**Oil (petroleum) Basics**

**What is crude oil and how is it recovered?**

Crude oil is a fossil fuel that is a mixture of hydrocarbons that formed from plants and animals that lived millions of years ago. Crude oil exists in a liquid or solid form in tiny spaces within sedimentary rocks.

We can recover liquid petroleum by simply drilling into rock that contains petroleum. Sometimes the petroleum does not flow easily into the well, and chemicals or steam are injected into the well to help the oil flow.

Petroleum can also be in rock as a solid tarry substance between the grains in the rock. This solid petroleum will not flow into a well, but must be mined. The U.S. has some shale deposits that contain solid petroleum in the Southwest, but we do not currently have the technology to recover this petroleum cheaply enough to market it. However, Canada has large deposits of solid petroleum in its oil sands that it is currently recovering, making Canada the third largest producer of petroleum in the world.

**Where is U.S. oil produced?**

Crude oil is produced in 31 U.S. states and in U.S. coastal waters. In 2014, about 65% of U.S. crude oil production came from five states:1

* Texas (37%)
* North Dakota (13%)
* California (6%)
* Alaska (6%)
* Oklahoma (4%)

In 2014, about 16% of U.S. crude oil was produced from wells located offshore in the federally administered waters of the Gulf of Mexico.

Although total U.S. crude oil production generally declined between 1985 and 2008, it has been increasing since 2008. More cost-effective drilling technology has helped boost production, especially in Texas, North Dakota, Oklahoma, and Colorado.

**Offshore Drilling**

When you are at an ocean beach, you are not at the very edge of the United States. Although it might seem like the ocean is the nation's border, the border is actually 200 miles away from the land. This area around the country is called the Exclusive Economic Zone (EEZ).

Offshore drilling is done from drilling platforms that may be attached to the ocean floor, or may float. Offshore drilling is more expensive and more hazardous than drilling for oil on land, but some of the most productive oil fields in the U.S. are offshore.

Several federal government agencies manage the natural resources in the EEZ. The U.S. Department of Interior's Bureau of Ocean Energy Management and the Bureau of Safety and Environmental Enforcement manage the development of offshore energy resources by private companies. These companies lease areas for energy development and pay the federal government royalties on the energy resources they produce from the ocean. Individual states control the waters off their coasts out to 3 miles for most states and between 9 miles and 12 miles for Florida, Texas, and some other states.

**How Does Oil Impact the Environment?**

Products from oil (petroleum products) help us do many things. We use them to fuel our airplanes, cars, and trucks, to heat our homes, and to make products like medicines and plastics. Even though petroleum products make life easier, finding, producing, moving, and using them can harm the environment through air and water pollution.

Drilling for oil can cause environmental and problems. When wells are drilled on land, habitat is disturbed for drilling platforms and roads. During drilling, toxic fluids are produced that must be safely disposed of. Some oil is moved using aboveground pipelines, which can rupture and contaminate the soil and water in an ecosystem.

Wells drilled at sea also create environmental and health risks. Oil can be spilled during drilling or when transferring oil to the ships that transport it. Large oil spills can disrupt marine animals and shoreline habitats for decades. Accidents on offshore oil rigs can cause fires and injure workers.

Mining solid petroleum is from sandstone or shale has a different set of environmental issues. Mining disrupts large areas of land, much of it in wilderness areas. This process can use a lot of water, and runs the risk of contaminating water supplies. The biggest issue is that mining petroleum requires a lot of energy. It can take a barrel of oil to produce three barrels of oil from solid petroleum. This means that these forms of petroleum end up releasing much more carbon dioxide into the atmosphere than liquid forms of petroleum do.

Petroleum products give off many emissions when they are burned as fuel. These emissions can cause serious risks to human health and the environment, including:

* Carbon dioxide (CO2): a greenhouse gas and a source of global warming.
* Sulfur dioxide (SO2): causes acid rain, which is harmful to plants and to animals that live in water, and it worsens or causes respiratory illnesses and heart diseases, particularly in children and the elderly
* Nitrogen oxides (NOX) and Volatile Organic Compounds (VOC): contribute to ground-level ozone, which irritates and damages the lungs.
* Particulate matter (PM): results in hazy conditions in cites and scenic areas, and, along with ozone, contributes to asthma and chronic bronchitis, especially in children and the elderly. Very small, or “fine PM” is also thought to cause emphysema and lung cancer.
* Lead: can have severe health impacts, especially for children, and air toxics are known or probable carcinogens

**Reducing Pollution from Oil**

Over the years, new technologies and laws have helped to reduce problems related to petroleum products. As with any industry, the Government monitors how oil is produced, refined, stored, and sent to market to reduce the impact on the environment. Since 1990, fuels like gasoline and diesel fuel have also been improved so that they produce less pollution when we use them.

Exploring and drilling for oil may disturb land and ocean habitats. New technologies have greatly reduced the number and size of areas disturbed by drilling, sometimes called "footprints." Satellites, global positioning systems, remote sensing devices, and 3-D and 4-D seismic technologies make it possible to discover oil reserves while drilling fewer wells.

The use of horizontal and directional drilling makes it possible for a single well to produce oil from a much bigger area. Today's production footprints are also smaller those 30 years ago because of the development of movable drilling rigs and smaller "slimhole" drilling rigs.

When the oil in a well becomes uneconomic to produce, the well must be plugged below ground, making it hard to tell that it was ever there. As part of the "rigs-to-reefs" program, some old offshore rigs are tipped over and left on the sea floor to become artificial reefs that attract fish and other marine life. Within six months to a year after a rig is toppled, it becomes covered with barnacles, coral, sponges, clams, and other sea creatures.

http://www.eia.gov/kids/energy.cfm?page=oil\_home-basics