The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

Tapping into the Riser in the BP Deepwater Horizon Oil Spill

Posted by Heading Out on May 17, 2010 - 10:30am
Topic: Supply/Production
Tags: deepwater horizon, oil spill [list all tags]

The initial success that BP has obtained in inserting a 4-inch pipe into the broken riser that leads from the leaking well in the Gulf, is not yet clearly evident. Although the pipe has been inserted, and oil and natural gas are being carried to the surface, the full capacity of the system has not yet been tested. The intent is to slowly increase the volume of fluids carried to the surface, so as to define the limits of what is achievable. The official statement for the day (Sunday) notes that:

> Secretary Salazar and Secretary Napolitano issued a joint statement on these efforts: "Today, BP attempted another test to contain some of the oil leaking from the riser. This technique is not a solution to the problem, and it is not yet clear how successful it may be. We are closely monitoring BP's test with the hope that it will contain some of the oil, but at the same time, federal scientists are continuing to provide oversight and expertise to BP as they move forward with other strategies to contain the spill and stop the flow of oil. We will not rest until BP permanently seals the wellhead, the spill is cleaned up, and the communities and natural resources of the Gulf Coast are restored and made whole."
>
> MMS reports the Development Driller III, which will drill the first relief well, has finished running blowout preventer (BOP) stack and riser and is currently latching the BOP to the wellhead for the first relief well. The Development Driller II, which will drill the second relief well, is on location and is making preparations for initiating the drilling process and performing BOP maintenance.

The hope is that the pipe that has been inserted in the riser 600 ft from the BOP will be able to capture all the oil and gas that was leaking from that particular part of the riser. This had earlier been estimated to be up to 85% of the total spill. The remainder is coming from a smaller leak closer to the BOP, and which will likely only be sealed when the well is killed using the injection of heavy mud later in the week.

It is a little difficult to tell, as yet, whether the pipe will be able to carry all this fluid. In order to control the flow to the surface there is a choke in the line, and this provides a variable resistance to the flow of fluid out of the riser. This additional resistance gives an additional driving pressure to the contained fluid that will increase the flow from the remaining leak, and can also provide some pressure for the fluid to ease past the rubber seals that surround the relief pipe in the riser. Engineers will thus have to strike a careful balance in controlling the pressure, and thus the flow up the pipe, relative to capturing all the possible oil and gas that leaves the riser.

The size of the operation to kill the well is also now becoming apparent. The mud pumps that will

drive the mud into the BOP, with the intent of stopping the flow by weighting up the column above the reservoir, and then allowing a concrete plug to be inserted.

> The mud would be pumped at more than 30,000 horsepower through three-inch hoses and through "choke" valves at the bottom of the blowout preventer near the seafloor. Wells said the valves could shoot as much as 40 barrels of mud a minute into the well.
>
> "We'll be able to pump much faster than the well can flow," he said. "It's about us outrunning the well."
>
> Wells said the company had brought 50,000 barrels of the mud, a mixture of clay and other substances, for the effort, which he said should be far more than needed. He said that the much-ridiculed "junk shot," in which golf balls and shredded tires would be fired into the blowout preventer, would be used only if the drilling mud were being forced upward and needed to be blocked.

The problem in introducing a fluid into a rapidly moving stream, is that the stream will tend to carry the newly injected fluid along with it. There is some resistance to the fluid flow within the BOP itself, given that the cylinders at least partially functioned. They began by closing off the well, but the collapse of the riser, and the possible erosion induced by sand in the fluid flow has eaten out the initial pathway through the BOP to allow the current flow volume escape.

If the leak is at 5,000 bd, then the current flow out through the BOP is roughly 3.5 barrels a minute. That is as much as can get through the orifice in the BOP at the driving pressure coming from the bottom of the well. When the pumps kick the additional 40 barrels a minute into that flow passage, the resistance to the higher flow will be much greater through the BOP than down the well, and so the mud should reverse the flow in the well and start to flow down the well.

This is, of course, where it now gets very tricky since too much pressure in the well can cause the cement and rock at the bottom of the well to fracture, allowing the potential for a much higher flow into the well at that point. Given that the next step, however, if the well flow can be stopped by the weight and pressure of the mud injected into the well, will be to pump a significant concrete plug into the well to totally and permanently block the well, there is likely little concern at this point as to what will occur down at the shoe of the casing.

In passing I see that the makeup of the "dream team" that the Government has put together to help with the crisis has now been revealed.

> In recent days, the Obama administration has assembled a "dream team" of scientists to deal with the leak, including experts in robotics, physics, X-ray technology and the hydrogen bomb. Energy Secretary Steven Chu, a physicist who won the Nobel Prize, met with BP engineers in Houston last week and promised that the "intellectual horsepower of the country is engaged in solving this problem."
>
> But unlike many science and engineering problems that can be worked out in a lab or on a blackboard, this one is unfolding far from the reach of a human hand, in real time, with a potentially high penalty for failure.

> "It's not just theory. It's reality that has to be dealt with," said Henry Petroski, a Duke University professor of civil engineers and history. "This is a really tough problem."

It's that hydrogen bomb expertise that has me worried.

I thought that Joel Achenbach had his tongue in his cheek when he wrote about the possibility of using a nuclear bomb on the well in the WP but he quoted the success of the Russians in doing this, and as I have noted in an earlier post, so maybe all that brainpower is focusing on a more immediate answer. The President, after all, is getting impatient.
