Oil Production in Saudi Arabia

Saleh Alamer, Saudi Students House of Pittsburgh

Introduction to Petrol

The natural process of oil formation began million of years ago. Movements of giant plates in the Earth's crust created natural traps that kept the oil in place. Now we use advanced technology to locate these oil deposits and bring them to surface.

Origins of Petrol

The world's oceans and lakes were full of fish and other forms of marine life, including billions and billions of single-celled organisms. As all of this marine life died, it fell to the ocean floor. Over millions of years the decaying organic matter at the bottom of oceans and lakes accumulated in layers up to one mile thick.

Landslides and earthquakes deposited layers of clay over the decaying micro-organisms, creating a type of seal. These layers subject the decaying micro-organisms to tremendous pressure.

These micro-organisms have transformed by heat, pressure, and bacteria into the hydrocarbons we seek today.

Drilling Unit

Off shore oil field

Distillation & Fractionation

Oil and the petroleum gasses produced along with it contain many valuable chemicals. The process of un-mixing and extracting each of these chemicals is called distillation and fractionation.

The process is based on the scientific fact that any pure substance has a specific boiling pint or a temperature at which it vaporizes to gas form.

The Process:

- First the oil is heated until it vaporizes.
- These vapors are trapped in a vessel that separate them as they cool.
- The separated vapors condense into liquids.
- The process is then repeated to extract more liquids and products.

Crude Oil Unit

Searching for Petrol

The main character all oil explorationists have is reading the clues.

The Earth's plates have moved a lot in the past 7 million years causing the Earth's crust to buckle and crack, creating traps. The decaying organic matter forming oil is caught in these traps.

One clue is the fossil of plants and animals. These plants and animals are the origin of petrol.

Another way of searching for oil is to use sound waves to give us a good picture of the under ground structure.

The next step is to make a drill test to gather core samples of material from deep underground.

The core samples are then sent to geology labs for analysis.

Oil Tanker

Drilling and Production

The challenges of getting oil from the ground include drilling down the oil, lifting it to the surface, and moving it to the refinery for processing into valuable products.

In addition to drilling on land, it's common to use over-water drilling rigs to search for oil under the sea floor.

The process starts by making a deep vertical hole into the earth, then turning horizontal for the final penetration into the oil-zone.

Once the oil is pumped to the surface, it goes to a gas-oil separator plant. There, the gas is taken out of the oil stream. The oil goes to be stabilized and stored in tanks.

Next, it is loaded into supertankers that carry it to consumers all over the world.

Transportation Network

One of oil's greatest advantages is its transportability (its ability to travel).

Pipelines are the most efficient means of transporting oil. They must be designed to overcome gravity, friction, expansion and contraction. Series of pumps push oil through these pipelines.

The other mean is oil tanker ships. The largest oil tanker can carry about 3 million barrels of oil. It only requires a crew of 30 people!

Saudi Oil History

1933
Saudi Arabia grants oil concession to California Arabian Standard Oil Company (Casoc), affiliate of Standard Oil of California (Socal, today's Chevron). Oil prospecting begins on Kingdom's east coast.
1936
Texas Company (known as Texaco, now part of Chevron) acquires 50 percent interest in Socal's concession.
1938
Kingdom's first commercial oil field discovered at Dhahran. Crude is exported by barge to Bahrain.
1939
First tanker load of petroleum is exported.
1944
Casoc changes its name to Arabian American Oil Company (Aramco).
1948
Standard Oil of New Jersey and Socony-Vacuum Oil (both now Exxon Mobil) join Socal and Texaco as owners of Aramco.
1950
1,700km Trans-Arabian Pipe Line (Tapline) is completed, linking Eastern Province oil fields to Lebanon and the Mediterranean.
1973
Saudi Arabia's Government acquires a 25 percent participation interest in Aramco.
1975
Master Gas System project is launched.
1980
Saudi Government acquires 100 percent participation interest in Aramco, purchasing almost all of the company's assets.
1981
East-West Pipelines, built for Aramco's natural gas liquids (NGL)and crude oil, link the Eastern Province with Yanbu' on Red Sea.
1982
Exploration and Petroleum Engineering Center (EXPEC) opens in Dhahran.
1984
Company acquires its first four supertankers.
1987
East-West Crude Oil Pipeline expansion is completed, boosting capacity to 3.2 million barrels per day (bpd).
1988
Saudi Arabian Oil Company, or Saudi Aramco, is established.
1992
East-West Crude Oil Pipeline capacity boosted to 5 million bpd. Saudi Aramco affiliate purchases 35 percent interest in SsangYong Oil Refining Company (now S-Oil Corporation) of the Republic of Korea.
1993
Saudi Aramco takes charge of Kingdom's domestic refining, marketing, distribution and joint-venture refining interests.
1996
Saudi Aramco acquires 50 percent of Motor Oil (Hellas) Corinth Refineries and Avinoil. Company also assumes controlling interest in two Jiddah-based lubricants companies, now known as Saudi Aramco Lubricating Oil Refining Company (Luberef) and Saudi Arabian Lubricating Oil Company (Petrolube).
1998
Saudi Aramco, Texaco and Shell establish Motiva Enterprises LLC, a major refining and marketing joint venture in the southern and eastern United States.
2000
Petroleum Intelligence Weekly ranks the company No.1 in the world for the 11th straight year, based on the Kingdom's crude oil reserves and production.
Aramco Gulf Operations Limited is established to assume management of the government's petroleum interest in the Offshore Neutral Zone between Saudi Arabia and Kuwait.
New facilities are under construction in the Haradh and Hawiyah gas plant projects to process gas for delivery to the Master Gas System and on to domestic markets.
2001
Hawiyah Gas Plant, capable of processing up to 1.6 billion standard cubic feet per day of non-associated gas, comes on stream.
2003
Haradh Gas Plant completed two and a half months ahead of schedule.
2005
Saudi Aramco and Sumitomo Chemical Co., Ltd. sign a joint venture agreement for the development of a large, integrated refining and petrochemical complex in the Red Sea town of Rabigh, on Saudi Arabia's west coast.

2006
Saudi Aramco and Sumitomo Chemical broke ground on PETRORabigh, an integrated refining/petrochemical project. Haradh III was completed, yielding 300,000 bpd of oil. Accords were signed for two export refineries -- Jubail (with Total) and in Yanbu' (with Conoco-Phillips).
2007
Saudi Aramco begins a program to build a $10 billion world-class graduate research university, the King Abdullah University of Science and Technology (KAUST).