"INTEGRATED STATIC AND DYNAMIC MODELING APPROACH IN ONE OF THAMAMA GAS RESERVOIRS OF ONSHORE ABU DHABI ".

BY

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Abstract

The ability of integrated software to present solutions is evolving rapidly and has shifted to emphasize on what a best-practice modeling approach should be.
One of the issues often raised is the link between a facies-based model incorporating depositional and sequence stratigraphic characteristics, and its use during dynamic simulation. In this presentation, we will suggest an approach that introduces the concept of modeling based on the reservoir rock type.

The example used is one of the major producing gas reservoirs in a giant field in central onshore Abu Dhabi where the general structure trends is Northeast – Southwest and has dimensions of 40 by 30 kms. Its main reservoir zones are part of the Lower Cretaceous Thamama group. The overall depositional environment is characterized by its location on the Arabian carbonate platform within an intra-shelf basin.

Applying the sequence stratigraphy principles, the reservoir is divided into two parasequence sets. The lower part comprises of a progradational interval overlain by a retrogradational package, with the boundary between each package marking a stillstand. Five lithofacies were identified in the reservoir, bioclastic peloidal grainstone, algal packstone/floastone, bioclastic peloidal packstone, algal wackestone/floastone and bioclastic peloidal wackestone/packstone. These lithfacies are believed to be desposited on a homoclinal carbonate ramp that dipped gently seaward.

Porosity and permeability are well developed in the reservoir section due to a lack of pore-filling cement. In the field, a clear general trend occurs of down flank porosity reduction of more than 10% from Crest down to the water-bearing zone. This is mainly due to the increased abundance of stylolite formed during burial diagenesis during hydrocarbon migration and infill of the structural trap.

Analysis of both thin section descriptions and high-pressure mercury injection led to the identification of five distinctive rock types. Each reservoir rock type has a certain effective pore throat size distribution which will produce a particular capillary pressure curves and control porosity, permeability and water saturation.