PETROLEUM

Pumpjack pumping an oil well near Sarnia, Ontario

Petroleum (from Greek[[1]] petra – rock[[2]] and elaion– oil or Latin [[3]]oleum – oil) or crude oil, sometimes colloquially called black gold or "Texas Tea", is a thick, dark brown or greenish liquid.

Relevant data

Petroleum exists in the upper strata of some areas of theEarth's crust. It consists of a complex mixture of varioushydrocarbons, largely of the Alkane[[4]] series, but may vary much in appearance and composition. Petroleum is used mostly, by volume, for producing fuel oil and gasoline (or petrol), both important "primary energy" sources (IEA Key World Energy Statistics). Petroleum is also the raw material for many chemical[[5]] products, including solvents[[6]], fertilizers[[7]], pesticides [[8]], and plastics[[9]].

Extraction

Locating an oil field is the first obstacle to be overcome. Today, petroleum engineers use instruments such as gravimeters and magnetometers in the search for petroleum. Generally, the first stage in the extraction of crude oil is to drill a well into the underground reservoir. Historically, in the USA[[10]], some oil fields existed where the oil rose naturally to the surface, but most of these fields have long since been depleted, except for certain remote locations in Alaska. Often many wells (called multilateral wells) are drilled into the same reservoir, to ensure that the extraction rate will be economically viable. Also, some wells (secondary wells) may be used to pump water, steam, acids or various gas mixtures into the reservoir to raise or maintain the reservoir pressure, and so maintain an economic extraction rate. Recently in India also a Government controlled company, Oil and Natural Gas Corporation, ONGC, [[11]] is involved in complete oil business.

If the underground pressure in the oil reservoir is sufficient, then the oil will be forced to the surface under this pressure. Gaseous fuels or natural gas are usually present, which also supply needed underground pressure. In this situation it is sufficient to place a complex arrangement of valves (the Christmas_tree) on

the well headto connect the well to a pipeline network for storage and processing. This is called primary oil recovery. Usually, only about 20% of the oil in a reservoir can be extracted this way.

Over the lifetime of the well the pressure will fall, and at some point there will be insufficient underground pressure to force the oil to the surface. If economical, and it often is, the remaining oil in the well is extracted using secondary oil recovery methods (see: energy balance and net energy gain). Secondary oil recovery uses various techniques to aid in recovering oil from depleted or low-pressure reservoirs. Sometimes pumps, such as beam pumps and electrical submersible pumps (ESPs), are used to bring the oil to the surface. Other secondary recovery techniques increase the reservoir's pressure by water injection, natural gas reinjection andgas lift, which injects air, carbon dioxide or some other gas into the reservoir. Together, primary and secondary recovery allow 25% to 35% of the reservoir's oil to be recovered.

Tertiary oil recovery reduces the oil's viscosity to increase oil production. Tertiary recovery is started when secondary oil recovery techniques are no longer enough to sustain production, but only when the oil can still be extracted profitably. This depends on the cost of the extraction method and the current price of crude oil. When prices are high, previously unprofitable wells are brought back into production and when they are low, production is curtailed. Thermally enhanced oil recovery methods (TEOR) are tertiary recovery techniques that heat the oil and make it easier to extract. Steam injection is the most common form of TEOR, and is often done with a cogeneration plant. In this type of cogeneration plant, a gas turbine is used to generate electricityand the waste heat is used to produce steam, which is then injected into the reservoir. This form of recovery is used extensively to increase oil production in the San Joaquin Valley, which has very heavy oil, yet accounts for 10% of the United States' oil production. In-situ burning is another form of TEOR, but instead of steam, some of the oil is burned to heat the surrounding oil. Occasionally, detergents[[12]] are also used to decrease oil viscosity. Tertiary recovery allows another 5% to 15% of the reservoir's oil to be recovered.

Alternative means of producing oil

As oil prices continue to escalate, other alternatives to producing oil have been gaining importance. See [[13]].

[[Image:oilfield.jpg|frame|Oil field in California, 1938. The first modern oil well was drilled in 1848 by Russian engineer F.N. Semyonov, on the Aspheron Peninsula north-east of Baku.

Environmental effects

Burning oil releases carbon dioxide into the atmosphere, which contributes to global warming. Per energy unit, oil produces less CO2 than coal, but more than natural gas. However, oil's unique role as a transportation fuel makes reducing its CO2 emissions a particularly thorny problem; amelioration strategies such as carbon sequestering are generally geared for large power plants, not individual vehicles.

Renewable energy source alternatives do exist, although the degree to which they can replace petroleum and the possible environmental damage they may cause are uncertain and controversial. Sun, wind, geothermal,

and other renewable electricity sources cannot directly replace high energy density liquid petroleum for transportation use; instead automobiles and other equipment must be altered to allow using electricity (inbatteries) or hydrogen (via fuel cells or internal combustion) which can be produced from renewable sources. Other options include using biomass-origin liquid fuels (ethanol, biodiesel). Any combination of solutions to replace petroleum as a liquid transportation fuel will be a very large undertaking.

Classification

The oil industry classifies "crude" by the location of its origin (e.g., "West Texas Intermediate, WTI" or "Brent") and often by its relative weight (API gravity) or viscosity ("light", "intermediate" or "heavy"); refiners may also refer to it as "sweet", which means it contains relatively little sulfur, or as "sour", which means it contains substantial amounts of sulfur[[14]] and requires more refining in order to meet current product specifications.

OPEC attempts to keep the price of the Opec Basket between upper and lower limits, by increasing and decreasing production. This makes the measure important for market analysts. The OPEC Basket, including a mix of light and heavy crudes, is heavier than both Brent and WTI.

Source : http://engineering.wikia.com/wiki/Petroleum