Risks and Volumes Assessment for Conventional and Unconventional Plays and Prospects

Discipline: **Geology, Unconventional Reservoirs, Cross-Disciplinary**

Length: **3 Days**

Who Should Attend

Geoscientists, engineers, and managers who work on exploration projects and require competency in the assessment of risks and volumes.

Instructor

Dr. Alexei V. Milkov is Full Professor and Director of Potential Gas Agency at Colorado School of Mines and a consultant to oil and gas industry. After receiving PhD from Texas A&M University, Dr. Milkov worked for BP, Sasol and Murphy Oil as geoscientist and senior manager. He explored for conventional and unconventional oil and gas in >30 basins on six continents and participated in the discovery of >4 Billion BOE of petroleum resources. He also worked on several appraisal and production projects. Dr. Milkov has deep expertise in oil and gas geochemistry, petroleum systems modeling, exploration risk analysis, resource assessments and portfolio management. He published ~50 peer-reviewed articles. Dr. Milkov received several industry awards including J.C. “Cam” Sproule Memorial Award from the American Association of Petroleum Geologists (AAPG) for the best contribution to petroleum geology and Pieter Schenck Award from the European Association of Organic Geochemists (EAOG) for a major contribution to organic geochemistry.

Course Description

The course enables participants to transform qualitative geological descriptions of plays and prospects into quantitative success-case and risked volumetric models. Obtained learnings will help participants to evaluate the geological probability of success (PoS) for exploration plays, segments, prospects, wells and portfolios and to assess the range of petroleum volumes in exploration projects. Examples and case studies come from both conventional and unconventional plays, prospects and wells around the world. The learning objectives are achieved through well-illustrated lectures, numerous hands-on exercises and active class discussions.

We will cover the following topics:

- Play Based Exploration.
- Assessment of probability of success (PoS).
- Assessment of success-case and risked volumes for plays (conventional and unconventional), segments, prospects, wells and portfolios.
- Post-mortem analysis.

Learning Outcomes

By the end of the course participants will be able to:

- Use Play Based Exploration approach and tools (e.g., Commosn Risk Segment (CRS) mapping) to locate sweet spots in conventional and unconventional plays.
- Assess and justify the range and probabilistic distribution of input parameters (area, thickness, N/G, porosity, saturation, FVF, RF) used in volumetric calculations.
- Assess geological risks and probability of success (PoS) for conventional and unconventional exploration prospects.
- Use industry software (GeoX, REP etc.) to run Monte-Carlo simulations to estimate success-case and risked probabilistic volumes for exploration plays, segments, prospects and wells.
- Recognize biases and logical fallacies common in exploration assessments and know how to correct them.
- Aggregate segments into a prospect and use risk and volumes dependencies between segments to estimate PoS and volumes for the prospect.
- Aggregate prospects and wells into exploration portfolio. Predict the outcomes of portfolio drill-out.
- Evaluate drilling results to establish main reason(s) for well failure.

Course Content

Day 1. Big picture trends in petroleum exploration. Play based exploration. Fundamentals of volumetric and risk assessment for prospective segments.

The first day introduces the participants to global exploration trends and the concepts of Exploration Triangle and Play Based Exploration. You will learn the fundamentals of volumetric and risk assessment, the main definitions and the commonly used assessment tools (software).

- Welcome and introductions
- Global trends in petroleum exploration since 1900
- Play Based Exploration
- Common Risk Segment (CRS) maps
- Field size distributions
- Creaming curves
- Yet-to-Find resources
- Risk versus uncertainty
- Deterministic and probabilistic volumes
- Success-case and risked volumes
- Software tools used in the assessment of prospective resources

Day 1 exercises: evaluating the play fairway, making CRS maps, locating sweet spots in the play; evaluating field size distribution and creaming curves, defining remaining potential.

Day 2. Basics of statistics, distributions and probabilities. Biases and fallacies in exploration. Volumetrics and risking for a segment of conventional petroleum resources.

The second day starts with the discussion of statistical parameters, distributions and probabilities. Participants will use real-world data to build distributions as inputs into volumetric models. This will be followed by the discussion of biases and fallacies in petroleum assessments and the tools that help reduce them. We will finish the day by doing hands-on assessment of volumes and risk for a conventional prospect.

- Meaning of basic statistical parameters (Mean, Mode, P10 etc.)
- Distributions appropriate to use in petroleum exploration projects
- Where and how to get data to build distributions
- Main biases and logical fallacies common in petroleum exploration
- Techniques to reduce biases (Risk Tables, assurance teams)
- Assessment of volumes and geological PoS for a segment

Day 2 exercises: building porosity distribution for a segment; evaluating success-case volumes, geological PoS and risked volumes for a conventional oil segment.

Day 3. Aggregation of segments into prospect. Portfolio analysis. Volumetrics and risking for unconventional plays. Post-drilling analysis.

The third day focuses on the aggregation of segments into prospects and prospects into portfolio. This will be followed by the discussion of volumes and risk assessments in unconventional oil and gas plays (shale, CBM). We will finish the course by studying how to do post-mortem analysis, learn from exploration successes and failures and become better explorers.

- Aggregation of segments into prospect, with risk and volume dependencies
- Aggregation of prospects into portfolio
- Assessment of volumes and risks for unconventional plays
- Learnings from discovery wells
- Learnings from dry holes

Day 3 exercises: estimating volumes in a shale gas play.

Course Methodology

The course will be a combination of the following:

- 9 lectures (presentations) – 40%
- 5 practical exercises – 50%
- Class discussions – 10%