR (flow): chemical drag reducer.

CDR (logging): compensated dual resistivity.

CE: completions engineer.

CEC: cation exchange capacity.

CEL: cement evaluation log.

Cell Spar: a Spar platform with multiple floatation sections.

Cellar: a concrete or culvert pipe walled section below ground that often protects and shelters the annular access valves. Also used to house the BOP's on a drilling well.

Celloflake: a fluid loss additive for cement.

Cement (completions): typically the Portland, silicate, and/or pozzilin, etc., mixtures used to form a stone-like permanent seal between the pipe and the formation.

Cement and Cementation (formation): formation binding agents (calcite, clay, silica overgrowth, heavy oil, etc.) that hold the formation grains together.

Cement Accelerator: an additive such as calcium chloride, and salt in high concentrations that speeds the set of cement.

Cement Bond: the strength and adherence of the cement to the pipe and the formation.

Cement Bond Log: a sonic log that determines the top of the cement column and estimates the quality of the cement bond between the casing and the formation. Works on transmission of a sound wave and identifies areas that conduct the wave and those that do not (free pipe ringing). Communication is likely if CBL>10% of unbonded mv reading. Communication is unlikely is CBL < 5% of unbonded mv reading and bond length > 10 ft (3 m).

Cement Channel: a channel in the cement, usually caused by poor displacement of drilling mud.

Cement Density: the specific gravity of the set well cement, generally about 3.15 for Portland cement. Do not confuse with slurry density.

Cement Packer: a recompletion technique in which cement is injected down the tubing and through a punched hole in the tubing to form a 300 to 500 ft thick seal between the tubing and the casing, often far about the bottom of the well. Useful for isolation of upper zones to shut-off unwanted fluids or separate producing horizons.

Cement Plug: a plug of cement set by various methods that plugs the tubulars or the open hole.

Cement Poison: a material that stops cement from setting.

Cement Pump Time: the time after mixing of the cement slurry before the cement becomes so viscous that it cannot be pumped.

Cement Retainer: a temporary set plug to allow cement work above the tool. It is drilled out after the cement job.

Cement Retarder: a chemical additive such as lignosulfonate, salt in low concentration or most muds that slow down the cement.

Cement Slurry Density: the specific gravity of the unset cement slurry as mixed at the surface. Does not account for water loss to leakoff or segregation before the cement sets.

Cementing Head: a device attached to the top of the casing that allows connection of the flush and cement lines and allows plugs to be dropped. Special models may allow the cement to be rotated during cementing.

Cementation: the material in the rock between the grains that binds the grains together.

Cementation Exponent: the porosity exponent, m, in the Archie Factor.

Cementing Head: the connection between the wellhead the lines from the cement trucks. A rotating head (uncommon except on top-drive rigs) allows the pipe to be rotated during the cement placement to assist in displacing mud and preventing channels.

Cenozoic: a geologic epoch from today to 65 million years ago. Few major hydrocarbon bearing strata unless fluids have migrated to a trap from older source rocks.

Centipoise: viscosity measurement, $1/100^{th}$ of a poise.

Centralizer: a bladed or bow spring tool that helps center tools or pipe in the wellbore.

Centrifugal Pump: pump with an impeller or rotor that spins in a housing and the drag forces on the fluids cause them to flow.

Centrifuge: a device that separates materials by density through a centrifugal motion.

CEQ: council on environmental quality.

Ceramic (frac): usually ceramic (man- made) proppant.

CERCLA: a US Law – Comprehensive Environmental Response, Compensation and Liability Act of 1980.

Certs: certificates, usually on physical or chemical properties (e.g., MSDS Sheets).

Cessium Acetate: a lower toxicity weighting agent for brine.

Cessium Formate: a lower toxicity (than Zinc) weighting agent for higher density brines.

CET: cement evaluation tool.

CF: completion fluid.

Cfd: cubic foot per day.

CFD (fluids): computational fluid dynamics.

CFE: core flow efficiency.

CFPP: cold filter plugging point.

CFH: cubic feet per hour.

CFR: critical flow rate.

CG: connection gas, mud logging term.

CGA: Canadian Gas Association.

CGF: central gas facility.

CGR: condensate gas ratio.

Chain Tongs: a type of hand or power operated wrench used to make up connections in pipe.

Chalcedony: a cryptocrystalline form of quartz with waxy luster.

Chalk: an often highly porous but lower permeability carbonate composed of fine grained marine sediments such a coccoliths.

Chamber Lift: a type of gas lift that uses the tubing-casing annulus for accumulation of produced liquids between lift cycles.

Channel (cement): a flow area in the cement from inefficient cementing displacement of the drilling mud.

Channel (formation): an interconnected pathway through the matrix of the rock or an open fracture or other feature that connects a reservoir and the wellbore.

Chase: to run a pipe through a wellbore to determine if it is open.

Chat: any of many types of conglomerates.

Cheater: a length of pipe used on a wrench to extend the leverage. (HSE risk).

Check Shot Survey (seismic): determines formation seismic wave velocities over specific intervals. Measurement is made of travel time from surface to downhole geophones.

Check Trip: a trip back to bottom after a cleanout or other operation, to check for clearance.

Check Valve: a valve that only allow flow in one direction.

Checking (corrosion): slight breaks in a surface coating that do not penetrate to the underlying surface.

Chelant: a chemical that can tie up the molecules of an element, such as iron, and keep it in solution past the point where it should naturally precipitate.

Chemical cutter: a pipe cutting tool that uses boron trifluoride sprayed through a nozzle at very high velocities.

Chemical Dissolution: reactions involving the rock and connate fluids in which parts of the matrix are filled by scale or mineral growths or removed and become high permeability flow channels.

Chemical Flooding: one of several methods involving injecting a chemical into a formation to improve the production of hydrocarbon. May be from an injection well to a production well or injection into a producer with a soak period before recovery.

Chemical Resistance: the ability to resist chemical attack.

Chemical Sediment: sediment formed by precipitation from water, e.g., salt from dehydration and scales.

Chemical Tracing: using water soluble chemicals to track the flow channels in the reservoir.

Chemical Treating: various chemical treatments including acidizing.

Chemical Weathering: all the chemical reactions that act on rocks to produce stable minerals.

CHEMRAZ™: an elastomer used in seals.

CHFR™: cased hole formation resistivity tool.

Cherry Picker (fishing): an overshot fishing tool with a bottom cutter surface to allow milling the top slips or all the slips prior to retrieving a packer.

Chert: a hard, silicate sedimentary rock. Similar to flint, but with less ordered structure. A cryptocrystalline form of quartz.

CHESS: chemical hazard employee safety system.

Chevron packing (seal): a V-shaped seal very common on moving and static seals.

Chevron Pattern (corrosion): a V-shaped pattern on a fatigue or brittle-fracture surface. The pattern may also be one of straight radial lines on round specimens.

CHFP: cased hole frac pack.

CHGP: Cased Hole Gravel Pack.

Chicksan™: a surface treating line connector that allows quick, pressure tight bends in high pressure pipe.

Chisel Bit: a device with a single bit running the width of the hole. Also called a dove-tail bit.

CHK: choke.

CHKS (rig up): chicksans

CHKS: back flow checks.

CHL: cased hole log.

Chloride Stress Cracking: cracking of a metal under combined action of tensile stress and corrosion in the presence of chlorides and an electrolyte (NACE). Starts at a pit, scratch or notch. Crack proceeds primarily along grain boundaries. The cracking process is accelerated by chloride ions and lower pH.

Chlorinated Hydrocarbons: a chlorine atom substituted onto an alkane (hydrocarbon chain). These materials have been identified as refinery catalyst poisons.

Chlorine Dioxide: ClO2, a free radical compound especially useful in killing bacteria in waters. It is a powerful biocide that dissolves biomass cell walls. It is nearly impossible for bacteria to develop immunity against ClO_2.

Chlorine Log: a cased hole log, using gamma ray capture by chlorine atoms, that helps estimate the salinity or water behind pipe.

Chlorite: a clay type marked by high iron content. Usually not water sensitive and only slowly acid soluble. Very occasionally existing as fragile, free standing rims following sand grain dissolution over geologic time.

Choke: a device used to create a controlled pressure drop and allow some expansion of the gas. A choke holds a back pressure on the well fluids, controlling the expansion rate of the gas. It is useful for optimizing natural gas lift in oil wells with sufficient gas to flow naturally or in some gas lifted wells.

Choke Bean: a flow tube for a fixed bean-type choke.

Choke Line: a drilling and workover pressure control device. A line that attached to the BOP stack and through which kick fluids can be circulated when the BOP is closed.

Choke Manifold: a set of valves and/or chokes used to control drilling fluid returns on a drilling well or, in a few cases, used to control flow from a high rate well where the chokes may be in parallel or series.

Choke Trim: pressure-controlling choke components, usually replaceable, expendable pieces.

CHOPS: cold heavy oil production with sand.

Christmas Tree: the control sections that sits above the basic wellhead. It may contain hangers, master valves, annular valves, wing valves, and gauges or pressure, flow rate or monitoring measurement equipment.

Chromatogram: an analysis of hydrocarbons from a gas stream in order of molecular size.

Chrome Tubing: one of several steel compositions for tubing that uses chromium for increased resistance to CO_2.

Churn Flow: a flow regime in which the rising gas bubbles have enlarged.

CIBHP: closed in bottom hole pressure.

CIBP: cast iron bridge plug.

CID (subsea): chemical injection for downhole.

CIM: Canadian Institute of Mining

CIRC: circulate.

Circulate: establishing flow down the tubing or drill pipe and up the annulus. Reverse circulating involves injecting down the annulus and up the drill pipe.

Circulate and Weight Method: a kick control method that circulates the well immediately and mud weight is brought up gradually. (Concurrent method).

Circulating Pressure: the pressure generated by the mud pumps and, in normal circulation, exerted on the drill string.

Circulation Charge: see Puncher Charge.

Circulation Control Valve: valve normally placed across the circulation point to allow isolation of the tubing strings or tubing/casing during production.

Circulation Losses: losses for any reason while circulating the well.

Circulation Squeeze: a secondary or repair cement method using upper and lower perforations and a packer set between. Circulation is established with water and mud remover chemicals to clean the channel. Cement is circulated with a set volume pumped, then the packer is released and pulled above the zone. The cement is displaced from the tubing. A secondary squeeze may be done.

Circulation Sub: a sub in the circulating string with a side port that can be opened remotely to allow circulation from that point.

Circulation Valve: a downhole valve in the treating string, operated by pressure pulsing or wireline that will allow the annulus to be circulated.

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CIT (corrosion): corrosion inhibitor treatment.

CIT (pressure test): casing integrity test.

CIT (subsea): chemical injection for tree.

CIT-OA: casing integrity test – outside annulus.

Citric Acid: a weak organic acid that serves as a chelating agent for iron (slows iron hydroxide formation).

CIV (completion): completion isolation valve.

CIV: chemical injection valve.

CIWHP: closed in well head pressure.

CL: control line.

ClampOn™ Sand Detector: a brand name of a sand particle movement detector.

Clamshell Marks (failure/crack development): characteristic markings (ridges, tears, risers, etc.) on fracture surfaces after fatigue crack of fracture propagation (also known as beach marks, conchoidal marks and arrest marks).

Class A Cement: construction grade Portland cement.

Class C Cement: finer grind cement, higher early strength.

Class E and F Cements: high temperature cements.

Class G and H Cements: oilfield related cements.

Clastic: a rock grain, formed somewhere else and transported into place to be part of another rock.

Clay: a fine grain (<0.00015" or about 4 microns) – finely crystalline silica sheet minerals. Usually of silicate composition. In oil field terms, the most common clays are Smectite (montmorillinite), illite, kaolinite and chlorite. The characteristic for authogenic clay is to have extremely high surface area-to-volume ratio.

Clay-Bound Water: water held in or on the surface of a clay and not free to move with other connate fluids.

Clay Extender: a drilling additive to increase the viscosity of water based muds gelled with bentonite.

Clay Flocculation: dropping suspended particles out of a fluid by agglomerating them into larger, easier separated particles.

Clay Migration: movement of clay particles, usually after partial disintegration of the clay matrix due to absorption of water or reaction to other effects such as ions, velocity, crushing due to overburden, etc.

Clay Swelling: the absorption and modification of the clay matrix by a reactive water.

Clean Circulation (drilling): fluids returning to the surface without cuttings or other solids removed from the well.

Clean Oil: oil with less than 1% water. Usually within pipeline spec.

Cleanout: removal of fluids or solids from a well, usually by circulating.

Clear Brine: a brine without suspended solids.

Cleat Fracture (in coal): a natural fracture along the cleat plane, usually parallel to max stress. Often extensive, especially in thin beds.

CLFP: choke line friction pressureClinker: pea to marble sized pellets of raw cement prior to grinding.

Clintoptolite: a common zeolite mineral with sensitivity to some surfactants.

ClO_2: chlorine dioxide, a powerful biocide that dissolves biomass cell walls. It is nearly impossible for bacteria to develop immunity against ClO_2.

Close In: to shut-in a well.

Closed Chamber Testing: testing the well into a chamber open at the bottom, but closed at the surface. Fluid entering the wellbore is equal to the fluid production minus the gas volume charge. A material balance approach.

Closing Ratio: the ratio between the pressure in the hole and the operating-piston pressure needed to close the rams on a given BOP design against a particular well head pressure.

Closure (fracture): the pressure at which a fracture closes. Related to the closure forces in a formation.

Cloud Point (Paraffin): the first appearance of microsized paraffin crystals in suspension in the oil.

Cluster Perforating: grouping the perforations in small groups usually to generate multiple, regularly spaced fractures using hydraulic diversion or ball sealers (etc.).

CLW (SSSV): control line to well communication.

CMC: carboxy methyl cellulose.

CMHPG: carboxy methyl, hydroxyl propyl cellulose.

CMIT – TxIA: combination mechanical integrity test – tubing x inner annulus.

CMIT – IAxOA: combination mechanical integrity test - inner annulus by outer annulus.

CMIT – TxIAxOA: combination mechanical integrity test – tubing x inner annulus by outer annulus.

CMP (depth): common mid point.

CMS: carboxy methyl starch.

Cmt: cement.

CMTD: cable mounted tension device.

CNG: compressed natural gas.

CNL: compensated neutron log. Radioactive neutron source bombards the formation with high energy neutrons, which are slowed and captured by atoms of the formation. The low energy neutrons are reflected back to the tool and counted. The amount of neutrons returning is inversely proportional to the porosity of the formation.

CO: circulate out, mud logging term.

CO: carbon monoxide.

CO_2: carbon dioxide.

CO_2 Injection: secondary recovery technique for oil. The carbon dioxide gas is injected and alternated with water. CO_2 lowers the viscosity of most oils, but may trigger severe asphaltene and scale precipitates.

Coagulation: forming a larger mass from smaller ones by collision and sticking together.

Coal: sedimentary rock, often highly naturally fractured, composed of thermally modified plant remains.

Coal Bed Methane: natural gas formed during the coalification process and trapped within and adsorbed to the coal.

Coal Gas: usually methane which is adsorbed and absorbed to the high surface area of the coal.

Coal gasification: the chemical conversion of coal to a gas.

Coal liquefaction: chemical conversion of coal to a liquid hydrocarbon.

Coalescence: the combination of bubbles or droplets in an emulsion to form larger bubbles or drops that will separate easier.

Coarse: API designation of sand-type particles larger than 2000 microns.

Coating: a liquid, liquefiable, or mastic composition that, after application to a surface, is converted into a solid protective, decorative or functional adherent film (NACE).

Coating Holiday: a break in an otherwise continuous coating.

Coccolith: a marine, single celled (1 to 5+ micron) animal that is a component of chalks.

COD: chemical oxygen demand.

COE: controllable operating expense.

COFCAW: a tertiary recovery mechanist consisting of combustion and water flooding.

Cogeneration: production of electrical or mechanical energy and heat or other power.

Coherence (seismic): a seismic comparison method. Reverse method is incoherence.

Cohesion: a force that holds fluids and sand grains together. The force is generated by attraction at the molecular level. Cohesion is often used to describe sand grains stuck together by a low viscosity fluid such as oil or water, although this is better explained as adhesion.

Coiled Tubing: a continuous reeled tube from 1" diameter to >3.5" diameter. The tubing is injected into a well via a coiled tubing unit (CTU) and can be used to unload wells with liquid, foams or gasses, logging, fracturing, etc.

Coiled Tubing Completion: a completion where CT and associated CT-mounted hardware is used as the primary completion flow path.

Coiled Tubing Connector: a mechanical device used to join strings of CT or attach a BHA to the CT.

Coiled Tubing Drilling: where CT is used as the primary drill string with a mud (less commonly an electric) motor to rotate the bit. Often used in underbalanced drilling.

Coiled Tubing Injector Head: the hydraulic powered chain driven unit that snubs or strips coiled tubing into or out of a well.

Coiled Tubing Unit: the CT, reel, injector head, power pack, control unit and pressure control equipment used in a coiled tubing job.

Coke: a generally insoluble hydrocarbon that has been oxidized to the point of a solid, often hard mass.

Cold Finger Test: a device with a chilled probe that measures the temperature at which paraffin will precipitate of an oil solution.

Cold Treating: the treating of an emulsion with chemicals to break an emulsion without resorting to the application of heat.

Coleman Equation: equations for deliquification of a well at operating pressures less than 1000 psi.

Collapse Chimneys: a type of Karst (geologic time sink hole).

Collapse Pressure: external hydrostatic pressure that will cause the onset of pipe yielding. Heavily influenced by tension loads on the pipe.

Collapse Rating: the collapse pressure derated by a safety factor. Takes into account the effects of axial load. The formulas are only good for round pipe.

Collar: the connection or coupling on jointed pipe. It the strict sense, it is the section with female x female connections.

Collar Lock: a profile that can be set by wireline in the space in an API type coupling.

Collar Log: A magnetic inflection log, run on wireline that is principally used to locate the depth of threaded pipe connections and other masses of metal.

Collar Stop: a wireline set plug without a profile. It is set in a coupling and grips with packer-like slips.

Collett: a mechanical device used for holding or locking where segmented keys or fingers are pushed into a recess to hold, anchor or grasp the tool.

Collett Connector (coiled tubing): a type of connector that utilizes a collett-type device for attaching a BHA to coiled tubing.

Collett Lock: a type of lock used in a profile.

Collider: an explosive charge in a tool designed to sever very heavy BHA tools such as drill string collars and stabilizers. It latterly uses a focused explosive to blown the string apart. A tool of last resort.

Collision: when the drill bit in a new-drill well contacts an existing wellbore.

Colloid: a substance with particle size so fine that it exists as a stable dispersion rather than settling out.

Colloidal Suspension: a dispersion of fine particles, held by charge or other force in a stable suspension.

Combination Log: a single assembly of various logging tools.

Combination Trap: a trap that has both structural and stratigraphic character.

Combustible Limits (fuel gas): the range of gas concentration in air where the fuel gas or combustible gas will ignite.

Commercial Production Level: varies with the well – an indicator of the minimum flow rate and type of fluids that can justify completing or continuing to operate the well.

Commingle: mixing production. In a well, when two or more zones are mixed to assist in economic production. In a flow line, when multiple crude source streams are mixed.

Common Carrier (petroleum): those engaged in the transport of petroleum products.

Common Process: a common way of working that generates and/or protects value, sets out baseline expectations, to materially impact performance, is enduring and globally consistent, and helps advance the capacity of the global organization.

Communication: ability to circulate or pass fluids from one chamber in a well to another.

Compaction: a crushing of the matrix structure as overburden loads press down on the rock, reducing the pore space. During production of the well, the load on the matrix increases as the pore-filling fluids are removed. These loads may reduce the porosity of the rock expelling fluids from the rocks (compaction recovery of fluids). Permeability may be decreased in compaction, first by closing natural (unpropped fractures) and then by reduction of matrix perm in severe cases.

Compaction Drive: a drive mechanism in a weak zone that displaces fluid by reducing the overall volume of the formation.

Company Man (drilling): the operating company representative on location.

Compartmentalization: separate compartments or smaller reservoirs in a larger, common reservoir that may not be in communication.

Compartments: segregated flow units of a main reservoir that have a poor flow connection or no flow connection to the main reservoir.

Compensated Formation Density Log: a dual spacing formation density log, using two detectors at different distances from the source.

Compensated Log: a well log that is designed to correct for an effect associated with the borehole.

Completion Bore Protector (subsea): a removable sleeve that covers the internals of the subsea tree during drilling operations.

Compatible Brine: a brine that does not create formation damage or permeability reduction when introduced into a formation.

Completed Well: a well that has been drilled, cased and cemented and is ready to produce hydrocarbons.

Completion Fluid: a brine, oil or gas based fluid that is used as isolation (kill, separation, inhibition functions, etc.) fluid during the completion of a well. Commonly sea water, NaCl brine, formation water, KCl brine, $CaCl_2$ brine, etc. Oil based fluids are common where formation sensitivities with shales, clays, minerals, etc., prevent use of aqueous fluids.

Completion Interval: the pay zone exposed to the wellbore. This may or may not be the entire pay.

Completion Technical Limits: the maximum production or flow capacity possible by the best completion attainable.

Complex Fracturing: opening up secondary natural fractures that may be orthogonal to the planar fracture. Also – networked fractures and shear fracturing.

Complex Well: a well design with engineering or application challenges that are out of the ordinary.

Compliant Expansion: a term used in expandable nomenclature signifying expansion that fits itself to non-gauge boreholes.

Composite Bridge Plug: a bridge plug made mainly of plastic and composite materials.

Composite Log: several logs spliced or overlayed to form a single group log record.

Compressibility: the volume change of a material when pressure is applied.

Compressional Wave: a P wave.

Compression-Ignition Engine: a diesel engine; an engine in which the air and fuel are ignited by the heat produced on the compression stroke.

Compression Ratio: the ratio of the absolute outlet pressure of a compressor to the absolute inlet pressure.

Compression-Set Packer: a retrievable packer where the slips are set and the seal energized by setting tubing string weight down on the packer. Releases by picking up the string. Useful where annular pressure could unseat a tension-set packer.

Compressor: a type of pump that increases the pressure of gas. Commonly used as a production rate increaser by increasing the gas pressure delivered from low pressure gas wells to enter the pipe line. The intake into the compressor lowers the wellhead pressure creating a larger drawdown.

Compton Scattering: a gamma-ray reaction in which the gamma-ray, after colliding with an electron, shifts some energy to the electron. The higher the energy loss by Compton scattering in a zone, the higher the electron concentration or density. The basis for the density log.

CONCAWE: Conservation of Clean Air and Water in Europe.

Concentric Completion: a multiple completion in which the upper zone flows to the surface through the annulus formed by the casing and the deeper zone tubing. Usually used only in sweet, dry gas upper completions.

Concentric Operations: any operation where a smaller tubing is inserted through a larger tubing string. Normally done with the wellhead in place. Often done with the well under pressure.

Concentric Tubing: one string inside another.

Concentric Tubing Workover: a workover using a small diameter tubing inside the existing tubing. Usually done with a hydraulic workover rig or coiled tubing. Commonly used with a positive surface well pressure and seals on the smaller tubing in a live-well workover.

Concession (lease): A grant of access for a defined area and time period that transfers certain rights to hydrocarbons that may be discovered from the host country to an enterprise. The enterprise is generally responsible for exploration, development, production and sale of hydrocarbons that may be discovered. Typically granted under a legislated fiscal system where the host country collects taxes, fees and sometimes royalty on profits earned (SPE).

Conchoidal Marks (failure/crack development): characteristic markings (ridges, tears, risers, etc.) on fracture surfaces after fatigue crack of fracture propagation (also known as beach marks, clamshell marks and arrest marks).

Concurrent Method: a well pressure control operation in which circulation is started immediately and mud density is brought up in steps until the well has been completely circulated to the kill weight fluid.

Condensate: the part of the hydrocarbon stream that is a vapor in the formation and condenses to a liquid after being cooled. Normally the volatile condensate has a composition of C5 to C8 and an API gravity of >40.

Condensate Banking: a relative permeability effect where condensate, usually hydrocarbon, drops out of the vapor phase around the wellbore when the pressure drops below the dew point in response to drawdown or depletion. Gas rates can be severely reduced by the permeability reduction.

Condensed Water: water condensed from gas as it is produced. Usually fresh water.

Condition the Mud: circulate the well to remove cuttings and gelled mud prior to running the casing.

Conductance: the reciprocal of resistance in direct current logging measurements. Measured in siemens (formerly mhos).

Conduction Heat Transfer: heat transfer when two solids are in contact and heat passes between them – heat transport by direct transfer of energy from one particle to another.

Conductive Concrete: a highly conductive cement and coke based material used an impressed current anode.

Conductivity (fracture flow): the permeability of the pack times its width. Expressed in md-ft.

Conductor Pipe: the first string of casing run, usually to keep rocks or dirt out of the wellbore. It is usually not cemented in place. It may be jetted in, driven in, drilled in or installed in an excavated hole.

Confining Bed: A rock layer that through either low permeability or different modulus serves as a boundary for an event such as fluid flow or fracturing.

Confining Pressure: various earth forces acting on the formation. Includes overburden.

Confirmation Well: or delineation well; a secondary well, after a field discovery well, drilled to help determine field extent, volume or potential rate.

Conformation Well: well or wells drilled to prove the formation or resources discovered in the initial or discovery well.

Conformity: a surface separating younger from older rocks with no indication of erosion or other disturbance.

Confusion Block: see impression block.

Conglomerate: poorly sorted collection of sediments, generally formed in a very high energy environment. Similar to sandstones but have much larger grains (pebbles grade 4 to 64 mm). The space between the grains may be partly or completely filled with sand grains.

Coning: the movement of a water upwards or gas downwards towards a decrease in pressure caused by producing hydrocarbons in a zone with no vertical permeability boundaries.

Connate water: the natural brine occupying the pore spaces. Usually this water is at equilibrium with the minerals in the formation.

Connection Gas: the small amount of gas that enters the wellbore when circulation is stopped to make a connection. The gas only enters the wellbore in this case when the static fluid pressure is less than the pore pressure.

Consequence (Risk): outcome of an event.

Consistency: a fluid's ability to deform and flow and its general cohesion to itself.

Consistometer: a device with rotating paddles, used to check the pumpability and set time of cement slurries.

Consolidated: an approximate level of rock strength where sufficient cementation is present to allow the rock to remain intact during drilling and production. Often the unconfined compressive strength is greater than 1000 to 1500 psi.

Consortium: a group of unrelated companies working on a specific venture.

Constant Choke-Pressure Kill Method: a method of killing a well where the choke is adjusted to maintain a constant casing pressure as the a water kick rises in the annulus. The method should not be used with a gas kick (will not keep a constant BHP).

Contact: the depth of the interface between the oil and water, oil and gas, or water and gas.

Contact Angle: the angle of intersection of two fluids on a given surface. Describes wetting and non-wetting behaviors.

Contaminant (cementing): placing a material in a cement slurry (usually already in a wellbore) that purposely prevents the cement form setting so that it can be circulated out of the wellbore.

Contingency String (casing design): an "extra" string in a casing design that can be used in the event of failure to get an upper string to the correct depth.

Content (fuel): the heat value per unit of fuel expressed in Btu as determined from tests of fuel samples. Examples: Btu per pound of coal, per gallon of oil, per cubic foot of gas (AGA).

Continental Margin: the separation of emerging continents from deep sea basins.

Continental Shelf: the shallow area out from shore to a water depth of about 450'.

Contingent Resources: the hydrocarbons that are estimated to be potentially recoverable from known accumulations, but which are not currently considered to be commercially recoverable.

Continuous Flow Gas Lift: a lift system that uses continuous injection of gas into the liquid column.

Continuity: measurement of a formation being present over a large area.

Continuous Phase: the external phase in an emulsion.

Contour: a curve connecting points of equal value on a map.

Contracted Reserves: reserves of hydrocarbon dedicated to fill a specific contract.

Control Head: an extension of a retrievable tool that is used to set and release the tool.

Control Gas: that part of the gas stream used to actuate or operate equipment (may be rendered unusable for sale due to pressure drop, etc.).

Control Line: a small diameter line, usually attached to the outside of tubing, which controls the ScSSV or other downhole tools.

Convection Heat Transfer: heat transfer by gas, steam or liquid circulation. Heat transport by moving particles and the thermal energy they carry to a new location.

Convective Mixing: mixing created by heat transfer.

Conventional Crude Oil: petroleum in liquid form capable of flowing naturally.

Conventional Energy Sources: oil, gas, coal. The source of the energy may also have bearing on the definition. Unconventional hydrocarbon energy sources include shale oil (both mature and immature), shale gas, and tight gas (ultra low permeability, usually less than 0.001 millidarcy).

Conventional Gas: natural gas in a normal media, capable of flowing without other influences.

Conveyance (well work): the wireline, slickline, tubing or coiled tubing used to convey tools or equipment in a well.

COPAS (accounting): council of petroleum accounting and shipping.

Copolymer: a mixture of two or more polymers which polymerize at the same time and with some degree to linking to yield results unlike either polymer used alone.

Core: a sample of the formation, taken with a core barrel.

Core Analysis: lab work on a core sample that may yield permeability, porosity, pore size distribution, grain size, density, etc.

Core Barrel: a barrel in the drilling BHA with a coring head designed to receive a rock core cut as part of core sampling operations.

Core Diameter (coiled tubing reel): the diameter of the core of the CT reel.

Corkscrew: compressional deformation of tubulars to the point where the tubing resembles a corkscrew. The condition may be temporary if the metal is not yielded past the elastic recovery point. Tubulars that are corkscrewed may be pumped through but will stick most diameters of tool strings.

Correlate: to compare logging and core or other information and account for discrepancies.

Corridor: a strip of land or water through which a concession is obtained to run pipelines, electrical power, etc.

Corrosion: the deteriorating chemical reaction of a metal with the fluids with which it is in contact.

Corrosion Coupon: a representative piece of metal cut to a specific size and shape that is immersed in a test bath of placed in the flow stream to enable an estimation of the active corrosion occurring in a given set of conditions.

Corrosion-Erosion: eroding away of a protective film of corrosion product by the action of a process stream, exposing fresh metal which then corrodes.

Corrosion Fatigue: fatigue-type cracking of metal caused by repeated stresses in a corrosive environment.

Corrosion Film: First products of corrosion films that may form a tight, barrier film and reduce further corrosion.

Corrosion Inhibitor: a chemical substance or combination of substances that, when present in the environment, prevents or reduces corrosion (NACE).

Corrosion Potential (E_{corr}): potential of a corroding surface in an electrolyte relative to a reference electrode under open-circuit conditions.

Corrosion Resistant Alloy: CRA, alloy intended to be resistant to general and localized corrosion of oilfield environments.

Corrosion Resistant Ring Groove: a ring groove lined with material resistant to metal-loss corrosion.

Corrosive Gas – a gas that attacks metal or other specified targets. Most commonly CO_2 and H_2S. Usually in association with water or water vapor. Oxygen can be described as a corrosive gas in some cases.

COST Well: a well drilled on the continental margin to provide data for offshore leases.

Covalent Bond: the combination of two of more atoms by sharing of electrons. Covalent bonds are generally stronger than other bonds.

Counterbalance Weights: the rotating weights on a beam lift pump jack that offset the weight of the rod string.

Coupling: the connection point of jointed pipe. It may be a steel shell with female threads to which the pins are connected or a formed female connection (box) on the end of tubing.

Coupon: a test strip of metal used in corrosion and erosion testing.

CP (casing): casing point.

CPS: central power station.

CPT (corrosion): critical pitting temperature.

CQG: crystal quartz gauge.

Cr: chrome. 13Cr is 13% chrome.

CRA: corrosion resistant alloy.

Crack a Valve: to barely open a valve.

Cracking (refining): breaking longer chain hydrocarbon molecules to shorter chain molecules.

Crater (blow out): a depression formed from a release of gas through loose soil at the surface or sea floor.

Cratering or Sloughing: collapse of part of the formation into the wellbore during drilling or completions.

Crazing: a network of checks or cracks appearing on the surface.

Creep: the slowest form of mass movement.

Creaming Curve: a graph of the hydrocarbons discovered or produced in an area use to determine if new wells are improving with each new well.

Creaming of Emulsions: density separation state of emulsions, often where color variances are noted.

Creep: the slow movement of a solid due to an applied stress. Often very sensitive to time and rate of stress application.

Crest (geology): the top of a pay structure.

Crest (flow): the top of the water cone in (usually) a horizontal well. Compare with coning in a vertical well.

Cretaceous: a geological time from 65 million to 140 million years ago.

Crevice Corrosion - intensive localized electrochemical corrosion occurs within crevices when in contact with a corrosive fluid. Will accelerate after start.

Crew: a group of workers on a rig.

CRI (solids handling): cuttings reinjection.

CRI (structure): caisson-retained island.

Critical (flow): super sonic.

Critical Buckling Load: the compression load that initiates buckling in the pipe.

Critical Components: part identified in a system that need a higher degree of reliability or traceability.

Critical Drawdown: various. Usually the sand free rate, but may also include a rate to achieve cleanup in special cases.

Critical Failure: failure of an equipment unit that causes and immediate cessation of the ability to perform its required function.

Critical Flow Rate (biofilm): the minimum flow rate that keeps biofilm deposits from forming on the surface of the pipe.

Critical Flow Rate (corrosion/erosion): the maximum flow rate that avoids damage to the pipe from corrosion or erosion.

Critical Flow Rate (liquids unloading): the minimum flow rate to produce liquids from a well.

Critical Flow Rate (sand production): the maximum flow rate that avoids producing sand from the formation.

Critical Saturation: the saturation of a fluid at which the fluid will begin to flow as saturation is increased.

Critical Temperature: the temperature above which a fluid cannot be liquefied by increasing pressure.

Critical Velocity (erosion): setting a maximum flow rate to minimize erosion corrosion.

Critical Velocity (unloading): a minimum velocity to lift liquids in gas flow.

Crooked Hole: a wellbore drilled in excess of the maximum allowable dogleg.

Cross Dipole: a log with the receivers located 90^{o} to the emitter.

Cross Flow: flow between formations via a connected wellbore. Crossflow, as seen by downhole cameras, can occur with the wellbore full of fluid and the appearance of a dead well at surface.

Cross Plot: two or more log responses or other variable records plotted on an X-, Y- axis.

Crosslinked: a polymer gel with a chemical crosslinker added to link the linear gel into a higher viscosity gel.

Crossover (gravel packing): a section of the treating string that transfers incoming flow from inside the pipe to the annulus below the crossover, and the return flow from inside the tubing to the annulus above the crossover. Straddles a packer.

Crossover Sub: a short section of pipe with the proper threads cut into each end to join two pieces of pipe or equipment that do not have matching connections.

Crosswell Tomography: a map of the acoustic strata record between two wells where the emitter is in one well and the receiver is in the other.

Crown: high point.

Crown Block: the set of pulleys or sheaves at the top of the mast on a rig.

Crown Lands: government owned land.

Crown Plugs (subsea): the plugs above the flow T in a subsea wellhead.

Crown Saver: a device that keeps the traveling block from being raised ito the crown block.

CRP (rock mechanics): critical reservoir pressure for sanding appearance.

Crude and Crude Oil: a range of principally Carbon-Hydrogen chain compounds with generally straight carbon chain lengths of C1 (methane) to C60+. The straight chain materials are alkanes.

Crude Oil Equivalent: a conversion of all gas forms to a comparison oil volume. Conversion factors are usually 5.6 to 6.0 mscf (depending on btu of the gas) to 1 bbl of oil.

Crush Zone: the area of the rock adjacent to the perforation tunnel where permeability may be 50% less than initial, undamaged permeability.

Crust: the outermost crust of the earth.

Crystal: a mineral with a systematic internal arrangement of ions that forms a repeating outward latticework of three dimentional units.

Crystallation Temperature: the temperature at which the first crystal of salt appears from a brine that is being cooled.

CsCOOH: cesium formate.

CSD^{TM}: compensated spectral density log.

Csg: casing.

CSS: cyclic steam stimulation.

CST (fluids): centistokes. A measure of viscosity.

CST (rock): capillary suction time.

CT: see Coiled Tubing.

CTD: coiled tubing drilling.

CTDESP: coiled tubing deployed electric submersible pump.

CTE: coefficient of thermal expansion.

CTL: coiled tubing logging.

CTR: controlled tension release tool. A release tool for downhole.

CTU: coiled tubing unit.

Cumulative Production: production of hydrocarbon to date.

Cup Packer: a packer with elastomer cups that are pushed out during fluid injection as the primary seal. Used for washing perfs and some testing. Only seals during fluid injection.

Curie Point: the temperature above which a mineral loses its magnetism.

Curing Agent: a chemical substance used to initiate the hardening reaction of a resin.

Curvature (seismic): a seismic comparison method useful in finding Karsts.

Cushion (underbalance): a fluid column margin of some type. Usually well control mud weight, gas column, etc.

Cushion Gas: the reservoir pressure necessary to keep gas recoverable.

Cut: the fraction of a fluid in a mixture of fluids.

Cut and Strip: cutting the logging cable and threading it through the drill pipe when fishing for logging tools.

Cut Fluid: a fluid that has been contaminated by an undesirable fluid.

Cut Lip Guide: a type of cut on the bottom of an overshot that, when rotated, can help center the end of a pips that is laying against the side of the hole.

Cut-Off tool: generally a reference to a device that severs the pipe downhole by explosive, chemical, heat or mechanical action.

Cutrite: carbide particles in a metal binder. Applied to the cutting surfaces of mills.

Cuttings: chips of rock from the drilling process. They are circulated to the surface by the mud and separated in the screens and shaker. They are useful for identifying and correlating the formation.

CV: check valve.

CVAR (subsea): compliant vertical access riser.

CVP: The Group Capital Value Process, essentially the application of the stage gate decision process.

CVT: Chevron Texaco.

CWA: clean water act, a US law.

CWI (contract): carried working interest.

CWOP: complete well on paper exercise.

CWOR: completion and workover riser.

CWTF: central water treatment facility.

Cycle Gas: gas that is separated and reinjected.

Cycle Time (drilling): round trip time for a circulated fluid.

Cycle Time (plunger): the trip time for a plunger from dropping to recovery.

Cyclone: a device that separates cuttings by centrifugal motion of the fluids.

Cyclonite: another name for RDX explosive.

D&A: dry and abandoned.

D&C: drilling and completion.

D/t (pipe): the OD to the pipe wall thickness.

Daily Drilling Report: the daily report on activities, results, and shows of the past 24 hours.

Damage (formation): a general term commonly referring to an obstruction in the flow path.

Dampner or Dampener (flow line): a device in the line filled with gas that may reduce the surges of pressure pulsation or flow slugging.

Darcy: a measurement of permeability (ability of fluids to flow through the rock). The relationship is an empirical law which states that the velocity of flow through porous media is directly proportional to the hydraulic gradient, assuming that the flow is laminar and inertia can be neglected.

Dart: a pump-down fluid separation device. May also be used to operate tools downhole by hydraulic forces.

DAS: data acquisition system.

Data Frac: a small fracture treatment, without proppant, pumped into a well to assess fracture breakdown pressure, fracture extension pressure, fluid loss coefficient, frac fluid efficiency and fracture closure time.

Datum: a relative comparison point, such as the Kelly bushing, sea level or mud line.

Daughter: an atom that results from the radioactive decay of a parent atom.

Daylight Tour: day working shift.

DB: dump bailer.

DB&B: double block and bleed.

DC: depth correction.

DC (drilling): drill collar.

DCF (accounting): discounted cash flow.

DCS (pipe): depth control sub.

DCS: distributed control system.

DD: draw down.

DDB: drive down bailer.

DD&A: depletion depreciation and amortization.

DDCV: deep draft caisson vessel.

DDR: daily drilling report.

DE: drilling engineer.

DE (filter): diatomaceous earth filtration unit.

D_e (hydraulics): equivalent hydraulic diameter.

Dead Carbon (shale): carbon with a type of Kerogen content that has low potential to generate hydrocarbons (generally woody carbon).

Dead Leg (pipeline): a section of pipeline that is not in use.

Dead Line (lift systems): that part of a wireline or cable that is attached to a fixed anchor point and does not move through a pulley or other mechanical device.

Dead Oil: crude oil without gas. May have been degassed mechanically or by gas breakout during storage.

Dead Well: a well that will not flow on its own through natural gas lift or by reservoir pressure.

Deadman: buried anchor.

Dead Time: in radioactive logging, the length of time that the system requires to recover after counting an event.

Deaerator: devices used to separate gasses from liquids.

Dealloying (corrosion): selective corrosion of one metal in an alloy.

Dean Number: fluid flow effects in spooled tubing.

De-Bottlenecking: a program, typically in surface facilities and lines, to remove pressure drop causing flow restrictions.

Decay Rate: the rate at which a population of radioactive atoms decays into stable daughter atoms. Rate expressed in half-life of the parent isotope.

Decentralizing Arm: a mechanical level that pushes a tool against the side of the well.

Decision Tree (Risk): a sequence of nodes which are either a decision or an uncertainty, and outcomes associated with each mode. The purpose of a decision tree is to define the set of scenarios and the sequence of events that guide the evaluation of risk and return.

Decline Curve: the slope of the production rate vs. cumulative time or volume measurement. The decline of a well predicts how fast it is being depleted.

Decommision: remove from service.

Decompression Damage (gas effects on seals): when pressure is dropped rapidly, gas that has permeated the elastomers and some plastics may rupture the surface of a material when the gas expansion caused by the decompression is faster than the gas can pass through the substance. Most severe in weak tensile-strength materials.

Deconvolution (seismic): (using Werner) an automated profile-based depth estimation method derived from analysis of magnetic anomalies in sheet-like bodies. Polynomials can be simultaneously solved to estimate the depth, dip, horizontal location and susceptibility (magnetic) of the surface or structure. Basically undoing the effects of a filter.

Deep Investigation: measurement of formation properties far enough from the wellbore to minimize the effects of the invaded zone.

Deep Marine Chalks: often massive deposits of coccolith fragments. Usually very high porosity and limited permeability unless fractured.

Deep Penetrating Charge: a perforating charge with a liner shape designed to create a long penetration into the formation, but a smaller entrance hole in the pipe. See also Big Hole Charge.

Deep Propagation Log: a log that measures the resistivity of the formation.

Deferred Production: hydrocarbon production that is delayed due to any of several reasons, specifically well repairs, restrictions that curtail production, regulations, etc.

Deflagration: burning, decomposition or low order detonation of explosive.

Deflection: the total change in angle of a wellbore in a given distance.

Deflection (drilling): the amount of flex exhibited by the drill string.

Deflocculation: dispersing a clump or a gathering or "flocculated" of particles. Usually accomplished by dispersants or solvent thinners.

Defoamer: a foam breaking chemical.

Degasser: any device that helps remove gas from circulated fluid.

Degrees API: the API gravity.

Dehydrator: a treating vessel designed to remove water from a process stream.

Delayed Gamma Ray: a gamma ray that is emitted from the decay of an excited state in a nuclear reaction.

Delineation Well: a secondary well, after a field discovery well, drilled to help determine field extent, volume or potential rate.

Deliquification: removal of condensed or produced fluids from a low rate gas well.

Deliverability: the tested and proved ability of a well to produce.

Delta t: the sonic travel time in microseconds per foot, of a sound wave through the formation. Denser formations (generally better consolidated and cemented) have lower (faster) delta t times.

Deltas: mouth of river deposits, usually fan shaped with significant variation in composition, sorting and thickness. Quality of the reservoir rock may vary widely.

Demonstrated Reserves: (American Petroleum Institute) A collective term for the sum of proved and indicated reserves. Proved reserves are estimated with reasonable certainty to be recovered under current economic conditions. Indicated reserves are economic reserves in known productive reservoirs in existing fields expected to respond to improved recovery techniques where (1) an improved technique has been installed but its effect cannot yet be fully evaluated, or (2) an improved technique has not been installed but knowledge of reservoir characteristics and the results of a known technique installed in a similar situation are available for use in the estimating procedure.

Demulsifier: a chemical additive, usually a surfactant, that helps break emulsions.

Dendritic Drainage: a stream system that branches irregularly.

Densitometer: a device used for reading the density of a flowing fluid or slurry.

Density: the mass per volume of a substance. Density of fresh water is 8.33 pounds per gallon or 1 gram/cc.

Density Contrast (seismic): density of one rock relative to another. The contrast can be positive or negative. Gravity anomalies within sedimentary sections can be analyzed as structural or lithologic anomalies.

Density-Depth Function (seismic): the change in density with increasing depth is often a result of compaction. Age, lithology and porosity modification are also factors.

Density Log: one of a number of logging techniques that estimate the density of the formation.

Departure: the distance from the kelly bushing horizontally to the end of the well.

Departure Curves: graphs that show influence of a variable on the basic measurement; e.g., temperature, hole diameter, mud resistivity, bed thickness, adjacent bed resistivity, etc.

Depletion: reducing the fluid content of a formation by production of that fluid.

Depletion Plan: the primary process for Life of Field resource management. The Depletion plan sets out the framework of how Resource Management underpins efficient exploration of the resource.

Deposit Attack: corrosion occurring under or around a deposit on a surface.

Depositional Energy: relating to the energy of the transport mechanism that carries particles into an area of deposition. Low energy environments may contain large quantities of fines where high energy environments are usually marked by larger and more consistent grain sizes.

Depositional Environment: the conditions of sediment transport and deposition at the time the formations were laid down.

Depreciation, Accelerated: see Depreciation, Liberalized.

Depreciation, Asset Depreciation Range: A system of tax depreciation which enables a corporation to choose any life falling within 20% of the designated class life for determining its annual depreciation charge. ADR requires an annual election and all depreciation records must be maintained by vintage year (From AGA).

Depreciation, Declining Balance: One of the liberalized methods of computing depreciation (normally used for tax purposes). Under this method, the depreciation rate is stated as a fixed percentage per year and the annual charge is derived by applying the rate to the net plant balance, which is determined by subtracting the accumulated depreciation reserve (From AGA).

Depreciation, Flow Through: An accounting procedure under which current Net Income reflects decreases or increases in current taxes on income, arising from the use of liberalized depreciation or accelerated amortization for tax purposes instead of the straightline method. See DEPRECIATION, NORMALIZED (From AGA).

