BP

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Summary points from the Kill the Well on Paper Discussion
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Present at the review:

Kate Baker	John Benner
Bob Grace	Jon Sprague
Bill Kirton	Charles Morrow
Kurt Mix	Scott Perfect
Ole Rygg	Jim Redmond
Dan Wood	Mike Stone
Jack Bollman (NASA)	Derek Wapman
Curtt Ammerman	Arun Majumdar (for part of the time)

Summary Points

- **The need for accurate, low latency gauges and a system that permits rapid reaction of pumping operations to measured pressures was a point raised several times in discussion.**
- **Modeling indicates that a that a dynamic kill can be achieved for a well flowing oil at a rate of 5000 STBpd if the pressure in most of the flowing wellbore is above the bubble point**
- **Modeling indicates that a dynamic kill cannot be successfully executed if the oil flow rate is 15000 STBpd**
- **Knowledge of the flow rate is needed to form a view of the probability of success, as is knowledge of the position of flow restrictions.**
- **The dynamic kill operation is likely to put solids-laden fluid at a substantial rate**

be taken into consideration in the choice of mud weight. Also, the maximum pump pressure must be chosen so as not to compromise well integrity. For MC252 #1, the not-to-exceed pressure used in the calculations was 8,000 psi at the wellhead.

present at the meeting) were represented as doubtful that the gas zone is contributing to flow. At these pressures and temperatures, and given the fluid properties of the reservoired oil, the difference in density of the fluids is not great.

Dynamic Kill General Principles and Modeling Results (Ole Rygg) While the OLGA program was originally written to model two-phase flow in pipes, and is widely used for this purpose in industry, Dr. Rygg has used it on numerous occasions to model blowouts using tailored bolt-ons to the source code. In the Macondo well, given a measured reservoir pressure of 11,850 psi and a measured pressure at the mudline (below the test ram cavity) of 3000 psi, "chokes" must exist along the flow path which reduce flow at surface. A successful dynamic kill relies on being able to create enough frictional pressure drop (or backpressure) by the combined flow of hydrocarbons and kill fluid across a choke in the well that the kill fluid can begin to flow upstream away from that point in the flow path and toward the influx source. This is achieved by pumping fluid into the wellbore above some minimum rate. To achieve a static wellbore situation at the end of the pumping schedule, the mud weight pumped in is chosen to overbalance the flowing reservoir. If there will ultimately be a seawater gradient above a certain subsea depth, this must be taken into consideration in the choice of mud weight. Also, the maximum pump pressure must be chosen so as not to compromise well integrity. For MC252 #1, the not-to-exceed pressure used in the calculations was 8,000 psi at the wellhead.

If the main chokes are deep in the wellbore, e.g. formation damage or "skin" that reduces the effective permeability in the near-wellbore region, or partial cement across the flow path, then the