TETRA TECH RPS ENERGY | TRAINING

EC021: Play Fairway Analysis

Format and Duration
Self-Paced - 6 Hours

Summary

Play Fairway Analysis is a critical stage in hydrocarbon exploration, the fundamentals of which are covered in six modules that examine the presence and effectiveness of the main play elements: reservoir, seal, and source. The course introduces essential definitions and highlights the interplay between these elements in hydrocarbon generation, migration, and trapping. Participants will learn to identify play elements in the subsurface using techniques such as well log, seismic attribute, and seismic facies analysis.

Emphasis is placed on diagenetic processes influenced by thermal and effective stress, as well as depositional environments and sediment origin. Source rock quality is addressed through exploring pyrolysis techniques, with a focus on parameters such as hydrogen and production indices. Additionally, migration pathways, thermal histories, and charge timing are examined in detail. Practical insights into these complex concepts are provided through key case studies, including the Nam Con Son and East Texas Basins.

Learning Outcomes

Participants will learn to:

1. Define and evaluate the key play elements—reservoir, source, and seal—and their roles in hydrocarbon systems.
2. Apply workflows and visualization techniques, including seismic and well log analysis, to assess the presence and effectiveness of play elements.
3. Analyse reservoir quality and effectiveness, focusing on porosity, permeability, flow rates, and diagenetic controls.
4. Evaluate seal integrity, considering capillary forces, pressure regimes, and stress impacts on hydrocarbon column height.
5. Assess source rock presence, quality, and production timing using techniques such as pyrolysis and vitrinite reflectance.
6. Explore migration pathways, basin evolution, and charge timing, emphasising carrier bed properties and thermal histories.
7. Understand how to construct Gross Depositional Environment (GDE) maps and interpret seismic facies to support exploration decisions.
8. Integrate geological and geophysical data to reduce exploration risks, applying knowledge through global case studies.

Training Method

This is a self-paced e-learning course, approximately 6 hours learning time, consisting of 6 modules. Within each module the learning materials are structured into short sections, each including interactive text and image content, animations, video, and audio. Each module has a scored quiz at the end to provide the learner with their learning progress.

Who Should Attend

This course is aimed at geoscience and petroleum engineering professionals.

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Course Content

Introduction and Overview of Workflow
This module introduces Play Fairway Analysis, covering definitions, visualisation techniques, and workflows. Using the Exploration Triangle, introduced workflows assess reservoir, source, and seal presence and effectiveness, as well as trap domains and resource estimates. Practical examples, like the Northern North Sea Petroleum Province, illustrate play definitions and evaluation processes.

Reservoir and Top Seal Presence
This module covers reservoir and top seal presence, focusing on clastic reservoir identification through GDE mapping, sequence stratigraphy, seismic facies, and attribute analysis. It emphasizes the importance of top seals for hydrocarbon trapping, highlighting identification techniques like lithological analysis, well logs, and seismic mapping.

Source Presence and Quality
This module explores source rock presence and quality, focusing on factors like organic richness, thickness, and petroleum yield. It covers classification schemes, global case studies, and evaluation techniques such as well logs and pyrolysis. Topics include kerogen kinetics, depositional environment influences, and the generation and limitations of biogenic gas systems.

Reservoir Effectiveness
This module examines reservoir quality and effectiveness in clastic systems, focusing on porosity, permeability, and economic flow rates. It explores controls like sediment provenance, depositional environments, and post-depositional processes, emphasising effective and thermal stress. Key pressures and pore pressure plots are examined in detail, using examples like the Skagerrak field.

Top Seal Effectiveness
This module explores seal effectiveness, focusing on capillary and hydrodynamic seals, key pressures, and hydrocarbon migration. Key topics include capillary entry pressure, pressure regimes, fluid density, and controls on column height. Case studies, such as the Haltenbanken region, illustrate seal integrity, pressure dynamics, and migration pathways for hydrocarbons.

Source Effectiveness
This module focuses on hydrocarbon generation and migration, influenced by thermal history, basin geometry, and relative timing. Key topics include maturation, carrier beds, charge styles, and migration dynamics. Techniques like burial history modelling and case studies, such as the Western Black Sea, illustrate how basin evolution informs hydrocarbon exploration.