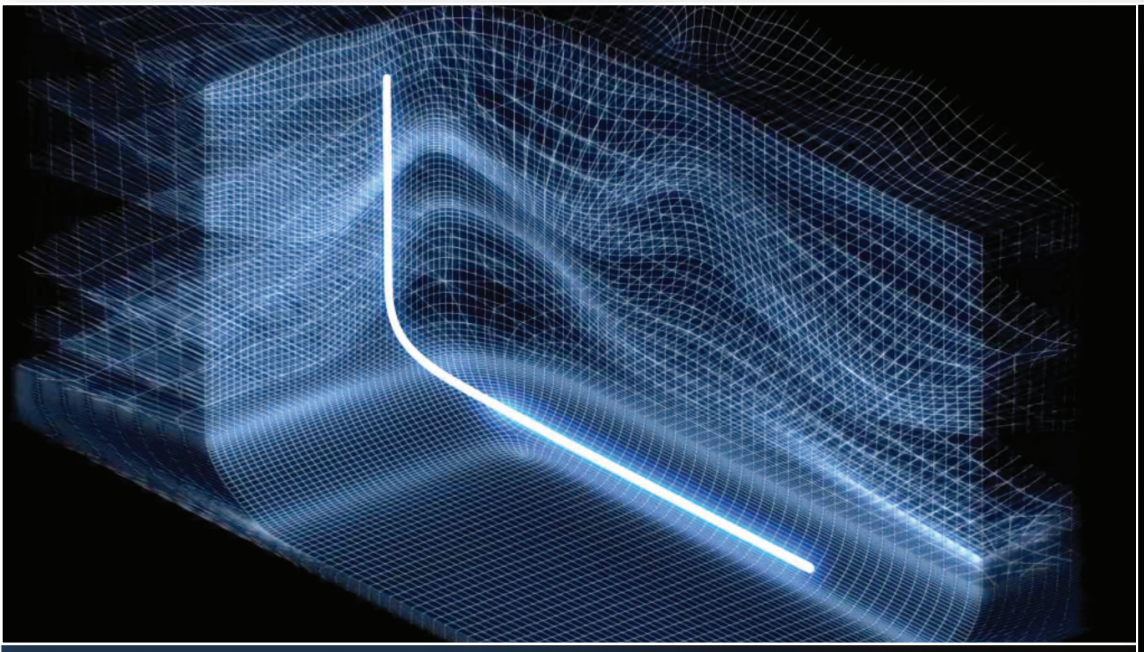
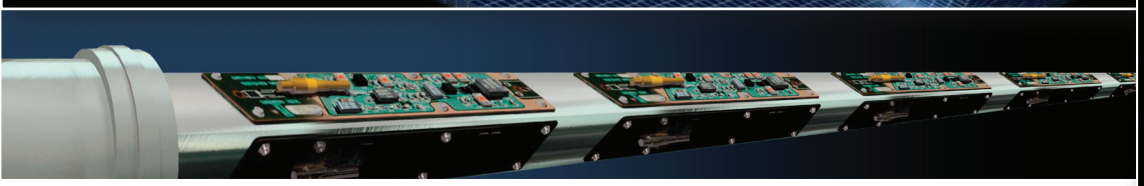
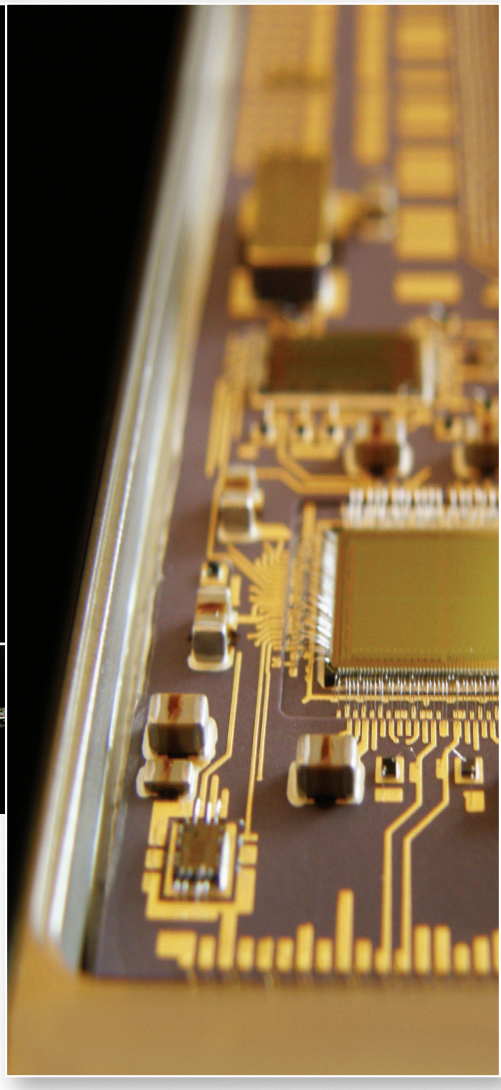






