Terri Finch
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DERRICKS TO DESKS

Objective: Students will be able to understand and identify the terminology terms of oil and gas.
Timeline: Approximately 3 - 4 hours (depending on travel time)
Setting: Prior to the field trip the students will spend class time preparing for the game by learning and quizzing each other on the appropriate terms. The game will actually take place at the West Kern Oil Museum located in Taft, CA. in conjunction with Barry Petroleum, Chevron employees and parents.

Grade Level: Senior High School

Materials:
Oil and Gas Terms
Blank Paper
Pen/Pencil
Map (to be distributed the day of the event)
Prizes

Instructions: Prior to the trip, the museum will be set up with "stations" according to the terms. The students MUST find all the stations and identify which term coincides with the appropriate station. The student must also have the volunteer SIGN OFF on their answer sheet, thus eliminating the "cheating" element. The students will create the map as they complete their game. Prizes will be awarded according to the most ACCURATE answer sheets turned in. The students will also have Q & A time with the oil industry people and an overview of the job opportunities available according to ability and education.

Outcome: Students will have the opportunity to observe terms "in action". The post test will be given upon return to the classroom.

Oil & Gas Terms

Barrel: (bbl) A liquid volume measure equal to 42 U.S. gallons (159 liters). One barrei of crude oil has the same energy as 350 pounds of coal or 6,000 cubic feet of natural gas.

Bit: The cutting tool that penetrates rock layers. It cuts a borehole through methods of percussion or rotation or both. Bits rotate at 50 to 300 revolutions per minute depending on the hardness of the strata through which it is boring. The diameter of a hole may be up to 24 inches but it is usually five to eight and one-half inches.

B.O. E.: Barrel of Oil Equivalent: A unit of energy equal to the energy in a barrel of crude oil or 5,800,000 BTU's.

By-Products: The secondary products from the processing of raw gas. This includes: light oils, natural gas, carbon, black, ethane, propane, butane and helium as well as nitrogen, sulfur compounds, carbon dioxide and water.

Continental Shelf: The continuation of the landmass into the ocean. Such a shelf is the site of potential oil and gas deposits. The federal waters are called Outer Continental Shelf (OCS) because they begin three miles offshore.

Core Sample: A cylinder of rock generally 1-5" in diameter drilled out of a likely area. The cylinder is brought to the surface for analysis by a geologist.

Crude Oil: Petroleum liquids as they come from the ground - formed from animal and vegetable material, which collected at the bottom of ancient seas.

Derrick: A frame tower, which supports the drill equipment over a well hole.

Drill Bit: The mechanism that cuts into ground layers to reach the gas deposit or to cut a core sample. (see also bit).

Drilling: The boring though the ground strata with a bit and attached pipe to reach a deposit. Drilling is generally done with rotary equipment but the cable tool method is used for shallow wells or in particular formations.

Drilling Rights: A company must obtain permission to drill from the mineral owner, or purchase the property, in which it wishes to drill. A mineral owner is compensated by royalties or a lump sum payment.

Dry Hole: A drilled well which does not yield gas and/or oil in quantities or condition to support commercial production.

Extended Reach Drilling: Uses advanced technology to drill into an oil or gas reservoir from many miles away.

Fault: A vertical fracture in the earth's crust, which shifts the alignment of porous and non-porous layers. A fault is one of the major formation sites for deposits.

Flare Gas: Natural gas that is burned in flares at an oil field. It is made up of waste gas.

Field: An area that contains oil and/or gas defined by geographic qualities such as faults, uplifting, structure and cap rock. In one field there may be several reservoirs that contain oil and gas.

Fractional Distillation: A process by which crude oil is separated into various products. Fractional distillations are the fundamental process of refining.

Formation: The composition of the earth has many layers with different qualities. Each layer is called a formation and named to distinguish it from the other layers or strata. Examples include the Rincon formation and the Monterey formation.

Geosciences: The sciences that involve the studies of the earth. Examples are geochemistry, geology, geophysics, etc.

Gravity: The major determination of oil quality is its gravity. The lighter the gravity, the higher the quality of oil. When oil gravity is heavy, more effort is required to extract the oil from the reservoir.

Hydrocarbons: A vast family of compounds containing carbon and hydrogen in various combinations, found especially in fossil fuels.

