Deepwater operations: Shallow flows pose problems

SPE/IADC 52779

"Failure of Batch Set Wells Due to Shallow Aquifer Flow"

The paper discusses a systematic approach to evaluate the integrity of batch-set wells where strong shallow aquifer flow exists. Analysis has been carried out to model the processes during riserless drilling of overpressured aquifers in deepwater Gulf of Mexico. The models combine estimates of sand production volumes, sand and shale deformations, and buckling deflections of single and dual casings. A post-mortuary analysis was conducted on an actual field case where failure of predrilled wells led to abandonment of the site The work formed the basis for selection of mud weight, well spacing and drilling sequence for the replacement site. The paper also discusses the use of a visualization tool, to assess the mode. Magnitude, risk and sequence of casing failure of the pre wells.

—Ahmed Abou-Sayed, et al, BP Exploration

SPE/IADC 52780

"Drilling Through Deepwater Shallow Water Flow Zones at Ursa"

Shallow water flow problems caused the loss of the wells at the first Ursa TLP site. The Ursa field is located in a deepwater area (3,800 ft water depth) of the Gulf of Mexico where shallow water flow problems have been severe. The sediments at Ursa contain massive sands that are pressured above a normal seawater gradient at a very shallow depth below mudline. Different techniques have been used while drilling the discovery, appraisal, and development wells to attempt to successfully prevent and control shallow water flow problems. Shallow water flow problems at Ursa have been overcome and an 11- well batch set was successfully completed at the second TLP site in mid-1998.

—L F Eaton, Shell Deepwater Development Inc

SPE/IADC 52781

"Titan-1 Exploration Well—Shallow Water Flow—Gulf of Mexico (Deepwater)"

This paper details the planning and successful implementation of procedures used to mitigate risks associated with a shallow water flow hazard at the Titan No. 1 well drilled in the Gulf of Mexico, Garden Banks Block 785 in 4,626 ft of water. This paper describes 1) local shallow hazard information; 2) key planning concepts used in the preparation of the drilling program to mitigate the risks associated with the potential shallow water flow hazard; 3) operating philosophy of immediately controlling the water flow and; 4) use of nitrified foam cement to isolate the water flow zone behind 20-in. conductor casing.

—P Schuberth, M Walker, Exxon Upstream Development Co

SPE/IADC 52782

"Problems of Ultra-Deepwater Drilling"

Ultra-deepwater drilling activity is at an all time high. The number of rigs rated to and actually working in greater than 6,000-ft water was recently two and will soon be over twenty. This increase is bringing a large number of new people to deepwater. This paper will present numerous problems that have occurred in deepwater operations under the assumption that understanding what can go wrong is the best way to &void problems. Problems and explanations will be addressed in rig positioning, BOP control, well control, riser management, the environment and top hole drilling.

—J Shaughnessy, W K Armagost, Amoco Corp, et al

SPE/IADC 52783

"Deepwater Rig Anchoring—Key Learnings and Ways Ahead"

For ELF to continue to drill extensively and more deeply offshore West Africa it has been necessary to investigate new mooring configurations and components. Since December 1997, the Sedco S700 has been equipped with one polyester line inserted into the rig mooring system and taking its own share of the loads. Latest results of the instrumentation data acquired so far will be presented. In the meantime, ELF is ready to place an order for its first preset mooring in West Africa.

—L D Foulhoux, Elf Exploration Production

SPE/IADC 52784

"A Radical Approach to Offshore Activities in the new Millennium"

This paper discusses the results of the first phases of a project, undertaken by Shell in partnership with Saipem, which considers the design of a very radical new drilling system for offshore activities. It also identifies some of the necessary technological building blocks that are needed in order for this system to operate in this ultra-deepwater arena.

—C G C Mitchell, Shell Intl Deepwater
—G Chiesa, Sonsub Intl Inc

SPE/IADC 52785 (ALT)

"Evolution of Well Design in the Campos Basin Deepwater"

In the '70s, the first wells were drilled in the Campos basin at a water depth around 100 m. Nowadays, Petrobrás is drilling wells in 2,000 m of water with promising discoveries. From Enchova to Roncador, passing by Marlin and Marlin South, well design has improved as water depth has increased. This paper presents the evolution of well design at the Campos Basin. This evolution has allowed Petrobrás to cope with the new challenges of deeper and deeper waters. The design evolved from five to three phases because of the peculiar geological characteristics of deep waters. Specifically, the paper addresses aspects such as the evolution of casing programs and wellhead systems. It also presents the last developments for drilling in ultra-deepwater(> 1,500 m), now being implemented in the Campos Basin. Other aspects considered in the paper are the drilling riser, wellhead and tubing hanger. 3 wells have already been drilled with this emerging technology, one breaking the drilling record of the Marlin Field. Examples of wells that have been drilled with this technology are presented, analyzed, and compared to the wells previously drilled with traditional technology.

—J B Salies, et al, Petrobras

SPE/IADC 52787 (ALT)

"Application of Aerated-Fluid Drilling in Deep Waters"

In the Campos Basin, Brazil, some of the older fields present favorable conditions for the use of aerated fluids, i.e., the low pressure reservoirs. It is expected that, along the next years, the potential demand for this technology will increase significantly in deep-water fields.

Based on this, a feasibility study was started having the objective of making the technology, including equipment, operational procedures, safety and training aspects and so on, available for the first quarter of 1999. Besides, a scenario for application was defined as well as the rig to drill the well.

Considerations, analyzes and solutions related to every item in this study will be described: (1) the scenario for application; (2) the equipment to be used, including the injection system, rotating head and separation system; (3) well design topics, with focus on drilling hydraulics and wellbore stability; (4) drilling procedures and safety aspects; and, (5) technical limitations and potential for development.

—E Y Nadagawa, H M Ribeiro dos Santos, Petrobras