Play-Based Exploration: Mapping, Volumetric and Risk Analysis
(3 Days)

INTENDED AUDIENCE
Geoscientists, engineers, planners and land (negotiating) personnel

DESCRIPTION
This content- and exercise-rich, fun course will touch on all aspects of Play Based Exploration (PBE). The combination of lectures with group mapping exercises from an actual exploration play reflecting state of knowledge at two periods of time (circa 1980 versus present day) provides participants insights from the actual results as compared to their predictions.

Play-based exploration reflects a fundamental shift in exploration focus, wherein prospects are not the basic unit of exploration, but plays are. Companies generate, and maintain in 'evergreened' fashion, maps of relative probability for large, genetically related prospective areas. Some companies stop at ‘traffic light maps’; other companies adopting such techniques make maps that apportion probability into shared/play-specific and local/prospect-specific probability. This course emphasizes the latter method and teaches all concepts needed to make such maps in a consistent way.

The emphasis in this course is upon conventional plays, with a brief portion of the course dedicated to application of these techniques to unconventional/continuous plays.

The course is designed as a series of lectures, each followed by a practical mapping or data analysis exercise.

What distinguishes this course is that

1) Participants learn how to consistently assess chance at the mapped play segment scale.
2) Participants form multi-disciplinary teams to analyze a dataset (maps, cross sections, wildcat drilling results, field volumes) for a mature basin based upon state of knowledge from circa 1980. The data are used to make Common Risk Segment maps for play and prospect-specific chance, predicted ultimate trap density, and predicted future field size characteristics.
3) At the completion of the exercises, a ‘solution set’ of actual results (1980-present) is provided so that participants can learn powerful lessons about what they did well, and areas for improvement. Results are checked against predicted success rate, number of discoveries, average field size and aggregate volumes.
4) To reinforce the learning and discipline required, the team matching the actual results most closely receives a nice prize.

The course comes with a comprehensive course notebook (with approximately 300 figures). Emphasis in the course is placed upon achieving consistency in mapped chance assessment, avoiding pitfalls in the process, and using appropriate analogs. At the end of the course, participants are fully prepared to create consistent Common Risk Segment maps.

3 DAY COURSE OUTLINE

Day 1: Introduction; Basic Statistics and Risk Analysis Concepts; Petroleum Systems and Plays; Defining Plays, Vertically and Laterally;

Day 2: Dividing Plays into Subplays; Treatment of Chance – Plays vs. Prospects; Data Issues; Field Size Data – Pitfalls for Predicting the Future;
Day 3: Calculating Undiscovered Volumes; Risk Analysis for Plays vs. Prospects: Strategic Play Analysis; Play Based Exploration for Unconventional Plays; Play Ranking Techniques

COURSE OUTLINE

1) Introduction
   - Play-based exploration - defined
   - Role in E&P Business process
   - Global patterns of discovery – probability of success and discovery size through time

2) Basic statistics and risk analysis concepts
   - A concise presentation of all key concepts needed for chance/volume assessment

3) Petroleum Systems and Plays
   - Global basin characteristics; life cycle of a basin; mega sequence concept
   - Petroleum System Defined; key elements and processes
   - Generation of play maps and timing worksheets
   - EXERCISE and Debrief: Petroleum Systems

4) Defining Plays, Vertically and Laterally
   - Critical data needs
   - Generating a play-specific well database
   - Overlaying element maps to generate play maps
   - EXERCISE and Debrief: Training dataset familiarization, defining overall play outline

5) Dividing Plays into Subplays
   - Play segments versus common risk segments – reasons for subplays
   - Gross depositional environment, tectonic setting
   - Concept of common risk segment maps, and segment families
   - Impact of uncertainty/confidence upon maps
   - “Geologic” vs. “strategic” play delineation with map examples
   - EXERCISE and Debrief: Initial play segmentation, assign ‘traffic light’ probability

6) Treatment of chance - plays vs. prospects
   - Review of Pg factors
   - Commonalities – prospect to play assessment of chance
   - Apportioning chance factors to shared/local elements, demonstrated with map examples
   - Reality checks
   - Impact of apportioning chance into shared/local chance upon chance of venture success
   - EXERCISE and Debrief: Assigning Play Chance Factors to segmented play map

7) Data Issues
   - Creating a Key Well Test Dataset
   - Key Well Annotation
   - EXERCISE and Debrief: Assigning Prospect-specific Chance Factors to segments
8) Field size data - pitfalls for predicting the future
   - Significance of using appropriate future field size – impact upon the math
   - Truncation of field size data due to under-sampling, dangers of small sample size
   - Impact of (and accommodating) discovery process to predict the future
   - Plotting techniques
   - Using appropriate analogs – and what to do in rank wildcat plays
   - EXERCISE and Debrief: Analyze field size dataset from play area, early exploration period and
     Predict future field size characteristics

9) Calculating Undiscovered (Yet to Find) Volumes
   - Different methods
   - Appropriate method to use based upon state of knowledge
   - Prospect/lead density
   - Pitfalls and reality checks
   - EXERCISE and Debrief: calculate undrilled leads, appropriate future field size distribution, and undiscovered
     potential for each identified segment, compare predictions to results. Award prizes for best group
     performance

10) Risk analysis for plays vs. prospects – Strategic Play Analysis
    - Expected value concept, significance and contrasted (prospect to play)
    - Inputs for play risk analysis, contrasted to prospect risk analysis
    - Systematic steps taken
    - Detailed review of each of the input parameters used in strategic play analysis, including pitfalls and reality
      checks
    - The math – plugging the inputs into the calculation of key play metrics of profitability and efficiency

11) Play Based Exploration for unconventional plays
    - Characteristics of unconventional resource plays
    - Similarities and differences in chance from conventional plays
    - Field size distributions versus EUR/well distributions
    - Key inputs and maps, differences in map process
    - Play fairway definition – differences from conventional plays

12) Play ranking techniques - choosing the best plays for your company
    - Review of potential ranking criteria – geologic, strategic, geopolitical
    - Review of calculated outputs from strategic play assessment methodology
    - Building and interpreting ‘business ranking models’

13) Wrap-up / Group Discussion

About the Instructor

P. Jeffrey Brown (BA with Distinction in Geology, Duke University; MS, Ph.D., in Geology, University of South
Carolina) worked for more than 21 years with Mobil and an additional 10 years as an industry consultant
specializing in prospect and play analysis. During his career he has been involved in the assessment of chance of
success, volumes, and value for literally hundreds of prospects, concessions, and plays worldwide. Brown has
dedicated the last 20 years of his career to developing and implementing proper Play-based exploration methods.
Most recently, he was a principal in implementation of such processes for a number of clients, including PTTEP,
Saudi Aramco, Shell, Pemex and Maersk, and he was a principal in a systematic global reconnaissance of every
significant petroliferous basin for unconventional gas potential, leading his client (a multinational) to focus upon,
and successfully enter, certain regions. Brown is an AAPG Certified Petroleum Geologist (#5734) and an active
member of AAPG, currently serving on the Committee on Resource Evaluation. Dr. Brown has also served as an
instructor in many AAPG courses. He is a Specialist for Rose & Associates, dedicated to Play Based Exploration.