Depreciation, Liberalized: This refers to certain approved methods of computing depreciation allowance for federal and/or state income tax purposes. These methods permit relatively larger depreciation charges during the earlier years, in contrast to the straight-line method, under which the annual charges are the same for each year. This is sometimes referred to as accelerated depreciation (From AGA).

Depreciation, Normalized: An accounting method under which Net Income includes charges or credits equal to the decreases or increases in current taxes on income, arising from the use of liberalized depreciation or accelerated amortization for tax purposes instead of the straight-line method. The contra entries for such charges to Net Income are suspended in Balance Sheet accounts. In future years, there is a feedback of these suspended amounts to Net Income when increases in the then current taxes on income occur because liberalized depreciation or accelerated amortization was used for tax purposes in prior years (From AGA).

Depreciation, Straight Line: A method of computing depreciation under which equal annual amounts are set aside for the ultimate retirement of the property at the end of its service life. For a property with an assumed 25-year life, the annual charge would be 4% per year, usually applied to the cost of the property less estimated net salvage (From AGA).

Depreciation, Sum of the Years: One of the liberalized methods of computing depreciation, normally used for tax purposes. Under this method, the annual deduction is derived by multiplying the cost of the property less estimated net salvage, by the estimated number of years of service life remaining, and dividing the resultant product by the sum of all the digits would be 25+24+23+22+ etc. +5+4+3+2+1 or 325. A simple way to compute this figure would be to multiply the number of years by the number of years plus one and divide by 2, i.e., (25 X 26) : 2 = 325. The first year's full depreciation deduction would be 25/325ths; the second year's would be 24/325ths, etc., of the cost of the property (From AGA).

Depreciation, Units of Production: A method of depreciation whereby the asset is depreciated over an estimated life expressed in units of output rather than over an estimated life expressed as a period of time (From AGA).

Depth Datum: the zero depth datum for well logging.

Depth Migration (seismic): data processing used to shift subsurface signals to their proper depth.

Depth of Investigation: the outer limit to which a logging tool can measure properties with a give accuracy.

Derrick: The elevated section of a rig that rises above the substructure and houses the crown block and draw works.

Derrickman: a person that works in the derrick and assists handling pipe to make up joints into the string or stand them in the derrick when breaking out joints.

Desander / Desilter: devices that typically use centrifugal flow paths to spin solids out of a drilling or circulating fluid.

Desorption: the release of materials that have been absorbed or adsorbed in or onto a formation.

Detail Log: a log recorded on a larger scale depth than the standard correlation of 1 or 2 inches per 100 ft.

Detectable Limit: the lower limit of analysis for a test of a piece of equipment for a specified measurement.

Deterministic Estimate (Risk): an estimate using a single number value. It does not account for ranges in value or probability of occurrence for the parameter.

Detonating cord: explosive wrapped with elastomer in the shape of a cord. Used to link and detonate charges in perforating guns.

Detonator: a blasting cap.

Detridal: a grain of a sedimentary formation that was transported from its origin and deposited as a whole grain in the matrix of the rock.

Developed Reserves (reservoir): Developed reserves are expected to be recovered from existing wells including reserves behind pipe. Improved recovery reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor. Developed reserves may be sub-categorized as producing or non-producing (SPE).

Development Well: wells that are drilled after the discovery and appraisal wells to develop the hydrocarbon production potential of the field.

Deviated Well: a well with an inclination other than zero degrees from vertical. In practice, deviated wells are usually more than about 10^{o} from vertical.

Deviation Angle: actual term is inclination - the angle from vertical in a section of a well.

Deviation Survey: a record of the deviation angle and the departure usually on a depth unit basis.

Devonian: a geological time between 365 million and 405 million years ago.

Dew point: the temperature at which liquids begin to condense from the vapor phase in a gas stream. (see also bubble point).

Dewatering (fluids separation): separation of liquids and solids in the general sense. Also, removing water from hydrocarbon streams.

D40/D90: a sorting criteria useful in screen selection.

DF:derrick floor.

DFIT: diagnostic fracture injection test.

DFP: deferred production.

DG Plug: a plug that is commonly set in the tubing hanger above the tubing or in tubing immediately below the wellhead for wellhead isolation.

DGLV: dummy gas lift valve.

DGMK: German Society for Petroleum and Coal Science and Technology.

DHC: downhole controller.

DHD: downhole diagnostics.

DHFC: downhole flow control.

DHPG: downhole permanent gauge.

DHSV: downhole safety valve.

DHTV: may be either downhole TV camera or a televiewer (a sonic caliper tool).

DHV: downhole video.

DHV™: Down Hole Video, Inc.

Diagenesis: the process of forming a sedimentary rock from the clastic grains. May also be in conjunction with several geochemical processes such as cementation reactions and chemical dissolution.

Diagenetic Porosity: the porosity formed by chemical and bacterial modification after the initial sediments were laid down.

Diamond bit or mill: a shaped bit body with diamonds for abrasive cutting of the formation.

Diapir: a salt or other column that pierces upper layers and may form traps of obstructions to flow.

Diatomaceous Earth: silica particles from Diatom beds. Used as a filtering media and as an additive to cement.

Dielectric: a material that does not conduct electricity or has only a low electrical conductivity compared to a metal.

Dies: a tool used to shape, form or finsih other parts.

Diesel #1: a diesel fuel, C10-C14+ typically. #1 Diesel has paraffins removed for cleaner operation or cold weather use.

DIF: drill in fluid.

Differential Pressure: the difference in pressure between upstream and downstream of a measurement point.

Differential SP: a curve recorded as a simultaneous SP measurements from two electrodes, each serving as a reference potential for the other.

Differential Sticking: a common method of pipe sticking where the overbalance pressure in the wellbore pushes the tubing against the side of the wellbore in a permeable formation.

Diffusion: the random scattering of particles due to kinetic energy of the particles. Affected by viscosity, density and temperature.

Diagenetic Trap: where rock changes produces a reservoir rock under a sealing rock.

Dike: a large igneous intrusion that cuts through the sedimentary layers, creating permeability barriers.

DIL: dual induction log.

Dilatancy (rock): the ability of a rock to expand through micro-fractures in consolidated rocks or grain position shifts in unconsolidated rocks.

Dilatant Fluid: a well dispersed, high solids content liquid that has very high apparent viscosity with any applied shear.

Diluent: the fluid added to a concentrated mixture to reduce the concentration of an internal phase or reduce its viscosity.

Dimple Connector (coiled tubing): a connector with shallow holes into the body and threads on the other for attaching a BHA to coiled tubing. The end with shallow holes is slipped into the coiled tubing and a clamp-on device with set screws is used to deform the coiled tubing wall into the dimple.

DIMS: Drilling Information Management System.

Dip: the angle that the structural surface or bedding plane or fault surface makes with the horizontal. Measured perpendicular to the strike and in the vertical plane.

Dip Log: dip meter log.

Dip Meter: a log that measures the inclination of the formation beds.

Dip Slip Fault: the vertical displacement of a fault along the dip plane.

Dip Tube: a tube from the intake of a pump that extends further into the liquid column of the well, to keep gas out of the pump.

Directional Driller: the specialist that plans and executes the directional drilling plan.

Directional Drilling: drilling the wellbore in a planned angle of deviation or trajectory.

Directional Permeability: a rock with a higher permeability along a given plane, usually created by natural fracture development, water flow that leaches the pores, depositional environment or localized reworking of the sediments.

Directional Survey: a measurement of the well path that records the inclination and azimuth of the wellbore using a compass or other device.

Dirty: high clay content or higher natural radioactivity signature on the gamma-ray log.

Disaggregation: when the formation breaks into grains.

Disbond: a formation that comes apart or disaggregates or separation of grains.

Disconformity: a change in the formation that may have been caused by ancient erosional forces. Accounts for variances in formation tops in near-by offset wells in a formation with no pay inclination.

Discontinuous Lenticular Sands: Limited aerial sands.

Discordant: cutting across surrounding strata.

Discovered (reserves): The term applied to a petroleum accumulation/reservoir whose existence has been determined by its actual penetration by a well, which has also clearly demonstrated the existence of moveable petroleum by flow to the surface or at least some recovery of a sample of petroleum. Log and/or core data may suffice for proof of existence of moveable petroleum if an analogous reservoir is available for comparison. (See also "Known Accumulation": Petroleum quantities that are discovered are in "known accumulations" or "known reservoirs") (SPE).

Discovered Petroleum Initially in Place: That quantity of petroleum which is estimated, on a given date, to be contained in known accumulations, plus those quantities already produced therefrom. Discovered Petroleum-initially-in-place may be subdivided into Commercial and Sub-commercial categories, with the estimated potentially recoverable portion being classified as Reserves and Contingent Resources respectively (SPE).

Discovery Well: the initial well in the field that tests hydrocarbons.

Dispersant: any substance that aids in breaking up a mass of individual particles, bubbles or droplets.

Dispersed: fluids with materials added to disperse solids or flocs.

Dispersed Phase: the internal phase in an emulsion – i.e., the droplets or bubbles.

Dispersion: a mixture of a internal phase of solids, droplets or bubbles that stay relatively suspended in a continuous fluid.

Displacement (horizontal well): the distance between the wellhead and the top of a vertical line from the bottom hole location to the wellhead elevation at the surface.

Displacement (process): the set of actions used to flow a fluid or solids out of a well and replace it with another fluid system.

Displacement (volume): the volume of a wellbore occupied by fluid. When the swept volume varies from the calculated displacement, part of the wellbore may not be actively swept.

Displacement Efficiency: a measurement of how completely a flooding fluid displaces the saturated fluid in a reservoir.

Disposal Well: a well into which fluids such as produced water and some liquid wastes can be injected. It is in a non hydrocarbon, non-fresh water sand and is not connected to the hydrocarbon bearing formation.

Dissimilar Metals: different metals that may form an anode-cathode pair in corrosion cell conditions.

Dissociation: the separation of a compound or molecule into pieces, ions, or atoms.

Dissociation Porosity: secondary porosity that is created when solid materials in sediment dissolve in interstitial solutions.

Dissolved Gas (production): the solution gas associated with produced fluids.

Dissolved Gas Drive: a reservoir drive mechanism in which dissolved gas from the crude oil breaks out of solution and provides energy to push the hydrocarbons toward the wellbore.

Dissolved Gas:Oil Ratio: the amount of gas contained in the oil (in std ft^3/bbl). This value can change if one fluid is produced faster than the other or if one fluid is re-injected.

Distillates: a range of manufactured products from the refining processes; includes kerosene, diesel, bunker C oil, fuel oil, heating oil, etc.

Distributed Temperature Log: a log of temperature along the entire length of the interval, well or flow path.

Ditch Gas: gas removed from the mud at the flowline by mechanical means.

Divergence: separation of groups of data from either other or from a norm.

Diversion (fluid treating): a method of limiting the fluid entry into a higher permeability zone and causing the fluid to flow to a lower permeability zone.

Diverter (acidizing): a material that forces acid to enter another zone by having a higher viscosity or building a filter cake.

Diverter (wellhead): a device in the flowpath at the wellhead that forces fluid to go down a pipe to a pit or tank.

Division Order: a list of interest owners and their share of revenues.

DLL: dual laterolog

DLS: dog leg severity.

DMD: driller's measured depth.

DMO (seismic): dip movement offset. The difference in arrival times at various sensors due to the dip of the surface off of which the signals are reflecting.

DMUR: drilling, milling and under-reaming.

DNL: dual porosity CNL.

DnV: Det Norske Veritas: a classification and qualification setting business.

DOE: US Department Of Energy.

Dog House: a crew or records shack at a lease or on a rig.

Dog Leg: a sudden change in the direction of the wellbore. Generally based on degrees per 100 ft.

Dog-Lock: a type of lock used in a profile.

Dolomite: calcium/magnesium carbonate rock. Dolomite is formed by chemical modification of a limestone.

Dolomite Rhombohedrials: crystals of dolomite in the pore space. May turn loose when acidized and become migrating fines.

Dome: a symmeatrical upfold of the layers of rock in which the beds dip in all directions more or less equally from a common point; any deformation characterized by a circular local uplift.

Domestic production: production originating inside a specific country of reference.

Doodlebug: seismograph.

Dope: pipe thread dope used to lubricate and seal the threaded connection.

D.O.T. (government): Department of Transportation – a US government agency.

Double Block and Bleed: two successive plugs, each capable of holding maximum pressure, with a vent between them capable of bleeding off all pressure between the plugs. Also – a valve with two seating surfaces which, in the closed position, blocks flow from both valve ends when the cavity between the seating surfaces is vented through a bleed connection on the body cavity.

Double Board: working platform for the derrickman on a drilling rig.

Double Grip (packer): slips that prevent either upward or downward movement.

Doubles (pipe): two joints screwed together.

Doughnut: a hanger, usually screwed onto the end of the top tubing joint and lowered into the slip bowl of the wellhead.

Down Dip: the direction going down the tilt angle of the formation.

Down Stroke: the recovery stoke downward on a beam pump where the pump is filling with fluid by pushing the open traveling valve through the standing fluid.

Downcomer: a pipe where the fluid flow path is down. Fluid return pipe.

Downhole: a general term referring to subsurface equipment, tools or other items.

Downhole Camera: any of a variety of downhole cameras, including full motion video, recording memory camera, sequence sending cameras, etc. Used to get a better picture of the wellbore or a fish.

Downhole Choke: a flow bean (restriction) set in a profile near the bottom of the well. Used as a flow regulator and to take part of the pressure drop downhole to reduce the potential of hydrates.

Downhole Gauges: surface reading, downhole located gauges capable of measuring pressure, temperature and/or flow rate.

Downhole Separation: removal of a part of the water downhole followed by injection of the water into a disposal zone.

Downhole Shutoff: a deliberate shut off of a zone by a downhole valve or other method, to prevent cross flow.

Downstream: the transport, refining and product making part of the oil business.

DP (offshore rig): dynamically positioned.

DP (perforating): a deep penetrating charge.

DP (reservoir): depletion plan.

DPC (gas lift): casing pressure at depth – the true gas weight at depth.

DPTA: diaminopropanoltetraacetic acid, a calcium scale remover and solvent.

DPT: deep propagation log

DPU: downhole power unit.

DRA (flow): drag reduction agent.

Drag (fluid flow): the force on a solid surface exerted by a fluid flowing past it.

Drag (pipe movement): resistance to linear motion.

Drag Blocks: spring loaded blocks on a packer or other tool that contact the pipe wall, producing resistance to movement. They aid in setting of packers.

Draw Works: hoisting mechanism on a drilling rig.

Drawdown: the difference between two pressures. Completion drawdown is the pressure differential from the formation near the wellbore to the wellbore.

DRBA: Delaware River Basin Authority.

Dress: to sharpen a bit or replace components of a tool.

Dress Off: to remove rough edges, flares, burrs, etc. from a piece of equipment prior to fishing.

Drift (geological): the rock, sand and clay moved by a glacier.

Drift (pipe gauge): the minimum id of tubing through which a standard drift tool will pass.

Drift (tool): a tool with a set diameter used to check the wellbore for clearance prior to running a tool string or piece of equipment.

Drift Diameter: the published drift diameter for a pipe that describes the diameter of a tool that can pass through the pipe when the pipe is vertical (no doglegs).

Drill Bit: The rock cutting device at the bottom of the drill string.

Drill Collar: a very heavy wall pipe used to add weight over the bit during drilling.

Drill Cuttings: the small chips and fines generated by drilling through a formation with a drill bit. Most of the cuttings are removed from the mud as the fluid pass through the solids control equipment (e.g., shakers, screens, cyclones, etc.,) at the surface.

Drill-In Fluid: the fluid used to drill the pay zone.

Drill Motor: a hydraulic or electric motor on the end of the drill string that turns the bit.

Drill Out: drilling through the cement after a primary cement job as the hole is deepened.

Drill Pipe: a heavy wall tubing used for drilling.

Drill Pipe Safety Valve: a full opening valve with threads that match the drill pipe that can be quickly screwed onto the pipe to help control fluid flow up the tubing.

Drill Stem: typically, rotating components in a drill string.

Drill String: all the equipment in a drilling BHA plus the drill pipe.

Drillable: downhole tools and equipment that can be broken up by the bit.

Driller's Console: the control panel.

Driller's Depth: measured depth or the length of the pipe from top to depth.

Driller's Method: a method of controlling a kick in which the gas is circulated out of the well using the normal weight mud controlled with backpressure of a choke. The heavier mud needed to control the formation without the choke is then circulated into the well.

Drilling: the action of placing a hole to a depth and location.

Drilling Ahead: continue with drilling after stopping to check flow or other activity.

Drilling Break: a sudden increase in the ROP (rate of penetration) while drilling. May indicate a higher pressure formation, a change in lithology, a naturally fractured zone, or a poorly consolidated zone.

Drilling Efficiency: average distance drilled per day divided by the total number of days in a measurement cycle.

Drilling Hook and Swivel: the components below the traveling block to which the elevators are attached.

Drilling Line: the wire rope used to position tools on the floor. Also used to describe the wire rope on a cable tool rig.

Drilling Mud: the fluid, water, oil or gas based, that is used to establish well control, transport cuttings to the surface, provides fluid loss control, lubricates the string and cools the bottom hole assembly.

Drilling Out: drilling out set or green cement from the casing before drilling ahead to make a deeper well.

Drilling Platform: usually offshore; a platform from which wells can be drilled. It may be permanent (with legs grouted into the seafloor to depths of several hundred feet), anchored or dynamically positioned.

Drilling Rig: the equipment at the surface used to lift and run the drilling string, provide the rotation and pump fluids down the string.

Drilling Spool: a section of the BOP that allows side ports for choke and kill lines.

Drillstem Test or DST: a controlled production of a small amount of fluid from an isolated section of the pay zone into the chamber formed by the drill pipe and a downhole valve. DST's measure pressures, some elements of depletion and gather samples of the produced fluids.

Drip: condensate liquid, or natural gasoline.

Drip Gas: natural gasoline or low carbon chain liquids, condensed from the rich gas from a well.

Drip Oil: natural gasoline or low carbon chain liquids, condensed from the rich gas from a well.

Drive Pipe: the conductor pipe.

DRGL: drilling.

DRODB: drilling, recompletion and repair data base.

Drop Ball: a sized ball dropped or pumped from the surface to shift a tool downhole.

Drop Bar (perforating): a bar dropped from surface to set off a TCP gun in a near vertical well.

Dry Gas (in production): a gas stream without condensate. Note: even dry gas at bottom hole conditions may have up to two barrels of water vapor per million standard cubic ft of gas. Dry gas on the process side has all liquids removed.

Dry Gas (reserves): Dry Gas is a natural gas containing insufficient quantities of hydrocarbons heavier than methane to allow their commercial extraction or to require their removal in order to render the gas suitable for fuel use. (Also called Lean Gas) (SPE).

Dry Gloss Heating Value (reactions): the total energy transferred as heat in an ideal combustion reaction at standard temperature and pressure in which all water formed appears as a liquid.

Dry Hole: a well that does not have or produce commercial deposits of hydrocarbons.

Dry Sieve Method: a sand particle size distribution obtained by shaking a sample of sand through a series of sieves or screens.

Dry Tree Well: an offshore well with the wellhead and access to the well at the surface.

Drying Oil: an oil capable of conversion from a liquid to a solid in the presence of air.

DS: drill string.

DS: directional survey.

DS: drill site.

DSI: dipole sonic.

DSL: diesel.

DST: Drill Stem Test.

DSV: down hole safety valve.

DTS: distributed temperature sensor or survey.

D/t: diameter to thickness ratio, a common comparison value in steel pipe.

D10/D95: a formation sizing criteria that shows impact of fines.

Dual completion: two pay zones in the same well that produce up independent flow paths in the same well.

Dual Induction Log: an induction log with dual and deep measurements of resistivity. Shallow measurements are indicative of severely invaded zone and the deepest measurements are most reflective of actual formation fluids.

DUB (perforating): dynamic underbalance perforating.

Dummy Run: a wireline or tubing run into a well with a dummy piece of equipment of the same size, shape and stiffness of a valuable or unrecoverable piece of equipment to make sure the equipment can be placed.

Dummy Valve: a solid body (non flowable) gas lift valve that "dummies off" a gas lift mandrel to seal the GLM or pocket.

Dump Bailer: a hollow tube with a flapper or other opening valve at the bottom, run on wireline to place cement or sand in a well.

Dump Flood: various – usually allowing water to gravity feed into the annulus (without packer) or the tubing and into the formation.

Dune: a deposit of sand produced by wind or running water. The dune may be massive, but usually lower energy and permeability varies.

Duplex pump: a type of pump with two, dual acting pistons.

Duplex Steel: a corrosion resistant alloy with chrome and nickel as common components.

Durometer (rubber): a term used to express hardness, usually of rubbers or elastomers.

Duster: a dry hole.

Dutchman: a filler piece used to close a gap in piping or equipment alignment.

DV Tool (cementing): a stage tool.

DW: deep water, usually inaccessible by a fixed (non floating) platform.

DWD: deep water development

DWOP (BP): drilling and well operations policy.

DWOP: drill well on paper exercise.

DWP: deep mater production.

DXV (subsea): direct crossover valve.

Dynamic Flow: non steady state flow or flow with changing conditions.

Dynamic Event (propellant fracturing): events such pressure surge or fracturing that occur over a few hundred milliseconds.

Dynamic Seal: a seal in a system where motion is expected in the seal or the seal area.

Dynamic Viscosity (produced fluid): the viscosity of the fluid in the reservoir at the reservoir conditions. Note – associated gas reduces the viscosity of most oils.

Dynamometer: a recording of the stresses in a rod string of a beam pumping unit.

DZO (seismic): demigration to zero offset. An improvement in seismic processing over dip movement offset where signal velocity varies significantly with depth.

E&A: exploration and appraisal.

E&P: exploration and production.

E-Line: see electrical line.

Eccentricity: decentralization of pipe in the hole. 100% eccentric is against the hole wall.

ECD: equivalent circulating density.

Echo Meter^{TM}: a trademarked, commercial tool that measures the height of a fluid (or solid) level by means of a reflected sound wave.

Economic Interest: ownership of part of the well.

Economic Limit: when the revenue from the produced fluids falls below the cost of operations set by the company.

EconoProp^{TM}: a trademarked name for an inexpensive light weight ceramic (man made) proppant.

E_{corr} : corrosion potential.

ECP: external casing packer.

ECTFE: thermoplastic fluoropolymer.

eCTU: electric line coiled tubing unit.

ED (elastomers): explosive decompression.

Edge water: water at the sides or edges of the hydrocarbon deposit. Often causes problems because the channels that deplete the fastest are the highest permeability and water production through them can be severe. These respond well to treatment if they can be isolated.

EDP (subsea): emergency disconnect package.

EDTA: ethylene diamene tetra acetic acid.

Eductor: a device that through flow of a power fluid through a nozzle, creates a low pressure area useful for moving fluids.

Effective Permeability: the permeability of the formation matrix to a particular fluid when two or more phases are present.

Effective Porosity: interconnected, drainable porosity.

Effective Shot Density: that number of the perforations that are open and flowing.

Effective Stress (fracturing): the principle stress less the fluid pressure.

Effective Wellbore Radius: the theoretical radius of a wellbore that would flow the same rate as a wellbore with a fracture. Effective wellbore radius is a comparison of flow improvement related back to physical radius.

Effluent: the fluids and solids, perhaps in a mixed stream, produced from a well.

EGM: Electronic Gas Measurements.

EGMBE: ethylene glycol mono-butyl ether. A mutual solvent.

EGP: external gravel pack.

EIA: Energy Information Administration.

Eight Round: a thread with 8 threads per inch.

EIS: environmental impact statement.

EIT: engineer in training.

EL: elevation.

EL&P: exploration, land and production.

Elastic: non-permanent structural deformation during which the amount of deformation (strain) is proportional to the applied stress (load).

Elastic Deformation: deformation of a body in the elastic range, i.e., recovery to the initial shape is possible when the stress or load is removed.

Elastic Limit: the upper range of elasticity, just before the body is permanently deformed.

Elasticity: the tendency of a body to return to its original shape and size once the stress is removed.

Elastomer: a rubber or plastic material used as a seal. May occur naturally or be synthesized.

Elbow: An “L” shaped fitting in surface piping.

Electric Line or E-Line: a wireline with a conductor in the middle and woven electrical braid over the conductor.

Electric Logging: a method of rock and fluid identification or evaluation that began in 1927. The first log was run by Conrad Schlumberger.

Electric Rig: a drilling rig where the power source is electricity provided by a generator.

Electric Submersible Pump: an ESP or dowhole artifical lift unit powered by electricity..

Electrical Log: typically a resistivity log.

Electrical Submersible Pump or ESP: an electrical powered rotating pump capable of lifting very large flow rates (>20,000 BPD).

Electrolyte: a material that, when dissolved in water, causes or increases the fluids' electrical conductivity.

Electromotive Force Series (corrosion): a list of elements arranged according to their standard electrode potentials.

Electrostatic Treater: a separation device that uses alternating current charged plates to help break emulsions.

Elevator Bails or Links: the bars that attach the elevators to the hook on the traveling block.

Elevators: the snap-around latches that couple around tubing below the pipe coupling and enables the traveling block on a rig to gab and lift the tubular string.

ELG: effluent limitation guidelines.

ELMD: electric line measured depth.

Elongation: an increase in length expressed numerically as a percent of initial length.

EM: eddy current measurement for wall thickness in corrosion and wear determination.

Embedment: proppant that has partly or completely sunk into a formation through displacement of the formation around the grain.

Embrittlement: a fatigue state of metal that may be caused by trapping atomic hydrogen in the structure of the steel. Characterized by loss of ductility. May also be caused by work hardening or other factor.

EMF: electromotive force. The force that drives electrons and creates an electric current.

ELMD: electric line measured depth.

Empirical: observed response, often well proven by experiences but not theoretically derived.

Emulsifier: a emulsion stabilizing mechanism, usually either surface active agent, fines, viscosity and/or charge.

Emulsion: a physical mixture of two or more immiscible phases.

Emulsion Stabilizer: a chemical or physical effect that prevents separation of two or more, normally immiscible phases. Normally surfactant, electrical charge, liquid or emulsion viscosity, or micron sized solids at the interface.

EMW: equivalent mud weight.

Encapsulated breaker: breaker in small pill-form particles that stays with the polymer and helps break the mud cake.

End of Well Report: a summary of general well data, operation data, geologic data, etc., for a particular well after the final completion step.

Endothermic: a reaction that absorbs heat.

Endurance Limit: the maximum stress that a material can withstand for an infinitely large number of cycles (NACE).

Enhanced Oil Recovery: one or more of a variety of processes that seek to improve recovery of hydrocarbon from a reservoir after the primary production phase.

Entitlement (reserves/production): Reserves consistent with the cost recovery plus profit hydrocarbons that are recoverable under the terms of the contract or lease are typically reported by the upstream contractor (SPE).

Entrained Gas: gas dispersed in a produced fluid.

Environmental Cracking: brittle fracture of a normally ductile material in which the corrosive effect of the environment is a cause (NACE).

Enzyme: a protein based (non-living) material that can serve as a catalyst for many organic reactions.

EOB: end of build (horizontal wellbore).

EOC: end of curve.

Eocene: a geological epoch from 38 million to 55 million years.

Eolian: formed by wind.

Eon: the primary division of geologic time – from oldest to youngest: the Haldean, Archean, Proterozoic, and Phanerozoic.

EOP: extreme overbalanced perforating.

EOR: enhanced oil recovery.

EOS: equation of state.

EOT: end of tubing.

EOWR: end of well report.

EP: equalizing prong.

EPA: Environmental Protection Agency, US pollution control enforcer.

EPCRA: Emergency Planning and Community Right-to-Know Act.

EPM: equivalents per million. The epm is equal to the ppm divided by the equivalent weight.

Epoch: a time division of geologic time next shorter than a period.

Epoxy: a resin formed by reaction of polyols with epichlorohydrin.

EPT: electromagnetic propagation tool. Measures propagation time and attenuation rate of microwave energy through the formation. Helps distinguish between oil and water.

EQMW: equivalent mud weight.

Equalizing Feature: a part of a plug that allows equalization of the pressures above and below a plug.

Equivalent Circulating Density: the effective fluid density that the formation sees when the friction pressure on the fluids returning to surface is added to the fluid density.

Equivalent Mud Weight: The equivalent mud weight felt by the formation when circulating with a certain mud weight and holding a backpressure. A 10 lb/gal mud in a 10,000 ft well with 1000 psi backpressure would generate an equivalent mud weight of about 11.9 lb/gal.

Equivalent Weight: the atomic or formula weight of a material.

Era: a division of geologic time, next shorter than the eon and larger than a period.

ERD: extended reach drilling.

ERF: error function

ERFC(x): complimentary error function = 1 – erf(x).

Erosion: progressive loss of material from a solid surface due to mechanical interaction between that surface and a fluid, a multicomponent fluid or solid particles carried within the fluid (NACE).

Erosion Corrosion: corrosion acceleration by passage of a high velocity flow or impingement of solids. May remove the thin, protective oxide film that protects exposed metal surface.

ERW: extended reach well.

Erosion: wear of a material by a slurry of liquid and (usually) solids.

ES (treating): electrostatic separator.

ES (wireline): equalizing sleeve.

ESD: equivalent static density.

ESD: emergency shut-down.

ESDS: emergency shut down system

ESP: electrical submersible pump.

ESR: equilibrium step rate test.

ESS (sand control): expandable sand control screen.

ESS (seismic): exploration sub salt.

ESV: emergency shut-down valve.

Ethane: a two carbon chain alkane, C_2H_6. A gas under standard conditions of temperature and pressure.

Ethanol: ethyl alcohol.

Ethernet (computer): a local area network protocol standard defined by IEEE 802.3.

Ethylene: a two carbon chain alkene – double bonds between the carbons and a formula of C_2H_4. A very common starting material for synthesis of various products.

ETP (BP): engineering technical standards.

EU or EUE: see External Upset.

Euler Method (seismic): a profile or map-based depth estimation method based on a concept that magnetic fields of structures are homogeneous functions of depth and location. This is used to satisfy Euler's equation.

EUR: expected ultimate recovery from a field.

Eutectic (brine): a mixture of substances having a minimum solidification/melting point.

Evaporite: a formation formed by the evaporation of water from shallow seas. Very low permeability.

Event (Risk): occurrence of a particular set of circumstances.

EVXT™ (subsea): enhanced vertical tree.

EVXT-DB (subsea): enhanced vertical tree, dual bore.

EVXT-SB (subsea): enhanced vertical tree, single bore.

Excess Cement: the amount of cement over that required to cement the zone. Usually between 30% and 100% depending on hole diameter unknowns and contamination risk.

Exfoliation Corrosion: localized and subsurface corrosion in zones often parallel to the surface that result in leaving thin layers of uncorroded metal resembling the pages of a book.

EXHT™ (subsea):enhanced horizontal tree.

Exothermic: chemical reactions that gives off heat.

Expandable Casing: well construction tubulars run in like conventional casing but mechanically enlarged downhole before the cement is set.

Expandable Completions: wellbore tubulars run in like conventional completions but mechanically enlarged downhole once in place. Can include combinations of sand screens, blank pipe and annular isolation seals used in lieu of gravel packs.

Expandable Hanger: a combination hanger and packer run like conventional hangers for drilling liners and well completions but permanently mechanically expanded once in the well.

Expandables: a class of pipe that can be expanded for cladding corroded or worn casing, saving room in a completion, casing open hole, sealing off perforations, etc.

Expanding Cement: cement with additives that promote volumetric cement expansion.

Expansion Joint: a device in a length of pipe that allows some pipe length expansion or contraction.

Expectancy: remaining life.

Expected Value (Risk): the weighted average using probabilities as weights. For decisions involving uncertainty, the concept of expected value provides a rational means for selecting the best course of action and for forcasting portfolio level performance.

Expendable Gun (perforating): a gun made up of perforating charges linked together with wire or clips. The debris is not recovered on the wireline run.

Exploitation: development of a producing reservoir.

Exploration: a general term covering the search for oil and gas.

Exploration Well: a wildcat or well in a new area with unknown producing potential.

Explosive Cutter: a pipe cut-off tool composed of linear shaped charge that is designed to sever pipe. Works on the same principle as a perforating charge.

Explosive Decompression: a rapid reduction in pressure that may cause trapped gas to try to break out of rubber/elastomer seals and ruin the seals. Common at the surface but uncommon downhole.

Explosive Fracturing: one of several techniques used to break the rock in the near well area. It was an early stimulation method. Fractures formed in this method are short. Although still used, its best application is in perf breakdown and overcoming some near well damage.

Explosive Limits: the low and high range (wt %) of a combustible gas mixed in air that can be ignited at ambient pressure and temperature.

Exponential Decline: constant percent decline of production rate over time.

Exposed Guns: a perforating gun with exposed charge capsules.

Extended Reach Well or ERW: A well deviated above the pay to reach further from the drill site or further into the pay formation to expose my contact area with the pay zone.

Extension Well: A well drilled on the edge of the existing field that may extend the known area of the field.

External Cage Choke: a choke capable of handling high solids content flow. The external sleeve is moved over a perforated hub with high erosion resistance properties.

External Casing Packer: a rubber bladder over a section of casing that is inflated, usually with cement, to give an annular seal in open hole sections. Frequently used with liners and set at intervals along the open hole.

External Cutter: a mechanical, chemical or explosive device that is lowered over a pipe to cut from the outside.

External Filter Cake: filtration control established on the surface of the wellbore by particles large enough to bridge on the entry of the pores.

External Phase: the outside or continuous phase of an emulsion.

External Upset: a pipe connection with a thicker connection body than the pipe body. In an EUE, the thickness is offset to the outside diameter.

Extraction Loss (produced fluids): loss of volume due to removal of gasses or liquids during processing.

Extraction Plant: a facility for removal of liquids from gas.

Extreme Overbalance Perforating: a method of applying a very high pressure surge to the formation at the instant of perforating. Usually in excess of 1.4 psi/ft. Designed to overcome frac initiation pressure and break down each perf with a very short (<1 m) frac.

Extrusion Gap: radial gap between the maximum rated casing ID and the minimum OD immediately adjacent to the packing element.

Extrusive Igneous Rock: a description of rock resulting from a magma breach to surface and exposed to atmospheric conditions during cooling.

EZSV^{TM}: a drillable bridge plug.

F (reservoir): formation resistivity factor, dimensionless.

ϕ: porosity.

F (logging): formation factor.

F Nipple: a standard profile. Can accept a plug or other tools.

Face Cleat (coal): a longitudinal fracture in coal.

Face Seal: allowing a flat, usually polished, face to deform an elastomer and create a seal.

Facies: the set of all characteristics of a sedimentary rock that defines its particular environment and distinguishes it from other facies.

Facultative (bacteria): bacteria that can survive either with or without oxygen.

Failure: when the designed function can not longer be met.

Fairway: the best part of a reservoir. Commonly used in coal pays.

Fall-Off Test: a multi-functional test that can be used to determine fracturing pressure or if the well is fractured.

False Set: an abnormal early thickening of cement which does not affect the length of time which the cement can be pumped.

Fann Viscometer: a common viscometer for oil-field fluids.

Fanning Equation (or friction factor): $f_F = (d_b/2\rho V^2)(\Delta P/L)$. Where ρ = density (ppg), V = avg. fluid velocity (ft/sec), ΔP is pressure loss over length L (ft).

Farmer's Oil: an older term indicating the mineral owners royalty-based "share" of the oil. This was from a time when natural gas had no value.

Farm-In: an outside party paying a concession owner all or a percentage of the drilling costs of a well in order to obtain a working interest in the land or well.

Farm-Out: a concession owner selling a percentage of a lease to an outside operator for drilling a well.

Fast Gauges: gauges with a high sampling rate.

Fast Line (drilling): end of a braided drilling line affixed to the draw works.

Fast Taper: a steep slope.

Fatigue: a metal failure based on weakening by flexing or cycling. The material often work hardens.

Fatigue Strength: the maximum stress that can be sustained for a specified number of cycles without failure.

Fault: where rock splits or ruptures with associated movement occurs on either side.

Fault Plane: the plane or direction along which fault movement has occurred.

Fault Trap: a formation that contains oil or gas that is held in place by a displaced, non permeable rock mass.

FBHP: flowing bottom hole pressure.

FBP: formation breakdown pressure,. The pressure at which the fracture initiates.

FC: fluorocarbon. A aromatic resistant seal material.

FCD: fracture capacity – a comparison of the conductivity of the fracture to the capacity of the formation.

FCP: final circulating pressure.

FCS (fracturing): fracture closure stress.

FCTA (brine): first crystal to appear.

FCV: formation control valve.

FCP: fracture closure pressure. A measurement of the pressure at which the fractured formation closes. Generally determined by the change in slope of the pressure reading as leakoff gradually lessens the volume of fluid that is holding the fracture open, until the fracture walls meet and the pressure reverts to a decline to pore pressure.

FDC: formation density log.

FDCNL: formation density compensated neutron log.

FDP: field development plan.

FE: facility engineer.

$FeCO_3$: iron carbonate scale.

Fee Land (contract): land where mineral and surface rights are controlled. Usually private lands, rather than public or government.

Feed In: influx into the well bore.

Feet of pay: the thickness of a pay zone or formation, usually the gross (total) thickness.

Feldspar: a silicate mineral, often modified and sometimes part of the movable particles in a formation.

Female connection: a coupling with threads on the inside.

FeOH: iron hydroxide gel (a precipitate after acid spends).

FEPM: fluoroelastomers (Aflas™, etc.)

FERC: Federal Energy Regulatory Commission (US gov. agency).

Ferric Iron: valence state +3 iron in solution. A very common catalyst in oil field emulsion and sludge formation. Precipitates at iron hydroxide when the pH exceeds 1.8 to 2.2 (depending on sour conditions).

Ferrite: body centered cubic crystalline phases common to iron based alloys.

Ferrous Iron: valence state +2 iron in solution. In oil field operations, most solution iron is ferrous until oxygen is encountered. Precipitates at iron hydroxide when the pH exceeds 7 or when oxidized to ferric by contact with oxygen.

FeS_x: one of several forms of iron sulfide.

FF: formation factor.

FFKM: Perfluoroelastomers (Kalrez™, Chemraz™, etc.).

FFI (logging): proportion of moveable fluids occupying the effective porosity.

FFM: full field model.

Fg: fracture gradient.

FGLR: formation GLR.

FGOR: flowing gas oil ratio.

Fiber Cement: cement with small hair like fibers that build strength or help control fluid loss.

Field: one or more reservoirs grouped by or related to the same general geologic structural feature or stratagraphic condition.

Field Rules: the spacing and production rules in a field or unit.

Field Weld: a weld repair made in the field. Usually derates the equipment pressure or tensile rating.

Filiform Corrosion: corrosion occurring under a coating in a pattern of filaments. May resemble threads.

Filter Cake: the layer of solids stranded on the face of permeable formations by liquids driven into the rock by pressure differential towards the formation. When sized correctly the filter cake may completely stop losses.

Filter Cake Lift-Off: the act of lifting off part of the mud filter cake, at the most permeable sections of the rock, in response to flow produced by draw down.

Filter Cake Lift-Off Pressure (drilling): the inward differential pressure difference that will result in part of the filter cake being removed from the face of the formation (usually over the most permeable and higher pressured sections).

Filter Media: the material used to make up a filter bed. Common filter media are DE, sand, various fibers, etc.

Filter Press: usually at DE filter.

Filtrate: the liquid that leaks off into the formation during fluid loss.

Filtrate Reducers: materials that reduce the fluid loss from a wellbore fluid. May include Bentonite clays, lignite, CMC, etc.

Filtration Level: the generally statement of the largest size particles in a fluid after passing through a filter.

Final Circulating Pressure: drill pipe pressure required to circulate at the selected kill rate.

Final Set: a reference to one of many expectations on when cement is sufficiently set to bear some type or level of weight.

Final Strength: the strength of cement when the strength development with time curve ceases to change significantly.

Finding and Development Costs: capital costs from acquisition, exploration, drilling and completion costs of proved reserves.

Fines Control: any process designed to minimize movement of otherwise mobile fines, typical size < 44 microns.

Fines Migration: movement of small particles (usually <5 microns) through the rock pores.

Finger Board (drilling): steel fingers mounted to the derrick into which the derrick man stores pipe that is standing in the derrick.

Fingering: movement of one fluid through another.

Fire Flood: a tertiary recovery method involving injection of air into the formation and igniting the oil. Under the right conditions, the heat produced from combustion of the heavy ends that are trapped on the sand grains lowers the oil viscosity and liberates light ends.

Fischer Assay: an assay method for organics in rock by pyrolysis (burning).

Fish: a lost piece of equipment in the well.

Fish Hook: a upward turning horizontal well – usually over 90^{o}.

Fisheyes: lumps of undispersed polymer in suspension in the pill.

Fishing Magnet: a magnet, usually run on wireline, used to recover lighter metal components from the well.

Fishing Neck: a piece of equipment on most downhole tools that is designed for simple, non-rotating attachment when retrieving.

Fishing Tools: the tools that can capture a lost item (a fish) in a well.

Fishtail Bit: a drag bit with no moving parts, rotated like a conventional metal drilling bit.

Fissile (rock): a fissile rock tends to break along a plane or planes that are roughly parallel to the bedding planes.

FIT (operations): Formation Integrity Test.

FIT (fracturing): frac isolation tools.

FIV: formation isolation valve. A downhole valve that is operated by pressure cycling or other remote method.

Five Spot Pattern: a well placement pattern that looks like the 5-spot side on a dice cube.

Fixed Choke: a non adjustable choke that uses a flow bean for regulation.

FKM: fluoro-elastomers (Viton™, Fluorel™, etc.).

FL (drilling/completions): fluid loss.

FL (operations): flow line.

Flag: marking the pipe or wireline with a paint stripe.

Flange: a common, high pressure wellhead connection, using bolt attached flange plates and metal-to-metal seals.

Flanged Up: completed.

Flapper Valve: A one-way, flow actuated valve common in safety valves, coiled tubing and fluid loss devices.

Flare: a burner on a remote line used for disposal of hydrocarbons during clean-up, emergency shut downs and for disposal of small volume waste streams of mixed gasses that cannot easily or safely be separated.

Flash (pipe): the weld seam on or in a welded pipe.

Flash Liberation: a sudden pressure drop that causes hydrocarbon light ends to go from a liquid to a gas.

Flash Point: an ignition temperature (given in ^{o}F) that liquid will put off enough vapors to be ignited.

Flash Set: a rapid, usually unplanned, thickening of cement.

Flashing: vaporization of water or light ends as pressure is released during production or processing.

FLC (completions): fluid loss control.

FLC (operations): field lifting cost.

Flexing: pressuring and depressuring the tubing (ballooning) to remove plugs or knock scale and other debris loose from the tubing wall.

Flint: a variety of chert.

Float Collar: a short piece of casing run one to two joints above the end of casing. The collar contains a backpressure or check valve which stops cement from reentering the well after displacement into the annulus. It is useful to prevent channels in the cement until the cement is set.

Float Shoe: same function as a float collar but run on the end of the casing.

Float Valve: the primary, bottom hole valve in the float collar or shoe that allow the casing to self fill while running and allows the cement to pass into the annulus but helps prevent cementing U-tubing after the job. Drillable and subject to erosion wear.

Flocculation: attraction, gellation and drop out of suspended particles from a liquid.

Flocculants: Materials used to increase visicosity. They cause colloidal particles to group into bunches or flocs.

Flood: injection of gas or water into a reservoir to drive oil towards a producing well or set of wells.

Flood Plain: reservoirs that occur along ancient rivers where the rivers overflowed. Deposits are mostly silt and mud.

Floorhand: a helper on the drilling floor.

Flow: very simply, movement of a fluid.

Flow-After-Flow: a multipoint flow test measuring skin at each flow rate. When plotted, the intersection of the best fit line with the y-axis (skin) at zero flow rate yields the mechanical skin.

Flow Assisted Corrosion: corrosion that is accelerated by the effects of erosion removing the initial corrosion films.

Flow Assurance: a science field dealing with prevention of scales, hydrates, asphaltene and paraffin deposits and other problems that could stop flow of fluid from the subsurface, wellhead or pipeline.

Flow Back: flowing a well back after a treatment.

Flow Bean: a flow restriction common in downhole chokes, surface chokes and some SSSVs.

Flow Coupling: a thicker body piece of tubing above and sometimes below a tubing profile or other tool to control erosion by fluid flow.

Flow Cross: a four-way connection. In a wellhead, a flow cross connects the master valve and the swab valve with two, normally horizontal, connections to the wing valves.

Flow Divider (screen): a device on the entrance to a screen to route the incoming flow more evenly across the face of the screen.

Flow Efficiency: ideal drawdown / actual drawdown.

Flow Line: the flow connection from the wellhead to the separation facility, pipeline or storage unit.

Flow Loop: a test loop of pipe in which flow characteristics are measured.

Flow Path: the subsurface course that fluids would follow as they move in a reservoir or between reservoirs.

Flow Profile: what the flow looks like across the cross-section of the pipe.

Flow Regime: flow condition (e.g., mist, slug, churn, etc.) of a multiphase process stream.

Flow T or Tee: a three-way connection. In a wellhead, a flow cross connects the master valve and the swab valve with the wing valve.

Flow Test: a flow test designed to prove that hydrocarbon exists in the reservoir and will flow to surface. May also indicate productivity or other characteristics such as interference or boundaries.

Flow Tubes: tubes with a diameter slightly larger than the braded wireline or slick line that are used in the "stuffing box" on a wireline intervention to isolate the well pressure and fluid from the atmosphere. They work in combination with oil or wireline grease injection to form a hydraulic seal.

Flow Wetted: any piece of a tool or the well that is wetted by the produced fluid flow.

Flowing Pressure: the pressure at some datum (usually surface, FSP, or bottom hole, FBHP, measured while the well is flowing.

Flowing Well: a well that flows to the surface by produced gas expansion and does not use any method of artificial lift.

Flowline: the pipe connection between the well and the separators or tank battery.

Fluid Contact: depth of the contact point in a specific well between immiscible phases.

Fluid Density: The mass per volume density of a fluid.

