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## N750: Mature Field Evaluation and Redevelopment

Instructor(s): Sharma Dronamraju

## Format and Duration

Classroom - 3 Days

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### Summary

This course focuses on the evaluation and redevelopment of mature oil fields that have been producing for decades and face challenges such as high water cuts, outdated technology, infrastructure limitations, market access, and over-regulation. Participants will learn how to apply modern geological and reservoir engineering techniques, including 3D seismic interpretation, sequence stratigraphy, and reservoir modeling, to unlock additional reserves and optimize recovery. The course draws on global mature field case studies, including those from the Middle East, Far East, the US (onshore and offshore), and Latin America, and emphasizes a multidisciplinary approach to mature field challenges.

### Learning Outcomes

Participants will learn to:

1. Define the characteristics and challenges of mature oil fields and understand their global significance.
2. Analyze historical production data and reservoir characteristics to identify untapped volumes and redevelopment opportunities.
3. Utilize 3D seismic data effectively for enhanced reservoir characterization and identification of bypassed pay zones.
4. Develop high-resolution, field-scale sequence stratigraphy models to better understand subsurface heterogeneity.
5. Integrate petrophysics and reservoir pressures to develop comprehensive field models.
6. Assess reservoir heterogeneity and its impact on production and recovery strategies.
7. Employ reservoir modeling techniques to simulate field performance and optimize redevelopment plans.
8. Formulate practical recommendations for mature field redevelopment that improve recovery factors and reduce operating costs.

### Training Method

This is a classroom or virtual classroom course that combines lectures, discussions, case studies, and practical exercises.

### Who Should Attend

This course is designed for Geoscientists, Petrophysicists, Reservoir Engineers, and Production Engineers with at least 5 years of experience. Integration and cross-learning are encouraged among these disciplines.

### Course Content

The primary approach of the course is to analyze a mature field with a new and fresh perspective. This requires a multi-disciplinary approach:

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**Phase I:** A bulk volumetrics or material balance exercise to hypothesize unswept volumes. This requires an understanding of current and historical production, production allocation, reservoir quality within the pay zones, and a brief review of petrophysics. This is mandatory for every mature field, done best by an experienced Reservoir Engineer and a Petrophysicist. (introduced but not covered in this course)

**Phase II:** A regional investigation, understanding the Petroleum System, source, reservoir, trap, and timing. Recast the lithostratigraphy into chrono/sequence stratigraphy. This is essential for finding upside potential in the field and identifying possible extensions of the field. It is this aspect of field evaluation and redevelopment that is the focus of this course.

### 1. Introduction to Mature Fields and Case Studies

- Definition and characteristics of mature fields
- Challenges of mature fields: water cuts, infrastructure, technology gaps, and financial justification for investing in a Mature Field
- Global case studies include: Prudhoe Bay (Alaska), Elk Hills and Bellbridge Fields, San Joaquin Basin (California), Wayburn Unit, Saskatchewan (Canada), Forties Field (North Sea), Casabe Field (Colombia), Priyobskoye Field (Siberia), Cantrell Field (Mexico), D18 field (Sarawak, Malaysia), Neuquen and San Jorge Basins (Argentina), Yusr Field (Gulf of Suez), Lak Ranch Heavy Oil Field (Wyoming)
- Common lessons learned from mature field redevelopment draw parallels with current challenges from the class
- Importance of a fresh, multidisciplinary perspective and approach

### 2. Geological Principles, Seismic Data Interpretation, and Sequence Stratigraphy

- Role of geology in mature field evaluation. Regional petroleum system elements: source, reservoir, trap
- Seeing is believing: Principles and applications of 3D seismic data, power of imaging
- Chronostratigraphy vs. lithostratigraphy: Exercises
- Sequence stratigraphy; the language of geos
- High-resolution sequence stratigraphy for mature fields, the hidden stratigraphy pay!
- Examples and exercises: Integration

### 3. Reservoir Modeling, a Key Differentiator in Mature Fields

- Static and dynamic modelling
- Static modelling for mature fields, a database for mature field operations in real-time
- Conceptual modelling, paleogeography, and analogs Static modelling methods: Framework and property modelling
- Subsurface reservoir heterogeneity, scale dependence, and capillary pressures
- Subsurface uncertainty and constraining
- Conclusions



**TETRA TECH**  
RPS ENERGY

**TRAINING** A small icon representing a training or development concept, showing a stylized figure or flame.

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