Hydrogen Sulfide (H2S): A malodorous gas made up of hydrogen and sulfur with the characteristic order of rotten eggs. It is emitted in the natural decomposition of organic matter. H2S is also a byproduct of refinery activity and the combustion of oil during power plant operations. In heavy concentrations, it can cause illness.

Odorant: A substance that can be smelled which is added at the city gate to natural gas so that leaks can be detected if and when they occur.

Offshore: A drilling site located on a platform, used particularly on the Continental Shelf, the Gulf of Mexico and the North Sea.

Onshore: A drilling site located on land.

Petrochemicals: Inorganic and organic compounds that are products of petroleum origin; i.e. based on hydrogen and carbon atoms. Currently over 3,000 chemical products are synthesized from oil and gas.

PIG: A cleaning device that flows along the inside of a pipeline between pumping stations like a pea in a peashooter. It is carried along by the flow of the pipeline fuel.

Pipeline: A tubular arrangement for the transmission of oil and gas. Pipelines measure 14 to 42 inches in diameter, but are usually 20 to 36 inches. The pipe is wrapped and coated for protection against corrosion. About half of all gas and oil is moved by pipeline. There are enough pipelines in the U.S. to reach beyond the moon.

Plafform: An offshore drilling site where oil and/or gas is extracted. Many times they are self-sufficient and generate their own power and desalinate their own water in addition to providing dining, living, recreational and working quarters for their crew.

Pressure: Force exerted. Examples are tectonic pressure that causes outcroppings, or underground water pressure that propels gas and oil up a well. Reservoir pressure can be as high as 10,000 pounds per square inch.

Processing Facility: (Such as the Ellwood Onshore Facility EOF). At this industrial site the oil, gas and water is separated. The gas is compressed and brought to utility grade standards before being shipped by pipeline to a local retailer. The oil is purified and sent by pipeline to a refinery.

Produce: To extract the oil and/or gas from the reservoir where it is found.

Producer: A company that produces oil and gas by extracting them from their source.

Production: The physical process that results in a commodity. Oil and gas production involves exploration, drilling, refining and transportation.

Recoverable Resource: The portion of a resource expected to be recovered by present-day techniques and under present economic conditions. A recoverable resource includes geologically expected resources.

Re-pressuring: Water, gas or air can be injected into the reservoir to increase pressure and, thus, production.

Refine: To cleanse or purify by removing undesirable components. To refine is to process a material to make it usable.

Reserve: The supply of a resource (such as oil or gas). Reserve numbers are modified to show degree of certainty such as proven reserves to possible and specuiative reserves.

Reservoir: A discrete section of porous rock containing an accumulation of oil or gas, either separately or as a mixture.

Reservoir Rock: Porous material such as sandstone that provides deposit areas for oil and gas.

Royalties: Periodic payments made to the mineral owner of a leased site, usually a percent of the fuel value of a successful well between 1/8 (12.5%) and 1/6 (16.67%). Mineral owners can be individuals, state or federal governments. In California offshore production, the state and federal government are the mineral owners.

Sedimentary Rock: Strata, including sandstones, limestone and shale, formed from marine silt and organisms that settled in layers and underwent eons of pressure, heat, and other natural process. Some sedimentary rocks are packed densely enough to become impermeable, others remained porous; together they form the reservoir areas for oil and gas.

Seep: A site where oil or gas oozes from the ground. Ancient earthquakes produced large fractures in the rock, which, together with high, subterranean pressure, allows for the natural seepage of oil and gas.

Seismograph: A prospecting instrument that records shock waves reflected from underground rock layers from percussion equipment. The geophysicist can learn the general types of formations in an area by studying the wave intensity and intervals.

Sweetening: The process by which petroleum products are improved in odor and color by oxidizing or removing the sulfur-containing and unsaturated compounds.

Sweet Gas: Refers to a gas low in impurities. Natural gas is sometimes sweet enough to be usable directly from the well. The opposite of sweet gas is sour gas, which must go through a sweetening process

Test Well: a borehole drilled to help determine the presence, quality and quantity of gas or oil in a likely area.

Waters (State): The State of California regulates and receives royalties from operations in state waters, which is the area from shore to the three-mile mark.

Waters (Federal): A federal agency, the Minerals Management Service, regulates and receives royalties from operations in state waters, which is the area that begins at three miles offshore.

Well: A hole drilled from the surface into the reservoir. Typically lined with steel pipe that is cemented in place. May range from several hundred feet to several miles. This is the route oii and gas take when extracted from the reservoir.