Fluid Invasion: the distance outward from the wellbore to the leading edge of the lost fluids. Varies with the permeability of the zone.

Fluid Loss: the rate of loss of liquids to the formations from the fluid being circulated through the wellbore.

Fluid Loss Coefficient: a measurement of fluid loss expressed in $cc/min^{1/2}$

Fluid Packed: liquid filled.

Fluid Pound: or rod pound – a beam lift term where the pump is filled with gas from pump-off or too fast of an operating speed (rod speed).

Fluid Pressure Gradient: a measurement in the well of the pressure vs. depth. Useful for spotting liquid levels, leaks, fluid entries, etc.

Fluid Saturation: the fractional or percent amount of pore space which a specific fluid occupies.

Fluidize: add sufficient fluid in an unconsolidated sand matrix to break cohesive bonds and lubricate grain by grain movement of sands.

Fluorocarbon: a seal with good resistance to aromatic fluids but susceptible to sour gas.

FLUORAZ: a high performance elastomer for seal assemblies.

Fluoroscope: a device that uses a black light for identifying hydrocarbons on cuttings.

Flush Joint: a Non Upset connection in most cases.

Flush Production: the early, higher rate production that comes from the larger pores, fractures and vugs that empty quickly. Delivers a small, high rate flow every time the well is shut-in (recharges) and is brought back on line.

Flushed Zone: part of the rock that has been flushed with a sweep fluid. The area may have little hydrocarbons remaining.

Fly Ash: ash from the burning of coal. Used as an extender in several cements and as a plug component.

Flying Leads (subsea): flexible hydraulic hoses connected to control systems in a subsea tree.

FMEA: failure mode and effects analysis.

FMECA: failure mode and criticality effects analysis

FMI: formation micro image, a common fracture detection tool.

FMJ (control line): ferrule metal junction.

FMWTR: formation water.

FN: fishing neck.

FO: full opening.

Foam: a gas in liquid emulsion. Common as a low density cleanout fluid or a frac fluid with reduced water content.

Foam Breaker: one of several materials that reduce the stability of the bubble skin in a foam and cause the foam to break.

Foam Cement: a cement slurry, foamed with between 40 and 60% nitrogen gas. Has a slurry density of about 7.5 to 10 lb/gal (0.9 to 1.2 g/cc).

FOC: field operations center.

Fold: a bend-like disruption in a rock strata such that the angle of the formation is significantly changed.

Formaldehyde: an older biocide, now rarely used.

Foot Wall: the side of the fault that protrudes underneath the upper formation.

Formate: one of several low damage, low toxicity, normally high cost brine for special applications. May be one of several formation compounds.

Formation: any distinct, mapable layer.

Formation Breakdown: initiating a fracture in the formation.

Formation Competency: the breakdown (fracturing) pressure of a formation.

Formation Damage: an obstruction to flow. Usually a reduction of permeability.

Formation Evaluation: the analysis of formation character or properties, usually by remote logs.

Formation Gas-Oil Ratio: quantity of oil dissolved in one stock tank barrel of oil at current reservoir pressure and temperature.

Formation Integrity: the ability to resist breakup. Often taken as the fracturing point.

Formation Integrity Test: a test of the fracture initiation pressure.

Formation Pressure: the pressure of the fluid in the formation. The initial reservoir pressure is the pressure at discovery.

Formation Resistivity: a measurement of the electrical resistivity of a formation. The measurement will be significantly affected by the type of fluid and the salinity of water based fluids within the pores of the rock.

Formation Sensitivity: the tendency of a formation to react with fluids, usually filtrates from injected fluids.

Formation Volume Factor or FVF: the number of barrels of reservoir oil that shrinks to one stock tank (surface) barrel after gas breakout and light end vaporization.

Formation Water: the connate water.

Formic Acid: an organic acid used in higher temperature wells for shallow damage removal.

FoRxo Log: a focused resistivity log that uses a pad contact with the borehole wall.

Fossil: the silicate replaced replica of an animal or plant.

Fossil Fuel: coal, natural gas or oil.

Fouling: accumulation of deposits on a surface.

Four Point Test: a flow test in which the flow rate is measured at four drawdowns to estimate how skin changes at each rate. Useful for identifying non Darcy skin or turbulent skin.

FPC: see Free Point Constant. Used in stuck pipe depth calculations.

FPH: feet per hour.

FPIT: free point indicator tool.

FPP: fracture propagation pressure.

FPSO: floating production, storage and offloading. An alternative to pipelines.

FPU: floating production unit.

FPWD: formation pressure while drilling.

FRA: formation rate analyser, a well performance test method.

Frac Ball: a technique for isolating multiple fracs using a short downhole settable ring or restriction and dropping a hard rubber ball between frac jobs. Two or more ring/ball sets can be used to stage frac a long zone.

Frac Fluid: the fluid used in a fracturing treatment, may include pre and post treatment fluids.

Frac Plug: a flow-through plug set after pumping a frac (between stages) in a multi-fraced well and sealed with a ball dropped from surface as the next frac stage is started.

Fractionation: the process of separating natural gas into component parts or fractions such as propane, butane, ethane, etc.

Fracture Acidizing: creating a fracture in a carbonate and etching the face of the fracture to preserve flow capacity down the fracture.

Fracture Breakdown Pressure: the pressure needed to initiate a fracture.

Fracture Closure Pressure: the earth stresses acting to try to close a hydraulic fracture offset by the pore pressure. A measurement of the pressure at which the fractured formation closes. Generally determined by the change in slope of the pressure reading as leakoff gradually lessens the volume of fluid that is holding the fracture open, until the fracture walls meet and the pressure reverts to a decline to pore pressure.

Fracture Effective Length: normally the propped part of the fracture that will support improved flow.

Fracture Extension Pressure: the pressure necessary to extend the fracture once initiated. The fracture extension pressure may rise slightly with increasing fracture length and/or height because of friction pressure drop down the length of the fracture. Fracture roughness, fracture width and fluid viscosity also have influence on extension pressure.

Fracture Finder^{TM} Log: an acoustic log that helps determine if fractures are present.

Fracture Fluids: the fluids used to fracture a well. Generally, a fracture fluid is a water based fluid with less than 0.5% total additives, most of which are common in food or household use.

Fracture Fluid Efficiency: a measurement, derived from a data frac, of the efficiency of a particular fluid in creating fracture area on a particular formation at a set of conditions.

Fracture Gradient: the gradient needed to initiate a fracture.

Fracture Half Length: the length of one wind of a fracture from the wellbore to the tip.

Fracture Initiation Pressure: the pressure necessary to start a fracture from the wellbore.

Fracture Network: the groupings of fractures, possibly interconnected, that form a enhanced flow unit.

Fracture Packing: a sand control technique coupling fracture treating (usually a tip screenout fracture) with a screen and gravel packing of the wellbore.

Fracture Pad: the initial part of the fracture fluid that creates the fracture width and controls the initial fluid loss but contains no proppant.

Fracture Porosity: the porosity attributed to the natural fractures, commonly less than 2 to 4%.

Fracture Propagation Pressure: same as fracture extension pressure.

Fracture Proppant Pack Density: the loading of proppant per square foot after the fracture has been placed. Commonly between 4 and 16 lb/ft^2 of fracture face.

Fracture Width: the width of a fracture at the wellbore. Hydraulic frac width is generated by frac fluid viscosity and/or pump rate (i.e., horsepower).

Fracturing: a stimulation method involving injection of fluid into the well at a high enough pressure to break the rock. Fracturing "failure" of the rock is a tensile failure as the wellbore in enlarged by pressure.

Fracturing Fluids: the fluids used to fracture a well. Generally, a fracture fluid is a water based fluid with less than 0.5% total additives, most of which are common in food or household use.

Fragipan: dense layer of soil containing silt and sand, but no organic matter and little clay. May have extreme hardness due to compaction.

Fragmental Source Sedimentary (rock): lithification of rock fragments.

Frangible Valve: purposely breakable valve, usually a flapper in a fluid loss device.

FRC: fire retardant clothing.

Free Gas: gas that is not dissolved in the liquid.

Free Point: a technique for estimating the highest free point in a string of stuck pipe. It is based on a differential stretch calculation with amount of pull and the free point constant (FPC).

Free Point and Backoff: Free Point analysis followed by downhole unscrewing of a pipe coupling above the stuck point.

Free Point Constant: a calculation used in the stuck pipe calculation to correct for pipe wall thickness and diameter.

Free Point Indicator: a tool with strain gauges that is run on wireline and moved along the stuck pipe with successive pipe pulls until the stuck point is located.

Free Water: 1. the excess water that separates from a cement slurry on standing. 2. the first water that separates from the crude oil in the first stage of the separator (free water knockout or FWKO).

Free Water Knockout: the first stage of separation in a crude that contains a large amount of water.

Freeze point (pipe movement): the depth at which the pipe is stuck.

Frequency Domain (seismic): where the independent variable is distance and the dependent variables are strength of the signal and frequency of the signal. (A domain is a mathematical function with dependent and independent variables.)

Fresh Water: water with less than about 600 ppm total dissolved solids. Suitable for drinking.

Fretting Corrosion: deterioration at interfaces of two metals accelerated by their relative motion.

Friable Sand: a sand with an unconfined compressive strength of 300 to 1000 psi. Crushable with forceps.

Friction: the resistance to a object's passage through a fluid (or a fluid's passage past a stationary object). Affected by viscous resistance, density, wall contact (vessel radii).

Friction Coefficient: a dimensionless value expressing the roughness of the pipe.

Friction Lock (coiled tubing): a state where the wall drag or friction is high enough to prevent further movement of the pipe.

Friction Reducer: a material, usually a polymer that reduces the friction of flowing fluid in a conduit.

Front-end Costs: money paid or costs at the start of a project (engineering, legal, contracts, etc.), before on-site activities begin.

FrontSim^{TM}: 3D streamline model.

Froth: a foam with very high internal gas volume, usually 90%+ gas. High viscosity and often very stable.

FRP: fiber reinforced pipe.

FRP: failure to release packer.

FRUCOS: final report until change of status.

FSN: failure to set in nipple/sidepocket.

FSP: failure to set packer.

FSV (completions): formation saver valve. A check valve that prevents fluids from reaching the formation.

FTC (SSSV): fail to close on demand.

FTH: failure to hold in nipple/sidepocket.

FTHP: flowing tubing head pressure.

FTO (SSSV): fail to open on command.

FTP: flowing tubing pressure.

FTR: failure to release from nipple/sidepocket.

Fuel Oil: one of many refined petroleum oils such as heating oil, diesel, etc.

Full Gauge Hole: a wellbore drilled with a full gauge bit (maintained initial diameter).

Funnel Viscosity: a viscosity measurement based on the number of seconds that it takes for 1 liter of fluid to flow through a Marsh funnel.

Furan: an organic resin, formed by polymerization reaction of furfuryl, used in consolidation, zone shut-off and water control.

Fusible Plug or Link: an emergency shutdown device activated by fire or thermal overload. (Note: fusible links below the ignition point in a wellhead may not be activated (melted)).

Fusible Vent: a pressure relief valve that opens when temperatures increases sufficiently to melt an activation linkage.

FV: flapper valve.

FVF: Formation Volume Factor.

FW: fresh water.

FWHP: flowing wellhead pressure.

FWHT: flowing wellhead temperature.

FWKO: see Free Water Knockout.

FWS: fish and wildlife service.

G: the acceleration of gravity measured in ft/s^2 or m/s^2. ($1G = 32\ f/s^2$ or $9.8\ m/s^2$.

G-function: dimensionless function used in shut-in time normalized to pumping time. It is used to analyze pressure-dependant leakoff.

G&G: geology and geophysics.

Gage Joint: an older well design process of using a single joint of the heaviest wall casing in the well just below the wellhead. (Note – this restricts access of fullbore tools to all points below the joint.)

Gaging Nipple: a small opening in the top of a tank, allowing gaging of the contents.

Galena: lead sulfide, PbS. A mud weighting additive for high mud weights.

Galling: thread damage from lack of lubrication or mismatched metals.

Galvanic Anode: sacrificial anode.

Galvanic: corrosion between two dissimilar metals - couplings, centralizers, pumps, packers, profiles – usually severe metal loss on one metal near contact point. May see galvanic loss on a single metal with current.

Galvanic Series: a ranking of metals from the easiest corrodible (magnesium) to the most difficult.

Galvanometer: a sensitive ammeter

Gamma Ray Index: a clayiness index determined from the difference between the radioactivity level of the zone of interest and that of clean rock compared to the difference between the radioactivity level in clay shale and that in the clean rock.

Gamma Ray Log or GR: Uses a scintillation crystal and a photomultiplier tube to measure naturally occurring and artificially induced gamma-ray radiation. The gamma-ray radiation is a signature of the formations in a well – very useful in depth control. Used in open hole or pipe and also used to spot changes in radiation (NORM scale) and radioactive tracers.

Gamma (seismic): unit of magnetic survey map. 1 gamma = 1 nanotesla or 1 gamma = 10^{-5} gauss.

Gang (rig): crew.

Gang Pusher (rig): supervisor.

GAP^{TM}: general allocation program.

Gap Test (perforating): a test of the sensitivity of the perforating charge to firing from a detonating cord. May be used to spot changes in charge explosive or differences in loading.

Gardner's Equation (seismic): empirically derived equation that describes the general relationship in rock between bulk densities (r) and acoustic velocities (v): $r = 0.23v^{0.25}$.

Gas Anchor: a gas separation device, usually a perforated pipe section, in a beam lift well that helps break gas out of the liquids, preventing gas entry and resultant gas lock of the pump.

Gas Buster: a device that helps knock out gas from circulated well fluid.

Gas Cap: a zone of free gas above an oil deposit. The gas cap occurs where the oil is oversaturated with gas (past the solubility limit). When a gas cap is not present at discovery, the oil is above the bubble point.

Gas Cap Drive: a reservoir drive mechanism in which gas expansion in the gas cap pushes the oil towards the wellbore.

Gas Condensate: the liquids, generally straight chain alkanes in the C2 to C6+ range, than can condense from gas when the temperature and pressure drop sufficiently low.

Gas Coning: gas from a fee gas cap that goes downward toward the top perforations in response to a drawdown.

Gas Cut: liquids with free gas. Usually refers to drilling or completion liquids. May indicate a kick if the gas is present in large enough quantities.

Gas Drive: flooding a oil reservoir from the top of the reservoir or an updip location, to push the oil towards a producing well.

Gas Effect (on logs): a difference in porosities caused by the compressibility of gas in porosities estimated by the formation density log and the neutron density log.

Gas Formation Volume Factor: the volume of reservoir gas resulting in one standard cubic foot.

Gas Gatherer: the entity that contracts with the producer to take the gas from the wellhead to the plant or market.

Gas Gravity: ratio of the gas density to the density of air. Equal to the ratio of molecular weight of gas to that of air (28.97).

Gas Hydrate: (see also hydrate), immense deposits of natural gas tied up in clathrate structures with water. Found extensively.

Gas-In-Place: the original amount of gas in the reservoir before production.

Gas Injection: the technique of injecting gas into a reservoir. It may be done for pressure maintenance, oil viscosity reduction, light end stripping or storage.

Gas Kick (drilling): an unexpected and unwanted entry of gas into the wellbore during drilling or well operations.

Gas Lift: one of the artificial lift methods that uses gas injected down the annulus and interspersed into the flowing fluids in the tubing to lessen the density and to assist in vertical flow by gas expansion.

Gas Lift Dummy: a solid body insert that replaces and blanks-off a gas lift mandrel pocket designed for a valve.

Gas Lift Mandrel: a section of pipe used in the tubing into which a gas lift valve can be inserted. The mandrel will allow communication with the annulus gas lift supply through the valve.

Gas Lift Side Pocket Mandrel: a type of gas lift mandrel that allows full bore passage. The valve "pocket" is on the side of the pipe.

Gas Lift Valve: a pressure operated valve, placed in a gas lift mandrels at designed points in the well. The gas lift supply gas is routed through the valves into the tubing. The top valves close and the lower valves open as the static liquid level drops in the well (the well is unloaded).

Gas Lift Valve - Injection Pressure Operated Valve (gas lift): gas lift valves where injection gas enters the valve and acts on the effective bellows area, overcoming the precharge in the valve and opening the valve (the retracting bellows lifts the needle off the seat) to allow gas lift gas flow from the gas filled annulus through the seat and the reverse flow check valve, and into the tubing.

Gas Lift Valve - Production Pressure Operated Valve (gas lift): production fluid enters the valve and acts on the effective bellows area, compressing the bellows against the precharge pressure, lifting the needle off the seat and opening the valve. The injection gas then flows through the seat, through the reverse-flow check valve and into the tubing.

Gas Liquification: the process of cooling gas to -162^{o}C, reducing its volume by 600 fold over the gas volume at standard conditions.

Gas Lock (pump): a pump filled with gas that it cannot expel and where no further fluid will enter the pump. Common in beam lift pumps that pump off or are used in high GOR wells.

Gas Lock (facilities): a gas retention device that permits gauging the tank without loosing gas to the atmosphere.

Gas-Oil Contact: the changing contact of the gas cap and the oil below in the rock.

Gas-Oil Ratio: the number of standard cubic feet of gas contained in a barrel of oil.

Gas Permeation: invasion of gas into a solid, usually an elastomer, but sometimes referring to a metal.

Gas Saturation: the fraction of the porosity in a zone that is occupied by free gas.

Gas Show: any indication of gas in the drilling fluid or cuttings that indicates gas production from a reservoir that has been drilled.

Gas Spiking: Adding gas to an injected fluid or treatment to reduce the injected water volume and provide energy for flowing the well back after the treatment.

Gasification: the production of gas from liquid or solid fuels.

Gasket: any of several replaceable seals in equipment or tools.

Gasoline: normally C7-C10 fuel, with a flash point of -40.

Gate Valve: a valve with a sliding bar – common in the oilfield as tree valves.

Gather (seismic): a display of the input data in a stacking process designed to show all the seismic traces corresponding to the same depth.

Gathering Agreement (contract): an agreement detailing the conditions for entry of the producer's gas into the gathering system.

Gathering Line: the flow line from the well to the separator or tank battery.

Gauge (drilling): the diameter of the bit of the hole drilled by the bit when there are no washouts.

Gauge (screens): a rating where each gauge point equals 0.001". A 12 gauge screen has 0.012" openings (about 300 microns).

Gauge Carrier: a downhole tool that houses gauges.

Gauge Diameter: the OD of a bit or tool used downhole.

Gauge Hole: a drilled hole with no washouts; the same diameter as the bit.

Gauge Pressure: pressure read by a gauge that is set to zero at atmospheric pressure.

Gauge Ring: a short, wireline-run tool that checks the id of a well bore.

GC: gathering center.

GCI: gas cap injection.

GCV: gas control valve.

GD: gravity drainage.

Gear Reducer: a pump or motor speed reducer.

Geiger-Mueller Counter: radioactive measuring device.

Gel: a fluid with a higher than normal viscosity created by a gallant material such as polymer.

Gel Strength: the ability of a fluid to suspend solids.

Gel Strength (drilling): the shear stress measured at low shear rate after the mud has set for a period of time.

Geochemistry: the branch of chemistry dealing with the specialized reactions of downhole fluids and formations.

Geologic Cross Section: vertical cross section (vertical is depth and horizontal is lateral distance) between two points through a rock section.

Geology: the science that deals with the study of the planet earth.

Geophone: an instrument that detects vibrations passing through the earth's crust.

Geophysicist: usually a professional involved with application of physics to geology, e.g., seismic interpreter.

Geophysics: the science of the physical properties of the earth.

Geopressured: overpresured zone.

Geo-steering: using the formation data generated by a measurement while drilling system to assist in drilling a wellbore to a specific target in the formation.

Geothermal energy: the heat of the earth, usually from produced natural steam, heat recovered from circulated water or direct heat-to-energy conversion (on-going research).

Geothermal Gradient: the gradient reflecting the amount of temperature rise as the well depth increases. Normally about 1.1 to 1.8^{o} F per 100 ft of true vertical depth increase.

Geothermal Wells: the wells that produce geothermal energy (heat).

Geronimo Line (rig): a safety slide or a line from the derrickman's platform to the ground, used in an emergency.

GHG: green house gasses.

GIIP: gas initially in place.

Gilsonite: an asphaltic drilling fluid loss additive.

GIS: global information system.

GIV: gas injection valve.

GJ: gigajoule; 1,000,000,000 joules.

GL (datum): ground level.

GL (lift): gas lift.

Glacial Drift: general term for debris and stones transported by glaciers.

GLAD^{TM}: software package, gas lift assisted design.

Gland: a seal around a moving rod.

Glass Disk: often a rupture disk to allow a well to flow after it is broken by a dropped bar.

GLL (subsea): guidelineless.

GLM: gas lift mandrel.

GLR: gas / liquid ratio.

GLV: gas lift valve.

Glycol: a hydrate inhibitor or freeze-up preventer.

Glycol Dehydrators: equipment for removal of water from natural gas.

Gneiss: a coarse, metamorphic rock with some parallel alignment of granular minerals and alternate bands of flaky or elongate minerals.

GNFT: gas no-flow test.

Go Devil: various. A wireline cutter. A cleanout pig. A sleeve, etc.

GOC: gas / oil contact

Gooseneck (coiled tubing): the CT guide arch over the injection head.

GOR: gas / oil ratio. May refer to a solution GOR or total GOR.

GOS: gulf of Suez.

GPF: gas production facility.

GPG: grains per gallon.

GP/GL (subsea): guide post guide line.

GPM: gallons per minute.

GPR: gravel pack replacement

GPS: global positioning system.

GR: gamma ray log.

Graben: a block of the formation that has slid downward between two faults.

Graded Production Acreage (GPA): a term that expresses the producability of a part of the reservoir for purposes of comparing one producing area to another.

Gradient: change in pressure or temperature per unit depth.

Gradiomanometer (well logging): a device that measures the density of fluids along a fluid column.

Gradiometer (seismic): a device that measures an electric field at multiple points at the same time. The gradient is the difference in measured values per unit of distance between the measuring points.

Grain (fluid loss additive): literally grain or animal feed that is circulated with mud to act as a identifiable marker.

Grain (formation): a small piece of the formation composed of a single piece of sand.

Grain Density: the density of the rock components, without the effect of porosity.

Grainstone: an often high permeability limestone where large grains are in contact. Only high perm if fines are absent.

Grand Slam: a combination of logs or a computational procedure for calculating the depth of invasion and the resistivity of both invaded and uncontaminated zones, based on a dual-induction-laterolog and a proximity log or microlaterolog.

Granite: common igneous rock. No effective permeability.

Granite wash: a sandstone with a large percent of weathered granite grains.

Grapple: a spring like device, resembling a interlocking finger puzzle that allows a round work piece to slide through the ID when in compression, but grips the work piece (or fish) when a tension load is applied. Common in overshot fishing devices.

Gravel: large, well sorted and consistently sized sand used to hold back a soft formation.

Gravel Pack: a sand control completion that uses a larger gravel to stop the formation sand and a screen to stop the gravel.

Gravel Pack Evaluation Tool: uses porosity, density and/or tracer tools to determine presence of gravel and placement of gravel type between the screen and the hole or casing.

Gravel Pack Log: a neutron-type device that evaluates the packing completeness or condition of the gravel pack. The log is useful for estimating voids in the pack.

Gravel Reserve: the amount of gravel above the top perf, after the job, in a well with deviation less than about 50^{o}.

Gravimeter: an instrument that measures differences in the gravitational attraction. Particularly useful in finding salt domes.

Gravimeter: a device that measures the local gravitational pull. Gravimeters are useful for determining small changes in the gravity. Very useful for detecting salt domes.

Graviometer: device that records the specific gravity of a fluid.

Gravity (API): the specific gravity of a fluid in API units, where fresh water is 10. Lighter gravity crude has higher API numbers.

Gravity Anomaly: difference between theoretical calculated and observed terrestrial gravity; excess gravity us positive and deficiency is negative.

Gravity Drainage: the movements in a reservoir driven by gravity.

Gravity Meter: a device that measures gravity changes over a specific area.

Gravity Unit (seismic): an acceleration unit (gu) used in gravity measurement. 1 milligal = 10 gu.

Gravity Specific: gravity of a fluid expressed as a ratio of a standard fluid. For liquids, the standard is fresh water. For gases, the standard is air.

Gravity Survey: a exploration method that uses an instrument to measure the intensity of the earth's gravity. Areas with unusual readings may indicate traps or structures that could contain hydrocarbons.

Gray Shale: an indeterminate description of a shale with lower carbon content than a "black shale".

Graywacke: a sandstone, characterized by angular-shaped grains of quartz and feldspar set in a matrix of fine grains. May have high hardness.

Grease Injector: a pressure control method for forming a pressure seal around braded line and electric line. Grease is injected between special tubes in a high pressure housing. The tubes are slightly larger than the line and grease seals the remaining area.

Green Cement: uncured cement.

GRI: Gas Research Institute.

Grind Out: a shake out of solids, centrifuged or otherwise separated from the produced or circulated fluids.

Gripper Blocks: the contacting blocks on a coiled tubing injector that grip and move the coiled tubing.

GRN: gamma ray neutron.

Gross Acres: the total acres in which the company owns an interest.

Gross Pay: The total thickness of the pay zone, whether or not it is productive.

Gross Production: total production. Has been used as total fluids produced. Has also been used as cumulative hydrocarbon production.

Ground Bed: anodes buried in the earth to supply cathodic protection to equipment.

Ground Water: water subject to recharge from surface water accumulation.

Grout: usually cement, water and some additives used to fill a void. May also be bentonite and water.

Growth Fault: a fault that is created in an actively forming basin. It is often parallel to the shore line when created.

GRP: glass reinforced plastic.

GS: a common inside fishing neck design. Also a series of running tools.

Gscm: giga standard cubic meters (one billion standard cubic meters).

GSO: gas shut-off.

GTL: gas to liquids. A conversion of gas to a liquefied state by compression and cooling. Also, a conversion of gas by chemical methods to an easily transportable liquid hydrocarbon of a more stable, longer chain.

GTS (well testing): gas to surface.

GTW: gas to wire. Generally converting the gas from a small field to electricity at the well site and transporting the power by the electrical grid.

Guard Log: a formation resistivity tool that involves the use of a guard tool.

Guard Tool: a tool that produces the effect of one elongated current electrode from which current flows radially in all directions to a distant current-return electrode. The output from the tool can be focused to improve logging resolution in thin beds.

Guar: a natural polymer from the guar plant. Common in fracturing fluid gellation.

Guide Ring: a protective cylinder or ring to guide downhole tools past casing obstructions.

Guide Shoe: a short section of casing with a rounded nose of a drillable material and a port through the center to allow circulation.

Gum: polymer gellants.

Gumbo: sticky, reactive shale formation.

Gun: perforating gun.

Gun Barrel: a vertical separator vessel.

Gun the Pits: mix the pits.

Gunk Plug: cement (or some clays) and diesel oil dispersion that thickens when water is contacted.

Gusher: a well drilled into a high pressure formation that results in an immediate surge towards the surface. In the days of cable tools with minimum fluid (hydrostatic) head, the formation fluids often flowed to surface when the pay zone was penetrated.

Guy Wire (rigging): a support wire or cable used to stabilize a mast on a rig or other structure.

GV: gate valve.

GWC: gas water contact.

GWPC: Ground Water Protection Council.

Gyp: see gypsum.

Gypsum or Gyp: a common form of calcium sulfate precipitate or scale. $CaSO_4$-H_2O.

Gyroscopic Survey: a survey of a wellbore that measures its position and trajectory.

h: thickness (or pay height).

H crossover or profile: a profile with circulation port.

h_j: layer thickness

H_2S: hydrogen sulfide.

Hadian: the oldest eon in earth's history. Extends from the origin of earth to about 3.9 billion years ago.

Hairy Illite: a fibrous form of illite, also described as spider-web illite. The hairs or fibers randomly project into the pore space. In most cases, the clay is not overly reactive with water but the fibers do act as a trap for migrating particles.

Half-Life: the amount of time required for one half of the population of radioactive atoms to decay.

Half Muleshoe: a pipe end cut on a diagonal to ease the string through restrictions or guide tools through.

Halite: sodium chloride, NaCl.

Hall Plot: a test of injectivity that is useful for establishing formation behavior during pumping.

Hammer Up: connect unions on treating iron.

Hand-Over Document: the document containing operational and test data used to transfer custody of a well from drilling to operations or production after completion or from production to drilling when repairs are needed.

Hang Fire: an unplanned delayed firing of explosives after the initiation attempt - various causes.

Hang Rods: suspending sucker rods in the derrick from rod hangers.

Hanger: a mechanical device that suspends all or part of the weight from a tubular string, transferring the load to the well head and the earth.

Hanger Plug: a plug placed below the BOP prior to a pressure test.

Hanging Wall Block: the body of rock that lies above an inclined fault plane.

HAP: hazardous Air Pollutant.

Hard Shut-in: to close in a flowing well with the BOP with the choke line closed.

Hard Water: water with a high mineral content.

Hardness (metal): measure of the resistance encountered in pressing a steel ball into the metal.

Hardness (mineral): the resistance of a mineral to scratching . Determined by the Mohs scale.

Hardness (water): ion content of water.

Hardpan: the relatively hard layer of soil just below ground surface.

Hatch: the opening on a tank.

HAZ: heat affected zone. The area around a weld or other area in the steel that has been modified by heat and, as a result, is more subject to some forms of corrosion.

Hazard: a condition or object that has the potential to cause harm risk is the probability of an event happening times the impact of its occurrence on operations. (Impact is the effect on conditions or people if the hazard is realized (occurs) in practice and potential is the likelihood that the impact will occur.)

HAZOP: hazardous operations.

HBP: held by production, a leasehold kept in force by production.

HCl: see hydrochloric acid.

$HClO_2$: chlorine dioxide, a bacteria killer.

HCPV (reservoir): hydrocarbon pore volume.

HDPE: high density polyethylene plastic

HE: see Hydrogen Embrittlement.

Heading (logging): the information on the well at the top of the log.

Heading (well flow): the flow of slugs of fluids (unstable behavior).

Heat Affected Zone: HAZ, the metal adjacent to a weld or other heated area that has been altered by the heating.

Heat Transfer Coefficient: coefficient describing the total resistance to heat loss from a producing pipe to its surroundings. Includes heat loss by conduction, convection and radiation.

Heater Treater: a separator that uses heat to speed the separation of emulsions.

Heating Oil: oil used for residential heating.

Heave (geology): the horizontal displacement (travel) of a fault.

Heave (ship): the vertical motion of a vessel.

Heaving: partial or full collapse of the wellbore by particles of shale.

Heavy Oil: lower gravity, often higher viscosity oils. Normally less than 28^o API gravity.

HEC: hydroxyl ethyl cellulose, a synthetic polymer.

Heel: the area of pay closest to the casing in a highly deviated well.

HEGF: high energy gas fracturing.

HEGS: high energy gas stimulation.

Held by Production: keeping an oil and gas lease in effect by producing the well.

Helical Buckling: a buckling characterized by maximum wall contact. Takes the form of a wound spring.

Hematite: a natural deposit of iron oxide.

Henry Hub: A pipeline interchange/delivery point. Used as a benchmark in gas futures for natural gas pricing.

HES: Halliburton Energy Services.

Hesitation Squeeze: a cement squeeze technique where the cement is squeezed into a channel or leak at a low rate, then allowed to sit and dehydrate by leakoff, before again raising the pressure. The action gradually builds a dehydrated cement node that blocks the channel.

Heterogeneities: differences.

Heterogeneous: rock with differences in texture, permeability, porosity or other factors.

Hexafluorosilicates: a byproduct and precipitant of the HF – silica reaction.

HF: hydrofluoric acid.

HHp: hydraulic horsepower.

High Angle Well: a highly deviated well.

High Anticlinal: top part of the structure, expected to be the best place to encounter accumulation of hydrocarbons.

High Density Basement (seismic): the deepest, thick, high density rock that serves as a density contrast in an area.

High Pressure Water Cleaning: cleaning at less than 5,000 psi water pressure.

High Rate Water Pack: a sand control operation in which gravel is injected into a well where a screen has been placed. The pressure of the injection is usually at or near the fracture pressure of the reservoir and a pressure packing of all perforations ensues. Some perf breakdown occurs. The amount of gravel placed is about 40 to 75 lbs/ft of perfs.

High Sulfur Oil: usually an oil with more than 1% sulfur.

Hindered Settling: a flow region in a near vertical well, in which rising fluid or gas hinders the fall rate of liquids of solids, enabling flow from the well.

Hinge Fault: a fault along which there is increasing offset or separation along the strike of the fault plane. Measured from the initial point of separation.

Hipp Tripper™: a brand name of a tool used to deliver rapid impact stokes to a small BHA downhole. Operated by fluid flow. Usually run on CT.

HIPPS (offshore): high integrity pressure protection system.

HLN: hydraulic landing nipple.

HMSV: hydraulic multi-service valve.

HMX: higher temperature perforation charge explosive. A modified RDX.

HNBR: hydrogenated nitrile (bunadiene rubber).

HNS: very high temperature perforation charge explosive; hexanitrostilbene.

Hoist: to lift. Also the equipment used to lift.

Holdup (flow): the volume fraction of a specific fluid in the upward moving stream.

Hole Cleaning: transporting drill cuttings or fill to surface.

Hole Opener: a larger device (usually of a fixed diameter) that enlarges the wellbore to a diameter equal to or less than the upper casing drift). Compare to an under-reamer or watermelon mill or string mill.

Holiday: a small hole in a coating.

Hollow Carrier: a perforating gun that surrounds the charges and contains much of the shock of the detonation.

Holocene: an epoch of geologic time from present to 10,000 years ago.

Hook (drilling rig): the hook on the traveling block from which the elevators are suspended.

Hook Load: the actual weight of a pipe string measured at the surface; affected by buoyancy, friction and other factors in the wellbore.

Hook Wall Packer: packers equipped with drag blocks or springs so rotation of the pipe unlatches the slips and sets the packer.

Hooke's Law: a statement of elastic deformation, where strain (deformation) is proportional to stress (applied stress).

Hopper: mixing chamber where dry components can be evenly mixed with liquids. The dry materials are introduced at the bottom of the hopper through a nozzle.

Horizon: a specific sedimentary layer across a study plane.

Horizontal Drilling: a well drilled in a manner to reach an angle of 90 degrees relative to a level plane at its departure point at the surface. In practice, the horizontal section of most horizontal wells vary several degrees.

Horizontal tree: a subsea production tree with a horizontal valve arrangement to the side of the tubing hanger, permitting direct access to the tubing and tubing hanger without having to remove the tree during a workover.

Horizontal Well: for a strict definition, a 90^{o} deviated well. Actually the well covers a range of "highly" deviated wells (80^{o} to $>90^{o}$). In the strictest terms, the deviation is measured as 90^{o} from vertical, but tilting bedding planes may make the deviation to the bedding planes a different judgment.

Horner Plot: a type of build up pressure test plot. The Horner plot uses a recording of the pressure during pressure build-up to predict its virgin reservoir pressure. The slope (m) of the extrapolated line reflects the nature of the reservoir rock and the fluids flowing through the rock.

Horse Head: the head of a beam lift pump jack, onto which the bridle to the yoke and polish rod attaches.

Horst: a block of the formation that has been raised between two faults.

Hostile Environment (well): high temperature, deep, high pressure or highly corrosive or erosive producing environments (e.g.: depth >20,000ft or 6100m, temp > 325^{o}F or 163^{o}C, pressure >20,000 psi, H_2S or CO_2 content).

Hot Oil: a technique of injecting or circulating heated crude oil from the surface to help remove paraffin deposits. It is usually only effective for shallow depths when circulated.

Hot Spot (mantle): an area in the upper mantle from which magma rises. A hot spot can endure for 10 million years or more.

Hot Spot (shale): a section of the formation with high gamma ray readings (usually above about 200 SPI units).

Hot Stab: a penetration under pressure.

Hot Tap: a method of attaching a valve or port to a pressurized line without removing the pressure.

Hot Work: operations requiring welding, cutting, grinding, burning, etc.

HP (facilities): high pressure facilities and lines.

HP (incident): a high potential incident.

HP (well): high pressure facilities or separator train.

HPG: hydroxyl propyl guar; a chemically modified guar.

HPHT: high pressure, high temperature. HPHT is where the *undisturbed* bottom hole temp at prospective reservoir depth or total depth is greater than 300^{o}F or 150^{o}C, *and either* the maximum anticipated pore pressure of *any* porous formation to be drilled through exceeds a hydrostatic gradient of 0.8 psi/ft, *or* a well requiring pressure control equipment with a rated working pressure *in excess of* 10000 psi.

HPLT: high pressure, low temperature. Identification of the problem zone for hydrate formation.

HRWP: see high rate water pack.

HS: high sulfur.

HSE: health, safety and environment.

HSFO: high sulfur fuel oil.

HSP (lift): hydraulic submersible pump

HSP (fracturing): high strength proppant.

HTHP: high temperature, high pressure.

HC: Hughes Christensen.

HUD: hold up depth.

Huff and Puff: a tertiary recovery operation, consisting of first injecting steam, followed by flowing the well back to recover oil that has had its viscosity reduced by application of the heat.

HWDP: heavy weight drill pipe.

HWHR (subsea): hot water hydrate removal.

HWO: hydraulic workover, usually working under pressure. Some HWO units are set up with pipe handling capacity as are snubbing units.

HWU: hydraulic workover unit.

HXT (subsea): horizontal tree.

HYD: hydraulic.

Hydrate: a clathrate type molecule (cage) of gas and water that forms in a certain range of temperature and pressure in wells. In flow lines, hydrates are a problem in deep-water sub sea wellheads and flow lines, but also seen in some nearly dry, onshore gas wells. In-situ hydrates are a potential natural gas resource.

Hydrate Suppressants: materials that lower the formation temperature of hydrate molecules.

Hydration: inclusion of water into the structure of a material.

Hydraulic Centralizer: a downhole tool centralizer that is engaged by raising hydraulic pressure.

Hydraulic Disconnect: a disconnect, usually in a BHA that is activated by hydraulic pressure.

Hydraulic Diversion: a diversion technique for injecting fluids into separate zones without added diverters. Limited numbers of perforations or set obstructions in the wellbore can build pressure at higher rates and cause diverting to lower permeability or damaged zones.

Hydraulic Fracture: a fracture creased by hydraulic pressure – usually intentional.

Hydraulic Hammer Effect: an effect, also known as water hammer, in which a pressure wave can be generated behind a rapidly closed valve. The pressure wave travels at sonic speed, reflecting off of the pipe end or the bottom of the well and returning to the valve. If the valve is closed before the wave returns, a hydraulic impact is produced on the valve. Extreme cases are seen with slam closures of sub surface safety valves. Much smaller effects may be produced in front of the valve in a few cases.

Hydraulic Head: pressure exerted by a column of liquid.

Hydraulic Isolation: partial isolation without using a direct seal between the device and the flow path. Efficiency depends on fluid viscosity, clearance and flow rate.

Hydrostatic pressure: pressure created by a column of fluid that expresses uniform pressure in all dirrectins at a specific depth and fluid composition above the measurement point.

Hydraulic Pump: an artificial lift system that is powered by injected fluid (usually water), that powers a pump similar to the rotating pump used in electrical submersible pumps.

Hydraulic Set Packer: packer set by hydraulic pressure.

Hydraulic Well Workover: a snubbing job in which the well is workover without killing the well with fluid. Usually accomplished by multiple barriers that seal on the tubulars.

Hydraulic Window (drilling): the allowable effective fluid density difference between the fracturing pressure and the pressures exerted b a fluid that are needed to control formation flow and the wellbore.

Hydraulics: a general term referring to how fluids move and unloads cuttings, etc. in a well. Most common in drilling to insure claring and effective pressure control.

Hydril™: a manufacturer of BOP and other well equipment. Also a common term for a section of the BOP stack that utilizes a large rubber "donut" that can seal on irregular surfaces or even on itself.

Hydrocarbon: a compound formed essentially of carbon and hydrogen.

Hydrochloric Acid: the most common oilfield stimulation acid. A mixture of hydrogen chloride gas in water. Useful for removing calcium scale, some mud and cement damage and very shallow stimulation of formations with some calcium in the flow path.

Hydrocyclone: a cone shaped device for separating fluids and the solids dispersed in fluids.

Hydrofluoric Acid: an acid that reacts with clays. Very harmful to humans in concentrated form.

Hydrogen Blistering: the formation of cavities just below the surface in a metal. Growth of the near-surface blisters may result in bulges in the metal.

Hydrogen Embrittlement: a corrosion mechanism in which atomic hydrogen enters between the grains of the steel, and causes the steel to become very brittle.

Hydrogen Induced Cracking: step-wise internal cracks that connect hydrogen blisters.

Hydrogen Sulfide: a toxic, corrosive, colorless gas with the characteristic smell of rotten eggs in low concentration. An acid gas.

Hydrogen Sulfide Cracking: minute cracking just under a metal's surface caused by exposure to hydrogen sulfide gas.

Hydrometer: an instrument that is dropped in a liquid to measure its specific gravity.

Hydrophilic: having affinity for water.

Hydrophobic: repels water.

Hydrophone: a pressure sensitive receiver that transforms sound to electrical signals that may be recorded.

Hydroset Tool: a tool that is set by hydraulic pressure.

Hydrostatic: the pressure exerted by a column of a single density fluid. For a non-compressible fluid the pressure (in psi) at any depth = 0.052 x depth x fluid density in lb/gal.

Hydroxide: compounds having the OH ion. Bases or caustics.

Hygroscopic: absorbing water from the air.

Hyperbolic Decline: variable rate of decline over the life of the well.

IA: inner annulus.

IADC: International Association of Drilling Contractors.

IAM: integrated asset modeling.

IAP: inner annulus pressure.

IAxOA: inner annulus to outer annulus.

IBP: inflatable bridge plug.

IC: inner casing.

iChoke: injection choke model. A model that helps identify critical junctures in injection support.

ICOTA: International Coiled Tubing Operators Association.

ICP: inflatable casing packer.

ICP: inside casing gravel pack.

ICP: initial circulating pressure.

ICV (injection): injection control valve.

ICV (completion): internal control valve.

ID: inside diameter.

ID Drift (of pipe): the OD of the drift that will pass through the tube.

ID_m: minimum ID.

ID_n: nominal ID.

Ideal Gas: a theoretical gas that perfectly obeys PV=RT/m, where V is the specific volume, T is the absolute temperature, R is the universal gas constant, and m is the molecular weight.

IEEE: Institute of Electrical and Electronics Engineers.

IEM: invert emulsion mud.

IFP: integrated field planning.

IFT: interfacial tension.

IGLR: injection gas lift ratio.

Igneous Rock: solidified molten rock. Specifically granites, etc.

IGP: inside casing gravel pack where no gravel is placed into the perforations.

IGRF (seismic): International Geomagnetic Reference Field.

II (injection well): injectivity index.

ILD (logging): deep induction log.

Illite: a clay type of varying form and composition. Rarely water sensitive. May occur in unusual cases as a fiberous deposit that can act as a particle trap.

ILM (logging): medium induction log.

SFLU (logging): spherically focused resistivity log. Measures the resistivity of the flushed zone (Rxo). In a hydrocarbon zone, the curve may report higher resistivity than deep (ILD) or medium (ILM) induction curves because the flushed zone contains mud filtrate and residual hydrocarbons.

IM Standard (BP): integrity management standard.

Imbibition: absorption and adsorption of fluids into the pores of the rock.

IMF: intermediate manifold facilities.

Immature Oil: young crude or crude that has not been thermally "processed" by heat to generate lighter ends (short carbon chains) and gas.

Impact (in risk analysis): impact (or consequence) is the effect on conditions or people if the hazard is realized (occurs) in practice and probability is the likelihood that the impact will occur. Risk is a function of probability and impact (consequence).

Impedance: total opposition (resistance, capacitance and inductance), expressed in Ohms, to the flow of current.

Impeller: the rotating pump component that drives the fluid in a centrifugal pump.

Impermeable: Rock with passages so small that no effective flow can take place. Note: all manmade and natural substances have some permeability, given high pressure, time, enough surface area and a low permeability fluid.

Impressed Current: a corrosion control mechanism in which a small charge is used to oppose the electrical current generated by a corrosion cell. The current reduces metal loss at the anode.

Impression Block: a soft lead flat end or cone bottom on a steel tool. The impression block can give ideas on what it is set down upon. Usually run via slickline and set down once to get an imprint. Also derisively called a confusion block.

Impression Packer: an inflatable packer with a soft rubber shell. It is inflated in an interval and then deflated; the rubber shell is a reverse cast of the imperfections in the well. Used to confirm split pipe or perforation density.

Improved Oil Recovery or IOR: any of various methods, chiefly reservoir drive mechanisms and enhanced recover techniques, designed to improve the flow of hydrocarbons from the reservoir to the wellbore or to recover more oil after the primary and secondary methods (water and gas floods) are uneconomic.

Impulse-Fracture Testing: an injection-type test with a goal of estimating reservoir parameters.

Inc (drilling): inclination or the deviation of the well from vertical.

Inclination (wellbore): the measurement of a wells deviation from vertical. When used with fluids, a positive number indicates upflow and a negative number may represent downflow.

Inclusion (corrosion): a nonmetallic phase such as an oxide, sulfide, or silicate particle in a metal.

Incompatible Waters: waters, which, when mixed, may cause a precipitate.

Independent: typically a non-integrated oil or natural gas company, usually active in a few sectors of the industry.

Index Fossils: fossils specific to a certain geologic time.

Indexing Tool: a tool that operates by pipe rotation or reciprocation.

Indicator (chemical): a chemical in a titration reaction that changes color at a certain pH.

Indicator (mechanical load): a dial or gauge.

Induced Spectral Gamma Ray Log: an activation log.

Induction Log: open-hole log that measures resistance difference between formation and wellbore fluids to various depths in the formation.

Inert: a general term meaning non-reactive with the materials with which it contacts.

Infant Failure: an early failure; often related to poor design, candidate selection or installation problems.

Infill Drilling: adding new wells in an existing field within the original well patterns to accelerate recovery or to test recovery methods.

Infinite Acting Reservoir: a reservoir that acts during a short term test as if it had no boundaries.

