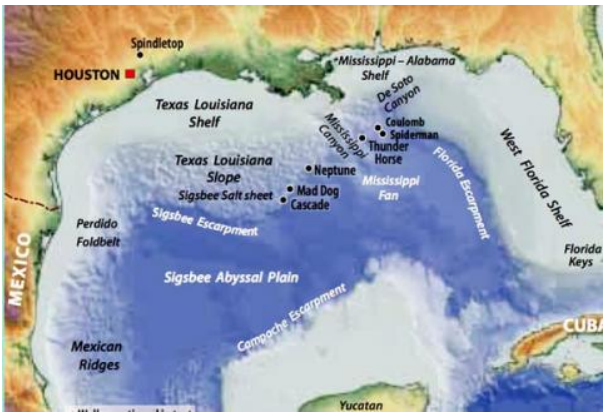
AWESOME stories

OFFSHORE DRILLING in the GULF of MEXICO



This map depicts a current view of the Gulf of Mexico. It was once larger, with algae growing along its shoreline. Algae, like plankton, is an ingredient in the transformation of organic material into petroleum (oil and natural gas). Note the location of Spindletop, America's first "oil gusher."

A percentage of America's petroleum resources are located deep in the seabed below the Gulf of Mexico. Some of the oil is located in an area known as the Mississippi Canyon where the sea floor is 4,993 feet below the water's surface.

To drill for oil in the Mississippi Canyon, one would need equipment capable of descending 18,000 feet - or more - from the oil rig's platform. What happens when such a well is drilled?

> *In simplified terms, the drilling process uses a motor, either at the surface or downhole, to turn a string of pipe with a drill bit connected to the end. The drill bit has special "teeth" to help it crush or break up the rock it encounters to make a hole in the ground. These holes can vary in diameter from a few inches to approximately 2 ft (0.6 m), but are usually in the range of 8 to 12 in (20 to 30 cm).*
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> *While the well is being drilled, a fluid, called drilling mud, circulates down the inside of the drill pipe, passes through holes in the drill bit, and travels back up the wellbore to the surface. The drilling mud has two purposes:*
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> - *To carry the small bits of rock, or cuttings from the drilling process to the surface so they can be removed.*
> - *To fill the wellbore with fluid to equalize pressure and prevent water or other fluids in underground formations from flowing into the wellbore during drilling.*
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> *Water-based drilling mud is composed primarily of clay, water, and small amounts of chemical additives to address particular subsurface conditions that may be encountered. In deep wells, oil-based drilling mud is used because water-based mud cannot stand up to the higher temperatures and conditions encountered.*

Suppose the offshore drillers (click on "Ultra-Deep Water Operations") have correctly targeted an area of oil. If we were able to see the "find," what would we observe? Would the petroleum be located in a vein (like coal, another fossil fuel), in an underground river (akin to a groundwater aquifer) or something else altogether?

During millions of years, the oil and gas that formed in the source rock deep within the earth moved upward through tiny, connected pore spaces in the rocks. Some seeped out at the surface of the earth. But most of the petroleum hydrocarbons were trapped by nonporous rocks or other barriers that would not allow them to migrate any further.

These underground traps of oil and gas are called reservoirs. Reservoirs are not underground "lakes" of oil; reservoirs are made up of porous and permeable rocks that can hold significant amounts of oil and gas within their pore spaces [akin to a sponge]. *The properties of these rocks allow the oil and natural gas within them to flow through the pore spaces to a producing well.*

Some reservoirs are only hundreds of feet below the surface, while others are thousands of feet underground. In the United States, a few reservoirs have been discovered at depths greater than 30,000 ft (9.15 km). Many offshore wells are drilled in thousands of feet of water and penetrate tens of thousands of feet into the sediments below the sea floor.

Most reservoirs contain oil, gas, and water. Gravity acts on the fluids and separates them in the reservoir according to their density, with gas being on top, then oil, then water. However, other parameters, such as fluid or rock properties and solubility will restrict complete gravitational separation. When a well produces fluids from a subsurface reservoir, typically oil and water, and often some gas, will be recovered. (Quoted passages from the *Society of Petroleum Engineers*, "How Does the Industry Find Oil and Natural Gas?")

Deep in the Gulf of Mexico's "Macondo Prospect" - the name given to an oil-exploration area - there is a reservoir of petroleum located at Mississippi Canyon 252. Before anyone knew for sure that such a reservoir existed, the U.S. government - acting through Minerals Management Services - granted BP a lease of the area in early 2009.

The company planned to sink two wells - "A" and "B."

About one year later, a 378-foot-high sophisticated oil rig called "Deepwater Horizon," which BP leased from Transocean, arrived at the drilling area. Built in South Korea by Huyndai, at a cost of $350 million, she had a crew of 126 people who were working offshore, just 47.6 statute miles from the Louisiana coast.

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