Senate Committee on Energy and Natural Resources

Andy Hendricks, President
Drilling and Measurements Schlumberger

May 10, 2011

Schlumberger

Mr. Chairman and members of the Committee, good morning. My name is Andy Hendricks, and I'm the president of the Drilling & Measurements division of Schlumberger. I have a degree in Petroleum Engineering, and my industry expertise is in the area of horizontal and extended-reach drilling of oil and gas wells. Schlumberger is the leading oilfield services provider, and my division is responsible for supplying oil companies with technology and services in order to control and navigate the direction of oil and gas wells, improve drilling performance to reduce overall costs, and to maximize the contact of the wellbore with the oil or gas bearing rock, or what we call - the reservoir.

I'm here today to talk to you about today's high-tech drilling technology. Our industry is about high-tech tools and equipment, and the skilled engineers who run them. Drilling has become a sophisticated science as it evolved over the years. In 1858, the Drake well in Pennsylvania was the first US oil well. This well was drilled with a cable tool drilling rig, which compared to today's standards, is a rudimentary concept that utilizes gravity and heavy steel bars suspended at the end of a cable to pound and crush the rock. The result then was a simple, vertical well, with the drilling operation making progress in the ground at 3 feet each day. Drake's well was 69 1/2 ft deep.

In 1901, rotary drilling rigs were the next big step change for the industry, where pipe is lowered into the well and rotated at the surface in order to turn a drill bit at the bottom of the well. Fluid is circulated down the pipe in order to cool the drill bit as it rotates and crushes the rock, and then to lift the drill cuttings from the well. Again, these wells were drilled vertical, or straight down, but early advancements allowed engineers to control the direction of the well, with a technique based on placing a simple, triangular-shaped deflection device down into the well and aligning this with a compass heading. At the time, the technology was in its infancy and progress was slow.

Today, we have full navigational and guidance instrumentation built into the drilling assembly at the bottom of the well—much more advanced and precise than the navigation system in your car—with high-speed communications through the drill pipe that allows us to direct the path of the well using robotic steering devices. One of our state-of-the-art pieces of equipment, which we refer to as a Measurements While Drilling tool, contains an electronics package consisting of two high-speed computer processors and memory boards, collecting data from navigational instrumentation and sensors, powered by its own turbine driven generator, and all of which is packaged and ruggedized to withstand 30,000 psi of wellbore pressure, temperatures to 400 degrees, and shock and vibration exceeding 150 Gs. Imagine baking your iPhone or Blackberry in the oven, then driving over it, and expecting it to continue to function.

An oil well drilled today will start off going straight down from the surface, but then it may gradually turn upwards through a smooth curve until it is going horizontal, or parallel with the surface, and then progress sideways, moving up and down or left and right in order to either maximize the reservoir contact, or link together smaller reservoir pockets in a chain along this 3-dimensional wellbore path. And when it comes to drilling performance, where the drilling of a well used to progress at 3 feet each day, today we drill wells at hundreds of feet each hour, and finish after the drill bit has travelled several miles into the earth.

With today's technology, we can drill multiple wells from a single location at the surface. This is a process called pad drilling or template drilling, and it is used in places like the Rockies on land or offshore from platforms. This reduces the footprint of the drilling operation on the surface by eliminating the need for multiple single-well locations. The challenge in this process is to navigate a dense cluster of well bores close to the surface, and we accomplish this through the use of the navigational technology mentioned previously.

Another complex operation used more and more is extended-reach drilling. In recent years, the oil and gas industry has been increasing its ability to drill longer and longer wells with more complex 3-dimensional paths. The horizontal lengths of these extended-reach wells are measured in miles. In Prudhoe Bay, Alaska, and in other parts of the world, extended-reach drilling is used to access offshore reservoirs using drilling rigs on land. The drilling of these long horizontal sections requires expert engineering, planning, and high-tech equipment to steer the miles of pipe drilling underground. We currently hold the world record for directionally drilling this type of well at 7.6 miles.