Inflatable Packer: a device with metal slats or cords woven around a rubber bladder with an elastomer cover designed to inflate in the wellbore and provide isolation.

Inflow Performance Relationship: the relationship between reservoir or pore pressure, flowing bottom hole pressure, and production rate. Can be calculated from reservoir properties (reservoir pressure, permeability, skin) or can be a curve fitted to experimental data from the well.

Influx: inflow.

Inhibitor: a chemical that slows a reaction between a reactive fluid and a material. Specifically, acid corrosion inhibitors slow the reaction of acids on steels.

Inhibitor Intensifier: a chemical that assists the corrosion inhibitor in slowing corrosion in harsh conditions.

Inhibitor Truck: a special truck equipped with a small pump and an inhibitor checmical tank used to treat wells on a scheduled basis.

Initial Circulating Pressure: the pump pressure required when a shut-in well that has taken a kick is circulated after initially opening the well.

Initial Gel Strength: the maximum reading from a direct reading viscometer (e.g., Fann VG meter), after the fluid has set for ten seconds.

Initial Potential: flow rate, often from a short test, measured during a test at or just before completion.

Initial Reservoir Pressure: the pore pressure in a reservoir at the time of discovery.

Injection Gas: gas injected into the reservoir to maintain pressure.

Injection Log: a downhole recording or log that shows where fluids are leaving the well bore. It is used to establish injection profile and to check for leaks and crossflow.

Injection Pressure Operated Valve (gas lift): gas lift valves where injection gas enters the valve and acts on the effective bellows area, overcoming the precharge in the valve and opening the valve (the retracting

bellows lifts the needle off the seat) to allow gas lift gas flow from the gas filled annulus through the seat and the reverse flow check valve, and into the tubing.

Injection Valve: a downhole valve in an injection well designed to prevent backflow if the injection is stopped.

Injection Well: a well either specifically drilled, or, more likely, a poor producer that is converted to inject fluids to stabilize the decline of pressure in a productive zone. An injector is required to have a pressure connection to the pay and to a producing well. Water is typically injected at the base of the pay or, in a gas well, or gas is injected into the gas cap.

Injection-Withdrawal Ratio: the ratio of the rate of injection to rate of production. A target may be as high as 1.0, although it is seldom achieved.

Injectivity Index: slope of inflow performance relationship for injection. Bbl/psi or m^3/bar.

Injector Head (coiled tubing): coiled tubing handling device that provides pulling and injection power. Usually powered by two to four motors that transmit the forces to the coil through chains equipped with specially shaped couplers.

Inland Barge Rig: a structure consisting on a barge to which drilling equipment is attached for the pumpose of drilling in shallow water. The barge is usually sunk to drill.

Insert pump: a pump run on a sucker rod string and set in a pump barrel, then powered with the sucker rod pump.

Inside Blowout Preventer: a valve installed inside the drill stem to prevent flow up the inside of the pipe.

In-Situ: in place or inside the formation.

In-situ Coal Gasification: gasification of an underground coal seam by injection of air.

In-Situ Combustion: burning a small part of the hydrocarbon to provide heat to reduce the viscosity of thermally crack the heavier ends. See Fire Flood.

In-situ stress: the stresses on the formation imposed by the overlying overburden and tectonic forces. The stresses are at least partially offset by the fluids in the pores of the formation.

Instrument Hanger: a piece of downhole equipment from which gauges and instruments can be suspended.

Insulated Flange: a flange with plastic gasket and bolt isolation devices to stop electrical conductance.

Insulated Tubing: one of several tubing configurations designed to reduce heat loss from the produced fluids.

Intangible Drilling Costs: that part of the drilling and completion expenses that have no practical salvage value.

Integrated: a firm that operates in both the upstream and downstream areas of the energy industry.

Integrity Management: all phases of management of the well pressure seal integrity as a principal, critical objective.

Intensifier: a pressure multiplier device use to assist pumping in high pressure well work.

Intercrystalline corrosion: corrosion along the grain boundaries of a metal.

Interface Treatment: a fluid diversion technique using density of the fluid to place fluids or other materials at a specific location in the well.

Interference (perforating): a perforating gun effect in which the firing of charges overlap slightly with the effect of one charge affecting the development of a jet in another with the result of reduced penetration.

Intergranular Corrosion: corrosion along the grain boundaries of a metal.

Intermediate Base Oil: oils with API gravity between 25 and 30.

Intermediate Casing: often a casing string or liner run to isolate a zone between the surface casing and the final production casing.

Intermittent Lift or Flow: gas lift where gas is periodically injected into the fluid column.

Intermitter: a time cycle controller that controls gas injection to improve lift.

Internal Cutter: a mechanical, chemical or explosive device capable of severing the pipe from the inside.

Internal Filter Cake: filtration control by particles smaller than the pore bridging size that invade the pores and bridge within the pore throats. Often very difficult to remove.

Internal Rate of Return: the interest yield expected from an investment based as a percentage.

Internal Upset: a pipe connection with a smaller I.D. than the pipe but a consistent O.D.

Interstitial Water: water within the pores.

Intervention: in a well work sense, usually a non-rig well entry using wireline or CT intervention where the well head remains attached. Rigs may be used. Compare to workover.

Intrusion: an igneous rock body, which when molten, forced its way into a surrounding rock. Salt intrusions are also possible.

Invaded Zone: the part of the rock next to the wellbore into which wellbore fluid has leaked.

Invasion (drilling or workover): movement of one fluid into a permeable zone.

Inverse Modeling (seismic): a modeling technique for 2D or 3D seismic where density, susceptibility or geologic data is calculated or matched to an observed gravity or magnetic field.

Invert Emulsion: An emulsion that has swapped the internal phase to the external phase.

Invert Mud: water-in-oil emulsion muds. There may be as much as 50% brine in the liquid.

IOGCC: Interstate Oil and Gas Compact Commission.

Ion Exchange: ion exchange (cation or anion) where scaling or water hardening minerals such as calcium and magnesium are removed by substitution for sodium.

Ion Milling: a focused ion beam useful in preparing SEM samples of rocks to gain much clearer pictures of pore structures.

Ionic Bond: a bond formed by an atom that has a strong tendency to loose electrons with an atom with a strong tendency to accept electrons.

IP (facilities): intermediate pressure separator or separator train.

IP (technology): intellectual property.

IPA: isopropyl alcohol.

IPAA: Independent Petroleum Association of America.

IPC (field capacity): installed production capacity including injectivity.

IPL: integrated porosity logging.

IPR: inflow performance relationship. The relationship that shows inflow as a function of drawdown. Changes with time.

IPTT: interval pressure transient test.

IR: Infra-Red.

IRIS™: intelligent remote implementation system.

Iron Control: chemicals that control the precipitation of iron from solution.

Iron Hydroxide: a brown, gelatinous precipitate that comes out of a spent acid solution when the acid spends completely or when the Ferrous Iron (+2) in solution at pH > 1.8 oxidizes to Ferric iron (+3).

Iron Reducer: a chemical that helps reduce the valiance state of iron from iron+3 (ferric) to iron +2 (ferrous) in non sour applications. Helps prevent sludges that are triggered by iron and asphaltic crude in combination with salt water or acid. May also help prevent iron precipitation in sweet wells.

Iron Roughneck: a pipe connection device that sits on the rig floor or is suspended just above the floor. It combines lead and backup tongs with a integral spinning table to spin the top joint during make-up or break-out.

Iron Scales: iron carbonate, iron sulfide and other forms of scale deposits containing iron.

Irreducible Water Saturation: the fraction of the pore space occupied by water when the hydrocarbon content is at maximum. This level of water can only be reduced below this level by flow of very dry gas that evaporates the water. Rewetting of a core with saturation below the irreducible water point may sharply reduce native state permeability to gas.

ISA: Instrument Society of America.

Isenthalpic: a constant heat loss/gain applied to a calculation and a temperature or pressure can be adjusted to meet this new heat content (around fluid equilibrium considerations).

ISIP: initial shut-in pressure. Used to isolate the formation fracturing or injection effect from the friction effects.

ISIS™ : Integrated subsurface information surveillance.

ISO: International Organization for Standardization, a network of national standards institutes of 146 countries, based in Geneva, Switzerland.

Isobar map: a map that shows points of similar pressure in a field.

Isochronal test: a multi-rate drawdown and build-up test with different drawdowns of the same duration but buildups reaching stabilization.

Isochrone: at the same time.

Isopach: a map that shows contours between points of equal formation thickness. It may also show depth of the zone.

Isoproponal: isopropyl alcohol.

Isosaturation: map showing equal points of a specific fluid saturation.

Isotope: one of several forms of an element, all having the same number of protons but differing in the number of neutrons.

Isothermal: taking place at constant temperature.

Isotropic: no variation in properties with direction.

ISP: intermediate strength proppant.

ISRS: international safety rating system.

ISSSV: injection subsurface safety valve.

IU: see Internal Upset.

IUD: instantaneous underbalance device.

IVICV: infinitely variable internal control valve.

IWOCS (subsea): integrated workover control system.

J: productivity index.

J Profile: a profile design (less common than F, S, and X). The F allows circulation with the annulus. Used in place of a sliding sleeve, but does present a restriction.

J-Slot: a pin and groove assembly that keeps a tool in the unset position while running and then can be worked or "Jayed" to operate the tool. Common in retrievable packers and liner hangers.

Jack (beam lift): usually a pump jack, operating the rods in a lift and fall motion.

Jack Knife Rig: a rig with a folding mast that can be lowered and raised relatively quickly.

Jack-Up Rig: an offshore rig with retractable steel legs that can be placed on the ocean floor and raise the rig above the water line.

Jacket (platform): the steel support structure from the sea floor to the top sides.

Jar: a device run on slickline, coiled tubing, tubing or drill pipe that will sharply increase the impact force of the conveyance when trying to retrieve a stuck tool or equipment.

Jar Accelerator: a hydraulic tool used in combination with a jar to increase the impact of the jar on the fish.

Jerk Line (drilling rig): a cable from the tongs through a pulley in the mast and to the cat head.

Jet Charge: a shaped charge used in perforating.

Jet Cone Mixer: a mixer that introduces additives to a moving fluid stream though use of the low pressure formed with fluid passage through a nozzle. An "on-the-fly" mixing device.

Jet Cutter: a radial shaped charge (explosive) cutter for pipe.

Jet Fuel: high quality, kerosene-like fuel.

Jet Mixer: a type of mixer for cement that uses air pressure to propel the dry cement into the flowing water.

Jet Nozzle: a nozzle through which fluid is pumped to produce an impact force. Used in jetting tools and bits. These nozzle often have a designed shape to maximize impact.

Jet Perforating: shaped charge perforating.

Jet Pump: an artificial lift device that uses the flow of a power fluid through a nozzle to create a low pressure area that draws well fluids into the chamber and assists in lift the fluids to the surface.

Jetting: injecting fluid at high pressure against a target, often with fluid focused through a nozzle tool.

JOA: joint operating agreement.

Joint (geological) a large, generally planar fracture through a rock across which there has been no movement.

Joint (pipe length): a section of tubular.

Joint (connection): the tubular connection.

Joint Operating Agreement: a written agreement that sets the terms under which a property will be developed by the working interest owners.

Joint Venture: a project in which two or more parties are involved. Funding may be in direct money or work-in-kind.

Joule-Thompson Effect: when a real (not ideal) gas expands, the temperature of the gas drops. During passage of a gas through a choke, the internal energy is transferred to kinetic energy with a corresponding reduction in temperature as velocity increases. The effect for natural gas is approximately 7^{o} F for every 100 psi pressure reduction.

Journal Bearing: a bearing on a rotating shaft.

JRA: job risk assessment.

JRC^{TM}: Jet Research Center.

JSA: job safety analysis.

JT (gas): Joule Thompson.

Jug: geophone.

Junction (multilateral): the intersection of the lateral and the mother-bore when two or more laterals are drilled in a multilateral well, or when a single kick-off lateral is drilled from a vertical well. The junction may be unsealed or sealed and may or may not hold pressure.

Junk: debris in the well.

Junk Basket: may also be called a Jet Basket: a device with nozzles and a basket or catch basin to catch smaller pieces of junk stirred up by circulation.

Junk Mill: a rough, sturdy mill for grinding up odd shaped materials in the well.

Junk Retriever: junk basket.

Jurassic: a geologic time period 140 to 200 million years ago.

K (viscosity): the consistency index, is the shear stress or viscosity of the fluid at one sec^{-1} shear rate. An increasing K raises the effective annular viscosity, increases hole cleaning capacity.

k: permeability

K Valve: storm Choke.

KALREZ™: a brand name for a high temperature seal.

Kaolinite: a clay type marked by platelet like deposits in the authogenic form. Usually not water sensitive but may have occasional loose attachment to the host grain.

Karst: a topography formed when groundwater forms pockets or caves below or in a structure (usually limestone), allowing some of that structure to drop (e.g., create sinkholes). The complete cycle occurs over geologic time.

KB: Kelly bushing on a rig with a rotary table. A depth datum.

Kbbl/d: 1000 barrels per day.

KCl: potassium chloride salt.

KCOOH: potassium formate.

Kelly: the main rotating shaft on a rotary drilling rig that connects to and turns the drill string.

Kelly Bushing: the bushing that directly transmits torque from the rotary table to the kelly.

Kelly Cock: the valve on the Kelly.

Kelly Down: when the kelly has reached the rotart table and a joint of drill pipe must be added.

Kelly Saver Sub: a short threaded sub that is made up to the kelly and to which the drill string is connected. The connections are made to the sub, saving wear on the kelly threads.

Kelly Spinner: a pneumatic device fitted to the top of the kelly that can spin the kelly.

Kerogen: An initial stage of oil that never developed completely into crude. Typical of oil shales.

Kerogen Type 1: Liptinite; (usually lacustrine in origin) has a high hydrogen to carbon ratio and a low oxygen to carbon ratio. Oil prone with a high yield – up to 80%.

Kerogen Type II: Exinite; (naphthenic) has an intermediate hydrogen to carbon and oxygen to carbon ratio. Usually formed from marine organic matter (planton) in a reducing environment. Oil and gas prone with yields of 40 to 60%.

Kerogen Type III; Vitrinite; has a low hydrogen to carbon and high oxygen to carbon ratio. Usually dry, low quality gas prone with low yields. Source is terrestrial vascular plants. Humic coal precursor.

Kerogen Type IV: Inertinite; very low in hydrogen, principally a dead carbon. No oil or gas generating gas potential.

Kerosene: a medium range (C9-C16), straight chain blend of hydrocarbons. Flash point is about 60^{o}C (140^{o}F). Boiling point is 174^{o} to 288^{o}C. Density is 0.747 to 0.775 g/cc.

KEVLAR^{TM}: an extremely strong fiber, common in composites.

Keyseat: a out of round bore hole worn to the side, often with the side of the drill pipe in a crooked hole, that looks like a key hole. Keyseats create problems with passage of tool joints and larger pipe that does not bend as easily as smaller diameter pipe.

kh: the permeability times the height; a measure of formation conductivity.

k_h: horizontal permeability.

Kick: an unwanted flow of fluids from a formation into the wellbore. Can happen during drilling, completions or interventions.

Kick-Off Point: the point at which a rapid change of deviation is made in a vertical well.

Kick Off Pressure (gas lift): the gas injection pressure available for unloading fluids from a gas lifted well down to the last valve.

Kickover Tool: a fishing tool that decentralizes the retrieving tool. Commonly used in gas lift.

Kill: a term used to describe various methods to stop flow from a well. Commonly pumping a kill weight fluid into a well to create an overbalance into the formation.

Kill and Block Valve: a downhole valve in the tubing string used to isolate the string and allow a kill without having fluid on the formation.

Kill Fluid: a liquid with a density sufficient so that a full column of the fluid would control the well and prevent fluid entry into the wellbore from any exposed formation.

Kill Lines: flow lines to the BOP stack, entering below the pipe rams, through which kill weight fluids can be pumped.

Kill Pill: a pill with fluid loss control materials selected to stop losses in the well. A kill weight pill is a fluid with a density high enough to control the well.

Kill Spool: a kill line port located between the shear ram and the slip ram on a BOP.

Kill Weight Fluid: the density of a full column of fluid when the density of that fluid is just high enough to prevent pore fluid flow.

Kilo: kilogram, 1000 grams.

Kilojoule: about a BTU (British thermal unit). Used to express the heat content of gas.

Kilopascal: kPa, 1000 Pascal, 6.9 kPa per psi, 1000 psi = 6900 kPa.

Kinematic Viscosity: the ratio of the viscosity to the density using consistent units. Same behavior as in a Marsh Funnel.

Kinetic Hydrate Inhibitor: an inhibitor that prevents solid hydrate plugs.

Kinley Caliper^{TM}: a multi-finger caliper for determining casing ID condition.

KJ: Knuckle Joint.

k_j (rock): permeability of a layer.

Kl/d: 1000 liters per day.

Kitchen: a source rock in with sufficient heat and other inputs to produce hydrocarbons.

Klinkenberg Permeability: a method of correcting permeability measurements to account for gas not adhering to the walls of rock pores as does water. Gas permeabilities are usually higher than liquid permeabilities by up to one order of magnitude, especially in dry cores.

KM: Kerr McGee

Knockout: a separator used to remove easily removed or excess gas or water from the produced fluid stream.

Knuckle Joint: a flex joint in a tool string that allows alignment with a target not in the same plane.

KOP: kick-off point.

KOT: kick over tool.

KP: kill pill.

kPa: kilopascal, 6.9 kPa per psi, 1000 psi = 6900 kPa.

KPI: key performance indicator.

K_{rg}: relative permeability to gas.

Kriging (seismic): the geostatistical method of applying known values in one sample to produce an unbiased estimate of values in another.

K_{ro}: relative permeability to oil.

K_{rw}: relative permeability to water.

KT: one thousand metric tons.

Kuff (process): the partly broken emulsion layer between water and oil in a separator.

kv: vertical permeability.

Kwm (drilling): kill weight mud.

LACT: lease automatic custody transfer unit. A calibrated measurement device used as an official sales point for crude oil transfer into a second party pipeline.

Lag Time: The time it takes for drill cuttings to be carried to surface from the bottom of the well.

Lagoonal Deposits: regionally extensive deposits along the shores of ancient seas. Permeability varies with energy of deposition (amount of residual silt).

Lamellar Corrosion: localized and subsurface corrosion in zones often parallel to the surface that result in leaving thin layers of uncorroded metal resembling the pages of a book.

Laminar Flow: fluid flowing at a lower rate with elements of the fluid flowing in fixed streamlines. Laminar friction is a function of N_{Re} (Reynolds number). For laminar flow, the Fanning fracition factor = $16/N_{Re}$.

Laminated Sands: sandstone deposits in layers, often with very different permeabilities and frequently found with barriers to vertical flow.

Laminations (geological texture): parallel layers less than 1 cm thick.

LAN (computer): local area network.

Land Casing: installing casing to the casing set point.

Landman: a person who negotiates with the land or mineral rights owner to secure a lease to drill.

Landing Nipple: a nipple profile that contains a specific profile with a lock and a polished bore for sealing.

Langelier Index: a calculated saturation index for calcium carbonate, useful in scaling predictions.

Langmuir Isotherm (gas adsorption): the relationship of pressure to the amount of adsorption of gas to an organic surface.

LAP (packer): leakage across packer elements.

Lap: where the top of the liner comes up inside the upper casing string.

Laplace' Law: The larger the vessel radius, the larger the wall tension required to withstand a given internal pressure. A spherical vessel will have half of the wall tension of a cylindrical vessel for a set vessel radius and internal pressure.

Laser: light with a narrow spectral width. Light Amplification by Stimulated Emission of Radiation.

Laser Distribution: a % by volume distribution of the particle sizes in a sample.

Latch: one of several a downhole coupling mechanisms that hold the string to a predetermined load before releasing. Useful for confirming depth and attachment when the string is snapped into or out of a latch.

Latch On: to connect the elevators to the tubing.

Lateral (wellbore): an indefinite term, usually meaning one or more departures from a mother bore. May be used in some areas to mean a high angle well bore.

Lateral length: the length of the lateral part of the well, usually in the pay zone. The departure length is the horizontal distance from the surface penetration point to the furthest distance reached by the drill bit.

Lateral (load): a sideways load.

Laterlog: an electrical log. Formation resistivity measurement with specific conductive muds.

Latex: a organic cement additive that provides some strength in set cement and fluid loss control in the slurry.

Lava: magma that comes to the earth's surface.

Law of Capture (hydrocarbon movement): a legal concept, valid in some places, that since oil (and gas) are mobile fluids, that they are not owned until they are produced.

Layer: a distinct segment in a vertical stack of formation sequences. Often with areal extent.

Laying Down Pipe: to disassemble the drill string into individual joints and lay it down on the pipe racks.

LCA: leakoff control acid.

LCM: lost circulation material.

LCP: leakage in closed position.

LCTD: last crystal to dissolve.

LD: lay down.

LDC (transport): long distance carrier.

LDFN: lay down for night.

LDHI (hydrates): low dosage hydrate inhibitor.

LDPE: low density polyethylene.

LDS (wellhead): lock down screws.

Lead Cement: the first part of the cement slurry injected – often contaminated during the flow by mixing with mud from the walls of the pipe or the formation.

Lead Lines (pipeline): the lines from a well to a battery. Also called gathering lines.

Leak Off Rate: the fluid lost from the well expressed in volume per time.

Leak-Off Test: LOT, a drilling test. A LOT is intended to determine the point of leak-off. Compare to FIT.

Lean Gas: a near dry gas, containing only a trace of condensate.

Lease (drilling): a legal document granting the right to prospect, drill, complete and produce hydrocarbons on a tract of land.

Lease Hound: a person that acquires leases and resells them to a drilling company.

Lease Setback: the minimum distance away from a lease boundary that a well may be drilled.

Least Principal Stress: minimum principal stress. Hydraulic fractures form perpendicular to this stress.

LEL: lower explosive limit.

Lens: a permeable, often small sedimentary deposit bordered by impermeable rock.

Levelwind: a device in a coiled tubing reel control that aids in controlling spooling of the CT.

LIB: lead impression block.

Lift Cost: the cost of lifting or flowing fluids from a well to the facilities. Often used as a benchmark for efficiency.

Lift Curve: tubing performance curve.

Lifting Frame: a device on which the CT injector may sit that can be hydraulically raised to allow access to the BHA below the CT connector. Takes the place of a crane.

Lifting Cost: the operating expenses of producing fluids to the surface.

Lifting Sub: the short pipe section that screws into the top of the tubing hanger and is then latched onto by the elevators to manipulate the tubing string.

Lift-Off Pressure (mud): the differential pressure across the mud cake from formation towards the wellbore that will cause some of the mud filter cake to lift off the face of the formation and to re-establish permeability.

Light Crude: varying definition, typically an API gravity of 30^{o} or 33^{o} up to 40^{o}.

Light Ends: hydrocarbon liquids with lower boiling points that may flash off when pressure is released.

Light Weight Cement: a cement with a slurry density less than the normal approximate density of 16 lb/gal (1.92 g/cc) density. Normally in the range of 11 to 14 lb/gal (1.32 to 1.68 g/cc).

Lignite: very young coal. Moderate to low energy yield.

Ligosulfonates: a multipurpose additive base derived as a byproduct from paper manufacturing. Used as gellants, fluid loss, drilling additives, etc.

LIH: left in hole.

LIL: log-inject-log.

Limited Entry: penetrating or perforating only part of the pay zone. Usually done to control water or gas entry or to assist in ball sealer action in selective treatments.

Line Drive: using a line of injectors to drive fluid preferentially along a given path.

Linear Darcy Law: the Darcy equation describing linear movement of fluids in laminar flow through a porous media.

Linear Gel: an uncrosslinked polymer gel. Typical polymers are guar, HPG, CMC, HEC, etc.

Liner (casing): a partial string of pipe that does not run back to surface. Liners may or may not be cemented.

Liner (perforating charge): the inner liner over the propellant in a perforating charge, most often made of pressed, powdered copper mixture or drawn or stamped from copper sheet. The liner deforms as the charge is fired and its mass is added to that of the jet from the charge.

Liner (sand control): a perforated, drilled or slotted liner for formation control or to preserve wellbore access.

Liner Hanger: a packer-like hanger with slips suitable for hanging liner weights. May or may not incorporate a seal.

Liner Lap: the top of a liner, specifically the interval between the liner top and the shoe of the previous casing.

Liner Tie-Back: a string of casing, usually of the same size, used tie a set liner back to surface.

Liquefied Natural Gas or LNG: methane that has been compressed and cooled to the liquefaction point for shipping.

Liquefied Petroleum Gas or LPG: light ends, usually C3 and C4 gasses liquefied for storage and transport.

Liquid Holdup: when gas is slipping by the liquids, emptying only a part of the liquids in the well and leaving a portion of the liquid in the wellbore.

Liquid Level: the depth in a well where the standing or percolating level is located.

Lithification: process of changes that produce rock from sediments.

Litho-Density™ Log: measures the bulk density of the formation. Useful to estimate lithology.

Lithofacies Map: a map of subsurface changes in formation physical properties.

Lithologic Log: a chart of the physical properties of the formations; specifically rock composition, texture, porosity and type, etc.

Lithology: rock composition and type; limestone, sandstone, etc.

Lithosphere: outer layer of the earth including the crust and the uppermost mantle.

Lithostatic Pressure: overburden pressure of rocks at a depth.

Live Carbon (shale): carbon with a type of Kerogen content that has a high potential to generate hydrocarbons.

Live Oil: produced oil before removal of associated gas.

Live Well Workover: a workover done without killing the well (with wellhead pressure and proper barriers).

LLD (logging): deep laterlog resistivity.

LLRT: liquid level leak test.

LLS (logging): shallow laterlog resistivity.

LMRP: Lower Marine Riser Package.

LNFT-IA: liquid, no flow test, inside annulus.

LNG: see liquefied natural gas.

LO (reservoir fluid): live oil.

Load Cell: a device based on strain gauge technology that helps measure the surface weight of coiled tubing.

Load Fluid: the fluid that is injected into a well.

Lock: a mechanism to hold a plug in a profile.

Loess: deposits of windborne dust.

Log: a systematic recording of data from a well.

Log Header: the information section at the top of a printed well log.

Log-Inject-Log: a production or injection well logging technique where the zones is logged for water saturation, oil saturation or temperature, followed by fluid injection, followed by another logging pass. Data available include changes in saturations, quantitative/qualitative determination of injection location and amount of temperature charge, etc.

Logged Depth: total depth or measured depth.

Logging While Drilling: a technique using a suite of logs that are part of the drilling BHA. The formation properties are measured while drilling (although 40 to 60 feet back from the bit) and the information is pulsed to the surface.

Long Radius Well: a description of well deviation change at about 2^o to 6^o per 100 ft.

Long String: in a side-by-side dual completion, the tubing string that connects the deeper zone to the surface.

LOP (rock mechanics): leak off point. The departure from the straight line of a limit test on a wellbore. Usually from at leakoff test after casing is set and before drilling ahead.

LOP (production): loss of production.

Losal: low salt or fresher water.

Lost Circulation: during circulation, when less fluid returns to the surface than was injected into the well. Severe lost circulation is the loss of all returns.

Lost Circulation Control Agent or LCA: any of a number of materials that control the loss of fluids to the formation. See Filter Cake.

Lost Circulation Materials or LCM: same as lost circulation control materials.

Lost Circulation Zone: a high permeability zone that takes fluids from the wellbore and the conventional filter cake building materials have no effect on fluid losses.

Lost Pipe: any pipe lost in the hole.

Lost Returns: loss of returning fluid during circulation of a well.

LOT (drilling): leakoff test, a drilling test. A LOT is intended to determine the point of leak-off. Compare to FIT.

Low Alloy Steel: steel with less than about 5% alloying additives.

Low Carbon Steel: steel with less than 0.30% carbon and no other alloys.

Low Energy System (geologic): a depositional environment where to deposited sediments are poorly sorted and can have a large proportion of very fine particles.

Low Pressure Squeeze: a cement squeeze technique with a final squeeze pressure below the formation fracturing pressure.

Low Pressure Water Cleaning: cleaning at less than 5,000 psi water pressure.

Low Solids Mud: mud with a low suspended solids quantity. It may be formulated with a brine with high density created by dissolved salt.

Lower Completion: the part of the completion below the packer.

Lower Crown Plug (subsea): a plug that fits in the bore of a subsea tree, usually below the tubing hanger, to serve as the primary barrier against reservoir pressure.

Lower Kelly Valve: a near full-opening valve installed just below the kelly. It has the same outside diameter as the tool joints.

LP (facilities): low pressure separator or separator train.

LPG: liquefied petroleum gas.

LPS (downhole gauge): loss of pressure signal.

LPS: low pressure separator.

LPSA: laser particle size analysis.

LPSD: laser particle size distribution.

LPT (downhole gauge): loss of pressure and temperature signal.

LRP: lower riser package.

LS: low sulfur.

LSA (scale): low specific activity scale. Low radioactivity scale.

LSFO: low sulfur fuel oil.

LSOBM: low solids oil base mud.

LTA (seals): leakage to annulus.

LTA: lost time accident.

LT&C: long thread and coupled, a connection description.

LTBS: liner tie back sleeve.

LTOBM: low toxicity oil based mud.

LTRM: long term reservoir management.

LTS: low temperature separation.

LTS (downhole gauge): loss of temperature signal.

LTSI: long term shut-in.

LUB: lubricator.

Lubricants: materials that reduce torque and drag. May be oil, synthetic (polymer) liquids, graphite, glycols, glycerines, etc.

Lubricator: a pressurized shell, mounted above the BOP or master valve, which houses the tool string when entering a live well.

Lubricity: lubrication properties of a given drilling mud.

LWD: see Logging While Drilling.

LWL: low water loss.

LWRP: lower workover riser package.

Lyohilic: an easily suspended colloid. Having an affinity for the suspending medium.

m (logging): cementation exponent.

M^3: cubic meter. 0.16 barrels. (6.28 barrels per meter.)

MAASP: maximum allowable annular surface pressure.

Macaroni String: a small diameter string, usually attached to the outside of the tubing, used to place inhibitors and other chemicals downhole. May also be used to describe any small tubing.

Magma: molten rock (lava) that crystallizes into an igneous rock.

Magnetic Basement (seismic): usually a crystalline unconformity on which a non-magnetic sedimentary rock sequence has been deposited.

Magnetometer: instrument used to measure the intensity and variances of the magnetic fields in the earth.

Main Bore: motherbore or main wellbore from which a lateral bore is drilled.

Major: typically a large operator, usually a multinational oil company that is usually a large producer in several areas of the world.

Make A Trip: the round trip of pulling the drill string from a well and returning it to bottom. Usually done to change or check the bit or to change the BHA.

Make Hole: drill.

Make-Up: screw pipe joints together.

Make Up Tongs: specialized wrenches used for making up pipe connections.

Male Coupling: the part of a connection with threads on the outside.

Maltene: a cyclic compound associated with asphaltenes that helps keep asphaltene platelets in suspension.

Managed Pressure Drilling: an adaptive drilling process used to precisely control the annular pressure profile throughout the wellbore (IADC definition).

Mandrel: a round bar or tube (i.e., as in a packer) around which other parts are mounted.

Manifold: a junction or center for connecting several pipes and selectively routing the flow.

Mantle: the middle layer of the earth, laying just below the crust and composed of relatively high density rock.

Maraseal: a Marathon Oil water/zone control chemical. For matrix shut-off.

Marble: a metamorphic rock composed largely of calcite.

Marcit: a Marathon Oil water/zone control chemical. For fracture shut-off.

Mare's Tail (process facility): a frayed rope-line strand inserted in a flow line before a separator that aids in separation of entrained droplets in a flowing liquid.

Marginal Field: a field at the edge of commercial viability.

Marginally Consolidated: formation with an unconfined compressive strength of less than 300 psi. Can be crush with fingers.

Marine Riser: an outer steel shell that connects a drill ship, jackup or floater to the well template on the ocean floor. The drill string is run through the riser and the returning mud and cutting flow u the drill pipe / riser annulus.

Marker (circulation): a material such as a dye, sand, grain, etc., that can be recognized as the fluid is circulated. Useful for determining swept volume of the hole.

Marker (formation): an easily identified formation that is used to identify the start of a rock sequence. In the wellbore, a marker is a material placed in the circulating fluid that can be easily seen when the fluid returns to surface – helps identify the swept volume of the wellbore.

Marker Fossils: fossils specific to a particular age.

Marsh Funnel: a funnel shaped device of specific volume and shape and outlet that is used to quickly estimate the viscosity of the drilling mud by the time it takes a funnel volume to flow out of the funnel. The Marsh funnel viscosity is reported as the number of seconds required for a given fluid to flow 1 quart through the funnel.

Martensite: a hard carbon supersaturated iron characterized by needle-like microstructure.

MASP: maximum allowable surface pressure.

Mast (rig up): a portable derrick, usually a single unit that can be quickly raised.

Master Bushing: a device that fits into the rotary table to accommodate the slips and drive the kelly bushing.

Master Valve: the main shut-in valve on the well.

Material Safety Data Sheet: a description of the HSE data for a marketed product.

Matrix: the physical structure of a clastic rock.

Matrix Acidizing: acidizing a rock below the fracturing pressure, either to reduce the formation damage or to improve the initial permeability.

MAWP: maximum allowable working pressure.

Maximum Allowable Working Pressure: the maximum pressure to which a surface vessel can be operated or the maximum pressure during treating to which a well should be exposed.

Maximum Efficient Rate: the maximum rate that a field can be produced or drawn down in pressure without undue stranding of oil that could be lost during more rapid production. Setting the MER required knowledge of fluid and rock properties and well design throughout the formation.

Maximum Principal Stress: the direction of greatest earth stress in a reservoir. Hydraulic fractures are parallel to this stress.

MaxIP: the largest production volume for a month, divided by the number of days in that month.

Mbal: material balance calculation of fluid production.

MBD: thousands of barrel per day.

MBPD: thousands of barrels per day.

MBE (reservoir): material balance equation.

MBE (heavy oil): matrix breakthrough event.

MBT: methylene blue test.

Mcf: 1000 ft^3, usually measured at a specific set of conditions.

MCS: master control station.

mD (frequently shown incorrectly as md): millidarcy, $1/1000^{th}$ of a Darcy.

MD: measured depth – the along hole measurement of depth of the well. As opposed to true vertical depth (TVD).

MDRT: measured depth relative to the rotary table.

MDT: modular formation dynamics tester.

Meandering Stream: a stream that transverses relatively flat land, ultimately creating different channels in response to floods and sediment build up.

Measured Depth: depth measurement of a wellbore as measured along the drill pipe without respect for vertical penetration.

Measurement While Drilling: downhole logging while drilling. “Logging While Drilling” is one form of "measurement while drilling" - to differentiate it from mud logging, wireline logging, etc. See Logging While Drilling.

Mechanical Filter: A strainer type filter that is specifically for removal of larger particles in a liquid stream.

Mechanical Integrity Test: A regular pressure test on an injection well to assure the integrity of the isolation seal.

Mechanical Jar (wireline tools): a device used to provide a short space of free wireline travel before solidly connecting to the BHA in a string. Used in fishing.

Medium Radius: a description of well deviation change at about 8^{o} per 100 ft.

MEG: monoethylene glycol. A hydrate inhibitor.

Memory Logs: usually slickline or CT logs that record data electronically and are downloaded later.

Memory Tool: any downhole tool that records the information rather than transmitting the data back to surface.

Meniscus: a phenomena between a liquid and a solid surface created by adhesion and cohesion forces. The meniscus may be upward where adhesion forces are stronger than cohesion or downward when cohesion forces are stronger.

MeOH: methyl alcohol.

MEOR: microbial enhanced oil recovery.

MER: maximum efficient recovery or rate.

Mercaptan: a class of compounds containing carbon, hydrogen and sulfur. The shorter chain materials are used as an odor marker in natural gas.

Mercury Pore Measurement or Porosimetry: mercury is injected at step-wise increasing pressures where large pore fill first, followed by smaller pores at successfully higher pressures. Volumes injected at different pressures indicate the pore size distribution.

Mesh: a measurement of particle size based on the openings per inch in a screen.

Meshrite^{TM}: a sand control screen made from steel wool trapped between two perforated or slotted liners.

Mesozoic: a geologic time era from 65 million to 250 million years ago.

Metal-to-Metal Seal: a seal in a pipe joint, flapper seal or other area based entirely on the fit or the deformation of one metal surface against another.

Metallizing: coating of a surface with metal.

Metamorphic: change produced in a rock to another state by temperature, pressure, time or chemical influence.

Meter Factor: a correction factor applied to a meter to increase measurement accuracy in a range.

Meter Slippage: related to the amount of fluid that slips by a meter without being accurately recorded.

Methane: CH_4. or natural gas.. The simplest alkane.

Methanol: methyl alcohol, a common hydrate inhibitor.

Metocean: a contraction of the words 'meterology' and 'oceanology' referring to the waves, winds and currents conditions that affect offshore operations.

Metric Ton: approximately 7.4 bbls of 36^o API crude.

MFCT: multi-finger caliper tool.

MFE: a trademark for a repeat formation tester.

MFP: manifold flowing pressure.

MFT: manifold flowing temperature.

mGal (seismic): milligal.

MGI: miscible gas injection.

MGL: mean ground level.

MI: move in (as in equipment).

MI (flooding): miscible injection.

Mica: a silica mineral, often present as ultra thin flakes and sometimes mobile.

Micelle: an association or grouping of molecules in suspension.

Micro Cement: cement with very small particle size.

Microbeads or Microballoons: small, hollow ceramic or glass beads used as a lightening agent for special, ultra light weight cements.

Microgels: lumps of non dispersed polymer.

Microlaterlog: a pad contact micro resistivity log. Useful for assessing the flushed zone fluid in contact with the pad.

Micro Log: a special resistivity tool that measures the resistivity of the mud cake on one curve and the resistivity of the fluids in the formation, but near the wellbore, on a different curve. Separation between the curves is an indication of permeability since mud cake builds on permeable zones.

Microorganisms: microscopic living organisms such as protozoa, bacteria, viruses, algae and fungi.

Micro-Seismic: the small energy emissions from small feature tectonic events, including production of fluids from a reservoir and the resultant transfer of overburden to the matrix of the reservoir.

Microemulsion: an emulsion with very tiny, highly dispersed bubbles. May be very stable and highly viscous when the internal phase is high (>75%).

Micron: one millionth of a meter. μm.

Micron Rating: a rating of the opening in a screen (or in a filter less accurately). A micron is approximately $1/25400^{th}$ of an inch.

Micropolishing: a very smooth finish on the interior walls of a pipe to reduce friction during fluid flow.

Microporosity: very small pores created by high surface area, authogenic clay deposits. May trap water in structure and indicate higher Sw.

Microseismic: a method of tracking a fracture by listening for the sounds of shear fracturing in the formation during the hydraulic fracturing process.

Microseism: a weak vibration of the ground that can be detected by seismographs and caused by wind, waves or human activity but not earthquakes.

Middle Distillates: refinery products in the middle distillation range of refined products: kerosene, heating oil, jet fuel.

Midstream (operations): the area between upstream and downstream operations. Usually includes pipelines.

Migration (seismic): a computation applied to seismic data that returns reflection events (signals) to their origin in the subsurface.

Migration (fluids): the movement of fluids, generally away from a source rock through permeable layers towards a trap or vent.

Mill: a cutting tool used to grind up metal, dress off a fish, or open up a window for a kick-off.

Mill Scale: an iron oxide on the pipe walls that is formed during pipe manufacture.

Milli: prefix meaning one thousandth.

Millidarcy: $1/1000^{th}$ of a Darcy.

Milligal (seismic): unit of acceleration used in gravity measurement. 1 Gal= 1,000 milligal. 1 Gal = 1 cm/sec^2. 1 milligal = 10 gravity units.

Milling: removing a blockage, fish or casing wall by drilling with a metal-cutting device to gain access to the area beyond.

Millout Extension (packer): a large diameter tube below the packer where a grab will deploy when the packer is being milled out.

Mils Per Year: a corrosion, abrasion or erosion measure of penetration through the walls of the measured material. MPY reports the material loss as an average across a surface and does not accurately reflect penetration by localized pitting.

Mineral: a compound of generally known composition and structure involving naturally occurring silica-based formulations. Minerals are natural compounds formed by geologic processes.

Mineraloid: a natural compound that does not meet the stricter mineral definitions.

Mineral Rights: the ownership of the in-place (in the reservoir) hydrocarbon.

Minerals Management Service: MMS, a US government agency that oversees minerals production from US federal lands.

Mini Frac: see Data Frac.

Minimum Bend Radius: the minimum radius (R) that a pipe with a tube OD (D) can be bend around and remain in the elastic region. R= E(D/2)/Sy. (R is in inches). $E=30x10^6$ psi.

Minimum Principal Stress: least principle stress in a rock. Hydraulic fractures form perpendicular to this stress.

Miocene: an epoch of time from 5.3 to 25 million years ago.

MIR: maximum injection rate.

MIRU: move in, rig up.

Miscible: fluid phases that mix together without forming a distinct boundary.

Miscible Gas Drive: injection of a large volume of gas from an injection well where the gas is designed to lower the viscosity of the oil and help displace it towards the wellbore.

Misfire: in perforating; fail to fire the perforating gun.

Mississippian: a geologic period of time from 320 to 265 million years ago.

Mist Flow: a flow regime where droplets of liquids are entrained in the gas flow.

MIT: see Mechanical Integrity Test.

MIT-IA: mechanical integrity test – inside annulus.

Mitigation: an action taken to reduce the impact or consequences of an event.

MIT- OA: mechanical integrity test – outer annulus.

MIT-T: mechanical integrity test – tubing.

Mixed Layer Clays: typically mixtures of illite and smectite or other clays. These may or may not be water sensitive.

Mixing Tank: a preporation tank for gel, mud, treating chemicals, etc.

MJ: megajoule. 1,000,000 joules.

ML: multi-lateral.

MLT: mud line temperature

MMbls: million barrels.

MMcf: million standard feet of gas.

MMH: mixed metal hydroxide: a type of drilling fluid.

MMO: mixed metal oxides.

MMS: US Minerals Management Service.

MMscf (gas volume): millions of standard cubic feet.

mrem: millirem (a radiation dose or exposure unit).

mrem/yr: millirem per year.

Mobility Ratio: a comparison of the ability of a fluid to move through another fluid or to displace the fluid.

Mobilize: transport to the location.

MOC: management of change – a process to understand all the implications of a change to a procedure.

Model D Packer: a trademarked name for a very common packer.

Modified Isochronal Test: a multi-rate drawdown and build-up test with different drawdown pressures but the same duration.

MODU: Mobile Offshore Drilling Unit.

Modular Perforating Gun: a set of hollow carrier guns that can be run with wireline and stacked in the well before being fired.

Modulus of Elasticity: stress over strain. A measure of stiffness or Young's Modulus (E). Rocks are ½ to 12×10^6 psi and mild steel is 30×10^6 psi. Modulus refers to stress at a predetermined level of elongation, usually at 100% elongation. The higher the modulus of a compound, the more apt it is to recover from loading or localized force and the better is its resistance to extrusion.

MOE: millout extension.

Mohr-Coulomb: a plotted relationship that predicts shear stress levels at various envelopes of effective normal stress.

Mohs Scale: a ten point scale of mineral hardness. The levels are keyed to the minerals: talc, gypsum, calcite, fluorite, apatite, orthoclase, quartz, topaz, corundum, and diamond.

Monkey Board: the spot where the derrick man works.

Monobore: a tubular string all the same diameter. Some monobore definitions exclude profiles and some do not.

Monocline: a simple fold with an otherwise uniform dip, in local steepening strata. All strata are inclined in the same direction.

Monolayer: a full layer of proppant, only one proppant thick.

Monte Carlo Risk Assessment: a method of assessment that helps identify the risk in data analysis or sampling.

Montmorillonite: a water reactive clay mineral, now called smectite, a common component of bentonite.

Moon Pool: an open shaft in a deep-sea drilling vessel, usually located in the center of the hull, through which the drilling takes place.

MOP (LWD): mud operated pulse.

Mosquito Bill: a siphon tune on a downhole pump.

Motherbore: the main well bore from which a lateral well bore is drilled.

Mouse Hole: a hole in the rig floor designed to hold a joint of pipe. The rat hole (a term also used for the borehole below the pay zone) holds the Kelly when it has to be disconnected.

Moveout (seismic): the difference in arrival times of reflected seismic data at different detectors.

MPa: Megapascals, 1 million Pascals.

MPD: managed pressure drilling.

MPLT: memory production logging tool.

MPY: mills per year, a measurement of corrosion.

ms: millisecond, equal to 1/1000 of a second.

MSA: methane sulfonic acid.

MSA (regulations): mine safety act.

MSCF (gas volume): thousand standard feet.

MSDS: materials safety data sheet.

MSFL (logging): microspherically focused log resistivity .

MSV: multi-service valve.

MT: manifold temperature.

MTBE: methyl tertiary butyl ether.

MTBF: mean time between failures, a measure of reliability.

MTR: motor.

MTTF: mean time to failure: a measure of reliability.

MU: make up.

Mud: drilling mud. Usually a slurry of weighting and fluid-loss control solids in a liquid.

Mud Acid: an inexact term, usually meaning a mixture of hydrochloric (HCl) and hydrofluoric acid (HF), HCL/HF. HF will dissolve some silicates and some of the components of drilling mud.

Mud Anchor: a enlarged area that promotes solids settling prior to a fluid entering the pump.

Mud Balance (fluid density): a simple scale with a cup and bar with a sliding weight that, when used with a pedestal mount, will give the density of mud, cement or brines. See also Pressurized Mud Balance.

Mud Cake: the filter cake on the formation formed by dehydration of the solids as the liquid part of the mud (filtrate) leaks off into the formation.

Mud Cup: a graduated cup used to sample mud and fill the Marsh funnel.

Mud Density: the specific gravity of the mud expressed in lb/gal, kg/m^3, etc.

Mud Displacement Flush: a sequence of washes, dispersants, carrying fluids and spacers designed to remove mud and mud cake from the annulus prior to cementing and completion.

