

# Drilling Contractor (2005)

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Exhibit No. \_\_\_\_\_  
Wardlaw Court  
Birmingham, Ala.

WELL CONTROL

## Today's complex drilling operations demand sophisticated well-control modeling tools

**On 8 Days, Well Flow Dynamics At**

**THE COMPLEXITIES OF** today's drilling operations (including deepwater drilling, shallow water or gas flow problems, 3D/3T wells and multilateral drilling operations) demand modeling tools to be able to accurately plan and predict these types of operations.

The challenges facing a well control intervention task force will be even more substantial for all three types of operations and a significant effort should therefore be placed on up front risk reduction measures.

The hydraulic modeling tools required for risk reduction measures are being available today for these types of operations back to be used in emergency planning and during a well control incident.

Flow diagnostics and hydraulic operational design drive the emergency response. This includes what kind of equipment and tools to use, which interventions needed to use as well as how the operations should be controlled.

The same drilling elements are also evident in the emergency planning process. The focus is then on being able to respond to a hypothetical well control incident, or even an intervention to reduce the risk of the drilling operation.

This could, for example, include interventions on well design and operational procedures.

**WELL CONTROL DESIGN**

A successful well control operation to regain control of an incident, a blowout well consists of three equally important phases:

- The analyzing phase;
- The planning phase;
- The execution phase.

In all three phases the well control modeling plays an important part and drives the decision making towards a successful operation.

**ANALYZING THE INCIDENT**

When facing a well control incident the first challenge is to analyze the existing situation thoroughly. It cannot be

During the planning phase the modeling tools should be used to simulate the different intervention options. Based on the results the experienced well control engineers can decide on the best way forward and further estimate the resources required to perform the plan.

**EXECUTION OF THE OPERATION**

When the operation to regain control begins the modeling tool should be converted to an "online" simulator following the operation carefully in order for the engineers to continuously update their plans. If changes have to be made during the operation, the effect of the changes can be tested in the results before the well control task force take the appropriate action.

**CONTINGENCY PLAN**

In evaluation of emergency response for a drilling operation, onshore or offshore, one essential element is the pre-evaluation of the possibility of regaining control of a blowing well. Even though the probability of a blowout might be small, the consequences with respect to safety, cost and pollution could be catastrophic.

Direct interaction options are dependent upon a range of factors such as being or taking and on the probability and need and option for relief well intervention.

It is essential to have important drilling phase in. Several incidents in the past have occurred due to planning and/or execution based on limited and wrong assumptions about the existing situation.

In the analyzing phase, a well control simulator should actively be used together for current flow situations in the well including well pressure, temperature, fluid types and rates. Furthermore, modeling should be used to recognize the situation in the well prior to the incident and to each enhance the understanding of the problem circumstances.

**PLANNING THE OPERATION**

When the well situation is fully understood, the detailed well control planning can be initiated.

A contingency plan will focus on the ability to regain control. The plan would also estimate the various levels of intervention and operational expertise available for a blowout intervention operation. Scenarios can then be identified and appropriate action taken to reduce the deficiencies early in the planning phase.

A contingency plan will typically include the following parts:

- Define worst case scenario based on the drilling and development plan;
- Calculate maximum blowout rate for the defined scenario;
- Evaluate potential kill options.

**DRILLING CONTRACTOR**      **Barco/Scania 200**

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