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We're Going Global

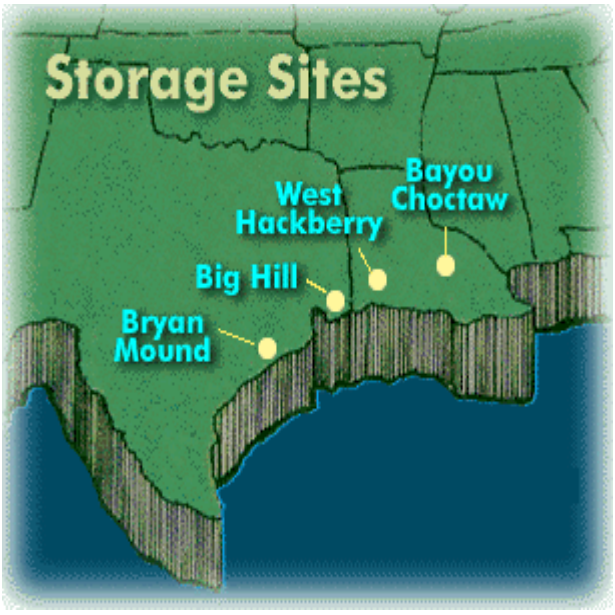
Storage Caverns…

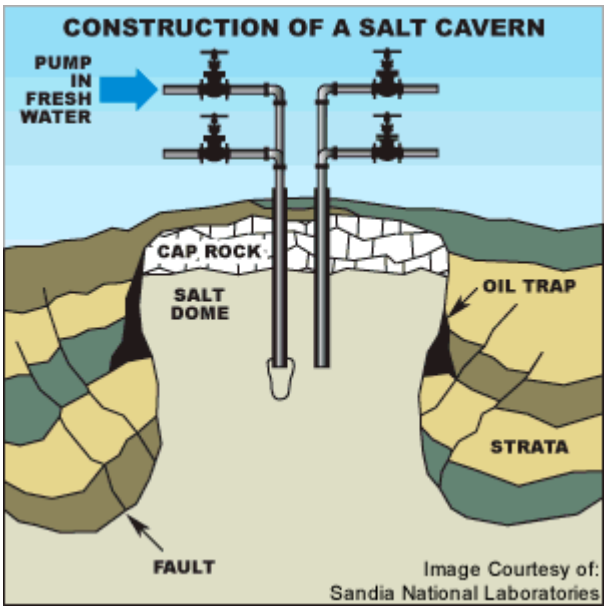
There are literally thousands of underground storage caverns across the globe containing a variety of hydrocarbons including Liquefied Petroleum Gas (LPG), propane, butane, ethane, ethylene, fuel oil, gasoline, and crude oil.

For the purposes of this TECHTALK, we will concentrate on crude caverns and explore their purpose with regards to the Strategic Petroleum Reserve here in the United States.

The Strategic Petroleum Reserve (SPR) is the world's largest supply of emergency crude oil. The federally-owned oil stocks are stored in huge underground salt caverns along the coastline of the Gulf of Mexico.

When the U.S. Government decided to create the Strategic Petroleum Reserve in the mid-1970s, it acquired previously created salt caverns to store the first 250 million barrels of crude oil. This was the most rapid way to begin securing an emergency supply of crude oil following the oil shocks of the 1970s. To stockpile oil beyond the first 250 million barrels, the Department of Energy created additional caverns. Today the current storage capacity is 714 million barrels and current days of import protection is 59 days





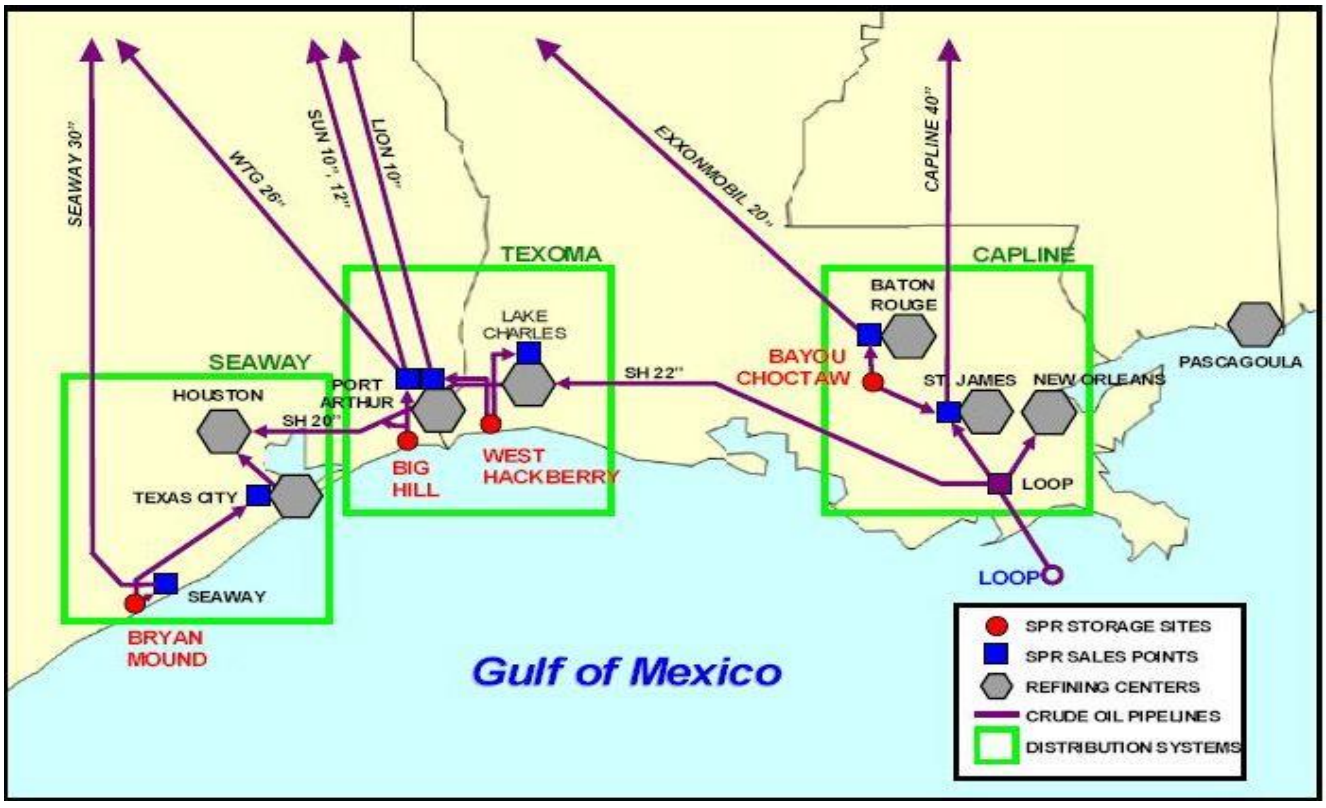
Salt caverns are carved out of underground salt domes by a process called "solution mining." Essentially, the process involves drilling a well into a salt formation, then injecting massive amounts of fresh water.