Mud Engineer: person in charge of building the mud (mixing) and compositional checks.

Mud Filtrate: the liquid part of the mud that invades the formation after the particles are stranded at the surface of the formation.

Mud Flow Through Screens: a laboratory test that flows drilling fluids through screens to check for plugging potential on cleanup.

Mud Log: a record of information on mud or cuttings that are circulated to the surface.

Mud Loss: loss of whole mud to the formation.

Mud Logger: the person who monitors the mud for hydrocarbon shows, y use of chemical analysis, microscopic examination or instrumentation.

Mud Motor: a hydraulic powered motor used on the drilling sting or coiled tubing to provide rotation.

Mud Pit: the primary storage tank for drilling mud.

Mud Pit Level Indicator and Alarm: the indicator system that reports the level of mud in the tank. Useful for losses and kick indications.

Mud Pulse: a pressure pulse in the mud system. Some downhole tools can be controlled by mud pulses and some data is transmitted from bottom hole to the surface via pressure pulses.

Mud Pump: primary mud circulation pumps on the rig.

Mud Tracer: a material such a grain, dye, flakes or other material that can be circulated with the mud to track how quickly and to what extent the hole is circulated.

Mud Up: increasing the density of the mud.

Mud Weight: mud density.

Mudstone: sedimentary rocks that consist of particles finer than sand grade (less than 0.0625 mm) and include both silt and clay grade material. Also called shales.

Mule Shoe: a bias cut across the pipe or tool body on the end to aid in entering restricted openings.

Multicomponent Seismic: a survey conducted using 3-component geophones for sensing seismic reflections in the vertical, horizontal, and crossline directions (3-C). In the marine environment, a hydrophone is included to acquire 4-component (4-C) data.

Multi-Finger Caliper: a diameter measuring device that uses many small blade-like fingers to track and record the shape and imperfections of the ID of a pipe.

Multi-Lateral: more than one producing wellbore from a single wellbore or mother bore.

Multi-Phase Flow: two or more flowing phases. This often severely complicates pumping, flow prediction and measurement. .

Multiple Completion: having multiple and often separate completions into different producing pays but in the same wellbore. The completions may be concentric or side-by-side where the pays are not to be commingled or stacked where the flow is to be commingled.

Multi-Pointing: when two or more gas lift valves are flowing gas at once.

Multi-Stage Cementing: using more than one stage of cement to get more complete cement coverage of the annulus.

Mutual Solvent: a chemical that have some common solvency for both water and oil materials. See EGMBE.

MW: mud weight.

MWD: see measurement while drilling or logging while drilling.

MWP: maximum working pressure.

MWPT: measurent while perforating tool.

Mylar^{TM}: polyester film.

Mysid Shrimp: a species of shrimp used to test toxicity of chemicals in sea water.

MZ: multizone.

n (logging): saturation exponent.

n (viscosity): power law component. As n decreases from 1, the fluid becomes more shear thinning. Reducing n produces more non-Newtonian behavior.

NACE: National Association of Corrosion Engineers.

NaCl: sodium chloride salt. Halite.

Nanometer: one billionth of a meter.

Nanotesla (seismic): the units in which magnetic survey maps are contoured. 1 nanotesla = 10^{-9} tesla. 1 nanotesla = 10^{-9} weber/m^2. 1 nanotesla = 10^{-1} lines/m^2. 1 nanotesla = 10^{-5} lines/cm^2. 1 nanotesla = 10^{-5} gauss, 1 nanotesla = 1 gamma.

NaOH: sodium hydroxide.

Naphtha: an aromatic solvent with highly-variable quality. Often has a described carbon range in the C7 to C10 area.

Naphthalene Base Oil: Oil with API gravity of less than 25.

Naphthalene Flakes: a common diverter. It can sublime, or go directly from a solid to a gas.

Native State Core: a core preserved as close as possible to reservoir conditions with effort made to keep all hydrocarbons in place.

Natural Clays: natural occurring clays as opposed to commercially formulated clays.
Natural Completion: a completion that is not stimulated.

Natural Fracture: a fracture in the rock created by geologic events such as uplift.

Natural Gas: methane, $CH_{4;}$ plus some short chain hydrocarbons (ethane, propane, butane) that may be in gasseous state at standard conditions.

Natural Gas Liquids: The portion of the natual gas compounds that liquify at surface conditions.

Natural Gasoline: condensate liquids.

Natural Seep: a naturally occurring hydrocarbon seep to surface. (There are over 1100 known seeps in North America.)

Naturally Flowing Well: a well that can flow to the surface unassisted.

Naturally Occurring Radioactive Material: NORM scale, usually barium or strontium sulfate scale with very low level radiation from atoms of uranium, thorium and potassium in the matrix of the scale.

NBR: nitrile butadiene rubber. The most widely used elastomers in the oil field.

ND: nipple down. Disassemble.

NDT: non destructive testing.

Near Wellbore Damage: damage to the permeability occurring within the first few feet away from the wellbore.

Neat Cement: cement slurry without additives.

NEB: nation energy board for Canada.

NEC: national electric code (US).

Needle and Seat Choke: an adjustable common choke for clean (no solids) production flow.

Needle Valve: a low volume, small orifice, high pressure bleed valve.

NEO: neoprene. A ball covering and seal type.

NEPA: National Environmental Policy Act.

Neritic: marine zone; the environment between low tide and the continental shelf.

NESHAPs: National Emission Standards for Hazardous Air Pollutants.

Net Acres: the total of the company's fractional interest in the gross acreage position.

Net Back: the amount of money received per barrel of oil equivalent produced after subtracting operating and administrative costs, and royalties.

Net Pay: the most productive part of the pay zone.

Net Pay Cutoff: the lower level to the permeability, porosity or saturation in what is considered net pay.

Net Production: the company's share of the production after royalties and partners shares are removed.

Net Profits Interest: a share of the production as calculated from the net profits of the operation.

Net Revenue Interest: that part of the proceeds less royalty payments.

Net-To-Gross Ratio: the ratio of the net pay to the gross pay.
Network Fractures: opening up secondary natural fractures that may be orthogonal to the planar fracture.

NETL: National Energy Technology Laboratory.

Neutral Point: the theoretical point in pipe length that accounts for the effects of buoyancy.

Neutralization (processing): neutralizing acid production (sour gas) with sweetening agents, etc.

Neutralization (stimulation): raising the pH of the backflowed acid to the neutral point.

Neutron Capture: a measurement in which a target, either a formation of an injected fluid adsorbs natural or generated neutrons.

Neutron Log: A log whose source emits neutrons into the formation. Neutrons interact with hydrogen nuclei resulting in an energy loss that is converted to neutron porosity. All hydrocarbons and water contain hydrogen, but the formation usually does not. The amount of hydrogen in the gas affects the reading, so gas filled porosity shows a lower log porosity than oil or water filled porosity.

Newtonian Fluid: a fluid whose shear force and response is directly proportional to shear rate. Yield point is zero.

NFT: no flow test.

NGL: natural gas liquids.

NGV: natural gas vehicle.

NH_4Cl: ammonium chloride.

Night Toolpusher: an assistant toolpusher. Also known as a tour pusher.

Nipple (tubular string): a short piece of pipe, usually with a profile shape in the ID. Nipple profiles are used in tubular strings to provide places to set plugs.

Nipple Down: take apart or tear down a piece of a equipment such as a wellhead.

Nipple Profile: the specific shape of the nipple, usually an accepted profile such as a F, X, J, S, etc.

Nipple Protector: a sleeve that fits inside of a profile to protect the polished bore and the latch recess.

Nipple Up: construct or put together a piece of equipment such as a wellhead.

NIR: near infared.

NITR: nitrile

Nitride: a metal surface treatment that improves abrasion and wear resistance.

Nitrified Fluid: a stimulation fluid with dispersed nitrogen gas, usually at several hundred cubit feet per barrel.

Nitrile: elastomer base material with resistance to oil.

Nitro Shot: an old stimulation process that involved lowering nitroglycerine canisters into a well and detonating.

Nitrogen Cushion: a cushion of nitrogen gas placed on top of a liquid column to reduce the downhole pressure. Also use in the annulus for an expansion cushion in the event of annular fluid expansion.

Nitrogen Kickoff: bringing a well on with nitrogen lift to get the initial flow rate or to get it to steady state flow. Commonly used after workovers to jet back heavy brines until the hydrocarbons with associated gas flow into the well and begin natural production.

Nitrogen Lift: short term use of nitrogen to kick a well off, i.e., establish flow.

Nitrile: a common seal materials with good resistance for oil but poor resistance to aromatics.

NLL: neutron lifetime log.

Nm^3: normal cubic meters.

NMO (seismic): normal moveout offset. Difference in arrival times of reflected signals at different detectors caused by source variance and detector separations.

NMR: nuclear magnetic resonance log. Can show the difference in water, oil and gas movable fluids.

No Go: a profile ring in the tubing with a very small opening that allows flow but stops any equipment or tool from passing through the restriction. May be small I.D. or pinned.

Nodal Analysis: a pressure drop vs. flow study, using a computer program that compares flow performance at various "nodes" along the flow path.

Nodding Donkey: a rod pump surface unit – pump jack.

Node: a reference point in the well.

NOEL: no-observed-effect level

Noise Log: A sound recording downhole. Best performance of noise logs is with gas flow. Gas flow can be heard to about 10 actual ft3/D (Note – not standard ft3/day). At very low gas flow rates ($q<400$ actual ft3/D), gas flow can be estimated from millivolts of noise between the 200-Hz and 600-Hz frequencies: $q = 0.35 (N200 – N600)$. Where q is the actual gas flow in ft3 and N = noise log cut at that frequency.

Nolte G-function: a dimensionless measure of time often used in analyzing pressure behavior during the hydraulic fracturing process.

Nolte-Smith Plot: a log-log plot that is very useful in predicting when the fracture is in tip-screen-out mode and whether the fracture is being widened or height growth is occurring.

Nominal (in filtration): an approximation of a filter's ability to remove particles of a certain size or larger. Often does not perform at this level until a filter bed of particles builds up on the upstream side of the filter.

Non Associated Gas: natural gas, not initially dissolved in oil, produced from a reservoir.

Non Conductive Mud: usually oil base or an oil external mud which will not conduct electrical charge. Many logs cannot be run in these muds.

Non Conventional Gas: gas in unusual reservoirs, e.g., hydrates, coal beds, low permeability, etc.

Non Darcy Flow: a flow regime departing from the laminar flow region where Darcy flow is measurable. Generally turbulence.

Non Dispersed: a fluid without thinners or dispersants.

Non Emulsifier: a material, usually a surfactant that prevents emulsions.

Non Marking Slips: special slips for make up tongs that do not mark 13Cr pipe.

Non Newtonian: a fluid with a viscosity that does not produce a linear shear stress-shear stress graph.

Non-Producing Reserves: Reserves subcategorized as non-producing include shut-in and behind-pipe reserves. Shut-in reserves are expected to be recovered from (1) completion intervals which are open at the time of the estimate, but which have not started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons. (SPE).

Non-Stress Preferred Fracture Plane: a fracture that is driven in a direction other than perpendicular to the least principle stress. Common in explosive fracturing events.

Non Upset or NU Connection: a pipe connection with consistent I.D> and O.D. with the pipe. The connection walls are thin and weaker than EU or IU connections. Used in flush joint liners and wash pipes.

Non Selective Nipple: a profile cannot pass another plug. Usually only one non-selective profile is used – at the bottom of a well.

Nonclastic: sedimentary rocks not composed of fragments of pre-existing rocks or minerals. Usually called crystalline.

Nonconformity: an unconformity that separates profoundly different rock types, such as sedimentary rocks from metamorphic.

Nonionic Surfactant: a surfactant with no preferential charge.

NORM: a naturally occurring radioactive scale. Usually Barium Sulfate scale with Uranium or Radium atoms substituted into the lattice structure. Can be detected downhole with a gamma ray log.

Normal Circulation: circulation down the tubing and up the annulus.

Normal Fault: a fault with mostly vertical movement.

Normalizing (pipe): heating a steel pipe to a temperature above the alloy transformation temperature range and holding at the temperature for long enough to remove stored stressed from handling, forming or other fabrication.

Normally Pressured: a formation with a pore pressure the same as a sea water gradient (0.46 psi/ft).

NORSOK: Norsk Sokkels Konkurranseposisjon.

North Sea Brent: crude oil from the Brent field often quoted as a price benchmark.

NOx: nitrogen oxides.

Nozzle: a shaped orifice for directing fluid flow.

NPD: Norwegian Petroleum Directorate.

NPDES: Natural Pollution Discharge Elimination System.

NPH: Naphtha.

NPT: non productive time.

NR: no returns, mud logging term.

N_{Re}: Reynold's number.

NRV (flow line): non return valve.

NRWO: non rig workover.

NTA: nitrilotriacetic acid, a chelant.

NTEL: no-toxic-effect level

NTU: nephelometric turbidity unit, a unit used in measuring water quality. An instrument called a nephelometer (from a Greek word meaning "cloudy") measures turbidity directly by comparing the amount of light transmitted straight through a water sample with the amount scattered at an angle of 90° to one side; the ratio determines the turbidity in NTU's. NTU measurements can be confused by the base color of the water from stains that may not create damage in the rock.

NU (pipe): see Non Upset.

NU (repairs): nipple up. Put back together.

Nuclear Log: radioactivity log.

NYDEC: New York State Department of Environmental Conservation.

Nylon: a polyamide material.

O_3: ozone.

O-Ring: a circular seal with a circular cross section.

OA (logging): oxygen activation.

OA (well design): outer annulus.

OAP: outer annulus pressure.

OBR: oil:brine ratio.

Observation Well: a well with primary purpose of monitoring fluid movement or other reservoir function.

Obsidian: dark, volcanic glass.

OC: operating center.

OC: outer casing.

OBS: ocean bottom seismic.

Observation Well: wells used for instrumentation or mechanical observations of a reservoir.

OCS: outer continental shelf.

OCS Orders – rules and regulations from US Minerals Management Service (MMS)

Octane: an eight carbon chain hydrocarbon in the paraffinic oil series.

OCTG: oil country tubular goods.

OD: outside diameter.

OD/ID: outside diameter/inside diameter, usually used in reference to pipe dimension, and a factor in pressure stability of the pipe.

Off -pattern Well: a well outside the normal drilling/production pattern.

Offset Well: a well drilled next to another. Sometimes refers to neighboring wells of different operators.

Offshore Well: a well that has it's wellhead location offshore, either on a platform or on the sea floor as a subsea well.

Offshore Platform: a fixed, moored, or dynamically positioned platform for hydrocarbon production or handling operations offshore.

OFP: open flow potential.

OGIP: original gas in place.

OGLV: operating gas lift valve.

OGP: International Association of Oil and Gas Producers.

OH: open hole.

OHFP: open hole frac pack. Frac packing in an open hole.

OHGP: open hole gravel pack.

Ohm: electrical unit of resistance. One ohm is the the resistance through which a potential of one volt will maintain a current of one ampere.

Ohm's Law: E=IR, I=E/R, or R=E/I, the current "I" in a circuit is directly proportional to the voltage "E", and inversely proportional to the resistance "R".

Oil Based Mud: a mud in which the external, liquid phase is oil.

Oil Column: vertical thickness of an oil accumulation above an oil/water contact.

Oil Emulsion Mud: a predominately oil phase drilling mud with trace water (<10%) as an additive or a contaminant. Oil as the continuous or external phase. Note: special cleanup and dispersants are needed before displacing with brine or treating with acids.

Oilfield Services: the support services involved in constructing, stimulating, producing and repairing a well.

Oil-In-Place: the oil in place at any time in the reservoir. The original oil in place is OOIP.

Oil-in-Water Emulsion: a common oilfield emulsion where oil droplets (the internal phase) are suspended and surrounded by the water (the continuous or external phase).

Oil Jar: a jarring tool, capable of very large impacts that is cocked and then triggered by oil moving through an orifice.

Oil Pool: a porous rock reservoir that contains oil.

Oil Run: the oil production or transfer during a specific time period.

Oil Sand: payzone, usually produces oil in economic quantities.

Oil Saturation (reservoir): the fraction of the porosity of a zone occupied by oil.

Oil Saver: a seal arrangement on top of a wireline lubricator that prevents loss of oil or gas to the atmosphere.

Oil Shale: a mudrock or mudstone, composed of a large amount of kerogen or similar deposit, which will yield oil only when refined.

Oil-Water Contact: local boundary between the oil and the bottom water. OW Contact may vary in the field depending on individual drawdowns and local variations in vertical permeability.

Oil Wet Rock: rock coated with an oil in direct with the rock and attracted by natural surfactant properties.

Oil Zone: a formation from which oil might be produced.

OIM: operations installation manager.

OIP: oil in place.

OIW: oil in water.

OJ: oil jar.

OJT: on the job training.

Oleofinic Hydrocarbon: hydrocarbons that contain one or more double or triple bonds.

Oligocene: an epoch in time from 25 to 28 million years ago.

On-Pump: no longer flowing naturally.

On Structure: at or near the top of the structure that forms the reservoir trap or cap rock.

On-The-Fly (in mixing): generally used as an addition method of adding materials to the fluid being pumped without recirculation.

OOC (North Sea): Offshore Operators Committee.

OOIP: original oil in place.

OOS: out of service.

Oolite: spheres of calcium carbonate precipitated from connate water.

OPA: oil pollution act.

OP (gas lift): opening pressure of a gas lift valve at depth.

OPEC: Organization of Petroleum Exporting Countries. (1983 list: Saudi Arabia, Kuwait, Iran, Iraq, Venezuela, Quatar, Libya, Indonesia, United Arab Republic, Algeria, Nigeria, Ecuador and Gabon.).

Open Flow Potential: the maximum potential rate from the well if all back pressure was removed.

Open Formation: a productive interval, open to the wellbore.

Open Hole Completions: a completion without casing.

Open-Hole Fishing: attempts to retrieve pipe of tools lost in the open hole.

Open Hole Gravel Pack: a sand control completion for high permeability soft sand formations where the small amount of area offered by the perforations is a restriction on what the formation can deliver to the wellbore.

Open Hole Log: one of a suite of logs commonly run in a well before it is cased.

Open Hole Packer: an inflatable or other packer that can seal in an open hole environment.

Open Hole Perforating: shooting an open hole section of the well for stimulation.

Open Shoe: a external annulus (production by surface casing for example, in which the cement behind the production pipe has not been brought up into the casing by casing annulus. The annulus is open to the formation into which the outer string has been set.

Opening Ratio: the ratio of the pressure required to open the preventer to the pressure under the rams.

Operating Gas Lift Valve: the operating valve (open and flowing) in a gas lift system.

Operator: the company who makes the decisions and is responsible for drilling, completing, operating and repairing the well.

OPEX: operation expenditures. Generally repair or maintenance expenses.

Ordovician: a geologic time period from 425 million to 500 million years ago.

ORF: offshore receiving facility.

Organic Acid: an organic acid such as acetic, formic, etc., that has the characteristic $COOH^-$ group.

Organic Deposit: a deposit in the flow path that is chiefly organic in composition – typically paraffin (wax), asphaltene, tar, or other organic material.

Organic Theory: the most widely accepted theory to explain the generation of hydrocarbons. As organic materials are buried, heat and pressure transform them into hydrocarbons over geologic time.

Ore: a mineral deposit rich enough to be mined commercially.

Oriented Perforating: perforating to align the charge penetration direction with a feature like the fracture plane or to miss an adjacent string of pipe.

Orifice Meter: a single phase flow meter, primarily for gas that measures the pressure drop created by the hole as gas is flowed.

Orifice Plate: part of a orifice metering system. A plate with a hole through which a single phase flow produces a pressure drop.

Orifice (gas lift): a set diameter passage. (Not really a valve).

Original Gas in Place: OGP or OGIP, the entire volume of gas contained in a reservoir, whether or not it is currently recoverable with state of the art technology or ability to produce.

Orogeny: a period (geologic) of mountain building.

Orphan Wells: wells for which the operators cannot be located.

OS: overshot.

OSHA: occupational safety and health administration, US government agency.

Osmosis: movement of a solvent through a semipermeable membrane (plastic, polymer or living cell) into a solution of higher solute (dissolved salt) concentration that tends to equalize the concentrations of solute on the two sides of the membrane.

OTC: Offshore Technology Conference.

Ottawa Sand: a high quality, widely available mined sand used for gravel packing and fracture proppant.

Outcrop: where a formation surfaces.

Outer Continental Shelf (MMS): All submerged lands seaward and outside the area of lands beneath navigable waters. Lands beneath navigable waters are interpreted as extending from the coastline 3 nautical miles into the Atlantic Ocean, the Pacific Ocean, the Arctic Ocean, and the Gulf of Mexico excluding the coastal waters off Texas and western Florida. Lands beneath navigable waters are interpreted as extending from the coastline 3 marine leagues into the Gulf of Mexico off Texas and western Florida.

Outgassing: breakout of gas from a liquid, normally at the point where the pressure has declined sufficiently to allow solution gas to be released as bubbles.

Ovality: a change in tube roundness. Ovality in percent = (Dmax-Dmin)/Dnominal x 100.

Ovality Limit (CT): a limit placed on coiled tubing, usually in % ovality, after which the CT may not be used in deep wells or in well operations outside of completion hangoffs.

Overbalance: where the pressure in the wellbore in higher than the pressure in the reservoir.

Overburden: the sediment weight pressing down on the formation. Usually about 1 psi/ft.

Overflush: the fluid that is pumped after the last reactive or active part of a stimulation to displace the stimulation down to (displacement) or into (overflush) the formation.

Overlap: the section of a concentric liner or casing installation where both strings are cemented.

Overlift: over production, beyond the allotment or contract volume, that must be accounted for in a contract.

Overpull: the load applied when pulling equipment that is in excess of the actual string weight.

Overriding Royalty Interest (contract): a royalty interest that may be retained by a third party as payment or investment. This interest normally bears no part of the drilling and completion expenses of the well.

Overshot: a fishing tool designed to slip over the fish and grasp the outside.

Overthrust: an area of earth shift common to mountainous regions in which strata are shoved upwards creating highly titled reservoirs.

OWC: oil water contact.

OWR: oil:water ratio.

Oxbow Lake: a crescent-shaped body of generally isolated water, cut off from a meandering stream as the stream changed its course.

Oxidizers: reactants that oxidize, e.g., bleach and sodium persulfate. Also, a compound that releases oxygen.

Oxygen Activation Survey: a log that detects compounds with oxygen such as water. Often used to detect channels behind pipe.

Oxygen Index (shale): (OI, mg CO2/g TOC) a measurement of the percent of oxygen needed to support reaction.

P&A: plug and abandonment.

P&ID: process and instrument diagram.

P Wave: primary or compression wave. A seismic body wave that involves particle motion, alternating compression and expansion. It is the fastest seismic wave.

PAL: producer, artificial lift.

P/Z Plot: a plot of P/Z vs. cumulative production that indicates compartmentalization if not a straight line.

Pack-Off: a seal between or around equipment to isolate pressure or areas within the well. .

Packer: a device that forms a seal between two chambers of the well. Packers may be equipped with slips that anchors the packer and stops movement under high pressure.

Packer Bore Receptacle: a removable PBR anchored into the top of a packer.

Packer Elements: elastomer seals on a packer.

Packer Fluid: the fluid left in the annulus behind the packer. It may help offset pressure in the tubing or help reduce thermal losses.

Packer Milling: removal of a permanent packer.

Packer Squeeze Cementing: isolating a cement injection site between a packer and a plug prior to squeezing.

Packerless Completions: a completion with no packer. Common where ever gas has to be kept away from ESPs and rod rumps.

Packing (seals): seals around a moving shaft or other equipment.

Packing Element: seal that blocks fluid communication.

Packoff: a seal formed in the tubing or around the top of a screen or packer to isolate a flow path.

Packing off: a collection of materials including cutting and/or fill that dehydrates or is held by pressure and stops to circulation of fluid in a wellbore.

PACV: pressure activated circulating valve.

Pad: a volume of fluid, without proppant, injected in front of a frac job to establish frac width.

Paddle Blender or Mixer: a mixing chamber, usually in a small tank or pod that uses a rotating paddle to mix the fluid and the additives.

PAL (log): pipe analysis log.

PAL (lift): producer, artifical lift.

Paleocene: a geologic time period from 250 to 570 million years ago.

Paleontology: the study of fossils. Useful for dating and identifying rocks.

Paleozic: an era of geologic time lasting from 570 million years ago to 245 million years ago.

Paraffin: normal or straight carbon chain alkanes with carbon chain lengths of C18+. The alkanes in this range solidify at temperatures from 80^{o}F to over 200^{o}F. Paraffin is amorphous but may appear to have structure in slow growth examples.

Paraffin base oil: oil with API gravity greater than 30.

Paraffin Scraper or Scratcher: a wireline tool to remove paraffin deposits.

Parent: a radioactive element whose decay produces stable daughter elements.

Parted Rods (beam lift): a sucker rod string that has broken or come apart in the well.

Partial Completion: where only part of the pay zone is completed. Generally used to control coning of a fluid or to select the origin of the fracture in a stimulation.

Partial Monolayer: a layer of proppant with gaps between the grains. High capacity but weak.

Partial Penetration: drilling only part way through a reservoir (near vertical wells).

Partial Pressure: for CO_2 corrosion potential; the mole fraction of the gas times the total pressure.

Particle Distribution: a sieve or laser analysis of the particle sizes in a sand.

Particulate Matter: PM, a particle of solid or liquid matter (soot, dust, mist, etc.).

Parts Per Million or PPM: unit weight of the solute per million unit weights of the solution. A small correction factor is needed to convert to mg/liter.

Pascal: a unit of pressure equal to 1/100,000 of a bar.

Passivation (corrosion): reduction of the anodic reaction rate.

Passive: a condition when the metal shows a marked decrease in corrosion rate.

Patch (tubular): an in-place, downhole repair of part of a tubing string.

Pattern Water Flood: a series of injection and production wells in a regular arrangement.

Pay Zone: hydrocarbon producing interval.

Payoff: when the well has produced sufficient net revenue to pay the cost of drilling and equipping the well.

Payout: the point where the capital cost have been earned.

PB: pump bailer.

Pb (reservoir fluids): saturation pressure or bubble point pressure.

PBR: see Polished Bore Receptacle.

PBTD: plug back total depth.

PBU: pressure build up.

PC: production casing.

PCL (SSSV): pemature valve closure.

PCP: progressive cavity pump.

PCP: permanent completion perforating.

PCT (brine): pressure crystallization temperature.

PCT (tool): production combination tool.

PCT (brine): pressure crystallization temperature.

PD (gas lift): bellows gas pressure at 60^{o}F.

PD (reserves): proved developed.

PDC: poly crystalline diamond compact drill bit or cutter.

PDC Log: perforating depth control log.

PDG: permanent downhole gauge.

PDHG: permanent downhole gauge.

PDNP (reserves): proved developed non producing.

PDP: professional development plan.

PDM: positive displacement motor.

PE: petroleum engineer or production engineer.

PE (plastic): polyethylene.

Peat: a organic deposit, which, with time and burial stresses would become coal.

PEEK: Polyetheretherketone, (Victrex™, Arlon™)

PEI: production efficiency improvement

Penetration Rate (drilling or well cleanout): a rate, measured in distance per time or the penetration of a bit or cleanout sub through a formation or a deposit.

Pennsylvanian: a geologic time period from 290 to 320 million years ago.

Penny Frac: a frac that grows up and outward.

Pentane: a five carbon chain alkane. Used in the lab to check for asphaltenes (precipitates them).

Peptize: disperse into a colloid.

Perched Water Table: a water saturated area that lies within a zone of aeration.

Percussion Hammer (drilling): a device that delivers rapid thrust or blows to the assembly containing the drill bit.

PERF: Petroleum Environmental Research Forum.

Perforated Completion: a completion where the well is cased and cemented and then perforated in the zone of interest.

Perforated Liner: a liner with holes drilled for fluid entry. Not usually for sand control but may be useful for increasing hole stability or access.

Perforating Charge: a shaped explosive charge used for penetrating casing and cement.

Perforating Debris: pieces of charge cases, loading tubes, and alignment equipment generated by firing the gun. They may or may not be left in the well.

Perforating Density: shots per unit length.

Perforating Depth Control: the process by which a perforating gun is lined up to fire at the correct depth.

Perforating Gun: a carrier for shaped charge explosives that punches holes through the casing and cement and into the formation. Guns may be run on wireline or tubing.

Perforation: a hole made through the casing and cement and into the formation. It has a characteristic entrance hole and penetration. It is the flow path from the formation to the wellbore in a cased and cemented completion.

Perforation Breakdown: the fracturing of a perforation tunnel. Often used to bypass damage or increase permeability.

Perforation Carrot: a piece of the copper liner that forms a cylindrical slug.

Perforation Crush Zone: the area of crushed rock surrounding the perforation. Usually 30 to 70% of initial permeability and ½" or about 1cm thick.

Perforation Density: the number of perforations per unit length of pipe in an interval.

Perforation Entry Hole: the diameter of the hole in the first string of pipe penetrated by the perforator.

Perforation Penetration: the total depth of penetration including the casing thickness, the cement and the formation.

Perforation Phasing: the angle between the shots. The phasing can have an impact on pipe strength, formation strength and productivity.

Perforation Prepacking: packing the perforation with gravel to prevent tunnel collapse.

Perforation Shot Density: the number of perforations per foot or per meter.

Perform™: nodal analysis program.

Period: a geologic time scale that is less than an era and greater than an epoch.

Permafrost: a type and structure of frozen soil found in a new cold areas of the world. May extend to depths in excess of 1000 meters.

Permanent Packer: a reliable packer designed and intended to be left in place for a long period of time that seals and holds pressure or resists movement from both directions.

Permeability or k: a measurement of the ability of a fluid to flow through a rock.

Permeability Barrier: a barrier to movement of a fluid through the rock. This may be a change in the rock where the pores are no longer connected or even present, or secondary mineral growth that filling in the pore throats and natural fractures. In one sense, a permeability barrier may be another rock that acts as a seal.

Permeability Contrast: a comparison of permeabilities of a fracture proppant and the formation.

Permeability Correlation: a mathematical permeability correlation, normally based on porosity and rock type.

Permeation: movement of gas to and through an elastomer.

Permian: a geologic time period from 250 to 290 million years ago.

PES: production engineering supervisor.

Petal Basket (cementing): a attachment to tubing or a plug that looks like an upside down umbrella. It helps hold cement or sand as a plug is started. It has metal ribs and a tough fabric between the ribs.

Petal Basket Flowmeter (logging): a petal basket that reroutes all the fluid over the diameter of the wellbore into a single flow stream near the middle so an accurate measurement with a flowmeter can be made.

PETN: a low temperature explosive used in perforating charges.

Petrochemicals: chemicals derived from oil or gas.

Petroleum: Latin origin is rock oil.

Petrophysics: the study of reservoir rocks and their reactions.

P_f: friction pressure – may be annulus or tubing.

PFO: pressure fall off test – a common injector test or a test after pumping in.

P_h: hydrostatic pressure.

pH: the negative logarithm of the hydrogen ion activity. $pH = -\log_{10} (a_H+)$ Measurement of acid (<7), basic (>7), neutral = 7. pH measures the acifdity or alkalinity of water.

Phase: a homogeneous body of material that differs in properties from other phases (immiscible) – e.g., gas, liquid, solid.

Phi: ϕ, porosity

Phosphate Esters: derivatives of phosphoric acid and alcohols. Used for scale inhibitors in process flow.

Phosphonates: organophosphorus compounds that form the basis for many scale inhibitors that are squeezed into a formation and provide long term protection.

PHPA: acrylamide polymer mud.

PI: the productivity Index, usually measured in bbl/day/psi of drawdown.

Pick (seismic): a selected event on a seismic record.

Pick Up Weight: the surface weight measurement when pulling a pipe string or wireline out of the hole. Includes both string weight and frictional drag.

Pickett Plot: a log-log plot of resistivity (x-axis) vs. porosity. Helps determine which zones contain hydrocarbon.

Pickle: a chemical treatment of the tubulars to remove pipe dope, mill scale and mud or cement residue.

PID : perforation Inflow Diagnostic.

PIE (BP): a pressure transient data base.

Pig: a flow line clearing device, pumped through the line with normal flow.

Pill: a volume of gelled fluid mixed for a specific purpose. A fluid loss pill for example.

Pilot: a small scale test or trial used to assess the feasibility of a process to a reservoir or field.

Pilot Hole: a small (sometimes) diameter hole drilled through a pay zone to determine the pay top and bottom or various contacts, before the main well position is selected. May also use a pilot hole to better control influx rate.

Pilot Mill: a step-diameter mill that makes a pilot hole then enlarges it with the upper diameter.

Pin (in pipe): the male end of the connector.

Pin (in wireline tools): a small piece of steel, brass, aluminum bar stock that is designed to break on a certain impact or pressure load and enable another tool function.

PINC (DOI): Potential Incident of Non Compliance

Pinch Out: loss of permeability in a reservoir rock. Often so severe that the pinch out becomes a barrier or a seal.

P_{inj}: bottom-hole injection pressure.

Pinnacle Reef: a conical shaped reef-type deposit, usually with good permeability and pososity.

PIP: trademarked name for a pin point injection packer.

Pip Tag: a radioactive tag or marker in the casing threads or the perforation that can quickly and positively be found wit h a gamma ray log.

Pipe Dope: a lubricant, anti-gall and sealer applied to the pin threads when making a connection in the pipe.

Pipe Heavy: a hydraulic workover/snubbing tubing running term – when the weight of the pipe is sufficient to pull the pipe into a well against the surface pressure.

Pipe Lay Down: removing pipe from the well or from standing in the derrick and laying in on the pipe racks away from the rig.

Pipe Light: hydraulic workover/snubbing tubing running term – when the weight of the pipe is not sufficient to pull the pipe into a well against the surface pressure and additional force (snubbing) is required.

Pipe Rack: storage racks.

Pipe Ramp: an angled ramp or track for bringing pipe from the rack to the rig floor.

Pipe Rams: the rams in a BOP that seal around the pipe diameter for which they were sized.

Pipe Tongs: tools used in making up pipe connections.

Pipe Upset: an increased diameter of the pipe body which allows for a thicker coupling and an increased diameter at the coupling.

Pipeline: the principle underground transport of produced gas and oil.

Pipeline Quality Oil: oil with the BS&W removed and the contaminates brought within the contract specifications.

Pipeline gas: produced gas within pipeline spec and under sufficient pressure to enter the pipeline against the pressure of the fluid in the pipeline.

Pipe Upset: the thicker part of a pipe where threads are machined for the coupling.

PISS: pump in spinner survey.

PISTL: pump in spinner temperature log.

PITA: perforation inflow test analysis.

PIT: packer integrity test. Pressure testing the tubing/casing annulus to insure isolation.

PIT: pressure integrity test.

Pit (drilling): a temporary (earlier use) or permanent containment for circulated fluids.

Pit Level: the level of mud in the pits.

Pitch (drilling): deviation from a horizontal plane. Down is negative and up is positive.

Pitman: the connecting rod from the rotating counterweights to the beam on a beam lift pumping unit.

Pitot tube: a small tube used for sensing pressures in a flowing stream.

PITS: pump in temperature survey.

Pitting – Extremely localized attack that results in holes in the metal. Will accelerate after start.

Pitting Resistance Equivalent Number: a relative measure of a material's pitting resistance in corrosive service.

PJ: petajoules. 1,000,000,000,000,000 joules. 1 kilojoule = 0.9478 BTU.

PJTHA: prejob task hazard analysis.

Pkr: packer.

PL: pipeline.

Placer Deposit: a deposit of heavy or durable minerals found where runoff water slows.

Planktonic: free floating bacteria.

Plastic Deformation: a stress level, beyond the elastic limit, that produces yielding in tubulars.

Plastic Fluid: a complex, non-Newtonian fluid whose shear force is not proportional to the shear rate. Pressure is necessary to start circulation of the static fluid. Main low rate flow is plug flow. Yield point is greater than zero.

Plastic Viscosity: an absolute flow property indicating the flow resistance of certain types of fluids. A measurement of shear stress.

Plateau: the best producing time of a field, before decline of total production rate begins.

Platform: an offshore structure from which a well may be drilled or produced.

Play: a pay zone or set of pay zones with proven commercial reserves.

Playa: a dry lake basin found in a desert.

PLC: programmable logic controller.

PLET (subsea): pipeline end terminal.

PLT: production logging tool.

Plug: any device, object or material that blocks a flow passage.

Plug and Abandon: P&A. Setting cement and mechanical plugs to seal off pays, potential leak points, fresh water zones and the surface.

Plug and Cage: a type of choke that is suitable for high volume and can stand some solids.

Plug and Seat Choke: a high volume flow choke.

Plug Back: to set a plug (usually permanent) in a wellbore, giving a new bottom.

Plug Back Depth: the depth of the well to the top of the last permanent plug.

Plug Container or Dropper (cementing): the housing with valves and bails that controls the position and dropping of the plugs used in cementing.

Plug Flow: fluid moves as a unit.

Plug Valve: a high pressure valve with a rotatable plug that allows or denies flow.

Plunger (gas wells): a tool that is dropped without attachment through the tubing and standing water in the well, then seals against the tubing using the pressure of the incoming gas to raise the plunger and the water above it to the surface. A very common Deliquification tool.

Plunger (beam lift): the traveling bar in beam lift pump internals.

Plutonic igneous (rock): magna extruded into overlying rock that is not exposed to atmospheric conditions during cooling.

PM: particulate matter.

PM_{10}: particulate matter having a size diameter of less than 10 millionths of a meter (10 micro-meters).

$PM_{2.5}$: particulate mater having a size diameter of less than 2.5 micro-meters.

PMACS: portable measurement, alarm and control system.

PML (perforating): powdered metal liner.

PNC: pulsed neutron capture.

PNG: pipeline natural gas.

PNID: process and instrument diagram.

PNL: pulsed neutron log.

Pocket (drilling): old term for rat hole.

Pocket (gas lift): a receiving orifice for a gas lift valve in the gas lift mandrel.

Pod Mixer: a tank with an agitation system used to more precisely mix components during a job.

POE: polyoxyethylenated – a common surfactant group.

POH: pull out of the hole. Also POOH.

Poiseuille's Law (flow): in the example or laminar flow for Newtonian fluids, the volume flow rate is given by the pressure differential (inlet to outlet) divided by the viscous resistance. This resistance depends on fluid viscosity and the length but is dominated by dependence on the fourth power of the radius.

Poisson's Ratio: As a rock is compressed axially, the ratio of longitudinal compressive strain to the transverse extension strain (length change over width change). Always between the range of 0 to 0.5.

Polished Bore: a slightly smaller I.D. that the tubing above it in a tool or profile that allows a set of seals to provide isolation.

Polished Bore Receptacle: A polished bore, typical in a packer to accept the seal assembly on the end of tubing.

Polished Nipple: a polished nipple is run below blast joints to allow a pack-off set point when by-passing a damaged joint.

Polished Rod: a surface rod pup joint that slides through the stuffing box on a beam pumped well. The part is highly polished and generally chrome plated. It must not be exposed to HCl acid.

Polished Rod Clamp (beam lift): a device that fastens the polished rod to the bridle.

Polyacrylamide: a polymer with a very stable carbon chain. A good friction reducer in small amounts, but the polymer may cause formation damage. Can be used to gel acid, but the polymer will not break.

Polyester: resin formed by condensation of polybasic and monobasic acids with polyhydric alcohols.

Polymer: a synthetic or man made gelling agent that increases viscosity and helps control leakoff.

Polymorph: a mineral that is identical to another mineral in chemical composition but differs from it in chemical structure.

Pony Rod: a short rod for spacing out a rod string.

POP (plug): pump open plug.

POP (production): put on production.

Poppet Valve: a type of valve common on early subsurface safety valves, where higher than expected flow through an orifice can move a round ball onto a sealing surface and stops the flow.

POOH: pull out of the hole.

Pool: generally a petroleum containing reservoir or group of reservoirs.

Pooled Unit: unit created by combining separate mineral interests under the pooling clause of lease or agreement.

Poorly Sorted: a comparison of sand grain sizes in a formation where there are a broad range of coarse to fine particles.

POP: put on production.

POP (downhole): pump-out plug.

Pore: the opening within the rock. Interconnected porosity is linked together and results in permeability.

Pore pressure gradient: the formation or reservoir pressure divided by the depth.

Pore Size Distribution: a range of the pore sizes plotted against frequency of that size. Mercury is injected at step-wise increasing pressures where large pore fill first, followed by smaller pores at successfully higher pressures. Volumes injected at different pressures indicate the pore size distribution.

Pore Throat: the connection between the pores, often a fraction of the pore size and an obvious restriction.

Porosity: the percentage of the rock volume that is not rock grains and could be occupied by fluids. Pores may or may not be connected.

ϕ: porosity

Porosity Cutoff: the lower limit of porosity that identifies a proven productive part of a particular formation.

Porosity Exponent: the exponent, m, in relating formation factor to porosity in the Archie equation, $F = 1/\phi^m$

Port Plug: the sealing plug over a charge on a reusable perforating gun.

Potable Water: water suitable for human consumption.

Ported Nipple: a nipple profile with an accessible side port to the annulus.

Portland Cement: a general class of cement that encompasses the most common cements used in construction and the oil field.

Portland Cement Clinker: hard, approximate marble-sized nodules of calcium silicates and other additives that are the feed stock for making cement.

Positive Choke: typically a non adjustable choke using a flow bean.

Possible Reserves: Possible reserves are those unproved reserves which analysis of geological and engineering data suggests are less likely to be recoverable than probable reserves. In this context, when probabilistic methods are used, there should be at least a 10% probability that the quantities actually recovered will equal or exceed the sum of estimated proved, plus probable, plus possible reserves. In general, possible reserves may include (1) reserves which, based on geological interpretations, could possibly exist beyond areas classified as probable, (2) reserves in formations that appear to be petroleum bearing, based on log and core analysis but may not be productive at commercial rates, (3) incremental reserves attributed to infill drilling that are subject to technical uncertainty, (4) reserves attributed to improved recovery methods when (a) a project or pilot is planned, but not in operation and (b) rock, fluid, and reservoir characteristics are such that a reasonable doubt exists that the project will be commercial, and (5) reserves in an area of the formation that appears to be separated from the proved area by faulting and geological interpretation indicates the subject area is structurally lower than the proved area. Often referred to as P3 (SPE).

Possum Belly: an enlarged section of a tank for settling solids.

Pottable water: drinkable water.

Potassium Chloride: a salt commonly used in brines to reduce or prevent clay swelling in the formation.

Potassium Chloride Substitute: generally salt and/or surfactant materials designed to simulate the effect of potassium chloride in preventing clay swelling. Substitutes may work in the wellbore but generally fail in the formation where severe swelling conditions exist.

Potassium K^{40}: one of the natural isotopes that as a trace element may incorporate into the matrix of naturally forming barium or strontium sulfate scale and make it a very low level radioactive material (NORM scale).

Potential (electrical): difference in electrical power level.

Potential (risk analysis): actually probability - the likelihood that the impact will occur. Impact (or consequence) is the effect on conditions or people if the hazard is realized (occurs) in practice and probability is the likelihood that the impact will occur. Risk is a function of probability and impact (consequence).

Pour Point: the lowest temperature that a hydrocarbon fluid can be flowed before gelling or turning solid. Related to pumpability.

Power Fluid: a fluid, usually dead oil or water, pumped downhole to operate a pump.

Power Law Fluid: a description of the flow properties (viscosity) of a fluid. Power law fluids are characterized by decreasing viscosity with increasing shear.

Power Swivel (drilling and workovers): a rig floor tool that can rotate a string.

Power Tongs: hydraulic power make up tools suspended above the rig floor.

Pozzlin: a silica cement additive.

PP: pulling prong.

PP (formation): pore pressure.

PPB: parts per billion or pounds per barrel depending on the use.

PPE: personal protective equipment.

PPG: pounds per gallon. Usually used as a measure of additive, slurry or cleanout. Actually it is pounds of proppant in a gallon volume with liquid added to make up the gallon "space".

PPGA: pounds per gallon added. See PPG.

PPM: parts per million.

PPPOT-T: positive pressure pack-off test – tubing.

PPS: Polyphenylene sulfide (e.g., Ryton^{TM})

PPTB: pounds per thousand barrels.

PR: pressure.

Pr (reservoir): reservoir pressure.

PRE: pitting resistance equivalent number.

Precambrian: the geologic time from 570 million years ago to be beginning of the earth. Most rocks in this period have no hydrocarbons.

Precipitated: a solid material that drops out of an over saturated solution. Usually driven by an upset of equilibrium.

Precipitation Hardening: hardening caused by precipitation of a material (specific element or alloy) from a supersaturated solution.

Precipitation Point: the calculated solubility point of an ion in solution (scale/brine stability calculations).

Precision: the number of significant decimals expressed in a measurement.

Prehydrated (clay or polymer): already wetted to make easier to disperse and fully wet.

Prepacked Screen: a sand control screen that uses a captured gravel or resin coated gravel to assist in restraining formation sand or gravel packing gravel.

Prepacking (perfs): packing the perforations with gravel to prevent tunnel collapse.

Prescient (Risk): Foreknowledge of events. Human anticipation of the course of events.

Present Net Value: PNV; the current time value of an income stream that extends into the future. Various calculation methods and interest rates have been applied.

Preserved Core: core removed from the formation and preserved by sealing or freezing to prevent drying or other altering of the rock or fluids.

Pressure: force per unit area exerted by a fluid.

Pressure Bomb: a downhole device used to collect reservoir samples at pressure.

Pressure Buildup: the rate at which pressure builds up after a flow period. It is related to permeability, fluid viscosity, pressure differential, hole volume, zone thickness and time.

Pressure Dependent Permeability: the permeability that increases as driving pressure increases, such as opening fractures wider at higher pressure.

Pressure Depletion: a method of producing a reservoir when water drive is not available. Also a condition that exists when the gas pressure is drawn down before the oil is recovered.

Pressure Dependent Permeability: modifications to the character of the rock through the matrix or natural fractures, where the permeability is a function of the pressure applied to the rock through fluid pressure or earth stresses.

