TETRA TECH RPS ENERGY | TRAINING

N522: Integrated Charge Access Evaluation: The Key to Successful Exploration

Instructor(s): Leon Dzou & Mark Thompson

Format and Duration

Classroom - 3 Days
Virtual - 5 Sessions

Summary

Charge access considers the journey of the expelled charge from the source rock into the reservoir of the prospect, and is often a critical if not the critical risk in any exploration well. Indeed, very often the seismic interpreters hand over their work at the last minute to the petroleum systems analyst giving no time all for the necessary integration. This integration of the geological framework with the petroleum systems modelling is key to avoiding drilling dry holes. Charge access is complex and many explorers don't fully understand the scientific principles defining it. This course demonstrates the necessity to integrate the basin-wide regional understanding with prospect evaluation principles in order to sensibly quantity resource estimates and risk in any prospect.

Business Impact: Does your company drill numerous failures with no shows? Do you consider faults as the main migration route into your prospect? Do you make complex 3D basin models that don't predict the next well result? If so, we have a useful course for you!

Learning Outcomes

Participants will learn to:

1. Understand the science that underpins petroleum migration and accumulation.
2. Understand the impact of depositional environments, geological models, and critically the role of faults and fractures in migration and trapping.
3. Apply the principles to make better predictions of charge access in prospect evaluation and therefore drill fewer dry holes.
4. Appreciate a rich variety of case histories from basins worldwide and how they can be applied to your prospect to help reduce risk.

Training Method

This can be taught as either five online webinar sessions (1 week of half day sessions) or a three-day classroom 'hands-on' course, with a number of informative exercises designed to get across the principles, punctuated by a series of short talks. There are a rich series of global examples and case histories, taught by two industry experts with over 80 years of experience between them.

Who Should Attend

This course is aimed at geoscientists working on basin, play fairway, and prospect evaluation with 5 years or more experience working frontier to mature basins. This is an applied and integrated course involving all geoscience disciplines.

N522: Integrated Charge Access Evaluation: The Key to Successful Exploration

Instructor(s): Leon Dzou & Mark Thompson

Format and Duration

Classroom - 3 Days
Virtual - 5 Sessions

Prerequisites and Linking Courses

This is an integration course involving regional and prospect specific analytical techniques and petroleum systems modelling. As such a broad understanding of basin/play fairway and prospect evaluation and petroleum systems is required.

Course Content

The key elements to be discussed will be:

1. Organofacies, source rock properties, source potential and distribution
2. Genesis of primary biogenic gas accumulations.
3. Geological Models (source-carrier-seal systems)
4. Migration time lag and migration loss
5. Role of faults as migration pathways
6. Prospect charge evaluation workflow
7. Top seal capacity (column height) evaluation workflow
8. Correlation of oils and gases

This has been organised here assuming the course is delivered as 5 online webinar sessions each lasting half a day.

Day 1: Source Rock Potential

- Introduction: Course overview.
- Thermogenic source rock formation.
- Primary biogenic gas system.
- Case history Gulf of Mexico: nature and distribution of the various petroleum systems (organo-facies A and B).
  - Exercise: GoM Mensa gas field: did we miss thermogenic oil charge or source rock is absent?
  - Exercise: Where are GoM Norphlet fields sourced from?
- Case history Cooper Basin, Australia (organo-facies D/E/F).

Day 2: Geological Models (Source-Carrier-Seal Systems)

- An overview of petroleum secondary migration guiding principles.
- Depositional environments (clastics and carbonate systems).
  - Exercise: Zohr gas field, Nile Delta Egypt.
- Case history Pearl River Mouth Basin, South China Sea.
  - Exercise: where's the missing oil charge in southern PRMB?
  - Exercise: Liuhua 11-1 field, what are the dominant factors favouring long distance transport of petroleum?

N522: Integrated Charge Access Evaluation: The Key to Successful Exploration

Instructor(s): Leon Dzou & Mark Thompson

Format and Duration

Classroom - 3 Days
Virtual - 5 Sessions

Day 3: Migration and Entrapment

- Focussed v dispersive on a basin scale. Vertically v laterally drained petroleum system.
  - Exercise: Alternative models source and seal
  - Exercise: Migration blind spots Bintuni Basin, Papua New Guinea
- Case history and discussion of vertically drained petroleum system Marco Polo Field, Gulf of Mexico (charge budget, structural focus, structure relief and seal capacity), also, impact of oil and gas molecules travel time from source rock to first carrier bed and time to fill up the trap.
- Exercise: W Shetlands Basin Palaeocene discoveries.
- Role of faults
  - Case history on Thunder Horse.
  - Trap configuration concept: evaluation of the capillary sealing capacity of all the seal rocks
  - Case history Columbus Basin, offshore Trinidad: use of fault-seal analysis in understanding petroleum migration in a complexly faulted anticlinal trap.

Day 4: Post-Well Evaluation

- Case history Norway and Equatorial Margin.
  - Exercise: Catemaco fold belt.
- Case history Brigadier Trend and Ironbark well.
  - Exercise: Good luck, Bad luck and Mukluk.
- Case Histories Shows as a smoking gun.
- 3D Petroleum Migration Modelling
  - Case History Williston basin: 3D modelling study of the low-permeability petroleum system of the Bakken Formation.
  - The use of 3D petroleum migration modelling in exploration, how useful are these models in exploration risking and decision making? 10 minutes discussion.
  - Alternative workflow for petroleum migration modelling – thinking processes to draw schematic charge cartoon, and then with appropriate software (percolation modelling).

Day 5: Prospect Charge Analysis

- Impact of DHI's on charge access risking.
  - Exercise: Assess Campeche salt basin exploratory wells charge access risk.
- Charge assessment: procedures for estimating amounts of oil and gas generated, migrated, and trapped in prospects.
- Case history Perdido Trend and Great White field, GOM.
  - Exercise: biogenic gas charge assessment.
- Case history Frade and Roncador Fields, Campos Basin.
- Concluding remarks and summary of best practice.

TETRA TECH RPS ENERGY | TRAINING

N522: Integrated Charge Access Evaluation: The Key to Successful Exploration

Instructor(s): Leon Dzou & Mark Thompson

Format and Duration

Classroom - 3 Days
Virtual - 5 Sessions