The water dissolves the salt. In creating the SPR caverns, the dissolved salt is removed as brine and either reinjected into disposal wells or more commonly, piped several miles offshore into the Gulf of Mexico. By carefully controlling the freshwater injection process, salt caverns of very precise dimensions can be created.

Strategic Petroleum Reserve caverns range in size from 6 to 35 million barrels in capacity; a typical cavern holds 10 million barrels and cylindrical in shape with a diameter of 200 feet and a height of 2,000 feet.

The fact that oil floats on water is the underlying mechanism used to move oil in and out of the SPR caverns. In some caverns, in order to withdraw crude oil, fresh water is pumped into the bottom of a cavern. The water displaces the crude oil to the surface. Other caverns have sophisticated pumping systems. After the oil is removed from the SPR caverns, pipelines send it to various terminals and refineries around the nation.

Created deep within the massive salt deposits that underlie most of the Texas and Louisiana coastline, the caverns offer the best security and are the most affordable means of storage, costing up to 10 times less than aboveground tanks and 20 times less than hard rock mines.



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Why the Gulf Coast…

Storage locations along the Gulf Coast were selected for the SPR because they provide the most flexible means for connecting to the nation's commercial oil transport network. Strategic Reserve oil can be distributed through interstate pipelines to nearly half of the Nation's oil refineries or loaded into ships or barges for transport to other refineries.

Besides being the lowest cost way to store oil for long periods of time, the use of deep salt caverns is also one of the most environmentally secure. At depths ranging from 2000 to 4000 feet, the salt walls of the storage caverns are "self-healing." The extreme geologic pressures make the salt walls rock hard, and should any cracks develop in the walls, they would be almost instantly closed.

An added benefit of deep salt cavern storage is the natural temperature difference between the top of the caverns and the bottom, a distance of around 2,000 feet. The temperature differential keeps the crude oil continuously circulating in the caverns, maintaining the oil at a consistent quality.

Strategic Petroleum Reserve Facts

- **Current storage design capacity -** 714 million barrels
- **Crude Oil Storage by Site** (as of August 31, 2015)

  Bryan Mound - holds 245.0 MMB in 20 caverns - 68.6 MMB sweet and 176.4 MMB sour
  Big Hill - holds 162.3 MMB in 14 caverns - 67.7 MMB sweet and 94.6 MMB sour
  West Hackberry - holds 213.2 MMB in 22 caverns - 107.6 MMB sweet and 105.5 MMB sour
  Bayou Choctaw - holds 73.6 MMB in 7 caverns - 21.7 MMB sweet and 51.8 MMB sour

- **Current days of import protection in SPR -** The SPR holds the equivalent of 137 days of import protection (based on 2014 net petroleum imports). Time for oil to enter U.S. market - 13 days from Presidential decision
- Decisions to withdraw crude oil from the SPR are made by the President under the authorities of the **Energy Policy and Conservation Act**. In the event of an energy emergency, SPR oil would be distributed by competitive sale. The SPR's formidable size (design capacity of 714 million barrels) makes it a significant deterrent to oil import cutoffs and a key tool of foreign policy. The SPR has been used under these circumstances only three times, most recently in June 2011 when the President directed a sale of 30 million barrels of crude oil to offset disruptions in supply due to Middle East unrest. The United States acted in coordination with its partners in the International Energy Agency (IEA). IEA countries released all together a total of 60 million barrels of petroleum.

STRATEGIC PETROLEUM RESERVE INVENTORY					
CURRENT SPR INVENTORY AS OF February 26, 2016					
SWEET	SOUR				TOTAL
266.1 million bbls	429 million bbls	*			695.1

SPR OIL MOVEMENTS in Millions of Barrels					
MONTH	EXCHANGE BARRELS		Fill BARRELS		NET MOVEMENT
Jan-16	0.0		0.0		0.0
Feb-16	0.0		0.0		0.0

( ) = Barrels released from SPR

* Totals may change due to rounding

An aerial view of the Bryan Mound storage site of the Strategic Petroleum Reserve
Photo: U.S. Department of Energy

Source http://energy.gov/fe/services/petroleum-reserves/strategic-petroleum-reserve
Source: http Source: http://www.earthlyissues.com/spr.html