Pressure Falloff: the rate at which pressure decreases at the end of an injection. Related to rock permeability, and to fracture closure stresses when above the fracture point.

Pressure Gradient: change in pressure with depth.

Pressure Integrity Test: a pressure test of a vessel formed by the entire well or a part of the well. It usually measures the ability of a pressure vessel to hold pressure without leaking at a given pressure.

Pressure Relief Valve: a mechanical valve that opens at a preset pressure to relive pressure in a vessel.

Pressure Transient Test: an analysis of well flow using a test that shuts the well in following a flow period and measures the rate or pressure build-up.

Pressure Traverse: calculation of well pressure vs. depth by integrating the pressure gradient for increments of pipe length (MD).

Pressurized Mud Balance (fluid density): a cup and bar with a sliding weight, similar to a Mud Balance, but also having a screw on top with a slide valve through which a small amount of fluid could be added under pressure, collapsing the air dispersed in the fluid. Better accuracy than an unpressurized mud balance.

Primacord™: a detonating cord for perforating guns.

Primacy: a right granted to states by the US government that allows state agencies to implement programs with federal oversight. Usually, states develop their own set of regulations to meet a specific goal.

Primary Cementing: the first attempt at creating a cement seal in the annulus.

Primary Completion: the first completion in a well.

Primary Natural Fractures: natural fractures oriented along the same plane as the preferred fracture direction, i.e., perpendicular to minimum principle stress.

Primary Production: the oil recovered before pressure maintenance (flooding).

Primary Recovery: the amount of the reserves recovered by primary production, i.e., without injected fluid pressure support.

Primary Term: the period of time which a lease is effective without being renewed.

Prime Mover: the main type of power source for an application.

Primer Cord: detonation cord for explosives. Primacord™ is a trademarked name for detonation cord. Normally used in a perforating gun.

Probabilistic Estimate (Risk): the probabilistic (risk weighted) approach of estimating recognizes that, in the real world, there are uncertainties associated with each project component. As such, for each

component, there exists probabilities of occurrence within a range of possible values. Likewise, for the total project estimate (Being an accumulation of individual components defined by a mathematical mode), there exist probabilities of occurrence within a range of possible values. An estimate using a range of numbers with associated probabilities of occurrence for each of the components or, at least, for each of the components that have substantive certainty.

Probability: the likelihood that the impact or event will occur. Impact (or consequence) is the effect on conditions or people if the hazard is realized (occurs) in practice and probability is the likelihood that the impact will occur. Risk is a function of probability and impact (consequence). With discrete data, it is determined by taking the number of occurrences for the particular type of event being considered and dividing that by the total number of outcomes for the event. Expressed as a deterministic value (quantative single value, or, high, medium, low, etc.) or as a range of values – i.e., uncertainty – that is represented by a probability distribution.

Probability Distribution (Risk): a mathematical relationship between the values and the associated probabilities for a variable across the entire range of possible values for that variable. Typically, probability distributions are displayed as frequency or cumulative frequency plots.

Probable Reserves: Probable reserves are those unproved reserves which analysis of geological and engineering data suggests are more likely than not to be recoverable. In this context, when probabilistic methods are used, there should be at least a 50% probability that the quantities actually recovered will equal or exceed the sum of estimated proved plus probable reserves. In general, probable reserves may include (1) reserves anticipated to be proved by normal step-out drilling where sub-surface control is inadequate to classify these reserves as proved, (2) reserves in formations that appear to be productive, based on well log characteristics, but lack core data or definitive tests and which are not analogous to producing or proved reservoirs in the area, (3) incremental reserves attributable to infill drilling that could have been classified as proved if closer statutory spacing had been approved at the time of the estimate, (4) reserves attributable to improved recovery methods that have been established by repeated commercially successful applications when (a) a project or pilot is planned, but not in operation and (b) rock, fluid, and reservoir characteristics appear favorable for commercial application, (5) reserves in an area of the formation that appears to be separated from the proved area by faulting and the geologic interpretation indicates the subject area is structurally higher than the proved area, (6) reserves attributable to a future workover, treatment, re-treatment, change of equipment, or other mechanical procedures, where such procedure has not been proved successful in wells which exhibit similar behavior in analogous reservoirs, and (7) incremental reserves in proved reservoirs where an alternative interpretation of performance or volumetric data indicates more reserves than can be classified as proved. Often referred to as P2 (SPE).

Produced Gas-Oil-Ratio: total gas (solution + free) production divided by the oil production volume. Excludes gas lift gas.

Produced Water: water, ranging from fresh to salty, produced with the hydrocarbons as a result of pressure drawdown and flow through the formation.

Producing Horizon: the depth or zone in which the well is being currently produced.

Producing Well: a well that produces hydrocarbon in commercial quantities. .

Production Casing: the innermost casing string that straddles and isolates the producing interval.

Production Chemist: a chemist that specializes in hydrocarbon flow and emulsion separation problems.

Production Index: J or PI. A measure of a well's ability to flow. Applies above the bubble point.

Production Index (Shale): an indication of source rock potential measured by the conversion of kerogen into free hydrocarbons (PI, S1/(S1+S2)): For PI < 0.08, the source is immature, for PI of 0.08 to 0.5, the source is in the oil window, for PI > 0.5, the source is in the gas window.

Production Log: a technique in which the entry points and the amount of fluid entering the wellbore are identified.

Production Maintenance: the operations necessary to optimize recovery and keep production as high as practical.

Production Packer: any packer that forms a seal between tubing and annulus during production.

Production Pressure Operated Valve (gas lift): production fluid enters the valve and acts on the effective bellows area, compressing the bellows against the precharge pressure, lifting the needle off the seat and opening the valve. The injection gas then flows through the seat, through the reverse-flow check valve and into the tubing.

Production Rig: a mobile servicing or workover unit.

Production Separator: a vessel through which production passes and the multi-phase fluids are broken and separated.

Production Technical Limits: the maximum potential from the best achievable production practices.

Production Test: a monitored flow test.

Production Tree: the pressure and flow control tree on a producing well.

Production Tubing String: the primary flow path from the pay to the surface.

Production Wing Valve: the valve on the flow cross that controls the exit point as produced fluids flow from the tree.

Productivity Index: a comparison of the productivity of a completion to the productivity of an ideal, undamaged open hole. Labeled PI or J.

Productivity Optimization: Comparison of processes, products or operators by comparison to the rest of the operators in an area.

Profile: a machined design in a short piece of tubing or casing that allows a plug to set, anchor and seal.

Propane: an alkane with a 3 carbon chain.

Propellant: a gas generating charge of explosive that is used for perf breakdown.

Proppants: well sorted and consistently sized sand or man-made materials that are injected with the frac fluid to hold the fracture faces apart after pressure is released.

Prorationing: allocation of production among commingled reservoirs according to reservoir production characteristics, tests, etc.

Prospect: a location where a well is to be drilled.

Prosper™: nodal analysis program.

Protection String: a string of casing used when drilling a well to protect an outer string of pipe from drill string contact or to protect a zone.

Proved Reserves: Proved reserves are those quantities of petroleum which, by analysis of geological and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under current economic conditions, operating methods, and government regulations. Proved reserves can be categorized as development or undeveloped. If deterministic methods are used, the term reasonable certainty is intended to express a high degree of confidence that the quantities will be recovered. If probabilistic methods are used, there should be at least a 90% probability that the quantities actually recovered will equal or exceed the estimate. Often referred to as P1, sometimes referred to as "proven" (Reserve definitions are from SPE).

Proved Undeveloped Reserves: Proved Undeveloped Reserves are those Proved Reserves that are expected to be recovered from future wells and facilities, including future improved recovery projects which are anticipated with a high degree of certainty in reservoirs which have previously shown favorable response to improved recovery projects. (See Undeveloped) (SPE).

Proved Developed Reserves: Proved Developed Reserves are those Proved Reserves that can be expected to be recovered through existing wells and facilities and by existing operating methods. Improved recovery reserves can be considered as Proved Developed Reserves only after an improved recovery project has been installed and favorable response has occurred or is expected with a reasonable degree of certainty. (See Developed Reserves) (SPE).

Developed reserves are expected to be recovered from existing wells, including reserves behind pipe. Improved recovery reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor. Developed reserves may be sub-categorized as producing or non-producing. (SPE)

Producing: Reserves subcategorized as producing are expected to be recovered from completion intervals which are open and producing at the time of the estimate. Improved recovery reserves are considered producing only after the improved recovery project is in operation. (SPE).

Non-producing: Reserves subcategorized as non-producing include shut-in and behind-pipe reserves. Shut-in reserves are expected to be recovered from (1) completion intervals which are open at the time of the estimate, but which have not started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons. (SPE).

Behind-pipe reserves are expected to be recovered from zones in existing wells, which will require additional completion work or future re-completion prior to the start of production (SPE).Proximity Log: pad contact tool that measures resistivity.

PRP: premature release of packer.

PRV: pressure relief valve.

P_s: pressure at the surface.

PS: pump station.

PS Wave (seismic): seismic energy that has traveled partly as a P-wave and then as an S-wave; having been converted on reflection at an interface.

PSA: pressure setting assembly. A E-line tool used to set downhole tools. Normally uses a gas propellant charge.

PSASV: pressure shut annular standing valve.

PSC (contract): production sharing contract.

PSC (gas lift): closing pressure at surface for a gas lift valve.

PSD: particle size distribution.

Pseudogravity (seismic): a magnetic gravity field expression that is measured at or transformed to the magnetic pole. Susceptibility values are converted to density values and expressed as a vertical integration.

Pseudoplastic fluid: a complex non-Newtonian fluid without thixotrophy. Flow starts with pressure but apparent viscosity decreases instantaneously with increasing rate of shear.

PSI: pounds per square inch.

PSIA: pounds per square inch absolute.

PSIG: pounds per square foot gauge.

PSL: product specification level. A rating for wellheads.

PSO (gas lift): surface opening pressure of the gas lift valve.

PSP: premature setting of packer.

PSV: production swab valve.

PSV: pressure safety valve.

PT (gas lift): tubing pressure.

PT (skills): petroleum technologist or technician.

PT (subsea): pressure temperature.

PT (well test): pressure test.

PTFE: Polytetrafluoroethylene, (e.g., TEFLON^{TM}).

PTRO (gas lift): test rack opening pressure for a gas lift valve.

PTL: production technical limits.

PTS: pressure temperature survey.

PU: pick up.

Public Lands: any land owned by the government in the US. May compare to Crown or Federal lands in other countries.

PUD (reserves): proved undeveloped.

Puddle Job: a cement job done by spotting a column of cement then lowering a liner into the cement slurry.

Pulling Unit (rig): a well servicing rig used specifically for pulling rods and tubing.

Pulse Echo Tool: various forms of a tool for bond evaluation, usually an ultra sonic emitter and detector.

Pulsed Neutron Log: a cased-hole log capable of distinguishing between water and hydrocarbons.

Pump Barrel (beam lift): the tube through which the plunger of a rod pump reciprocates.

Pump Down Tool: any tool that is pumped down the well by injected fluid.

Pump Efficiency: the output of the pump at stated conditions divided by the ideal output.

Pump Jack: the main rocking unit of a rod pumped well. Older uses were in central power units.

Pump Off: pumping all the fluid out of the wellbore to the point where free gas enters the pump.

Pump-Open Plug: a plug that is opened by pressure that is used for well suspensions.

Pump Out Plug: a plug run on a work string that is being snubbed into a well that can be pumped out when the tubing is landed.

Pump Through Plug: a plug that permits pumping into a well but stops backflow of the well.

Pump Trucks: pumping units used in bullheading, circulating or other operations involving liquid and foam pumping.

Pumpability: a measurement of a fluids capability to be pumped. Usually refers to cement slurry and is also called the thickening time.

Pumping Tee: a Tee fitting in the top of a rod pumped well. The side ort allows the pumped fluids to flow into the surface lines.

Puncher Charge: a specially designed perforating charge that is designed to punch through only one string of pipe and not damage the outer string. Useful for establishing a circulation path in a well with collapsed or plugged tubing prior to killing the well.

Pup Joint: a short section of casing or tubing used as a depth identifier to a collar locator log or used at the top of the well when spacing out a string prior to hanging the string.

Purple K: a fire extinguished powder.

Push Pill: a gelled pill designed for piston-like fluid displacement.

PV (drilling fluids): plastic viscosity.

PV (PVT analysis): Pressure-Volume method.

PV (rock): pore volume.

PVC (gas lift): closing pressure at depth for a gas lift valve.

PVC (plastic): polyvinyl chloride.

PVDF: thermoplastic fluoropolymer.

PVT: pressure volume temperature data for fluids.

PW: produced water.

PWI: produced water injection.

PWRI: produced water re-injection.

PWT: produced water treatment.

Pyroclastics: particles (to chucks) of molten igneous rock ejected from a volcanic vent during an eruption.

Pyrobitumen: a hard, native asphalt within the pores. Does not ordinarily move or enter into reaction.

Pyrolysis: destructive distillation that involves decomposition of coal, woody materials, petroleum, etc., by heating in the absence of air.

PYX: a very high temperature perforating explosive.

q: flow rate.

QA/QC: quality assurance and quality control.

QN Nipple: a high pressure (10,000 to 15,000 psi) profile. N signifies that it is a no go design.

q_o: flow rate or initial flow rate.

QRA: qualitative risk assessment.

Quality (foam stimulation fluid): the percent of the total volume that the internal phase comprises.

Quality (product): a product providing utility without variability (Taguchi).

Quaternary: a geologic time period from present to 2 million years ago.

Quartz: SiO_2 mineral with a variety of crystal shapes.

Quench Crack: a crack in steel resulting from stresses produced during transformation from austentite to martensite.

Quench Hardening: heat treating requiring austenitization followed by cooling, under conditions that austenite turns into martensite.

R&R: read and record.

R&W: reservoir and wells.

R/P: reserves to production ratio.

RA (logging): radioactive.

Rabbit: a drift dropped through tubulars on the rig floor before joint make up.

Rack: a pipe storage rack.

Racking Back Pipe: to stand pipe in the derrick.

RAD: radioactive densiometer. Fluid density measuring device.

Radial Darcy Law: the Darcy equation describing radial movement of fluids in laminar flow through a porous media.

Radial Stress (tubular): stresses inward and outward along the tubing radius.

Radiant Heat Transfer: heat transfer without convection or conduction. Sunshine is radiant heat.

Radioactive Log: any log with a radioactive source, e.g., Neutron Porosity and Formation Density. A Gamma Ray log detects naturally occurring radioactivity and does not emit.

Radioactive Tagging: applying a washable or non-washable radioactive tracer to equipment or proppant to allow tracking of position of the tagged item in the well. Can be used to determine if radioactive tagged sand entered the formation at a specific set of perforations.

Radioactive Tracer: a very low strength radioactive isotope used to tag water or other fluid for tracing the path of fluid in the reservoir or in a well.

Radioactive Tracer Log: a log device that emits a burst of tracer and tracks its movement. May "see" a foot or so outside casing in good circumstances. Normal for injection wells.

Radiographic Inspection (pipe inspection): X-ray inspection.

Radioisotope: an unstable isotope of an element that decays spontaneously, emitting radiation.

Radiolarian: a class of one cell marine animals with siliceous skeletons.

Radionuclide: an unstable form of an element that emits nuclear radiation through radioactive decay.

Radium: R^{226}, one of the natural isotopes that as a trace element may incorporate into the matrix of naturally forming barium or strontium sulfate scale and make it a very low level radioactive material (NORM scale).

Radius of Curvature: the radius of the guide arch, reel or bend through which a pipe is moved.

Radius of Investigation: depth of investigation of a tool or logging process.

Rag Pump: a rod pump with extremely loose tolerances (an loose seals) that may be temporarily run in a well to pump fluid that contains sand. Used for clean-ups after a fracture treatment.

Ram: one of the hydraulically actuated rams in a blow out preventer (blind, shear, pipe or slip).

Range of Load (beam lift): the difference in the peak load at the polished rod on the upstroke and the minimum load on the downstroke.

Range 1 Tubular: a pipe 16 to 25 ft in length.

Range 2 Tubular: a pipe 25 to 34 ft in length.

Range 3 Tubular: a pipe 34 to 48 ft in length.

Rank Wildcat: an exploratory well drilled in a basin where no other wells (or too few wells to define the basin) have been drilled. (Some areas use a specific distance between wells).

RAPPS (subsea): riser annulus pressure protection system.

RAPPS (policies) : reasonable and prudent practices for stabilization.

Rasp: a wireline-run, round, rough file like device useful for scraping hard deposits on tubing walls.

Rat Hole (well): the hole below the pay zone. Commonly drilled to drop off perforating guns or as a gathering or sump area for liquids to separate from gas prior to being pumped out of the well.

Rat Hole (drilling rig): the hole through the rig floor where the kelly can be stored when it has to be disconnected.

Rate Dependent Skin: a skin value that increases with flow rate. Generally recognized as a turbulence induced skin.

Rate of Penetration: the speed of a drill bit or a clean-out nozzle in penetrating a formation or a wellbore deposit.

Rate Sensitive (damage): a term describing a resistance to flow that increases exponentially with flow and may disappear when the flow rate is dropped.

Ratio of Specific Heats: thermodynamic comparison ($k = cp/cv$) of the ratio of a specific heat (k) at a constant pressure (cp) to a specific heat at a constant volume (cv). The ratio range for most gasses is 1.2 to 1.4.

Raw Natural Gas: gas as it is produced from the reservoir. Raw gas may contain methane, heavier hydrocarbons and other nonhydrocarbon gasses such as CO_2, H_2S, nitrogen or helium.

R-BOP: rotating BOP.

RB: reservoir barrels.

RBP: retrievable bridge plug.

RCA: root cause analysis.

RCFA: root cause failure analysis

RCM: recirculating mixer.

RCRA: Recourse Conservation and Recovery Act.

RCP: resin coated proppant.

RCS: resin coated sand.

RCSSP: resin coated sand slurry pack.

RCT: radial cutting torch, a tubing cutting tool that uses thermite plasma.

RD: rig down.

RDDK (valve): a Weatherford valve, retrievable dummy dump valve. It is a valve that is placed in a standard gas lift mandrel and has a fracture rod for pressure shearing (then has a check valve to prevent tubing to casing communication). It can be used to displace the completion fluid from the "A" annulus during the completion. It can later be pulled like a regular GLV and replaced with a dummy or live valve.

RDFN: rig down for night.

RDMO: rig down, move off or out.

RDT: reservoir description tool.

RDX: perforating charge explosive. Cyclotrimethaylenetrinitramine.

r_e: reservoir drainage radius.

RE: reservoir engineer.

Real Time Gauge: a downhole, surface readable gauge.

Reamer: a hole enlargement tool to open up a open hole or a window through the casing.

Reave: tear apart.

RECIP: reciprocate.

Reciprocate: to move a pipe up and down. Usually done to help remove mud or cuttings during well cleanup or placement of cement.

Recirculating Mixer: any mixing device that circulates the fluid through one or more tanks with the intent of more evenly blending the fluid.

Reciprocating Pump: a piston pump.

Reclamation: restoring land to its pre-development condition, or to a condition specified by regulations..

Recomplete: to move the primary completion from one zone to another. May involve reperforating, running other tubulars or setting a new packer.

Recoverable Gas Lift Gas: the gas lift gas produced from a well that is transferred into the pipeline.

Recoverable Oil: the percentage of hydrocarbons that can be recovered from the formation under planned production methods. Often depends strongly on the revenue received from the oil and the operating cost.

Recoverable Reserves: the portion of reserves that can be recovered by currently available technologies.

Recovery Efficiency: the percent of the initial in-place hydrocarbon that can be recovered in the project.

Recovery Factor: the percentage of the hydrocarbon in place that can be produced with each production plan: primary, secondary and tertiary.

Recrystallization: the growth of new mineral grains in a rock at the expense of existing grains which supply the material for the new grains.

RED: restriction enhancement drill (under reamer).

Re-Dress: to re-equip a tool to be run back into the well.

Reduction (chemical): gain of electrons in a reaction.

Reduction-To-Equator (seismic): A mathematical transformation of the total magnetic intensity field at its observed inclination (I) and declination (D) to that of the magnetic equator. $I=0^o$.

Reduction-To-Pole (seismic): A mathematical transformation of the total magnetic intensity field at its observed inclination (I) and declination (D) to that of the north magnetic pole. $I=90^o$, D=0.

Reciprocating pump: pump with an up and down stroke or motion.

Recompletion: action that changes the equipment or intake point in a well.

Reef: coral reef built deposits. Among the highest permeability reservoirs because of connected voids if there has not been extensive chemical modification.

Reel: a take up real for hose, coiled tubing or cable.

Re-Entry: actions taken to enter a well after it has been plugged or otherwise isolated.

Re-entry Spool: an upper tree connection profile that allows remote connection of a tree running tool.

Reeve (rigging): string wire or cable through a pulley.

Reference Point: the point on the logging tool that is the depth reference.

Refiner: a company involved in upgrading hydrocarbons to saleable products.

Refracture: to fracture a zone after the initial attempt. Refracs may be to correct a problem during the initial frac or to expose new pay after stresses in the rock have been modified by production.

ReFrac Efficiency: the ratio between the production of the well (or the initial or max production) to the production after the well is refractured.

Regional Gravity Field (seismic): long wavelength component of field density variations that are usually deeper than general exploration interest.

Relative Permeability: the permeability to a specific fluid based on permeability at 100% saturation of that fluid, when two or more fluids occupy the pore space. The relative permeability may change with changing fluid saturation.

Relative Permeability Modifiers: chemicals that attempt to change the permeability of a pore if another fluid tries to flow. A common approach in water control but with very mixed results.

Release Sub: a part of the BHA designed to separate on rate, pull or a ball drop.

Reliability: the ability to perform a design function at a specified set of conditions over a target time period.

Relief Valve: a valve in a pressurized system that is set to open and relieve pressure at a certain pressure level.

Relief Well: a close offset well drilled to intersect a well that is flowing out of control and cannot be killed with conventional methods.

Remedial Cementing: repair cementing.

Remotely Operated Vehicle: usually an unmanned diving vehicle that performs repairs or maintenance on a subsea well.

Repeat Formation Tester: a tool that isolates small sections of the pay and removes fluid samples and takes pressures.

Repeat Section: a section of a log that is repeated.

Repeater: an electronic device which receives, amplifies and transmits the signal.

Reporting Limit: the lowest required reporting level for a material.

Reserve Extension: any added reserves to an already described reservoir, due to drilling, testing, production, etc., that establishes new data on reserves or production limits outside the previously known limits of the reservoir(s).

Reserve Pit: tank or pit for used/discarded mud, or a secondary mud supply.

Reserves: a calculation of the amount of hydrocarbon reserves that are in the formation. Proven reserves have a very high degree of recovery with wells in place and techniques that are proven.

Reserves to Production Ratio: R/P, ratio of size of the field to the annual production capacity of that field. The R/P is used to estimate the field's productive life.

Reserves, 1P: proved reserves.

Reserves, 2P: proved plus probable reserves.

Reserves, 3P: proved, probable plus possible reserves.

Reserves, Behind Pipe: Behind-pipe reserves are expected to be recovered from zones in existing wells, which will require additional completion work or future re-completion prior to the start of production (SPE).Proximity Log: pad contact tool that measures resistivity.

Reserves, Developed: Developed reserves are expected to be recovered from existing wells, including reserves behind pipe. Improved recovery reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor. Developed reserves may be sub-categorized as producing or non-producing. (SPE).

Reserves, Entitlement: Reserves consistent with the cost recovery plus profit hydrocarbons that are recoverable under the terms of the contract or lease are typically reported by the upstream contractor (SPE).

Reserves, Extension: any added reserves to an already described reservoir, due to drilling, testing, production, etc., that establishes new data on reserves or production limits outside the previously known limits of the reservoir(s).

Reserves, Non Producing: Reserves subcategorized as non-producing include shut-in and behind-pipe reserves. Shut-in reserves are expected to be recovered from (1) completion intervals which are open at the time of the estimate, but which have not started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons. (SPE).

Reserves, Producing: Reserves subcategorized as producing are expected to be recovered from completion intervals which are open and producing at the time of the estimate. Improved recovery reserves are considered producing only after the improved recovery project is in operation. (SPE).

Reserves, Possible: Possible reserves are those unproved reserves which analysis of geological and engineering data suggests are less likely to be recoverable than probable reserves. In this context, when probabilistic methods are used, there should be at least a 10% probability that the quantities actually recovered will equal or exceed the sum of estimated proved, plus probable, plus possible reserves. In general, possible reserves may include (1) reserves which, based on geological interpretations, could possibly exist beyond areas classified as probable, (2) reserves in formations that appear to be petroleum bearing, based on log and core analysis but may not be productive at commercial rates, (3) incremental reserves attributed to infill drilling that are subject to technical uncertainty, (4) reserves attributed to improved recovery methods when (a) a project or pilot is planned, but not in operation and (b) rock, fluid, and reservoir characteristics are such that a reasonable doubt exists that the project will be commercial, and

(5) reserves in an area of the formation that appears to be separated from the proved area by faulting and geological interpretation indicates the subject area is structurally lower than the proved area. Often referred to as P3 (SPE).

Reserves, Probable: Probable reserves are those unproved reserves which analysis of geological and engineering data suggests are more likely than not to be recoverable. In this context, when probabilistic methods are used, there should be at least a 50% probability that the quantities actually recovered will equal or exceed the sum of estimated proved plus probable reserves. In general, probable reserves may include (1) reserves anticipated to be proved by normal step-out drilling where sub-surface control is inadequate to classify these reserves as proved, (2) reserves in formations that appear to be productive, based on well log characteristics, but lack core data or definitive tests and which are not analogous to producing or proved reservoirs in the area, (3) incremental reserves attributable to infill drilling that could have been classified as proved if closer statutory spacing had been approved at the time of the estimate, (4) reserves attributable to improved recovery methods that have been established by repeated commercially successful applications when (a) a project or pilot is planned, but not in operation and (b) rock, fluid, and reservoir characteristics appear favorable for commercial application, (5) reserves in an area of the formation that appears to be separated from the proved area by faulting and the geologic interpretation indicates the subject area is structurally higher than the proved area, (6) reserves attributable to a future workover, treatment, re-treatment, change of equipment, or other mechanical procedures, where such procedure has not been proved successful in wells which exhibit similar behavior in analogous reservoirs, and (7) incremental reserves in proved reservoirs where an alternative interpretation of performance or volumetric data indicates more reserves than can be classified as proved. Often referred to as P2 (SPE).

Reserves, Proved: Proved reserves are those quantities of petroleum which, by analysis of geological and engineering data, can be estimated with reasonable certainty to be commercially recoverable, from a given date forward, from known reservoirs and under current economic conditions, operating methods, and government regulations. Proved reserves can be categorized as development or undeveloped. If deterministic methods are used, the term reasonable certainty is intended to express a high degree of confidence that the quantities will be recovered. If probabilistic methods are used, there should be at least a 90% probability that the quantities actually recovered will equal or exceed the estimate. Often referred to as P1, sometimes referred to as "proven" (Reserve definitions are from SPE).

Reserves, Proved Developed: Proved Developed Reserves are those Proved Reserves that can be expected to be recovered through existing wells and facilities and by existing operating methods. Improved recovery reserves can be considered as Proved Developed Reserves only after an improved recovery project has been installed and favorable response has occurred or is expected with a reasonable degree of certainty. (See Developed Reserves) (SPE)

Reserves, Proved Undeveloped: Proved Undeveloped Reserves are those Proved Reserves that are expected to be recovered from future wells and facilities, including future improved recovery projects which are anticipated with a high degree of certainty in reservoirs which have previously shown favorable response to improved recovery projects. (See Undeveloped) (SPE).

Reserves, Recoverable: the portion of reserves that can be recovered by currently available technologies.

Reserves, Undeveloped: Undeveloped reserves are expected to be recovered: (1) from new wells on undrilled acreage, (2) from deepening existing wells to a different reservoir, or (3) where a relatively large expenditure is required to (a) recomplete an existing well or (b) install production or transportation facilities for primary or improved recovery projects (SPE).

Reserves, Unproved: Unproved reserves are based on geologic and/or engineering data similar to that used in estimates of proved reserves; but technical, contractual, economic, or regulatory uncertainties preclude such reserves being classified as proved. Unproved reserves may be further classified as probable reserves and possible reserves. Unproved reserves may be estimated assuming future economic conditions different from those prevailing at the time of the estimate. The effect of possible future improvements in economic

conditions and technological developments can be expressed by allocating appropriate quantities of reserves to the probable and possible classifications (SPE).

Reservoir: an independent hydrocarbon holding rock.

Reservoir Drive Method: one of several reservoir drive methods including volumetric, depletion, gravity, gas cap, solution gas expansion, water drive, etc.

Reservoir Energy: the driving force in the reservoir, usually gas cap, dissolved gas, water drive, gravity, or compaction of sediments.

Reservoir Pressure: the pore pressure in the reservoir, usually at current value unless otherwise specified.

Reservoir Rock: a rock containing porosity, permeability, sufficient hydrocarbon accumulation and a sealing mechanism to form a reservoir from which commercial flows of hydrocarbons can be produced.

Residence Time: a reference to the amount of time that a given volume of fluid spends in a location. Related to fluid holdup and separation. Used in both surface separators and mud removal times.

Residual Bend: a permanent deformation in metal caused by taking the stress loading past the maximum elastic point.

Residual Gravity Field (seismic): short wavelength component of field density variations within high density basement and/or low density overburden. Anomalies in the residual field are usually of interest in general exploration.

Residual Water: connate water that will not be displaced. See also Irreducible Water.

Resieved Sand: a sand that has been run through sieves a second time to remove fines and course particles.

Resin Coated Sand: frac sand that has been coated with a bonding or non-bonding sand.

Resin Consolidation: using an injected plastic to increase the grain-to-grain bond strength in the formation.

Resin (asphaltene micelle): a cyclic material that, along with maltenes, helps keep asphaltenes tied up a micelles in suspension.

Resin (sand control): one of several plastic compositions.

Resistivity: measurement of a substance (or rock) to resist the flow of electric charge. Opposite of Conductance.

Resistivity Log: one of various logs that measure some component of resistivity.

Restoring Force: force exerted by a centralizer against the casing to keep it away from the wellbore wall.

Retained Interest: a fractional interest in a project retained by a previous owner.

Retarder: a chemical that slows a reaction. In cementing, retarders slow the set time of the cement and prolong the pumpability of the cement.

Retention Time: the time, based on the separator volume and shape and the fluid flow rate that produced fluids spend in a separator. It is based on the time needed to separate an emulsion.

Retrievable Bridge Plug: a retrievable plug set in a non-profile segment of the downhole pipe string.

Retrievable Packer: a non-permanent packer meant to be retrieved.

Retrieving Tool: a tool used to locate, equalize and retrieve a plug or orther settable downhole device.

Retrograde Condensate: condensate that precipitates in the pore space of the rock in a previously dry gas (single phase) reservoir as the pressure drops below the dew point. The building condensate severely reduces the permeability to gas.

Return Permeability: the comparison of permeability after testing with the additive compared to initial permeability.

Returns: fluids and solids flowing out of a well during circulating.

REV: reverse.

Rev Dust™: friction reducing material composed of very small particles. Also used in lab tests to simulate mud cutting fines.

Reverse Circulate: circulating down the annulus and up the tubing.

Reverse Osmosis: a semipermeable membrane that will allow water to pass but not salt. Salt water is pressured into the face of the membrane, the water passes through but the salt cannot pass. The filter has be be backwashed regularly to remove the accumulated salt. The process is relatively slow.

Reverse Out: removing gravel or cement by shifting the packer or opening the sleeve and circulating out of a well by reverse circulating.

Revs (engine): revolutions per minute.

Reynolds Number: an experimental number used in fluid flow to predict the flow velocity at which the flow regime moves from laminar flow through a transition range and into turbulent flow. It is the dimensionless ratio of inertial forces to viscous forces in flowing fluids. It may be viewed as a ratio of the shear stress due to turbulence to the shear stress due to viscosity. Flow with a Reynolds number less than 2000-4000 is laminar flow; that with a Reynolds number greater than 2000-4000 is turbulent flow.

RF: recovery factor.

RFI- Request for Information; similar to a contracts tender, but has less strict legal constraints.

RFP: request for proposal.

RFQ: request for quote.

RFT: See Repeat Formation Tester.

RFV: radial flow valve.

RH (pipe): right hand thread.

Rheology: the study of the deformation and flow of matter. Real fluids include non-elastic solids, non-Newtonian fluids and viscoelastic substances. The added materials that provide viscosity range from clays to polymers to complex surfactant chemistry.

Rich Gas: methane gas containing other low carbon chain alkanes such as ethane, propane and butane.

Rig: typically a well drilling or service unit capable of pulling and running joined tubing.

Rig Down: disassemble the equipment that was placed around a well for a specific work operation.

Rig Up: assemble equipment at the wellsite for work on a well.

Right Angle Set: a term usually meaning flash setting of a cement or other material. May be intended or unintended.

Rigid Centralizer: a centralizer with ribs that do not bow or flex.

Rigless: without a drilling or workover rig (may involve a wireline unit, snubbing unit, or coiled tubing unit).

RIH: running pipe in the hole.

Ring Gaskets: a not re-usable, metal-to-metal seal. Used between spools of a wellhead and in other equipment such as flanges.

Riprap: materials (boards, rocks, etc.) arranged to mark a walkway or a barrier.

Riser: pipe through which liquid travels upward.

Risk: the probability of an event happening times the impact of its occurrence on operations. (Impact is the effect on conditions or people if the hazard is realized (occurs) in practice and potential is the likelihood that the impact will occur.)

Risk Analysis: a decision making tool that allows examination of the level and significance of workplace risk for humans, equipment, weather, operations or other conditions. Determines the probability of risk occurring, the impact the risk will have and how to mitigate the risk.

Risk Assessment: the process of identifying and evaluating the technical and non-technical risks associated with a project. It includes the amount or degree of potential danger perceived (by an assessor) when determining a course of action to accomplish a given task. Risk assessment may be qualitative or quantitative.

Risk Premium: the additional financial return which shareholders expect to be earned in order to compensate for taking additional risk.

Risk Weighted: result of impacting one or more potential outcomes from an uncertainty assessment with risk. Risks might take the form of specific losses (i.e., costs), the impact of the failure (failure to achieve a goal), or other representation. Risk weighting is expressed in a risk-weighted value such as Net Risk-Weighted Value, and Economic Risk-Weighted-Resource Value, other number of risk weighted parameters, and/or by impacting the Y-axis (probability) intercept of a cumulative-frequency curve on a cumulative frequency plot.

River Frac: a description of a large volume water frac (ungelled water) where proppant sand is pumped at ¼ to ½ lb/gal. Normally at very high rates (25 to 50+ bpm). For very low permeability, non water sensitive formations.

RKB: reference Kelly bushing or rotary Kelly bushing.

Rmf (logging): resistivity of the mud filtrate.

ROCE: return on capital employed.

Rock Density: ranges from 125 to 200 lb/ft^3

Rock Mechanics: the study of mechanical rock behaviors under changing loads and stresses.

Rock Properties: properties that describe the physical state of a rock; porosity, permeability, UCS, density, etc.

Rock Shear Strength: the stress level at which rock fails under shearing or distorting load. Generally the same as compressive strength.

Rock Salt: a diverter that is used in acids. Best for high permeability and fractures.

Rocking - pressuring up with supply gas and then opening the well. This works for wells without packers where the annulus can be used as a pressure charge chamber. When a well has a packer, the effect may also work if the liquids are pushed into the formation and then brough back with the extra gas for lift.

Rockwell Hardness: hardness measuring scales relating penetration of a small indentation ball to ultimate yield strength, used to establish steel harness. Rockwell C scale is used in determination of metal hardness limit to control stress chloride cracking.

Rod Box: the female coupling on sucker rods.

Rod Pound: a beam lift term where the pump is filled with gas from pump-off or too fast of an operating speed (rod speed).

Rod Pump: a beam lift artificial lift method. Useful for low rate wells (to 1200 BPD) of moderate depth (to 12,000 ft). One of the few lift systems to be able to remove all but a gas gradient of back pressure from the reservoir.

Rod String: the string of sucker rods used in beam pumping a well.

Rod Wiper: a wiper placed over the drill pipe to wipe off excess mud as they are pulled from the well.

ROI: return on investment.

Roll-On Connector (coiled tubing): a type of connector (with grooves around its diameter on one end and threads on the other) is slipped inside the coiled tubing and the wall of the coiled tubing is deformed by a roller-type device into the grooves, securely connecting the BHA to the coiled tubing.

Roller Cone Bit: a bit with multiple rotating cones that bring cutters into contact with the formation as the string is rotated.

Roller Stem: wireline stem with wheels to reduce sliding friction in highly deviated wells.

Rolling the Tanks: circulating the contents of a surface tank.

Roof Rock: a layer of dense (sealing) rock above a permeable strata.

Root Cause (in failures): the most basic reason for a failure.

ROP: rate of penetration.

ROPE: really overbalanced perforating, see EOP or extreme overbalanced perforating.

Rope Socket: the connection of the wireline to a threaded

Roping: sand and proppant falling through a vertical pipe faster than the downflow of fluid during placement of propping. Bridging may occur.

Rotary Bushing: the drive bushing on the rotary table that turns the kelly.

Rotary Drilling: a rig that spins a drill string with a bit on bottom.

Rotary Hose: the connection from the mud pump to the stand pipe. Also called the mud hose or kelly hose.

Rotary Speed: String RPM.

Rotary Steerable: a deviation drilling method where the BHA is turned through a steerable component at the bottom of the well that directs the path of the bit.

Rotary Table: the assembly of gears and connections that spins the kelly.

Rotating Head: a circulating connection that allows pipe rotation. Used in cementing with non top-drive rigs.

Rotating ROP: the rate of penetrating while rotating the pipe.

Rotor (PDM motor): the rotating shaft in a PDM motor.

Roughneck: a member of the rig crew.

Roughness: the interior surface metal roughness of a pipe. Rough pipes have higher friction.

Round Trip: Pulling a string of pipe from a well and returning to bottom.

Roustabout: general laborer in the field.

ROV: remote operated vehicle, usually an unmanned underwater work vehicle.

Royalty: a percent interest paid to the mineral owner on the value of fluids produced from a lease.

Royalty Oil: the mineral owners share of production, taken in oil rather than in cash.

RP (policy): recommended practice.

RPM (string rotation): revolutions per minute.

RPM: relative permeability modifier.

RQ: reportable quantity.

RSMD: resumed.

RSS (drilling): rotary steerable system

Rt (logging): true formation resistivity.

RTD: resistive thermal device, used for temperature measurement.

RTE (seismic): Reduction-To-Equator.

RTG (perforating): retrievable thru-tubing gun.

RTJ: ring tool joint or ring tool joint flange.

RTNS: returns.

RTP (seismic): Reduction-To-Pole.

RTS: Ready to service; time for a service company to be on location.

RTTGP: re-enterable through tubing gravel pack system.

RTTS: a brand name for a retrievable squeeze tool. Retrievable, test, treat, squeeze.

RTU: remote telemetry unit.

RU: rig up.

Rubblize: break up the formation into pieces to improve the flow path.

Rugose: roughness of a hole.

Rugosity: a measurement of roughness of the surface of a passage.

Run In: go into the hole.

Run Ticket: a record of the oil moved from a storage tank or through a pipeline to custody of another company.

Runaway (coiled tubing): uncontrolled run-in of coiled tubing into a wellbore.

Running Squeeze: a cement squeeze that injects cement until a resistance is built.

Running Tool: a tool used to run and set a plug or other device.

Rupture Disk: a frangible seal that can isolate a section of a well while the tubing is isolated and then be broken to bring in the well.

Rw (logging): resistivity of the formation water at the formation temperature.

r_w: wellbore radius.

RWO: rig workover.

Rxo (logging): shallow formation reistivity, usually of the flushed zone, from a very shallow reading device.

S1, S2, S3: Rock evaluation pyrolysis parameters.

S-Line: slick line.

S Profile: a standard profile. Can accept a plug or other tools.

S-Riser: S-shaped flow line off wing valve.

S-Shaped Well: a well path that starts vertical, then is deviated to reach a target before being turned near vertical again to drop through the pay zone.

S Wave: secondary wave, shear wave, transverse wave. A seismic body wave that involves particle motion from side to side, perpendicular to the direction of wave propagation. S-waves are slower than P-waves and cannot travel through liquid.

Sack (cement): 94 lb of dry cement.

Sacrificial Anode: a metal slug, lower in the electromotive series than steel that is hard wired to the casing and buried in a bed of wet soil or below the surface of the water. The corrosion cell in the well then transfers the current to the new anode and the steel in the well is protected. Common offshore.

Saddle: a pipe fitting made in parts to weld or clamp onto a line to create a junction.

Saddle Bearing: a bearing that allows the walking beam to move atop the Sampson post in a beam lift pump.

Safeing Out: securing a well such that the well is not capable of flowing hydrocarbons to surface.

Safety Clamp: a clamp for flush joint pipe. Also any clamp for securing pipe above the rotary table, even when the slips are set.

Safety Factor: the derating factor applied to a pressure test limit or weight limit to set a maximum operating load condition.

Safety Head: BOP.

Safety Joint: a joint above a piece of equipment that is designed to fail and allow recovery of the upper string.

Safety Release: a section in a downhole tool string than can be actuated by ball or pressure to allow recovery of the pipe string if the tool is stuck.

Safety Slide: the line from the derrickman's platform to the ground, used in an emergency. Also called a Geronimo line.

Safety Valve: various. Generally used in describing a surface or subsurface safety valve.

Sag: settling of particles in a fluid.

SAGD: steam assisted gravity drainage.

Sail Angle: the planned inclination of the tangent section of a directional well. In a horizontal well if would be 90 deg (+/- 10 deg), in a build and hold or S well it would be the tangent section, in a slant well it would be the inclination throughout.

Salamander: various, usually a heater.

Sales Gas: various, but generally the gas send to the pipeline after dehydrating, stripping and sweetening.

Saline water - water that generally is considered unsuitable for human consumption or for irrigation because of its high content of dissolved solids. Commonly expressed as milligrams per liter (mg/L) of dissolved solids, with 35,000 mg/L defined as equivalent to sea water, slightly saline as 1,000 - 3,000 mg/L, moderately saline as 3,000 - 10,000 mg/L, very saline as 10,000 - 35,000 mg/L, and brine has more than 35,000 mg/L (after USGS, 1984).

Salinity: one of many tests that measures, either directly or indirectly, the concentration of salt in a sample of water.

Salinity Gradient: a plot of increasing salinity with depth to spot anomolies such as uplift and migration paths.

Salinity Log: a type of log that measures salinity by use of gamma ray emission measurements from collisions of neutrons with chloride ions.

Salt (brine): specifically sodium chloride, but also may be a generic term for most water soluble salts.

Salt Bed Storage: storage of fluids in a chamber mined or leached out of a salt deposit.

Salt Bridging Material: rock salt or granulated salt sized to construct a filter cake to control fluid loss.

Salt Cavern: an underground cavern, developed usually by solution mining, for storage of gas or liquid products.

Salt Dome: a usually large movement or intrusion of salt that gradually flows through the rock. Can create reservoir traps and can create casing collapse problems.

Salt Water (production): any non-fresh water flow. Saturated NaCl brine has a density of 9.9 lb/gal.

Saltation: a particle movement method where the particle is carried in a series of short hops along a flow path.

Sample Log: a record of rock cuttings (and some properties) that is made as the rock is being drilled.

Sample Rate: the rate that data or samples are taken per unit of time.

Sampson Post: the uprights on a beam lift (rod) pump jack that hold the bearing housings.

SAM^{TM}: sensor activated module.

Sand (formation): specifically a sandstone, but also used in some texts as a general term for the pay zone.

Sand Bailer: a slickline tool used to place or remove sand or similar small grains from a wellbore.

Sand Consolidation: one of various methods of consolidating the grains of an unconsolidated or weakly consolidated formation. Typically resin consolidation (epoxy, furan or phenol-formaldehyde), but may also include sodium silicate, coking, and mineral or metal precipitates.

Sand Control: one of various mechanisms for controlling formation sand movement during fluid production from a weakly consolidated sandstone.

Sand Control Screen: a sand restraining device that is a mesh or wire wrapped screen wound over a base pipe with holes.

Sand Frac: a propped hydraulic fracture.

Sand Free Rate (production): the maximum production flow rate that a weakly consolidated pay zone will produce without producing sand.

Sand Line: the braided line on a rig, normally used for lifting and deploying tools. May also be used in some instances downhole.

Sand Line Drill: a chisel-like tool run on the rig's sand line to break up junk or stuck tools downhole.

Sand Production: free grains of sand pulled loose by flow, brittle failure or formation disaggregation and produced with the hydrocarbon production.

Sand Screen: a downhole screen designed to stop sand production before the flow enters the pump or tubing.

Sand Trap: a surface vessel in the production line with the specific task or capturing sand before the production goes through a point where the sand may damage equipment.

Sandface: the downhole completion interface.

Sanding Back: laying a sand plug over the lower perfs to cover and protect them form another operation.

Sand/Shale Ratio Map: a map that uses contours to show the ratio of sand to shale in a formation. Useful for determining clean sand trends and permeability channels.

Sandstone: granular sedimentary rocks with grain sizes between 0.0625 and 2mm. The pore space where hydrocarbons may be held is between the grains.

Sandy Service: a rating indicating improved performance in erosive environments.

SARA: Superfund Amendments and Reporting Act.

SAS: stand alone screen completion

Satellite Field: an adjacent field to larger, host, field facilities.

Satellite Well: an offshore well that is separate from the main group of wells but in the same field. May be a subsea well or a single platform well with a flow line tie back.

Saturated Solution: a solution containing the maximum concentration of a specific ion that it will hold at a certain temperature and pressure without precipitating.

Saturation (reservoir): the fraction of the effective porosity filled with a specific fluid.

Saturation Exponent: the exponent, n, in the water saturation term in the equation that relates resistivity to water saturation.

Saturation Pressure: pressure at which vapor and liquid are in equilibrium. For oils, equal to the bubble point. For condensates, the dew point.

