Technology Tuesday

Description

Weâ€™re running out of petroleum?

I donâ€™t think so. Itâ€™s just weâ€™ve managed to get the easy to find and extract from the earth reserves. Iâ€™m no geologist, but I dod some unintentional reading once in a while on this topic. I know weâ€™re actually progressed past the â€œeasyâ€• to get oil, and have developed techniques to go back to â€œoldâ€• fields and use methods, like hot water/steam to tease the entrained oil out of the surrounding soil so we can have that, too.

Just the other day, Brazil found a huge reserve of oil. From Forbes:

default watermark

> 11.09.07, 2:27 PM ET SAO PAULO, Brazil â€“
>
> A monster offshore oil discovery and promising fields near the find could help Brazil join the ranks of the worldâ€™s major exporters, but full-scale extraction is unlikely until 2013 and will be very expensive.
>
> The â€œultra-deepâ€• Tupi field off the coast of Rio de Janeiro could hold as much as 8 billion barrels of recoverable light crude, and initial production should exceed 100,000 barrels daily, though experts believe the amount will then go much higher.
> [â€¦]

So, whatâ€™s the deal? Isnâ€™t this post about technology?

Yep. Hang in here. Notice the words â€œultra-deep?â€•

> [..]
> Though tapping the Tupi field will be expensive, Petrobras is flush with cash for strategic investments because of growing production and high international oil prices.
>
> The Tupi field lies under 2,140 meters (7,060 feet) of water, more than 3,000 meters (almost 10,000 feet) of sand and rocks, and then another 2,000-meter (6,600-foot) thick layer of salt.
> [â€¦]

Kinda sounding like Bruce Willis andf his crew trying to get to the 800 feet on the asteroid, doesnâ€™t it, but without the zero gravity?

Obviously, it can be retrieved. Itâ€™s because we have discovered similar deposits in the Gulf of Mexico, but they areâ€¦a little bit deeperâ€¦to the tune of 30,000 ft down. From Wired:

> [â€¦]
> Siegele has reason to be giddy. He works for Chevron, and his team is sitting on several new record-breaking discoveries in the Gulf, a region that many geologists believe may have more untapped oil reserves than any other part of the world. On this trip, the 48-year-old vice president for deepwater exploration has come to a rig called the Cajun Express to oversee final preparations before drilling begins on the companyâ€™s 30-square-mile Tahiti field.
> [â€¦]
> A drill is plunging down through 4,000 feet of ocean and more than 22,000 feet of shale and sediment Ã¢â‚¬â€• a syringe prodding Earthâ€™s innermost veins. That 5-mile shaft will soon give Chevron the deepest active offshore well in the Gulf. Some land drills have gone deeper, but extracting oil from below miles of freezing salt water and unyielding sediment creates a set of technical problems that far exceed those faced on terra firma.
> [â€¦]

default watermark

And, the challenges are many and varied. Farther in the article, they discuss the drilling â€œplatformâ€• is actually a ship, based on the technology of the Glomar Explorer. It is a ship, not a fixed rig; it is not anchored, it hovers, using 4 large thrusters and a GPS feed to keep the ship above the pipe to the ocean floor, built of 90 ft sections. Top that off with the oil, being as deep as it in the earthâ€™s mantle, is hot and therefore very thin in terms of fluidity. When it gets to the piping exposed to the ocean on itâ€™s trip to the surface, itâ€™s all of a sudden surrounded by not much over 32 degree water, causing a dramatic change in viscosity. Again from the Wired article:

> [â€¦]
> Dropping a drill down through more than 1 mile of water and 4 miles of earth isnâ€™t easy either. The drill string is composed of hundreds of 90-foot sections known as joints that are dropped into the water by an automated mechanical arm and successively screwed into each other. It took more than three days to assemble all the joints in the drill string that pierced the Jack field.
>
> Once the rotating drill bit begins its journey down through miles of sediment and pierces the seafloor, it encounters another set of problems caused by the changing terrain. The test well for the Jack field drilled through nearly a dozen geological layers Ã¢â‚¬â€• ranging from hard bedrock to sandy sediment to empty voids. These rapid shifts from one level of pressure to another can disturb the rotations of the drill, causing it to get stuck or veer off course. Pressure is good Ã¢â‚¬â€• itâ€™s what naturally forces the liquid crude up the length of the well and into the barges and pipelines that send it back to shore. (The layer of shale over the oil-bearing sands acts like a brick on top of a water balloon Ã¢â‚¬â€• the fluid wants to surge upward.) But, at the very bottom, farther below sea level than Mount Everest is above it, thereâ€™s enough pressure to implode a human head Ã¢â‚¬â€• or, more pertinently, to crack iron casings.
>
> Moreover, the closer you get to Earthâ€™s core, the higher the temperature of the rocks. At 20,000 feet below seabed, the oil is hot enough to boil an egg. At 30,000 feet, it can reach more than 400 degrees Fahrenheit, hot enough to cook off into natural gas and carbon dioxide. Meanwhile, the water at the bottom of the deep sea is at near-freezing

> temperatures Ã¢â‚¬â€• between 32 and 34 degrees Ã¢â‚¬â€• creating a dangerous interaction: When the boiling-hot oil hits the freezing-cold water, it could solidify and block the flow, rupturing the pipes. The machinery on the seafloor, therefore, has to be well insulated. Engineers on the Cajun Express have been relying on a fairly primitive method Ã¢â‚¬â€• pumping the casing and substations with antifreeze Ã¢â‚¬â€• but much more sophisticated systems are in the works.
> [â€¦]

Soâ€¦there is oil to be taken from the Earth, above and beyond what we thought, because now we can go deeper to get it. With the cost of a barrels of oil hovering about the high $90s, to $100, it makes this a good investment of money to figure out the technology to get this oil to market. I also hopes it puts some pressure on the market,as the supply expands.

Interesting stuff.

â€œPopular opinion is the greatest lie in the world.â€•
-Thomas Carlyle

default watermark

Category

1. Technology
2. Technology Tuesday

Date Created
November 13, 2007
Author
admin