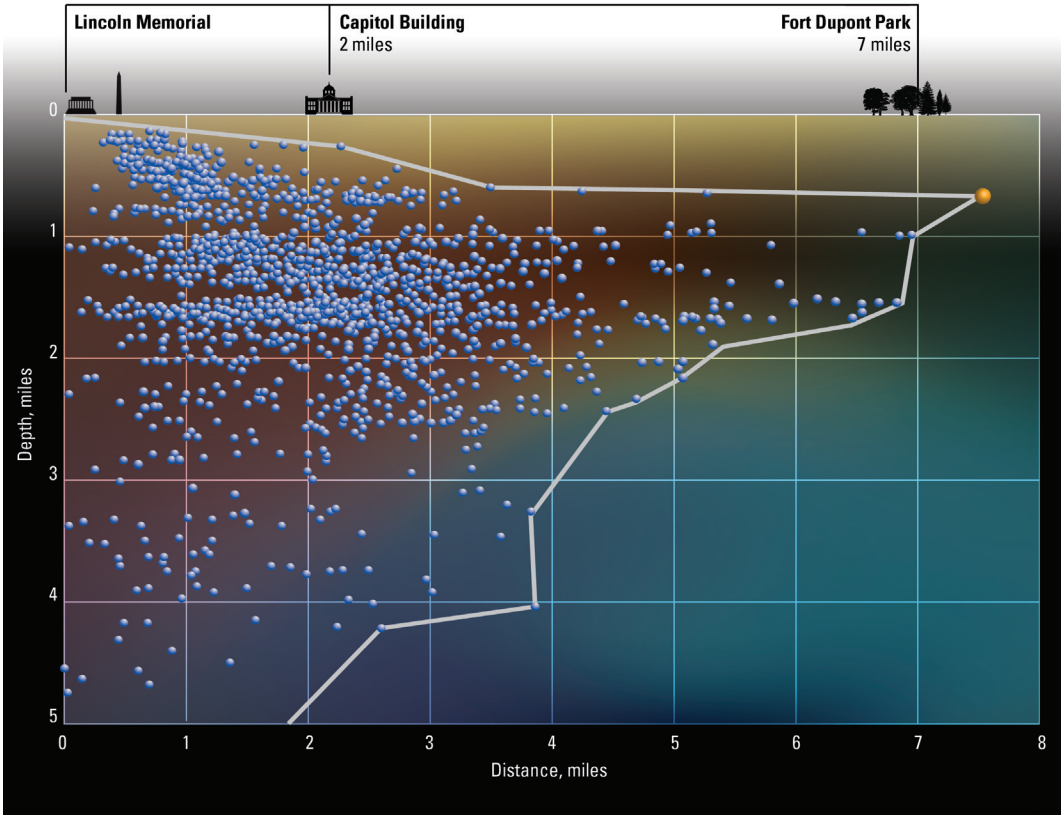
Now when it comes to placing the well in the productive zone, imagine that this room is a reservoir. It's miles down, and you're not even sure exactly what is in here. The walls, ceiling and floor are the borders, and we want to drill within these to get as much reservoir contact as possible—the steering is directed from 5 miles away. To do this, we will use a complex device called a rotary steerable system to steer the well path, and we will also have a variety of high-tech sensors collecting data in order to identify the reservoir boundaries, and analyze the type of rock we are in, and whether or not we have oil and gas.

The sensors include multi-frequency acoustic sound waves, electromagnetic radio waves, and magnetic resonance imaging that illuminate the reservoir, or in our case this room, so we can see where we are and steer the well to the most productive zones. All of this is done while we drill the well, by highly skilled engineers and geoscientists.

Schlumberger is the leader in drilling services and we hire the best from the most prestigious universities in the US and other countries. Our latest advancements further integrate technologies to improve drilling performance and to provide advanced techniques that allow the oil companies to reduce their costs. In 2010, we invested $919 million in research and engineering and worked with oil companies to drill more than 7,000 miles.

With our 2010 acquisition of Smith, we have complemented our existing technologies with drill bits, specialty drilling tools, drilling fluids and more, to provide a complete and integrated downhole drilling system. The next few years will be very exciting and see even more advancements.

I thank you for your time and attention.



This diagram shows a plot of the top extended-reach wells in the US and other countries. Extended reach drilling is a complex process of very long horizontal sections with challenging 3D paths. It requires expert engineering, planning, and high-tech equipment to steer the miles of pipe underground. The dot farthest to the right is the current world record held by Schlumberger at 7.6 miles. For context if a well started at the Lincoln Memorial, the well path could easily reach under the Capitol Building - 2 miles away with pinpoint accuracy, and continuing drilling as far as Fort Dupont Park is still a shorter distance than the current world record.