Saucier Criteria: a gravel sizing method that takes the 50% intercept of a cumulative percent retained of the formation sand against a log particle size; then multiplies by 6 to get the median gravel size for the pack.

Saver Sub (drill string): a threaded coupling under the kelly to which the joints of drill sting are make up. Save wear on the kelly threads.

SBHP: static bottom hole pressure. May also be called shut-in bottom hole pressure.

SBHT: static bottom hole temperature.

SBM: synthetic oil based mud.

SBR (elastomer): copolymer of stryene and butadiene.

Scab Liner: a casing or tubing repair technique that uses a packer at the top and bottom with a smaller diameter pipe in-between to isolate a breach in the pipe or seal off old perfs. Also used for a liner set in open hole to isolate an unstable zone or loss zone, rather than to increase the pressure containment capability of the well.

SCADA System: Supervisory Control And Data Acquisition, a data gathering system.

Scale: one of several mineral precipitates that crystallize out of waters at or above the saturation of the ions.

Scale Converter: a chemical that converts an acid insoluble scale to a acid soluble material.

Scale Dissolver: a product that chemically dissolves scale.

Scale Inhibitor: a chemical that prevents scale from forming in scale mineral saturated produced waters.

Scale Inhibition Squeeze: placement of a scale inhibitor chemical by injecting it into the formation. The material may absorb, adsorb or precipitate.

Scale Prediction: prediction of where in the wellbore that scale minerals are oversaturated in solution and could form scale. Not necessarily where scale will form.

Scaled Off: plugged by scale.

Scallop Gun: a hollow carrier perforating gun with relief ports drilled part way through the gun body to provide an exit point for the perforation charge and to provide a recess to minimize damage from the burr that forms around the exit hole in the perforating gun.

Scavenger: a material that takes another material out of solution or the flow stream. Among most common are oxygen and H_2S scavengers.

SCBA: self contained breathing apparatus.

SCC (corrosion): Stress Chloride Cracking.

SCC (sand control): sand control completion.

scf: standard cubic foot, a measurement at standard conditions of gas volume.

Scfm: standard cubic foot per minute.

Schist: a crystalline metamorphic rock that can be split into think layers because of the bedded mineral arrangements.

Scintillation Detector: a device that measures radiation output (Geiger counter).

SCM (subsea): subsea control module.

SCRAMS^{TM}: surface controlled reservoir analysis and management system.

Scraper: a device used to remove downhole deposits.

Scratcher: a device with bristles or wires that is used to remove mud cake, soft deposits, etc.

SCSFS: surface controlled selective flow system.

SCL: slickline collar locator.

Scorpion Plot: a graph or the production performance of wells against the cost of operations to achieve that production – particularly useful for comparing the effectiveness of workovers.

Scour: removal of part of sea bed by current, storm or ice.

Scout: a person that reports on competitor leasing and drilling activity.

Scout Ticket: a brief report on well information from drilling through initial completion.

SCP: sustained casing pressure.

SCR (alternate): steel catenary riser.

SCR (completions): subsea completion riser.

Scraper: a device that cuts through paraffin, asphaltenes, etc. inside the pipe. Run on wireline.

Scratchers (cementing): mechanical methods of physically removing mud cake from the borehole wall.

Screen: a sand exclusion device.

Screen Analysis: particle size distribution of a sand sample made by running the sample through a set of screens.

Screen Centralizer: A blade type centralizer, usually mounted at the connection, which holds the screen off the casing wall to assist in gravel packing and flow.

Screen Only Completion: a completion that uses a screen without a gravel pack, allowing the formation to cave in around the screen.

Screen Out: to dehydrate a sand slurry to a point where the sand is no longer moveable.

Screen Table: a platform and handling system to make up screens without damaging the screens.

Screening Effect: the tendency of proppants to segregate in the fluids due to density effects when the fluid velocities drop below turbulence.

Screenless Frac: a sand control method where the sand is held in place with closure pressure, resin or other methods and no screen is run.

Screw Port Gun (perforating): a reusable, reloadable perforating gun with port plugs over the perforating charges.

Scrub: removal of components (gas, liquids or solids) from the methane achieved by surface equipment (scrubbers).

Scrubber: a reactor that removes various components from produced gas.

ScSSV: surface controlled subsurface safety valve.

ScSSV Leak Rate (acceptable to pass): < 900 scf/hr.

SCVF: surface casing vent flow.

SD: shut down.

SDFN: shut-down for the night.

SDR (downhole gauge): signal drift.

SDR: size diameter ratio, a common measurement in plastic liner pipe.

SDV: shut down valve.

SDWA: Safe Water Drinking Act.

Sea Water Composition (ASTM.D1141): 19359 mg/l chloride; 2702 mg/l sulfate; 142 mg/l bicarbonate; 11155 mg/l sodium + potassium; 1297 mg/l magnesium; 408 mg/l calcium; TDS = 35169 mg/l; pH = 8.2.

Sea Water Composition (typical): pH 8.0; Oxygen 6-8 ppm; Sodium 11,000 ppm; potassium 380 ppm; calcium 400 ppm; magnesium 1,300 ppm; Chloride 19,000 ppm; sulfate 2600 ppm; carbonate 142 ppm. Sea water composition may be fresher near rivers and melting ice caps, and more concentrated near desert areas.

Sea Water Density: 65 lb/ft^3 or 8.68 lb/gal (1.04 g/cc).

Seal (geologic): a rock seal that is sufficiently impermeable to prevent leakage of hydrocarbons from a trap.

Seal (mechanical): a elastomer or metal-to-metal device that isolates one pressure region from another.

Seal Assembly: a short section with external seals on the end of tubing to stab into a polished bore receptacle and achieve a seal. The seal assembly may be allowed move in the PBR when tubing temperature and/or pressure changes.

Seal Bore Extension: a seal bore receptacle below the packer. Used where a longer seal assembly is needed.

Seal Bore Packer: a packer with the seal bore through the body of the packer.

Seal Ram: a ram in the BOP that seals around the pipe.

Seal Swelling: a reaction of an elastomer seal by absorbing gas or a liquid and increasing its volume. May or may not be detrimental.

Seal-Tite: a trademarked name of a leak stopping material.

Sealing Fault: a fault that effectively seals a compartment.

Seating Nipple: a machined profile in a heavy wall short tubing section that allows a plug to be set and the seal on the plug to effectively isolate the well.

Secondary Cementing: an inexact term. Any cementing after the primary cement job. Rarely used.

Secondary Fractures: usually another set of natural fractures in the pay oriented at some angle to the primary natural fractures.

Secondary Porosity: non intergranular porosity such as fractures, vugs, etc. that may contribute sharply to permeability but may not significantly raise the porosity level.

Secondary Recovery: a recovery improvement process such as water flooding or gas flooding.

Section (US land): 640 acres.

Sedimentary: deposit made up of pieces of other rocks.

Sedimentary Basin: a specific geographical basin of sedimentary rocks.

Seeding: introducing very small particles in the liquid that accelerate the development of scale or other precipitates.

Seep (natural flow): a natural site, generally small, where water or oil percolates slowly to the land surface or into a stream, lake or ocean.

Seismic: an exploration technique that can find structures and potential reservoir traps by reflecting sound waves from the rock strata. [Seismic acquisition (2-D, 3-D, 4-D) – seismic data are used to map subsurface formations. A 2-D survey reveals a cross section of the subsurface. In a 3-D survey, seismic data are collected in the inline and crossline directions to create a three-dimensional image of the subsurface. In a 4-D or time-lapse 3-D survey, 3-D surveys are repeated over time to track fluid movement in the reservoir. (from Baker Hughes).

Seismic Lines: "shock" waves from an event (explosive, tectonic, impact, etc.) that travel through the earth and reflect off of subsurface structures (rocks) in the same manner as sound echos and water waves and ripples.

Seismograph: a device that records vibrations (natural or man-made) in the earth. With interpretation, the data can give information on buried strata.

Selective Firing: a perforating gun initiation that can sequentially fire charges at two or more depths on a single gun run.

Selective Profile: a profile design that can be used at several places in the same string. A plug must pass through the profile and be pulled back into the profile to set.

Self Potential Log: see Spontaneous Potential Log or SP.

SEM: scanning electron microscope.

Semi-Submersible: a rig supported by attached pontoons.

Separation (fluid treating): processes related to separation of gas, water and hydrocarbons.

Separator: a production treating vessel designed to facilitate the separation of gas, oil, and/or water from a produced fluid stream

Separator Pressure: the pressure at which the separator is operated. This pressure is a direct backpressure on the well.

Sepiolite: clay mineral used in drilling fluid. Like attapulgite, it creates viscosity by mechanical interference with the clay particles rather by electrochemical forces.

Sequestration: to tie up ions into a complex micelle or molecule and prevent or slow precipitation of materials.

Service Well: a well that is used for purposes other than production.

Sessile: attached masses of bacterial colonies.

Set Back: pulling tubing and stand back in the vertical racks on the rig.

Set Casing: the actions involved with running casing and cementing it in place.

Set Pipe: run casing and cement. General term that means to start the completion on a well.

Set-Through Completion: a completion with casing set through the interval and cemented.

Set Time: time for cement (usually construction cement) to become rigid. Pumping time and strength development terms are usually used for downhole cementing.

Settling Tank: a surface vessel where solids are allowed to settle out of a produced or circulated fluid stream.

Set Up: gel or harden as in cement.

S_g: gas saturation.

SGR: spectral gamma ray tool.

Shake-Out Tests: solids production test accomplished by taking samples of the produced fluids and centrifuging to separate the solids.

Shaker: a piece of drilling equipment, usually with a vibrating screen, where drill cuttings are removed from the flowing mud.

Shale: a common sedimentary rock with porosity but little matrix permeability. Shales are one of the petroleum source rocks. Shales usually consist of particles finer than sand grade (less than 0.0625 mm) and include both silt and clay grade material.

Shale Control Inhibitor: materials that slow or prevent the mechanical or chemical disaggregation of shale. These materials include inorganic salts and some organic compounds.

Shale Gas: methane gas stored in a shale. May be in the pore space, adsorbed to the mineral or rock surfaces, or as free gas in the natural fractures.

Shale Oil: can be either a immature oil phase, often called Kerogen, or actual oil in the crocks of pores of a shale.

Shale Shaker: a solids separation piece of equipment on a drilling rig that uses vibrating screens to remove solids from the returning mud.

Shaped Charge: a shaped explosive charge for perforating steel pipe.

Shear Dilation: the small movement in a newly fractured formation that results from the formation unloading build in streses.

Shear Joint: a joint above a piece of equipment that is designed to fail and allow recovery of the upper string.

Shear Load: a loading at a diagonal to the structure.

Shear Modulus (G): shear stress over angle of deformation.

Shear Pin: a pin in a tool (brass, steel or aluminum) that is designed to shear or break at a certain pressure that enables a tool function.

Shear Ram: a ram in the BOP that shears off the pipe.

Shear Rate: the rate of shearing of a fluid during a viscosity measurement. The rate of movement between plates.

Shear Strength: the minimum shear stress that will produce permanent deformation of the fluid (gel breaking).

Shear Stress (viscosity): the force required to move a given area of fluid. Units are Newtons per sq. meter.

Shear Thinning: a fluid that when sheared, reduces viscosity.

Shear Wave: S wave.

Shearing The Pin: an impact or pressure load that shears the pin in a downhole tool and allows another tool function.

Sheath: a jacket or armour, often around a logging cable, a gauge cable, or a pump cable.

Sheave: a grooved pulley.

Sheen: a visually apparent oil layer on water. Depending on the hydrocarbon type, sheens can develop with as little as 50 to 100 ppm.

Sheet Sand: a thick sand body without significant vertical or areal barriers.

Shielded: metallic foil or multiwire screen mesh that is used to prevent electromagnetic fields from penetrating or exiting a transmission cable.

Shifting A Sleeve: opening or closing a sliding sleeve.

Shmax: maximum stress direction.

Shmin: minimum stress direction.

Shock Absorber: a mechanical dampener above a perforating gun that attenuates some of the acceleration force created by firing the gun.

Shoe (casing): the end of the casing, usually called a guide shoe than helps insert the casing through the drilled hole.

Shoe Joint: the casing joint containing the cement float.

Shoe Test: a test of the cement seal at the shoe.

Shoe Track: the space between the casing guide shoe and the cement float collar that traps cement contaminated by the top plug displacement.

Shoestring Sands: narrow strands of sandstone formation, often from stream deposits.

Shoot Fluid Level: use a sonic depth measurement device to find the fluid level in a well.

Shooting Nipple: surface equipment used for quick access to the wellbore.

Shooting the Well: setting off charges downhole to rubblize the formation and create a stimulation.

Shootoff (pipe recovery): separating a pipe string with a explosive cutter.

Shootoff (perforating): comparison of shaped charge performance in surface targets.

Shore Hardness (plastics): a plastics hardness scale. As hardness increases, abrasion resistance tends to increase for some plastics while impact resistance may decline.

Shore's Hardness: Elastomer rating system.

Short Radius: vertical to horizontal direction change in < 40 ft vertical travel (approximately 2.2^{o} per foot).

Short String (dual completion): generally the string leading to the upper completion in a side-by-side dual completion.

Short Trip: pulling the pipe up the hole several stands and returning to bottom. May be used to check for fill or to clear cuttings out of a section of the well.

Shot Density: number of perforations per unit length.

Shot Hole (completions): a wellbore where an explosive such as nitroglycerin has been exploded.

Shot Hole (seismic): a shallow wellbore filled with explosives and shot as a seismic signal.

Shot Point: location of initial seismic signal.

Shoulder: a surface on a downhole tool on which an upper tool or piece of equipment will stop.

Shoulder Off: set a seal stack all the way down so the locator shoulder on the stinger contacts the packer.

Show: cuttings or returning fluids with a hydrocarbon content above normal background level.

SHR (subsea): subsea hybrid riser.

Shrimp (testing): mycid shrimp used for toxicity tests.

Shrinkage Factor: the amount to which a reservoir barrel of oil shrinks when gases are removed at surface. Reciprocal of the formation volume factor.

Shroud: a device that directs fluids across a downhole pump motor for cooling or directs gas away from the liquid intake.

Shunt Tube: an Alternate Path^{TM} for gravel packing slurry that routes the flow around a well bore bridge out during gravel packing.

Shut-in: stop a well from flowing and close the valves.

Shut-in Casing Pressure: the pressure on the annulus side when the well is shut-in.

Shut-in Pressure: the pressure at a datum when the well is not flowing. The shut in pressure is usually either surface shut-in pressure or bottom hole shut-in pressure.

Shut-in Tubing pressure: the pressure on the annulus when the well is shut-in.

SI: shut in.

SIBHP: shut in bottom hole pressure.

SICP: shut in casing pressure.

Side-By-Side Completion: a single bore-hole completion where there are distinct surface-to-zone tubing strings with isolation from each other.

Side Pocket Mandrel: a short, full diameter passage tubing sub with a pocket reachable from the inside where gas lift valves or chemical injection valves can be placed by wireline.

Siderite: iron carbonate.

Sidetrack: a second (or higher) attempt to drill a wellbore after the first wellbore has been junked. This saves re-drilling the top part of the hole but requires drop back to a smaller wellbore size in the sidetrack. Also can be a second wellbore.

Sidewall Core: a core sample removed from the open hole bore hole wall by an explosive device or rotary drilled with a small tool.

SIDPP: shut in drill pipe pressure.

Sieve Distribution: a % by weight distribution of the particle sizes in a sample.

Sigma values (fracturing): following from Hsaio's work, SPE 16927. αβχδεφγηιφκλμνοπθ

σ'_r = radial effective stress

σ'_θ = radial effective stress

σ'_z = radial effective stress

$\sigma'_{\theta z}$ = radial effective stress

θ = circumferential angle around the borehole with $\theta = 0$ denoting the top of the wellbore.

φ = angle from σ_h to the borehole azimuth

ν = Poission's Ratio

σ'_v = overburden effective stress

σ'_H = maximum horizontal effective stress

σ'_h = minimum horizontal effective stress

Significant Wave Height: common measure of ocean wave conditions, approximately equal to the average of the highest one-third of the waves.

Silica Flour: very fine mesh sand used as additives and fluid loss.

Silica Gel (drier): a desiccant for removal of water vapor from gas.

Silica Sand (cementing): a high purity sand of specific size (0.088mm to 0.210mm) used in cement slurries to add weight.

Sill (rock): horizontal intrusion of igneous rock.

Silt: small sediment, usually 2 to 74 micron (200 mesh) particles.

Silt Stabilized Emulsion: an emulsion, usually breakable only with solvent that is stabilized by silt accumulation at the surface of the bubbles or droplets.

Silurian: a geologic period of time between 40 and 425 million years ago.

SIMOPs: simultaneous operations.

Simulfrac: two or more wells simultaneously fractured to achieve benefits of pressure diversion of fracturing within the formation.

Single Pole Unit or Rig: a well servicing unit that consists of but one steel tube.

Sink Hole: a depression in the ground at surface caused by collapse of a cave roof.

Sinker Bar: a weight stem on a wireline tool assembly.

Sinusoidal: a repeating shape like a sine wave. May be applied to pipe buckling.

SIP: shut in pressure.

Siphon String: see velocity string.

SITHP: shut in tubing head pressure.

SITP: shut in tubing pressure.

SIWHP: shut-in well head pressure.

Sized Salt: a salt with a range of sized designed to achieve a low permeability filter cake.

Skid: move a well to a close-by locations with minimum rig down of equipment.

Skin: a dimensionless estimation of obstruction to flow. An undamaged well would have a skin of zero. A damaged well has a positive skin above zero and a stimulated well has a negative skin.

Skin Damage: see Formation Damage.

Skin Frac: a fracture treatment designed to bypass skin damage.

SL: see Slick Line.

Slack-Off Weight: the weight reading when the pipe is entering the well. Compared to the pick-up weight to estimate the friction.

Slate: metamorphic shale rock with fractures or cleavage planes.

SLB: Schlumberger.

SLD (wireline): slick line depth.

Slick Joint: a pipe section, usually on the bottom of a BHA that is a straight pipe.

Slick Line: small solid wire used for rapid, economic placement and retrieval of small equipment in a well. Comes in several sizes; 0.072", 0.082", 0.092", 0.108", 0.125", etc.

Slick Water: a water base fluid with only a very small amount of a polymer added to give friction reduction benefit.

Sliding ROP: the rate of penetrating while sliding the pipe (not drilling) in a horizontal).

Sliding Sleeve: a downhole piece of equipment in a tubing string that allows flow from annulus to tubing. Usually opened and closed by wireline.

Sliding Time: the time spend sliding the drill pipe along the wellbore when leaving or re-entering a well.

Slim Hole: a smaller well. Thought to be cheaper to drill, but much more expensive to repair or workover and often limited on fluid flow rate potential.

Slime Former: a type of bacteria that forms a slick surface.

Slip and Cut: to remove a segment of wireline by pulling wire through the system from the reel, removing the wire that is worn or heavily used in normal operation of the wireline system.

Slip Joint: a tubular joint that allows tubing movement.

Slip Ram: an element of the BOP that grips and holds the pipe in place.

Slip Stop (wireline): a wireline set plug with slips and seals much like a small packer.

Slippage: where two phases travel in the same direction but at different velocities.

Slips: devices (usually containing steel teeth) that hold the pipe. Capable of suspending heavy pipe string loads.

SLM: slick line measurement.

Slotted Liner: a casing joint with regular pattern slots of a specific phasing, width and length. Used as a simple sand control method.

Sloughing (shale): movement of large amounts of shale material into the wellbore, usually caused by chemical reaction or earth shift forces. Typically as clumps of particles.

Sloughing Shale: a shale, usually in the wellbore, that increases size (swells) or casts of particles by reacting with brine or water.

Slow Taper: a shallow bevel or angle that is not steep.

Sludge: a very viscous, usually solids stabilized emulsion. Often triggered by ferric iron and an asphaltenic oil after an acid job.

Sluff: sloughing particles into the well.

Slug (Drilling): a volume of heavier or more viscous mud that is routed through the circulation system to assist in cleaning, fluid loss, etc.

Slug: a volume of gas or liquids that moves through the well and the production facility. A well that flows alternating volumes of water and gas is slugging.

Slug Flow: flow of distinct volumes of gas and liquid, often signaling unstable behavior.

Slurry: a mixture of a liquid and solids.

Slurry Packing: gravel packing with a gel.

Sm^3: standard cubic meter.

Smart Pig: a pigging device that incorporates instrumentation to measure properties of the pipe (corrosion, wear, etc.).

Smectite: a clay that exhibits water swelling and fines dissociation problems when it occurs in authogenic form and is reactive with the flowing fluid. Smectite clays such as bentonite generate viscosity by forming a colloid suspension in water.

SNAP™: nodal analysis program.

Snell's Law (seismic): an expression to predict change of direction of a wave crossing the boundary between two isotropic (no variation in properties with direction) media.

Snubbing (pipe running): forcing pipe into a well against the effects of wellhead pressure.

Snubbing Basket: the snubbing unit control location.

Snubbing Job: a job where the well is workover without killing the well. Usually accomplished by multiple barriers that seal on the tubulars.

Snubbing Stack: a set of pipe seal and blind rams used in the snubbing operation.

SO_2: sulfur dioxide.

S_o: oil saturation.

Soak: allowing a solvent to be in contact with a deposit for a period of time.

Soap Stick: a foamer for removing water from a gas well, placed in the form of a solid stick.

SOC: screen only completion.

Soda Ash: sodium carbonate.

Sodium Bicarbonate: used for treating cement contamination and calcium contamination in muds.

Sodium Silicate: water glass, used in sealing permeability channels.

Soft Water: water with low calcium and magnesium content.

Soil Mechanics: the rock mechanics related study of unconsolidated and poorly consolidated sands.

Solid Body Centralizer: a centralizer with a rigid, solid body with straight or curved veins that hold the pipe off the wall and allow flow. Used in deviated wells and with heavy pipe strings.

Solid Waste: any solid or semisolid material intended for disposal.

Solution Gas: the natural gas that is dissolved in a crude oil.

Solution Gas Drive: a drive mechanism where a drop in pressure releases gas from the oil that helps drive the oil towards the wellbore. It is a poor recovery mechanism.

Solution GOR: the solution GOR of the oil as it resides in the reservoir.

Solvent: a substance that will dissolve a solid. In the oil field, oil based solvents may range from xylene for asphaltenes and sludges, to kerosene and diesel/xylene mixtures for paraffins.

Sonalog: a commercial tool that measures the fluid depth in a well by use of a reflecting sound wave.

Sonde: a term usually referring to a logging instrument.

Sonic Amplitude Log: a log that measures the sonic amplitude of a formation to a sound wave. The log is used to locate fractures.

Sonic Caliper: a wellbore caliper, useful in larger wellbores and washouts that uses sound through thin liquids to map the wellbore.

Sonic Log: a sonic log measures the interval travel time (delta t) of compression sound waves moving through one foot of a formation (milliseconds/ft). If matrix velocity is known, porosity can be calculated since sound waves travel slower in porous media (travel slower in less dense materials such as fluids). Sonic logs are used for porosity determination, pressure determination in shale, as a correlation log, and a gas detector.

SOP: standard operating procedures.

SOR: statement of requirements.

Sorption: the processes of absorption and adsorption.

Sorting: a relative comparison of the formation to determine if there is a large difference between the size of the largest articles and the size of the smallest particles.

SOS: shear out sub.

Source Potential: ability of a source rock to yield hydrocarbons to a reservoir rock.

Source Rocks: generally fine grain rocks such as shales or carbonates that can yield hydrocarbons.

Sour: H_2S containing.

Sour Crude: crude oil that contains more than 1% total sulfur content. Typically applied as a label to oils with sour smell.

Sour Gas: gas rich in hydrogen sulfide, H_2S.

Sour Service: defined in NACE MR-0175/ISO 15156 as exposure to oilfield environments that contain H_2S and can cause cracking of materials by the mechanisms addressed by NACE MR-0175/ISO 15156.

Sour Service Rating: a classification of materials that predicts satisfactory performance in hydrogen sulfide.

Source Rock: the rock in which hydrocarbons form.

SOV: screened orifice valve.

SOx: sulfur oxides.

SP: spontaneous potential log.

SPA (BP): single point of accountability.

Space Domain (seismic): a function where distance is the independent variable and another factor (magnetic, density, amplitude) is the dependent variable.

Space Out: using short pieces of pipe to property position the top of the string to hang off while keeping the bottom of the string in the correct position and with the correct tension.

Space Out Joint (drilling): the joint of drill pipe used to prevent a tool joint from being in the BOP body (across a ram face).

Spacer (pumping): a fluid used between two fluids to prevent contamination.

Spacing: the distance between well producing in the same reservoir. The spacing is actually the area they drain (e.g., 320, 160 or 40 acres).

Spaghetti String: very small pipe.

Spalling: the chipping, fragmentation, separation or disbonding of a surface in response to pressure, mechanical or chemical influence.

Spang Jar: a mechanical jar, used commonly on wireline.

Sparge: using a jet of air or water to stir the contents of a tank.

SPCC: spill prevention control and countermeasures.

SPE: Society of Petroleum Engineers.

Spear: a fishing tool that is designed to enter an opening of a fish and grip the ID.

Specific Gravity: the ratio of the density of a substance to the density of a comparison material, usually at a specific temperature and pressure.

Specific Heat: the heat required to raise one unit mass of a substance by one degree.

Specific Weight: the weight of a volume per unit of volume.

Spectral Gamma Ray: a gamma ray tool capable of spotting the different isotopes used in tracers.

Spectral Gamma Ray Image: gamma ray tool which splits the spectral range into three parts: uranium, potassium and thorium.

Spf (perforating): shots per foot.

Spider: a round device that holds the slips when supporting a string of drill pipe on a rig.

Spill Point (reservoir): in a trap, the low point under which hydrocarbons will escape when the trap is full.

Spinner Log: a production log that uses a propeller-like spinner to measure changes in fluid velocity in sections of the well.

Spinning Chain: a chain moved by a counterweight or winch to assist in making up drill pipe joints.

Spiral-Grooved Drill Collar: a drill collar with spiraled grooves down its length to improve circulation of fluids in close clearance well bores.

Spiralizer™: a brand name of a spiral shaped solid body centralizer for casing and screens.

Split Estate: when mineral rights and surface rights are owned by separate entities.

Split Shot™: a linear explosive cutter that is designed the cut linearly through the pin and box connection during pipe recovery.

Split Skirt (milling tool): a slot in a mill or other tool to assist with alignment, cleaning or entry.

SPM (drilling): strokes per minute. A count of pump strokes times pump volume times plunger # times pump efficiency estimates volume pumped.

Spm (perforating): shots per meter.

SPOC: single point of contact.

Spontaneous Potential Log or SP: One of the oldest and simplest logs. Measures voltage between formations and the fluid in the wellbore. Potential differences arise due to the differences between salinity of the formation and the wellbore fluids. SP is used for qualitative permeability, reservoir quality evaluation, Rw calculations and zone shaliness estimation.

Spot Market: a market for short term transactions of specific volumes of product without a long term commitment.

Spotting Fluid: placing fluid at a specific place in the wellbore.

Spread Cost: the total cost for a rig, crews and all equipment that goes with operation of the rig for that job.

Spud: to begin drilling.

Spud Date: the date that drilling operations commenced and were reported to the governing regulatory body.

Spud Mud: mud used to drill from the surface to a depth where a more technical mud is needed.

Spurt Loss: the initial loss of fluids from a mud or frac fluid, before the walk cake can be formed.

SPWLA: Society of Petrophysicists and Well Log Analysts.

Squeeze Cementing: a cementing repair technique involving injecting cementing under pressure to fill channels in the primary cementing treatment.

Squeeze Treating or Job: a designed technique where a treatment is squeezed into a specific zone.

Squeeze Packer: a millable retainer for squeeze cementing.

SRBC: Susquehanna River Basin Commission.

SRB: sulfate reducing bacteria.

SRD: short radius Drilling.

$SrSO_4$: strontium sulfate.

SRT: spill response team.

SS: subsea.

SS: sliding sleeve.

SSC: stress sulfide cracking. Occurs when metal is in tension and exposed to H2S and water. Generates atomic hydrogen. Hydrogen moves between grains of the metal. Reduces metal ductility.

SSD: subsea disconnect used during drilling a subsea well in case the floating rig moves to an extreme that begins to threaten the shear resistance of the riser or the drill string.

SSIV: sub surface (or subsea) isolation valve. Often placed in offshore pipelines within a few hundred meters of the facility to give an emergency stop point in the event of a line rupture or fire.

SSP: static spontaneous potential.

SSTT: subsea test tree.

SSSV: subsurface safety valve.

SSV: surface safety valve (subsurface safety valve is SSSV)

ST: sidetracked.

Stab: insert the seal stack or stinger into the polished bore receptacle.

Stabilizers (drilling): near gauge diameter joints that stabilize the drilling BHA.

ST&C: short thread and coupled, a connection description.

Stack (seismic): a composite of traces from different seismic records.

Stage Tool (cementing): a alternate path device that allows access into the annulus when shifted. Used in two stage cementing operations to pump the upper job.

Staged Cementing: sequenced cement jobs that are placed through different entry points into the annulus. Undertaken to place a higher cement column in the annulus when the fracturing gradient of the exposed formations will not tolerate a full column of cement.

Stall (fluid powered motors): a condition in which the motor stops rotating when more force is required to rotate the shaft than the motor can produce.

Stand: see stand of pipe.

Stand-by-Time: the cost of a piece of equipment or a crew to wait when a job is postpones.

Stand of Pipe: The number of joints of pipe that can be pulled and stood back at one time by the rig, e.g., doubles or triples.

Stand Off: the distance from the tool to the wall of the hole.

Stand Pipe: a vertical pipe on the derrick used for routing injected fluid flow.

Standing Valve: the fixed position valve at the bottom of a beam lift pump.

Standoff: the clearance from casing to the tool face.

Standpipe: the pipe in the derrick that delivers mud to the kelly hose.

Stationary Block (drilling): the crown block on a drilling rig.

Stationary slips: the non-moving slips in a snubbing stack.

Standard Blue Barrel: bbl – the measurement of a barrel (42 gal) of oil originated by Standard Oil Company (their "standard" barrel was pained blue).

Static Bottom Hole Pressure: the bottom hole pressure when the well has been shut-in and the well stabilized.

Static Fluid Level: the depth below the surface to where the reservoir fluids will rise by pore pressure.

Static Pressure: the pressure when the well is not flowing. Can be surface static pressure or bottom hole static pressure.

Static Seal: seal where no motion is present.

Stator (PDM motor): the stationary rubber element of a PDM motor.

STB: stock tank barrel.

Steam Flood: a tertiary oil recovery method involving injection of steam into the reservoir to reduce the oil viscosity.

Steerable Motor (drilling): a downhole drilling motor with a bent housing that can turn a well's direction in addition to turning the bit.

Stem (wireline): a weight bar.

Step Out Well: a well beyond the current boundaries of a known field.

Step Rate Breakdown Test: an injection test, plotted pressure against injection rate, where a curve deflection and change of slope indicates the fracture breakdown pressure.

Stretch Target (Risk): an exceptional outcome that a team will strive for but will probably not achieve.

STG (subsea): seal test gauge.

Stick Plot: dip meter results.

Stimplan™: a fracturing design simulator from NSI, Inc.

Stimulation: any effort to increase production from a well by the improvement of natural or damaged flowing capability.

Stinger (well control): a hollow, tapered rod hooked to the boom of an oil fire fighting crane. Mud can be pumped through the stinger once it has been stabbed into the remains of a wellhead.

Stinger (well tubular): a short prong that slides into a tool. Often a seal assembly.

StM^3: stock tank cubic meter.

STO: stock tank oil.

Stock Tank Barrel: one barrel of stabilized or dead oil at the surface after the gas has escaped.

Stock Tank Conditions: atmospheric pressure of 14.696 psi and temperature of 60F (16C).

STOOIP: stock tank oil originally in place.

Stop-cocking: temporarily shut in and re-open well. Shut-in forces free gas into solution and some liquid back into the formation. Opening the well allows gas to breakout of liquids and the formation and lift liquids.

Storm Choke: A flow controlled shut-in device to control flow in the event of loss of surface well control. Must be reset periodically. Replaced by ScSSVs.

STP: standard temperature and pressure.

Straddle: a downhole device that isolates a zone, a wellbore or a piece of equipment.

Straddle Packer: a twin sealing element device with a perforated nipple in between. It is used to selectively inject fluids into a part of the zone.

Straight Hole: an essentially straight hole with less than 5^o total deviation from surface to bottom hole and dogleg severity less than 3^o/100 ft.

Strain: e = delta L / L.

Strain Gauge: a electronic "Wheatstone-type bridge" element than may form the measurement basis for a load cell or other strain measurement application. The device measures changes in electrical resistance produced by changes in load.

Strap: measure the fluid level in a storage tank.

Stratification (logging): the sequence of unlike formations penetrated by the borehole.

Stratified Flow: a flow regime in a highly deviated or horizontal well where the fluids are segregated by density.

Stratigraphic Trap: a reservoir capable of holding fluids created by decreases in porosity, permeability or disappearance of the reservoir.

Stratigraphy: the succession and age relationship of layered rocks.

Stray Current: the difference in potential between the earth and the well. Measured and minimized before explosive operations may proceed. Also a measure of corrosion potential.

Stray Current Corrosion - extraneous electrical current in earth. Point of arrival is cathode - departure point is anode.

Stream Bed: a moderate to low energy deposit with permeability streaks where energy was higher. May be very limited in extent and volume.

Stress: sigma, σ, is the force exerted on an object.

Stress Cage: a shallow zone of (usually) higher strength surrounding a perforation, cavity or the bore hole, caused by explosive effects or other pressure factors and possibly related to the mechanics of work hardening.

Stress Chloride Cracking: a corrosion form generated by high chloride brine contact.

Stress Corrosion Cracking / Stress Corrosion: occurs in metal that is subject to both stress and a corrosive environment. May start at a "stress riser" like a wrench mark or packer slip mark.

Stress Crack: an external or internal crack in steel or other material caused by the environment and/or the loads on the material.

Stress Relief: controlled heating of material to predetermined temperature for the purpose of reducing any residual stresses.

Stress Riser: a disturbance in the metal structure caused by impact or a wrench mark or penetration of slips that is a likely location for increased corrosion or some failures such as hardening or local fatigue.

Striation: a group of roughly parallel marks.

Strike: the compass direction of a feature such as a flood plane or fault.

Strike-Slip Fault: a tectonically induced failure of a section of a formation with the result that one block of the formation moves horizontally to the formation.

String Mill: a mill that cuts to the side, opening up windows or cutting out restrictions.

String Shot: one to four strands of explosive detonating cord suspended by wireline in a well and exploded to "rattle" the pipe and drop scale and debris from the sides of the pipe. Used frequently in back-off operations (unscrewing a pipe joint downhole).

Stringing Up: the act of threading the drilling line through the pulleys or sheaves of the traveling block and the crown block. One line is connected to the derrick and the other to the winch or hoisting drum.

Strip (processing): removing light hydrocarbons (C2+) from the gas before sale.

Strip Gun: a perforating gun where the charges are mounted on the strip. The strip is recovered after firing.

Strip Over: a recovery method, or less frequently, a wire installation method using pipe.

Stripper: the seal at the top of the BOP around coiled tubing or pipe during snubbing.

Stripper Rubber: the elastomer element that completes the seal in a stripper unit.

Stripper Well: a marginal productivity well, usually less than about 10 barrels per day in onshore US fields.

Stripping (pipe running): holding back on a pipe as it is run into the well.

Strokes Per Minute (Drilling): the number of strokes that a mud pump makes in one minute. SPM times time times pumper chamber volume equals volume displaced. Can be compared to volume recovered.

Strokes Per Minute (Beam Lift): the number of rod strokes per minute of the beam ift unit. Set by depth, viscosity of fluid, gas content, weight of fluid supported, etc.

STRONGER: State Review of Oil and Natural Gas Environmental Regulation, Inc.

Structural Casing: conductor casing string.

Structural Geology: the study of the geological processes that formed the earth's crust, mountains, etc.

Structural Map: a diagram using contour lines to connect the elevation of similar depth points in a formation.

Structural Model (seismic): 2D or 2-1/2D, a gravity or magnetic structural model is a density and/or susceptibility model of given or assumed geology in a system. The modeling can be to represent lithologic layers as equi-density and/or equi-susceptability layers or blocks. The layers are contrast boundaries. Best fit where high contrasts exist in nature.

Structural Trap: a combination of a formation structure feature such as a fault with a sealing mechanism that forms a place where oil accumulates or is "trapped".

Stuffing Box: a device using an elastomer seal (and sometime oil or grease injection) that provides a pressure barrier around a moving tubular or wireline.

Stuck Pipe (drilling): refers to drill pipe stuck in the hole from differential sticking or bridging.

STV (subsea): seal test valve.

Styolite: a pressure dissolution feature in a layered reservoir, often a vertical permeability barrier.

Suction Pit:a steel tank containing mud, where the input line to the mud pump originates.

Sub: a short section of pipe, used to describe tools or to solve space-out gaps.

Sub Critical (flow): sub sonic.

Subduction: the sinking of an oceanic plate edge as a result of collision of a less dense plate.

Sublimation: the process by which matter passes passed from a solid directly to a gaseous state.

Submersible Electrical Pump: see ESP

Submersible Rig: a large rig supported and stabilized by underwater pontoons.

Subsalt: formations located below a salt layer.

Subsea Completion: a subsea well.

Subsea Well: a well with the wellhead and significant control mechanisms located on the sea floor.

Subsidence: compaction of a zone (vertical height shrinkage) created by compaction of the matrix after some load supporting fluids have been produced.

Subsurface Controlled Subsurface Safety Valve: a downhole safety valve designed to close when the flow rate reaches a preset level as measured by a pressure drop across a valve.

Subsurface Safety Valve or SSSV: a downhole safety valve designed to shut the well in case of surface damage to the wellhead.

Sucker Rod: a string or solid or hollow tubular that is moved by a pump jack at the surface to operate a rod pump at the bottom of the well.

Sugar Water (cementing): a contaminate water that will prevent cement slurry from setting.

Suicide Squeeze: a cement squeeze involving injecting into a lower perforation, separated by a packer from an upper perforation while trying to fill a channel.

Sulfamic Acid: a dry acid derivative of sulfuric which is used in very minor acid jobs in the form of acid sticks dropped into the well.

Sulfate: one of several minerals containing sulfur ions bonded to oxygen atoms.

Sulfide: one of several minerals containing sulfur ions bonded to metal ions.

Sulfate Resistance (cement): the ability of set cement to resist deterioration in contact with water containing sulfate ions.

Sulfide Stress Cracking: Cracking of a metal under the combined action of tensile stress and corrosion in the presence of water and hydrogen sulfide (a form of hydrogen stress cracking) (NACE).

Sump: a low area, usually the area below the perfs.

Sump Packer: a bottom packer, commonly used to locate the bottom of a screen assembly in a sand control completion.

Supercharging: elevating the near wellbore pressure of a formation through leak-off of wellbore fluids during drilling, completion or workover.

Super Saturated: a condition where the liquid is over saturated with incompatible ions or one ion concentration is above the saturation point. Usually a result of cooling a undersaturated fluid below the saturation point without a sufficient upset to start the precipitation growth.

SURF: subsea, umbilicals, riser, flowline.

Surface Active Agents: surfactants that exhibit an effect on water or oil by changing fluid properties at the interface of the fluid. May be emulsifiers, demulsifiers, surface tension lowering , flocculants, deflocculants, wetting agents, etc.

Surface Casing: the casing string that protects the fresh water supply. It is always cemented across the water zone and usually extends to surface.

Surface Controlled Subsurface Safety Valve or ScSSV: a safety valve controlled from the surface through hydraulic or electrical power.

Surface Roughness: a consideration in fluid friction calculations. A pipe with a polished surface may have $1/10^{th}$ the friction and flow 10 to 25% more fluid at the same pressure drop (depending on pipe diameter), than a pipe with a corroded or heavily fouled surface.

Surface Tension: a measurement of the difficulty of moving a fluid past another fluid (see interfacial tension). The resistance is created by the cohesion forces between the liquid molecules. The forces make it more difficult to pass fluids past a surface. Surface tension is measured in dyne/cm. Untreated water is 72.8 dynes/cm at 20^{o}C. Ethyl Alcohol is 22.3 and mercury is 465.

Surfactant: a chemical that is attracted to the surface of a fluid and modifies the properties such as surface tension.

Surge Tool: a downhole tool that is used to create a sudden pressure decrease at a spot in the well.

Surging (pipe movement): a pressure higher than the hydrostatic column, below the BHA produced by rapid movement of pipe into the well. Maximized in cases with large diameter tools, high viscosity and high pipe speeds. May cause fracturing. Opposite of swabbing.

Surging (flow): opening the well to flow against a significantly underbalanced fluid column. A perf cleaning technique.

Susceptibility (seismic): a measure of the degree to which a rock can be magnetized. It is defined as the ratio (k) of the intensity of magnetization (I) to the magnetic field (H) projected into the rock.

Suspend: temporarily discontinue operations.

SW: sea water.

S_w: water saturation.

Sw/So (logging): movable hydrocarbon index.

Swa (logging): water saturation of the uninvaded zone.

SWD: salt water disposal.

Sw_{irr}: irreducible water saturation.

Swab: reducing the well pressure below the swab tool by rapid upward movement of a tool or equipment in a wellbore. Swabbing may be intentional using a wireline swab cup tool to lift water or unintentional by fast movement of a pipe or wireline conveyed, large diameter tool such as a packer.

Swab Valve: the valve at the top of the tree, above the flow cross or flow Tee. The lubricator for interventions may be attached above this valve or the valve may be removed to fit a larger lubricator.

Swage: a smooth faced tool that is used to try to re-round ovaled tubing.

Swarf: milling debris from cutting steel.

SWC: side wall core.

SWC (corrosion): stepwise cracking. Cracking that connects hydrogen-induced cracks on adjacent planes in steel.

Sw_{cor} (logging): corrected water saturation of the uninvaded zone.

SWD: salt water disposal

SWDA: Solid Waste Disposal Act.

Sweep: a displacement. In the reservoir a sweep is displacement of a hydrocarbon fluid from a reservoir rock by a flooding fluid. In the wellbore, a sweep is a viscous pill circulated around to help clear the wellbore of cuttings or debris.

Sweep Efficiency: the percentage of original oil in place displaced from a formation by a flooding fluid.

Sweep Pill: a spacer designed to pick up and transport particles from the well.

Sweep Spot: the part of a field that has the best production characteristics (permeability, porosity, hydrocarbon saturation, pressure, etc.).

Sweet: absence of hydrogen sulfide, H_2S.

Sweetening: removing H_2S from a hydrocarbon stream.

Swell Packer: a packer whose seal elements swell in a hydrocarbon, establishing a seal between packer body and casing.

Swept Volume (circulating): the amount of the wellbore that is circulated by fluid (describes the hold-up and upswept volume).

SWI (logging): initial water saturation.

Swivel (drilling): the connection between the traveling block and the hook that allows torque release and rotation.

SWOP: standard workover procedure.

SWR (subsea): subsea wellhead array.

Swr (logging): water saturation of the uninvaded zone.

Syncline: a down-fold in the rock where the sides tilt upwards. Opposite of a trap.

Synthetic Crude: oil formed by a chemical process that converts coal or shale to liquids.

Synthetic Oil Based Mud: a mud with the oil component replaced by a lower toxicity oil such as mineral oil.

SX: sacks.

Sxo (logging): water saturation of the flushed zone.

Syncline: a set of rocks that are bent downward.

Syncrude: synthetic crude upgraded from mined hydrocarbon.

Syngas: synthetically prepared natural gas.

Syneresis: dehydration of a gelled fluid.

t: time

t (pipe): wall thickness

T-Seal: a specialized seal shape.

TA or T/A: temporarily suspended (abandoned).

T&C: threaded and coupled.

T&D (drilling): torque and drag.

Tachehydrite: a precipitate of sulfate minerals following acidizing with strong hydrochloric acid.

Tadpole Plot:a plot of dipmeter or drift where the dip angle or displacement is plotted vs. depth as a displacement of the dot. Also called a vector plot.

TAG (perforating gun): throw away gun or scallop gun.

Tag: to touch the top of a tool, fill, water, etc., with wireline, tubing or CT tool.

Tag Line: a small rope attached to a load being lifted by a crane that allows a person on the ground to help guide or place the load.

TAI (shale): thermal alteration index; an estimate of how maturation has altered the source rock in the creation of hydrocarbons.

Tail Cement: the last of the cement slurry, generally the highest strength cement designed to be left across the casing shoe.

Tail Gas: residue gas, as from a sulfur recovery unit.

Tail Pipe: the tubing below the packer.

Tailing Rods: the act of laying down a rod string when pulling a sucker rod pumped well.

Tall Oil: a fatty acid drilling additive.

Tally: measuring and recording the length of all pipe and downhole equipment.

Talus: a pile of rock fragments at the base of a cliff from which they have broken off.

TAML: Technical Advancement of Multi-Laterals. An industry group that has defined multi-lateral junction levels and terminology.

Tamp: the pressure, exerted by packing or a fluid column above an explosive charge that helps contain or focus the energy of the explosive or propellant.

TAN: total acid number. Measurement of natural organic acididity in a compound such as oil.

Tangible Costs (Drilling): items of well construction that have salvage value, ordinarily capitalized on taxes.

Tangential Stress (tubing): stresses around the body of the tubing (Hoop Stresses).

Tangential Wave: an S wave.

Tank Battery: a storage and separation location for oil.

Tank Bottoms: the near solid or highly viscous residuals at the bottom of an oil storage tank, generally composed of a large amount of paraffins, silt, heavy ends, etc.

Tank Farm: a group of supply or storage tanks.

TAP: trapped annular pressure.

Tap: a valve on a line.

Tap: cutting of threads in a hole.

TAPS: trans Alaska pipeline system.

Taper Tap: a spear-like fishing device with threads to engage ID threaded fish.

Tapered Bowl: a two piece fitting placed in the master bushing to hold the slips.

Tapered Mill: a mill with a gradual concave or convex taper designed to enlarge the wellbore.

