

# Reservoir Simulation Provides Insights to Guide Development and Improve Recovery

## Knowledge

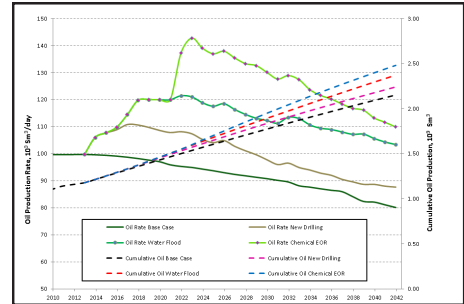
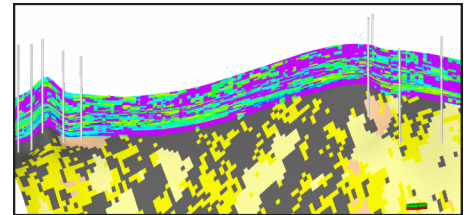
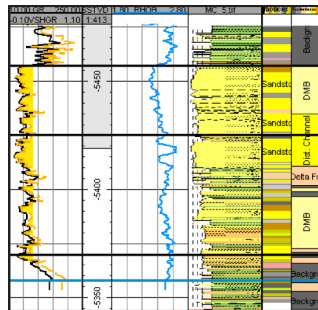
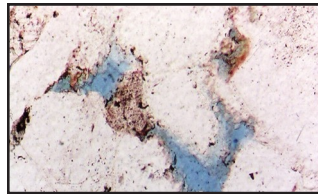
D&M employs more than 20 reservoir simulation experts who have experience in fields around the world.

## Integrity

The firm's reservoir simulation services cover both development planning and production-cost forecasting, and our professionals are committed to developing models that provide accurate representations, neither understating nor overstating performance.

## Service

D&M's reservoir simulation team has completed thousands of studies around the globe, and its track record for meeting client needs is reflected in the many long-standing client relationships that D&M has established through the years.



*These images reflect the workflow from pore-level interpretation of fundamental geological factors, to the analysis of log and test data for individual wells, to the building of a geocellular model, ultimately resulting in a validated reservoir model that can be used for forecasting and development planning.*

## Insights That Make a Difference

DeGolyer and MacNaughton (D&M) introduced its reservoir simulation services in 1967, and since that time, the firm has completed thousands of integrated studies around the world. This division is dedicated to reservoir characterization, simulation, and guidance for improving development and recovery. The team members average more than 20 years of industry experience and have worked on projects covering all types of depositional environments, methods of simulation, and field development or rejuvenation plans.

A detailed, integrated geologic model—conditioned to the reservoir's depositional origin, stratigraphy, diagenesis, and structure—constitutes the foundation for reservoir simulation models. D&M has performed simulation studies on numerous deepwater fields, as well as many fields undergoing water injection for pressure maintenance. To complete its work, D&M uses state-of-the-art geologic modeling software, such as IRAP-RMS and Petrel, and is well versed in most commercial simulators, including Eclipse, VIP, Nexus, and CMG. In addition, D&M develops its own software tools.

D&M helps clients with the following:

- Geophysical interpretation
  - 3-D structural and stratigraphic framework
  - Attribute analysis
  - Pre-stack and post-stack inversion
  - AVO modeling and analysis
- Petrophysical evaluation
  - Rock properties
  - Reservoir lithofacies
- Reservoir characterization
  - Core description
  - Geostatistics
  - Petrographic and diagenetic studies
- Geologic modeling
  - Depositional systems
  - Genetic stratigraphy
  - Reconnaissance-level basin modeling
- Subsurface modeling
  - Structure
  - Flow units
- Enhanced recovery studies
- Field development studies (black oil, chemical, compositional, and thermal)
- Field rehabilitation studies
- Exploitation studies
- Surface network simulation

### Support

The firm's reservoir simulation specialists travel around the world to provide one-on-one counsel to clients.

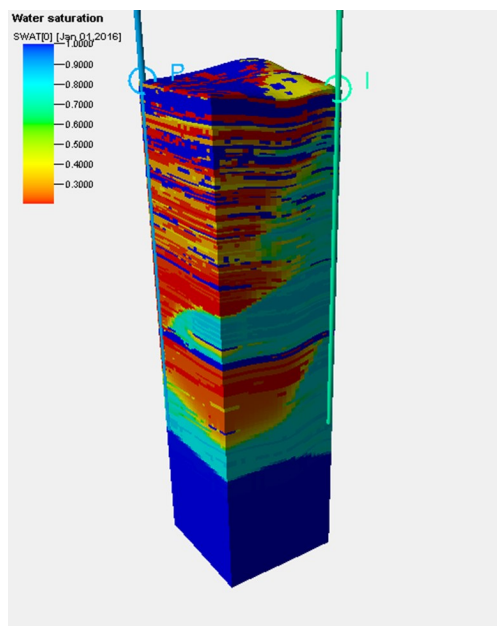
### Advanced Technology

D&M has made significant investments in computing resources and software development in order to meet the demands of its clients.

### Solutions

D&M offers more than reservoir modeling services; therefore, it can help clients address a complete range of consulting needs, from discovery to recovery.

## D&M Reservoir Simulation Projects



### Enhancing Recovery

Many companies contract with D&M's Reservoir Studies Division to obtain insights on ways to increase recovery in mature fields. A Russian company engaged D&M to develop a geocellular and reservoir simulation model that could be used to improve ongoing recovery efforts in a giant field in Western Siberia with reported reserves of approximately 2 billion barrels. The field extends across 100 kilometers in a roughly north-south orientation and averages about 10 kilometers in width. The field had more than 5,400 wells drilled, with more than 1,000 active wells. D&M made recommendations for pattern re-configuration, new well locations, recompletions, and improved operating procedures, all of which served to increase production rates and ultimate recovery.

D&M is Relevant, Respected, Reliable, Responsive, and Ready to solve your problems.

### Guiding Development

D&M conducted a reservoir model study for a large and complex field in South America. The primary objective of the work was to build simulation models to enhance the understanding of past reservoir performance and optimize development plans in four different reservoir intervals within the field. A key component in this work was the recognition of coal zones as chronostratigraphic surfaces and barriers to fluid flow. Data from more than 200 wells were incorporated in the geological models. Each model was built using a deterministic framework and a combination of stochastic techniques, including object modeling for facies distribution and sequential Gaussian simulation for rock properties. The range of uncertainty associated with each model was quantified by generating a series of realizations. For each model, a base forecast was generated from the existing wells. Additional forecasts were conducted using proposed injector and producer well locations. The model runs tested the validity of these well locations and delineated unswept areas requiring additional wells. As a result, incremental recoveries of 5 to 20 percent should be realized for this client through infill drilling.

The study described above is one of many examples that D&M can offer to illustrate how its team leverages innovative modeling techniques to assist its clients.

### SERVICES AVAILABLE

- Geophysical interpretation
- Petrophysical evaluation
- Reservoir characterization
- Geologic modeling
- Subsurface modeling
- Enhanced recovery studies
- Field development studies
- Field rehabilitation studies
- Exploitation studies



Worldwide Petroleum Consulting

5001 Spring Valley Road  
Suite 800E  
Dallas, Texas 75244  
214/368-6391  
www.demac.com  
demacweb@demac.com