Tapered String: a tubing string with more than one tubing size. Normally the smallest pipe is on bottom with larger sizes toward the top. The sizes are set to minimize flowing friction and keep the velocity above the critical level to lift fluid.

Tar: a deposit of very long carbon chain alkanes. May be associated with asphaltenes.

Tar Sands: A deposit of heavy oil, usually with API gravity less than about 18^{o}. May have sand content of 50%.

Target (Risk): a preferred outcome from an activity.

Tettle Tail: a reference mark, also a minute mark.

TBN: total base number, a reserve alkalinity number.

TC: time constant.

TCF (gas lift): temperature correlation factor.

tcf (reserves): trillion (one million million) cubic feet.

TCP: tubing conveyed perforating.

TCP (chemical additive): Tri Crecyl Phosphate, a defoamer.

TCT: true crystallization temperature.

TD: total depth measurement or pipe length to the depth. Used for displacement calculations.

TDH: total dynamic head.

TDRM: top down reservoir modeling/modeling.

TDS: total dissolved solids in a quantity of liquid.

TDT: thermal decay time log.

Technical Limit: a benchmarking comparison to determine how much better a process or a piece of equipment can be improved.

Technically Recoverable Resources: the amount of the resource that is estimated to be recovered by current or proposed technologies.

Tectonic Force: any one of several insitu or earth stress forces. May include classic plate tectonics, salt flows, thrust forces, faults, folds, etc. Can be either near-field or far-field.

Tectonic Map: a geologic map showing the structure of the earth's crust.

TEG: triethylene glycol.

TEL: tubing end locator.

Telemetry: conversion of a logging tool measurement to a signal suitable for transmission to the surface.

Telescoping Mast: a portable mast composed of sections nestled inside one another and raised with a winch or a hydraulic cylinder.

Televiewer:borehole televiewer, a sonic tool that creates a sound reflectance picture of the wellbore.

Tell Tale (gravel packing): an upper or lower screen in a gel packing gravel pack. Use to spot annular fill up by pressure rise.

Tell Tale Screen: short screens used at the top and bottom of older gravel packing assemblies to help determine where the gravel is within the screen by casing annulus during packing.

Telluric Currents: natural earth currents originating as result of variations in the earth's magnetic currents.

Temperature Gradient: the rate of increase of temperature per unit of depth. Varies in the world with geothermal activity. Usually between 1.1 and 2.2+ ^{o}F/100 ft.

Temperature Log: a measurement of temperatures along the wellbore. Useful for determining temperatures at any point, static and circulating temperature and tops of cement column. May also be used to locate the top of a fracture if run soon after the frac.

Temperature Stability Agents: products that increase the temperature stability of a material, usually a drilling or workover fluid above its normal expected range.

Temperature Survey: repeated, regular measurement of temperatures along a unit of depth in a well.

Temporarily abandoned: a well where operations are suspended; i.e., shut-in while awaiting repairs, pipe line engineering analysis, etc., but not permanently abandoned.

Ten Round: ten threads per inch.

Tender (ship): a support barge, boat or ship that supplies support to a rig or production facility.

Tensile Extension: the stretching of a material in pure tension.

Tensile Strength: the greatest lengthwise stress that a substance can bear without failure.

Tension Set Packer: a packer set by pulling and holding tension in the tubing.

TEOR: thermal enhanced oil recovery.

Tertiary: a geologic period 2 million to 65 million years ago.

Tertiary Recovery: an enhanced recovery process that goes beyond water or gas flooding. It may involve steam, fire, chemicals, miscible gases, bacteria or other techniques.

Test Pill: an encapsulated radioactive material that serves as a portable source of gamma radiation for tool calibration.

Test Separator: a smaller separator than the main production separator, used for regular production tests to measure oil, gas and water rates on a well.

TFE (elastomer): Teflon.

TFE: Total, Final, Elf.

TFL: through the flow line, a mechanism for well service where the tools are pumped downhole through the flow lines.

TG: trip gas, mud logging term.

TGLR: total gas lift ratio.

TGS: tight gas sands.

THAI: toe to heel air injection.

THD (subsea): tubing hanger.

Therm: a measure of heat content, where one therm = 100,000 btus.

Thermal Decay Log: a series of temperature log runs before, during and a sequence of temperature logs to spot channels, and differences in temperature heat up or cool down.

Thermal Decomposition: breaking down by thermal destruction of the molecule.

Thermal Expansion: expansion of the volume (length & diameter) of an object as it is heated. In tubing, heat increases lengthen the tube or increase axial stress.

Thermal Maturity: a measurement of the processing of kerogen towards dry methane gas. Usually expressed at Vitronite reflection percent. Vro <0.6 is a immature oil, 0.6 to 1.0 is a oil with dissolved gas, 1.0 to 1.3 is wet gas and >1.4 is dry gas. Vro over values of about 4.o are a reflection of all hydrocarbons being cooked off.

Thermal Recovery: an enhanced oil recovery process that uses heat to reduce oil viscosity.

Thermogenic gas: natural thermal cracking of sedimentary organic material to oil and gas (C14 isotope is absent).

Thermos Flask: a container used on logging tools to give temporary protection from the downhole temperature.

THI: threshold hydrate inhibitor.

Thickening Time: the time that a cement slurry will remain pumpable at temperature and pressure.

Thief: to remove a sample from a tank for analysis.

Thief Zone: a high permeability streak that serve as a loss site for wellbore fluids.

Thin Section: a section of the formation, forcibly impregnated with epoxy and sliced thin enough to examine with a light from the opposite side.

Thinners: materials that change the relationship between solids and viscosity of a fluid to lower the gel strength, yield point, yield strength or viscosity as it affected by solids.

Thixotropic: fluid property of being a semi-solid gel at rest and liquid when pumped. Thixotropic fluids decrease in viscosity with time at shear.

Thorium: Th^{232}, one of the natural isotopes that as a trace element may incorporate into the matrix of naturally forming barium or strontium sulfate scale and make it a very low level radioactive material (NORM scale).

THP: tubing head pressure.

Thread Gauge or Thread Form: a pattern template for identifying a specific thread type.

Thread Protector: plastic or metal storage couplings that are screwed onto a stored tubing string, protecting the threads from impact and sometimes corrosion.

Three-D or 3-D seismic: seismic maps that show detail in three directions. A network or grid of values that models a geologic surface or structure as a surface of density contrast (gravity), or susceptibility (magnetic).

Threshold Velocity: a limit flow velocity for a specific fluid, either minimum or maximum, that would accomplish a task. Threshold Velocities are usually minimums to promote liquid lift in a gas well, or a minimum velocity to keep a pipe surface clean.

Throttling: controlling flow with a reduced orifice.

Through the Flow Line: TFL, a completion or repair technique that depends on pumping the tools or equipment into a flow line and down the well.

Through Tubing: entering a well for a completion or repair by entering the well without removing the wellhead or the tubing string. Usually done under pressure.

Through Tubing Gun: a perforating gun small enough to be run and recovered through the tubing.

Throughput: the amount of a material that moves through a plant in a set time.

Throw: a fault's vertical displacement.

Throw the chain:to jump the spinning chain from the box end of the joint to the pin end of the joint after the connection has been stabbed. The chain is pulled by a rope from the cat-head to tighten the joint.

Thrust Fault: a type of reverse fault in which the inclination of the plane of the fault is not highly deviated.

THS: tubing hanger setting.

THT: tubing head temperature.

Tie: a structure, bed or identifiable rock feature that allows correlation of depth control in an area.

Tie-Back: to connect a downhole liner to the surface with a casing of similar size.

TIFL: tubing integrity fluid level.

Tiger Tank: a tank for holding treating or flowed back fluids.

Tight Formation: non specific term meaning lower permeability.

Tight Gas: natural gas held in reservoirs of low permeability that cannot be accessed in an economically reasonable time by natural flow methods. Hydraulic fracturing is required to create formation exposure sufficient to produce the gas.

Tight Hole: an exploration well or other project where information is not released to the public.

Tight Sand: low permeability formation.

Tight Spot: a restricted place in the bore hole, caused by wall cake, dog leg, deviation change or other factor.

TIH: trip in hole.

Tip Screen Out: a fracture treatment, common where high fracture flow conductivity is needed. Very high pressures and very high proppant loadings are applied near the end of a fracture treatment where the tip of the fracture has stopped growing due to bridging of proppant at the fracture dip because of dehydration (frac fluid leakoff).

TIV: tubing isolation valve.

TIW™: Texas Iron Works (manufacturer).

TJ: terajoules. 1,000,000,000,000 joules. 1 kilojoule = 0.9478 BTU.

TKV: tubing kill valve.

TLP: tension leg platform.

TLV: threshold limit value.

Tmax (shale): the temperature in shale maturity at which maximum hydrocarbon release occurs.

TMD: total measured depth.

TN: tank.

TNL: tubing nipple locator.

TOC: top of cement.

TOC (shale): total organic carbon in wt%.

Toe: the far end of a highly deviated well.

TOH: trip out of hole.

TOL (casing string): top of liner.

Toluene: an aromatic (cyclic) 6-carbon ring compound with 7 carbons and 3 triple bonds. A very powerful solvent for oil, tar and asphaltenes.

Tomography: three dimensional display of seismic velocity in a well or area.

Tongs: a wrench, hand or power, suspended above the rig floor to make or break pipe connections.

TOOH: trip out of the hole.

Tool Joint: a pipe connection.

Tool Pusher: on-site rig manager. Often there is a rig manager that looks after the rig (office position usually) and between 2 and 4 tool pushers)

Top Drive: a rig with the pipe rotation mechanism in the traveling block section. Usually does not use a Kelly.

Top Job: a cement repair job done by running a tube down an annulus and cementing to surface.

Top Kill: a dynamic kill procedure, used in low pressure wells, good for a short period of time. A typical top kill is to pump 5 bbl of fluid in the tubing, offsetting the tubing pressure as the fluid falls. The well must be monitored for pressure or flow and the pump truck usually stays connected in the event that another fluid pill is necessary.

Top Lease: a separate lease to a shallower part of the strata.

Top Plug: in cementing, the last plug pumped in cementing with the two plug system. It isolates the displacement fluid and cement slurry. It helps keep the heavy cement slurry from reversing or U-tubing back into the wellbore while the cement slurry is still unset.

Topographic Map: a surface elevation map.

Top-Set Completion: a completion with the casing set and cemented above the pay. Usually an open hole pay zone.

Topsides: platform equipment – facilities.

Tornado Chart: a resistivity log plot showing the different investigation results based on depth of fluid invasion.

Torpedo: the connection joining the electric line logging cable and the electrical bridle at the reel.

Torque: resistance to rotation of a string. The turning force applied to the string to cause it to rotate.

Torsion tester: a slickline tester used to spot slickline fatigue and embrittlement before the run.

Tortuosity: a description of the hindrance caused to flowing fluids as they attempt to enter the wellbore from a fracture or the formation. Also used to describe the deviation of the wellbore from a smooth path.

Total Depth: the maximum depth of a well measured along the wellbore.

Total Dissolved Solids: TDS, conductivity test of ions in the water. The combined dry weight of dissolved materials, both organic and inorganic, expressed in ppm that are contained in the water.

Total GOR: GOR that includes solution and free gas from the reservoir.

TOTP: turn over to production.

Tour: (often pronounced as tower) a shift worked by the crew.

Township: 36 sections of land, usually laid out as a square. Along with the section number and the Range, the Township is a way of describing the location of a well.

Toxicity: the degree to which a chemical is poisonous to the plant or animal life in specified surroundings.

TP: tail pipe – pipe below the packer.

TP: tubing pressure.

TPC (lift): tubing performance curve. A tubing specific relationship that is plotted with the IPR curve to select the tubing size for the well.

TPC (production): theoretical production capacity.

TPH: total petroleum hydrocarbon.

TPI (pipe and connection): threads per inch.

TPSV: terminal particle settling velocity.

tpy: tons per year.

Trace Element (analysis): an element found only in minor amounts (usually less than 1.0 mg/l).

Traceability: the ability to trace the components of a product through out the supply and manufacturing system from raw material to finished and installed product.

Tracer (injector): chemicals placed in the flow stream of an injector to determine that the water takes from an injector to the producing wells.

Tracer Log (fluid movement): a log that uses radioactive tracer to monitor fluid movement in the wellbore or measure losses from the wellbore.

Tracer Log (fracturing): a log that uses a spectral gamma ray and multiple marked sand tracers to analyze proppant placement.

Track: a recording of one measurement from a log.

Tractor: an electrically or hydraulically powered downhole tool with driven wheels or slip and hydraulic extension capability that can pull a tool string along a highly deviated well.

Transient: a short lived state. Generally used describing reservoirs during production as pressure is progressively drawn down near the wellbore and slowly permeates the rock outward.

Transition Zone (flow): a zone where the flow type or saturation changes due to gas breakout, gas expansion, shear or turbulence.

Transitional Spacer: a fluid that separates two incompatible fluids during well cleanout and prepares the wellbore for the next fluid.

Transmissibility: a measure of the conductivity of the formation corrected for the viscosity of the flowing fluid. kh/mu.

Traveling Block: the block of sheaves or pulleys that moves with the pipe during running or pulling.

Traveling Valve: the valve at the top of the pump in a beam pump.

Treater: a separator vessel.

Treating Fluid: the fluids used in a kill, stimulation, cleanout, etc.

Treating Iron: temporary surface piping rigged up for a stimulation or well kill operation.

Tree Cap: a blind flange over a valve at the top of the tree.

Tree Saver: an isolation device commonly used in fracturing to protect the tree from pressure and proppant erosion.

Trench Magnet: a magnet in the return trough from wellhead to shaker that removes suspended metal particles from the fluid.

Trend: an indefinite term normally used to identify a producing formation over a large area of production.

TRI: toxics Release Inventory.

Triassic: a geologic time from 200 million to 250 million years ago.

Triaxial: axial, radial and tangential stress testing.

Thribble (old drilling term): a triple, or three joints of pipe screwed together.

Trip: pulling all pipe from the well and rerunning the pipe to bottom.

Trip Gas: gas that enters the wellbore during a trip of the drilling string. May be due to swabbing and/or lowering the mud equivalent circulating density during pump shutdowns.

Trip In: run in the hole with tubing or drill pipe.

Trip Margin: any mud density over the amount needed to balance the formation with a static mud column. Related to overbalance.

Trip Out: pull a string of tubing or drill pipe out of the hole.

Trip Tank: a smaller tank that holds the fluids form running or pulling a string of pipe. Because of its smaller volume, it is used to quickly spot incoming kicks or fluid losses.

Triple: three joints of pipe screwed together.

Triplex Pump: a pump with three cylinders.

Tripping In: running pipe into the well.

Tripping Out: pulling pipe from the well.

TRSCSSSV: tubing retrievable surface controlled subsurface safety valve. May also be referred to as a ScSSV or DHSV.

TRSSSV: tubing retrievable subsurface safety valve.

TST (geologic): true stratagraphic thickness.

True Vertical Depth or TVD: the vertical depth from the surface to the depth of interest. Used for formation comparison and calculation of hydraulic pressures.

TSO: see Tip Screenout.

TSR: Tubing Seal Bore Receptacle: A type of polished bore receptacle where the receptacle is on the tubing and the stinger is looking up.

TSS: total suspended solids in a quantity of liquid.

TSTM (flow measurement): too small to measure.

TT: through tubing.

TTD: through tubing drilling.

TTFWO: time to first workover.

TTGP: through tubing gravel packing.

TTP (perforating): through tubing perforating.

TTP (tubular): tubing tail plug.

TTR: through tubing retrievable.

TTRD: through tubing rotary drilling.

Tubing: typically the smaller, inner string of pipe in a well that is primarily used for a fluid flow path.

Tubing Anchor: a packer-like device without seals that keeps the tubing from moving. Common in rod pumped wells.

Tubing Bonnet (wellhead): the spool or hanger receiver in the wellhead, above which the master valve is the primary control.

Tubing Bowl: a section in a part of the wellhead that accommodates the tubing hanger.

Tubing Conveyed: movement of any tool via the tubing string.

Tubing End Locator: a wireline device that indicates when the end of tubing is reached.

Tubing Hanger: a slip set or donut that suspends and holds the top of the tubing in the wellhead.

Tubing Head: a flanged spool containing the tubing bowl where the tubing hanger will set and seal.

Tubing Pressure: the pressure on the tubing during either flow or shut-in.

Tubing Pump: a beam lift pump where the barrel of the pump is attached to the tubing.

Tubing Retrievable: any equipment pulled with the tubing string.

Tubing Spider: the holder for the slips on a rig. Suspends the tubing during connection make-up.

Tubing Tail: end of tubing.

Tubing Valve: a gas lift valve controlled by pressure in the tubing.

Tubingless Completion: a low cost completion or multiple completion in which the tubing strings are cemented directly in the hole. There is no outer casing. Due to the small tubing diameters, potential to repair or re-enter the well for repairs is limited.

Tugger: a winch line or other device that can pull equipment into place.

Tungsten Carbide: a hard, abrasion resistant compound used in cutting tools such as mills and bits.

Turbidity: a measurement of fluid clarity. Suspended solids and color in water reduces light transmission. Turbidity is a comparison of the amount of light that passes through a trial fluid compared to a clear sample.

Turbine Motor: a motor spun by injected fluid moving past vanes affixed to the rotor.

Turbo Drill: a turbine motor for drilling.

Turbulent Flow: non laminar flow, usually above a Reynolds number of about 3000. The Blasius equation estimates the friction factor for N_{Re} values less than 100,000 as $f_B = 0.0791 / N_{Re}^{0.25}$.

Turner Equation: an equation that predicts the minimum gas flow to lift liquids in wells above 1000 psi flowing pressure.

Turnkey (drilling): a type of a drilling contract. Once it meant the entire job, beginning to end, and often to ready-to-produce for a set price, however, the term has numerous meanings as defined by individual contracts.

Turner Equations: equations for deliquification of a well at operating pressures greater than 1000 psi.

Turntable: rotary table.

TVD: True Vertical Depth.

TVDTR: true vertical depth from the rotary table.

TWC (core): thick walled cylinder.

TWC (flow path): two way check.

TWC (pipe): thick walled compression strength.

Twinning (flow lines): adding an extra flow line with the same path to increase capacity.

Twinning (wellbore): using a single slot on a platform to house two wellbores, with independent controls, that are drilled to different parts of the reservoir.

Twist-Off: to separate the drill string during rotation, usually from excess torque.

Two Barrier: a operating philosophy and sometimes a requirement that calls for having two barriers to flow from a well. Most appropriate for active drilling, workover or intervention. May not be appropriate for all production wells but is appropriate for wells with a higher risk factors concerning safety or environmental.

TxIA: tubing by inside annulus.

Type Curve: a method of analysis of well behavior by matching the problem curve to curves draw from known conditions.

υ: viscosity

U-Tube: a fluid flow path that has a low spot. In a well, the U-tube is represented by the tubing and the annulus with the bottom of tubing as the low spot. Where two different density fluids are involved, the effect is that the lower density fluid will be pushed higher on its side by the higher density fluid on the other side.

UB: underbalance.

UBD: underbalance drilling.

UBI: ultrasonic borehole imager.

UBO: underbalance operations.

UCS: unconfined compressive strength, a measure of the formation strength form compressive tests on core.

UIC: underground injection control.

ULCC: ultra-large crude carrier: > 500,000 dwt of crude oil.

Ultimate Strength: the maximum stress that a material can withstand.

Ultrahigh-Pressure Water Jetting: water jetting at pressures over 25,000 psi.

Ultrasonic: very high frequency sonic signals used in measuring distance, surface imperfections or even metal thicknesses.

Ultraviolet Disinfectation: a process using ultraviolet (UV) light to kill bacteria and viruses.

Umbilical: a control line attached to a remove piece of equipment, usually a subsea wellhead, to provide hydraulic or electrical control, or inject small amounts of chemicals.

UMV: upper master valve.

Unassociated gas: gas that occurs without association to oil.

Uncertainty: the amount of possible inaccuracy.

Uncertainty (Risk): a reflection of the measured or perceived possible range of outcomes associated with an event or process. Uncertainty can be expressed as deterministic quantitative value, a qualitative value, or as a probability distribution that combines a range of quantitative coefficients with the likelihood that any value in the range will occur.

Uncertainty Assessment (Risk): the process of combining uncertainties, as with a Monte Carlo Simulation, to generate output parameters that are represented by probability distributions. No involvement of risk is implied. Example: multiplying ranges of length and width to arrive at a range of resulting areas.

Unconformity: a geologic aged erosional removal from the top of a formation. Reservoir rocks below this surface may contain hydrocarbon deposits if the unconformity acts as a seal.

Unconsolidated formation: formations with insufficient cementing agents between the grains to stop movement of individual grains when fluid flows through the formation. Usually less than 2 to 10 psi compressive strength.

Unconventional Resources: hydrocarbon from unconventional and more difficult to produce resources such as (hydrocarbon): shale gas, shale oil, heavy and viscous oil, hydrates, tight gas, etc.

Under Reamer: a tool with downhole deployable arms and cutters that allow a larger hole to be drilled below a smaller opening.

Underbalance: when the pressure exerted by the column of fluid in the wellbore is less than the pore pressure in the formation.

Underbalance Drilling: drilling with a pressure in the wellbore that is lower than the pressure in the formation.

Underbalance Drilling Level 0: IADC-UBO term. Performance enhancement only; no zones containing hydrocarbons.

Underbalance Drilling Level 1: IADC-UBO term. Well incapable of flow to surface.

Underbalance Drilling Level 2: IADC-UBO term. Well capable of natural flow to surface, but conventional well kill methods are enabled, and limited consequences are possible in case of catastrophic equipment failure.

Underbalance Drilling Level 3: IADC-UBO term. Geothermal and non-hydrocarbon production. Maximum shut-in pressures are less than UBD equipment's operating pressure rating. Catastrophic failure has immediate, serious consequences.

Underbalance Drilling Level 4: IADC-UBO term. Hydrocarbon production. Maximum shut-in pressures are less than UBD equipment's operating pressure rating. Catastrophic failure has immediate, serious consequences.

Underbalance Drilling Level 5: IADC-UBO term. Maximum projected surface pressures exceed UBO equipment's operating pressure rating, but are below BOP stack rating. Catastrophic failure has immediate, serious consequences.

Underbalanced Perforating: perforating the well when the pressure in the wellbore is less than the pressure in the formation.

Under-deposit Corrosion: A corrosion deposit occurring under a scale or bacterial deposition and thus not treatable by corrosion inhibitiors that are not designed for the purpose.

Undergauge hole: any part of a wellbore drilled with a worn bit.

Underground Blowout: an uncontrolled and unintentional flow of fluids from one formation to another, generally when one or more well barriers have been breached.

Underlift: under production, short of the allotment or contract volume, that must be accounted for in a contract.

Under-Ream: enlarge an existing borehole by a special bit that opens to a diameter larger than running diameter by hydraulic or mechanical method, or by use of a bi-center bit.

Under Travel: when the travel of the rod string at the pump (bottom of the well), is less than the surface rod travel.

Undersaturated Oil: an oil with less gas than its solubility capacity.

Undeveloped Reserves: Undeveloped reserves are expected to be recovered: (1) from new wells on undrilled acreage, (2) from deepening existing wells to a different reservoir, or (3) where a relatively large

expenditure is required to (a) recomplete an existing well or (b) install production or transportation facilities for primary or improved recovery projects (SPE).

Undeveloped Acreage: lease acreage on which wells have not been completed to a point of testing or allowing production.

Undiscovered Petroleum Initially in Place: that quantity of hydrocarbons estimated yet to be discovered.

Undisturbed Zone: where the zone still has the natural connate fluids.

Undulating: a well path that rises and falls over its length.

Unit Operator: the oil company identified as the operator in a unitized field.

Unitize: form an operating unit with a operating company from a group of wells in the same field.

Unloading: lightening of a fluid column, usually by adding gas, until the fluid flows out of the well.

Unloading Valve: generally a downhole valve that, when opened, permits circulation.

Unproved Reserves: Unproved reserves are based on geologic and/or engineering data similar to that used in estimates of proved reserves; but technical, contractual, economic, or regulatory uncertainties preclude such reserves being classified as proved. Unproved reserves may be further classified as probable reserves and possible reserves. Unproved reserves may be estimated assuming future economic conditions different from those prevailing at the time of the estimate. The effect of possible future improvements in economic conditions and technological developments can be expressed by allocating appropriate quantities of reserves to the probable and possible classifications (SPE).

Unsteady State: non constant, in fluid flow a condition marked by changing flow properties.

Unweighted Fluid: the base fluid without added salts or solids.

u_o: oil viscosity.

Up Dip: in an upward direction in a tilting formation.

Updip Well: a well located higher in the structure.

Up Steam: in the fluid path before the point of interest.

Uplift: vertical movement of a formation to a shallower depth than when it was deposited.

Upper Completion: the part of the completion above the packer.

Upper Crown Plug (subsea): a plug that fits in the bore of a subsea tree to serve as the secondary barrier against reservoir pressure.

Upper Kelly Cock: a valve at the top of the kelly that can be closed in the event of a inside tubing kick or high pressures.

Upset (chemical): in a produced fluid stream, an upset is when chemical or physical reactions create precipitates or emulsions.

Upset (mechanical): an enlargement in the string, usually for cutting threads. May be internal or external upset.

Upset Connection: a pipe connection with thicker wall area at the coupling. An external upset is thicker to the outside with a consistent I.D. with the pipe and is called an EU or EUE. A connection upset to the inside (smaller ID but consistent O.D.) is an IU.

Upstream: the oil producing end of the business.

Uranium: U238, one of the natural isotopes that as a trace element may incorporate into the matrix of naturally forming barium or strontium sulfate scale and make it a very low level radioactive material (NORM scale).

UR: under-reamer.

USDW: underground source of drinking water.

USGS: United States Geololgical Survey, a US government agency.

USI^{TM}: ultrasonic imager.

USIT: a brand name for ultrasonic inspection tool, a corrosion damage monitoring device.

UTM: universal transverse mercator. An orienting/origin defining system used in surveys.

UV: ultraviolet.

V-Belt: a drive belt with a trapezoidal cross section.

V-Door (Vee Door): an opening at floow level in the side of the rig to facilitate bringing in pipe.

V-G Meter: Fann viscosimeter.

V-Stack: a seal stack of chevron type seals.

Valve: any of several valves: plug, gate, butterfly, needle, etc., used in oil field operations.

Van der Waals Force: attraction created by the weak electrostatic forces of distributed charge in a polar molecule. Even though the water molecule as a whole is neutral, the polarity or the molecule leads to attraction between individual molecules from slight negative and positive centers. This enters into effects of viscosity and surface tension.

VAPEX: vapor assisted petroleum extraction.

Vapor Pressure: the pressure exerted by the gas phase (vaporized liquid) in equilibrium with the system conditions.

Vapor Recovery Unit: a device that removes mists and vapors from gas in a tank or enclosure.

Variable Bore Rams: a ram element in a BOP that will fit more than one size of pipe. Commonly a ram element that can seal around the pipe body or the coupling.

Variable Speed Drive: a mechanism that allows the motor speed and power to optimally match the requirements of a pump.

VASPS (subsea): vertical annular separation production system.

Vee-Door: the opening in the rig framework that allows pipe to be pulled upright from the catwalk.

Velocity Gradient (seismic): usually the vertical velocity gradient, i.e., the rate of change of velocity of sound traveling through rock with depth. Normally, it refers to seismic velocity at seismic frequencies, i.e., smoothly varying (rather than rapidly varying, as with a sonic log). With respect to material being sheared, velocity gradient is the change (dv) in relative velocity (v) between parallel planes with respect to the change (dz) in perpendicular distance (z) throughout the depth of the material. Velocity gradient has the same dimensions as rate of shear, which is reciprocal seconds.

Velocity Safety Valve: a valve specially dressed for a particular well and kept current with maximum flow potential that can shut in the well if surface control is lost. Also called a storm choke – an early subsurface safety valve.

Velocity Stack: a long tube used in well fire fighting operations to move all the fluids and the fire up above the damaged wellhead. May also be used to put out the fire in some cases.

Velocity String: a small diameter tubing string, often coiled tubing that is suspended inside the existing production tubing. By occupying part of the flow path space, the velocity of the produced fluid is increased and the potential to lift water from the well is increased.

Vent: release gas pressure.

Vent Screen: a length of tubing with a screen at each end, intended to be installed through tubing and half of the assembly covered with gravel. A common repair for a breached screen. Generally low rate.

Venturi: a shaped nozzle.

Verification: tool surface operational check.

Vertical Depth: vertical extent of a depth measurement.

Vertical Tree (subsea): a subsea tree with the master valve above the tubing hanger.

Vibroseis: a seismic survey where the energy is generated by vibrators attached to large truck-mounted plates at the surface

VIP™: a finite difference reservoir simulator that replaced GCOMP™.

Virgin Pressure: the pore pressure at discovery.

VIS or VISC: viscosity.

Viscosity: a measurement of the internal resistance of a fluid to flow against itself. Expressed as the ratio of shear stress to shear rate.

Viscosifiers: any material that increases the viscosity of a fluid.

VIT: vacuum insulated tubing.

Viton™: a brand name of a common fluorocarbon elastomer common in seals. Aromatic fluid resistant.

Vitrinite Reflectance: a measure of shale maturity based on whether it has generated hydrocarbons. The value is in units of reflectance, in % Ro with values of 0 to >3.

VIV (riser): velocity induced vibration.

VLCC: very large crude carrier: 200,000 to 350,000 dwt of crude oil.

VLV: valve.

VME: Von Mise's Equivalent. – a method of calculating triaxial stress.

VOC: volatile organic carbon.

Voids: holes, blanks spots or empty areas.

Volatile oil: easily evaporated oil, usually above a gravity of 40^{o} API.

Volumetric Drive: a reservoir drive mechanism provided by the expansion of solution gas in the oil.

VME: von Mises Equivalent.

Vortex Shedding (marine): a form of hydrodynamic loading of deep water structures that may lock into a structure's natural vibration frequency. May include loop currents.

Vreeland Effect: a dynamic force. Most common is suddenly stopping a traveling casing string. May cause a pipe joint to separate.

VRU: vapor recovery unit.

VSD: variable speed drive.

VSP: vertical seismic profile> Run in a single wellbore. Helps correlate logs with seismic data.

Vug: a large open pore feature. May be associated with chemical dissolution of part of the matrix over geologic time.

VXT (subsea): vertical subsea tree.

W/C: water cut.

W/V: wing valve on a wellhead.

WAG: water-alternating-gas; a tertiary drive mechanism using alternating injections of water and gas.

Wait and Weigh Method: a method of controlling kicks in which the weight of the kill weight mud is calculated by the difference between the difference of casing and tubing pressure and the volume of fluid increase; followed by injection of the kill weight mud to displace the lighter weight mud and the kick in a single circulation.

Waiting on Cement or WOC: the time spent waiting on cement to reach sufficient strength to proceed with operations.

Walking Beam (beam lift): the main moving beam in a beam lift pump.

Walking Squeeze: a cement squeeze under the fracture pressure, trying to build pressure slowly. Typical in fracture sealing.

Walking Wash: placement of a fluid in the wellbore with coiled tubing where the fluid is spotted at the bottom of the zone and the CT is withdrawn at the same rate the hole is filled.

Wall Cake: filter cake.

Wall Hook: a device at the bottom of an overshot for centering the upward looking end of pipe that may be laying against the casing. The hook may resemble a finger or strip of metal pointing clockwise and used with pipe rotation to surround and center the pipe.

Wall Stuck: usually differential sticking (by overbalance), but may also include effect of friction and mud cake adhesion to the tubing or drill string.

WARI: walk around rig inspection.

Wash Over: a recovery process in which a larger pipe is used with circulation to surround and capture a pipe stuck in sand or cuttings. Circulation is critical to washing the sand from around the fish. Can be used with normal or reverse circulation.

Wash Pipe: a nonupset pipe with an O.D. close enough to the I.D. of an inner pipe to cause hydraulic diversion. Used inside a screen during gravel packing to direct flow and gravel to the bottom of the screen and effect a tighter pack. Developing hydraulic diversion benefits with a wash pipe usually requires that the washpipe OD be at least 80% or the outer pipe or screen's ID.

Washing: forced circulation of fluid through the perfed interval with the intent of generating communication between perforations or intervals.

Washout (drilling): flow cutting of equipment downhole.

Washout (formation): an enlarged area of the wellbore caused by removal of formation grains during drilling or circulation.

Washover Operation: using a overshot tool and circulation to remove debris above and from around a fish and grip the fish with the overshot.

Washover Pipe:a recovery tool that fits over the OD of the lost pipe.

Waste Water: water with any home or industrial waste.

Wasting Assets: assets that will lose or are losing their value.

Water Base Emulsion or Mud: mud with water as the external phase. May contain clays, polymers, or even an internal oil phase.

Water Block: a relative permeability problem usually occurring in a gas zone. Highest potential formations for water blocks are low pressure gas sands (<0.25 psi/ft pore pressure), with small pore throats (<10 microns), lower permeability (<100 md), and when using water that has a surface tension about 50 dyne/cm.

Water Coning: movement of water upward into oil strata in response to production of oil and lower reservoir pressures. May be localized in areas of high vertical permeability.

Water Cushion: a level of water in a string to be used for flowback to generate an initial damping back pressure.

Water Cut: the amount of water in percent in a produced fluid stream.

Water Disposal Well: a well where produced water is injected back into a deep, usually depleted zone but one that is not connected to the producing pay zones.

Water Drive: a reservoir drive mechanism where an aquifer provides pressure support and pushes towards the low pressure area around the well, driving the oil ahead of it.

Water Flood: purposely injecting water below and/or into the reservoir to drive the oil towards the producing wellbore. This is a secondary recovery mechanism.

Water Frac: a fracturing treatment using ungelled water.

Water Hammer: a sharp, sometimes very high force and pressure load that is created when a valve is closed too rapidly in a flowing stream. The major force occurs behind the valve. Most common in a production well when sudden closure (slam closure) of a subsurface safety valve can create a load of over 50,000 lbs force in the tubing tensile/compressive loading. In an injector, the water hammer effects of a rapid shut-in are lower, but some effects may be seen on the formation.

Water-in-Oil Emulsion: water droplets suspended in a continuous oil phase.

Water Injector Well: a well used to inject water into a reservoir to maintain pressure or to drive hydrocarbons towards producing wells.

Water Mellon Mill: a string mill, designed to enlarge the hole.

Water of Condensation: the water initially in vapor phase within a gas that condenses out when gas cools. Usually 1 to 2 bbls per million scf.

Water Pack: a gravel packing treatment using ungelled water as the carrier fluid.

Water Table (drilling): the top of the drilling mast where the crown or stationary block rests.

Water Table (water supply): the upper level of groundwater.

Water Wet: a surface condition in which he coating chemicals show an attraction preference for water.

Watershed: all lands that drain runoff water into a specific area.

Wave Train: response of an elastic formation to an acoustic energy impulse.

Wax: paraffin, C18+ alkane fraction.

Wax Beads: a diverting agent.

WBM: water based mud.

WBS (rock strength): wellbore stability.

WBS (seismic): wellbore seismic.

WC: water cut.

WCL (SSSV): well to control line communication.

Weak Link (coiled tubing): a weak point at the top of the BHA, designed to separate before the tubing fails if the BHA becomes stuck.

Weak Point (wireline or CT): a designed weak point, usually right about the fishing neck on the tool that is designed to separate when excess tension or axial loads are applied.

Wear Bushing: a part surrounding the drill string designed to wear instead of more expensive components of the rotary train.

Weather Window: period of time during which weather conditions favorable for operations will or may exist.

Weathered (mineral): a chemically altered mineral that has lost some definition of the lattice or crystal shape. May be more unstable or more reactive.

Weave Screens (sand control): screens where the filtration layer is largely layers of woven screenwire.

Weevil: an inexperienced worker.

WEG: see Wireline Entry Guide.

Weight (tubing): the weight of a particular tubing size, grade and weight on a weight per pound basis. Includes the weight of the coupling.

Weight Bar: same as a weight stem, a bar used mainly to add weight in a wireline BHA.

Weight Indicator: a string weight measurement device that can report the weight on the string at any time.

Weight Stem: a weight bar in a wireline tool BHA.

Weight Up: increase fluid density.

Weighting Materials: solids added to increase density in a fluid.

Well Cleanup: removal of solids, completion fluid, sand workover fluids by production.

Well Completion: that processes involved, after drilling, is properly isolate pressures and fluids, and then stimulate or restrain the formations so that hydrocarbons can be produced with minimum amounts of extraneous fluids.

Well Construction: the drilling and completion steps prior to production.

Well Control: using barriers to prevent unwanted flow of hydrocarbons to surface.

Well Interference: the change in pressure or flow rate in one well caused by production in another.

Well Operation: the act of producing the well with all the efforts involved in bringing the well on-line, keeping it flowing and shutting it in.

Well Patroller^{TM}: a cleanup tool that helps remove debris from a well.

Well Productivity: the tested ability of a well to produce hydrocarbons.

Well Program: the well drilling and completion or repair procedure.

Well Pulling Hoist: a unit used for retrieval of completion strings and accessories.

Well Sorted: A measurement of the comparison of large to fine grains. A well sorted formation has a narrow size range between the smallest and the largest particles.

Wellbore: in drilling, the drilled hole.

Wellbore Cleanout: a treatment designed to remove damage or debris from the wellbore and the perforations.

Wellbore Diagram: the drawing of the well and its equipment showing depths, sizes, grades, and specific equipment.

Wellbore Screenout: an early time frac failure when the frac width is too small and the fracture proppant bridges off on the fracture.

Wellbore Storage Effect: the after flow, created by wellbore volume, into a wellbore after the surface valve has been closed.

Wellbore Wash (chemical treating): a solvent or acid wash of the wellbore with minimum leakoff into the matrix.

Wellhead: the mechanical connection between the tree and the casing. May house tubular hangers, annular access valves. It is connected to the casing by welding, threads, hydraulic forming or set screws.

Wet: water bearing with little hydrocarbon.

Wet Combustion: injecting air and water into a reservoir during a fireflood.

Wet Gas: a hydrocarbon gas with heavier ends (C2+).

Wet Gloss Heating Value (reactions): the total energy transferred as heat in an ideal combustion reaction of a water saturated gas at a standard temperature and pressure in which all water formed appears as a liquid.

Wet Oil: oil with a water content above specification.

Wet Shoe: a casing shoe with poor cement support.

WETS^{TM}: wellwork evaluation tracking system.

Wettability: the measurement of the wetting phase currently on a formation. Wetting is driven by the fluid or the surfactants in the fluid in contact with the surface.

Wetted Surface: any surface in contact with the flowing fluids in a well.

Wetting Fluid: the fluid that coats a mineral surface; usually either oil wet or water wet.

WF: water flood.

WF: wellhead flange. The flange on the first cemented string of casing to which the BOP is bolted during drilling and on which the wellhead is built after drilling.

WFRV: water flood regulation valve.

WFT: wireline formation tester or wireline formation testing.

WG: wire grab.

WHE (wells): well head equipment.

WHFP: well head flowing pressure.

Whipstock: a hardened steel ramp along which a mill turns as it cuts a hole in the side of the casing to start a sidetrack or lateral wellbore.

White Oil: shorter chain hydrocarbon liquids, generally after refining.

Whole Core: a core as drilled from the reservoir and not separated into smaller cores.

WHP: well head pressure.

WHT: wellhead temperature.

Wickers: broken or frayed strands of braided line or E-Line.

Wildcat: a well in a previously undrilled area. An exploratory well.

WIMS: Workover Information Management System data base.

Window (casing): an exit point of a lateral from a mother bore, generally a hole cut in the side of the casing to allow sidetracking the well. Can also be where the entire section of the casing is removed.

Window (hydraulic): the allowable effective fluid density difference between the fracturing pressure and the pressures exerted by a fluid that are needed to control formation flow and the wellbore.

Wing Valve: a valve located at the tree, above the master valve, on the flow line.

WIO: working interest owners.

WIOP: well integrity operations procedure.

Wiper Plug: a pumpable plug with flexible cup-like extensions that seal and isolate the fluid behind the plug from the fluid in front.

Wireline: a term encompassing slickline, electric line and braided line operations.

Wireline Entry Guide: a small fitting on the end of a tubing string that is shaped to allow easier entry of logging tools when pulled back into the tubing from the wellbore below.

Wireline Feeler: a fishing tool used to find and catch wireline in preparation for fishing the line.

Wireline Formation Tester: a formation fluid sampling device.

Wireline Preventor: a BOP for wireline operations.

Wireline Retrievable: tools or equipment retrievable with a wireline trip.

Wireline Tools: tools specifically designed to operate on wireline conveyance. May be either for slickline (non electrical signal conducting) or for electric line.

Wire Wrapped Screen: a sand control screen with a shaped wire wound to achieve a set opening size (within tolerance) around a perforated base pipe.

Whirl (drilling): a detrimental condition where a bit bites into a part of the hole off center and forms a pivot point that creates impact of the bit and some of the string with the borehole wall.

WIT: well isolation tool.

WLM: wireline measurement.

WLMD: wireline measured depth.

WML (perforating): wrapped metal liner.

WO: workover

WOB: weight on bit.

Wobble Ring (gas lift): lock ring that anchors the gas lift valve in the side pocket mandrel.

WOC: waiting on cement or water oil contact

WOE: waiting on engineering.

WOO: waiting on orders.

WOR: water oil contact

Work Basket: the basket on a snubbing unit where the operator stands.

Work Hardening: a metal deterioration in which the metal becomes progressively harder and more brittle with repeated application of load.

Work String: a special, often large string of tubulars that are used during the completion of the well. Usually higher pressure capacity or allow higher weights than the production tubing.

Working Interest: an interest in an oil and natural gas lease that gives the owner of the interest the right to drill for and produce oil and natural gas on the leased acreage and requires the owner to pay a share of the costs of drilling and production operations.

Working Pressure: the pressure rating that continuous operations may take place at the set conditions and fluids. Examples – e.g., WP set at 80% of rated burst for new pipe, 70% for used pipe, 50% for welded or damaged pipe.

Working Window: a section, usually pressurized and capable of being opened, below a coiled tubing injector where larger tool can be added or removed to the CT BHA.

Workover: repairing a well. Usually implies opening the well and running in with a tubing string. May or may not involve killing the well and may or may not involve a conventional rig.

Workover Rig: a servicing rig designed to run and pull tubing. It usually has some capacity to mill or drill.

Worm: an inexperienced worker.

Wormhole: a channel created by acid reacting along a high permeability streak.

WOS: West of Shetlands.

WOW: waiting on Weather.

WPC: World Petroleum Council (formerly World Petroleum Congress).

WPH: well pulling hoist.

WQC: water quality act.

WRIV: wireline removable insert valve.

WROV: work removely operated vehicle.

Wrought: metal that is formed into a desired shape by rolling, extruding, forging, etc.

Wrought Iron: forged iron.

WRSSV: wireline retrievable subsurface safety valve.

WSO: water shut-off.

WTI: west Texas intermediate crude oil.

WTR: water.

WTS: west Texas sour crude oil.

WWS: wire wrapped screen.

X Profile: a standard profile. Can accept a plug or other tools.

Xanthan™: a biopolymer.

Xanvis™: a modified Xanthan polymer.

XCD™: a brand name biopolymer.

xHPHT: ultra high pressure high temperature.

X-Link: cross linked gel.

Xmas Tree: Christmas tree.

XNL: XN (nipple) locator.

X-Over: crossover.

XO: crossover.

XOM: Exxon Mobil.

XN Profile: X profile with a no-go or no-go ledge for selling a no-go sleeve.

XRD: x-ray diffraction analysis.

XT: Christmas tree.

ψ (reservoir): stream function or value of a streamline.

YE: year end.

Yield (drilling fluid): a measurement applied to clay dealing with the number of barrels of a set viscosity fluid than can be made from a given quantity of clay.

Yield Point (drilling point): the resistance to initial flow of a fluid or stress required to start fluid moving.

Yield Point (metal): The stress on a material at which the first significant permanent or plastic deformation occurs without an increase in stress (NACE).

Yield Strength (metal): the stress at which a material exhibits a specified deviation from the proportionality of stress to strain. The deviation is expressed in terms of strain by either the offset method (usually at a strain of 0.2%) or the total-extension-under-load method (usually at a strain of 0.5%).

Yield Value (fluids): the critical shear stress that must be exceeded before flow can be initiated.

Young's Modulus (E): stress over strain. A measure of stiffness or Modulus of Elasticity. Rocks are ½ to 12 x 10^6 psi and mild steel is 30 x 10^6 psi.

YP: yield point, the point at which a fluid shears.

Z (production logging): acoustic impediance.

Z-factor: the compressibility correction index used in the ideal gas law. $Z = V_{actual} / V_{ideal}$

Zeolites: a reactive class of minerals often associated with clay damage.

Zeta Hammer™: a brand name of a tool used to deliver rapid impact stokes to a small BHA downhole. Operated by fluid flow. Usually run on CT.

Zinc Brine: a brine made of salts of zinc, usually very dense.

Zinc Sulfide/Sulfate: scales that may occur after use of zinc brines where sulfate water is found.

$ZnCl_2$: zinc chloride.

Zone: a section of a formation.

Zwitterionics: a class of surfactant with both positive and negative charges.

1P: proved reserves.

2D Seismic: depth and width data seismic signals.

2P: proved plus probable reserves.

3D Seismic: seismic data capable of showing a three dimensional image of the reservoir. Strictly, 3-D is a closely spaced grid of 2-D seismic lines with interpolation to create a seismic cube. The cube can be sliced vertically to create 2-D lines or sliced horizontally to create time views of the traveling signal.

3P: proved, probable plus possible reserves.

4D Seismic: 3D seismic repeated over time. Can show the change in a reservoir over time.

% w/w: weight percent.

% v/v: volume percent.

This glossary is an attempt to document many of the terms, abbreviations and acronyms for oil and gas production engineering terms currently in use. No warranty is expressed or implied. Although effort has been made to be accurate, limitations in print space, regional

word meanings and current usage are limiting factors. Trademarked names are added where they are in very common use. Accuracy is not guaranteed. Please let me know of needed corrections and additions. Source of Reserves terms is the SPE – I have attempted to copy the term definitions exactly.

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