

## Prospect Evaluation Methods for Seismic DHI's

### Course Description

This 2- or 3-day course covers all aspects of the evaluation of exploration prospects that are supported by seismic anomalies known as Direct Hydrocarbon Indicators (DHI's, also known as HCI's or DFI's). It has a strong practical orientation that uses actual prospects and realistic exercises to illustrate the applications of the various concepts and analytical procedures involved in the technical evaluation and investment decision process of DHI-supported prospects. The course leverages over 20 years of learnings and workflow developments that have emerged from the Rose and Associates' DHI Interpretation and Risk Analysis Consortium since 2001. This 2.5-day version is customized from the full content version to meet the client's objectives.

The course follows the characteristic workflow of evaluating DHI projects, including both theory and application, and integrates the Geological and Geophysical aspects of interpretation. This version of the course, tailored to companies that are members of the DHI Consortium, includes full explanations of the Consortium's proprietary DHI risking software, Seismic Amplitude Analysis Module (SAAM). The course also gives the participants a global context of DHI-driven exploration, as well as how to use SAAM's 360-well calibration database for analog comparisons and global trends. Completion of the course should prepare participants for immediate application of all concepts and techniques in the risk and resource evaluation of DHI prospects.

### Course Outline

1. Introduction to DHI Evaluation and DHI Workflow
2. Review of DHI and AVO Technology
3. DHI Data Quality Considerations
4. DHI Characteristics: Concepts, Examples and Learnings
5. DHI Volumetrics
6. DHI/SAAM Workflow and Tutorials
7. Setting Final Pg – DHI vs. Traditional Geological Approach
8. Prospect Examples – Review and SAAM Analysis
9. Wrap-up: Lessons, Summary, Course Evaluation

In addition to these presentation topics, the Appendix with these course notes contains further information and resources on topics that are introduced to the class:

- Additional SAAM Modules and Tools: SAAM Toolbox, Initial Pg, CSEM module, Subsalt Module, and Machine Learning Data Export Functionality
- DHI Consortium Characteristics Calibration Poster (Consortium Member course only)
- Overview of Low Saturation Gas (LSG) issues
- Determining seismic phase
- AVO Best Practices

## Who Should Attend

This course is intended for geoscientists, engineers, commercial team members, and managers charged with evaluating exploration opportunities in seismic Direct Hydrocarbon Indicators (DHI's). The only required prerequisite is a basic working knowledge of subsurface Exploration concepts.

## Additional DHI Training Opportunities

This course, or various parts of it, have been presented to E&P Operating Companies since 2014, as well as inside the Rose and Associates DHI Interpretation and Risk Analysis Consortium. For more information on the Consortium, visit <https://www.roseassoc.com/dhi-consortium>.

In addition to this course, Rose and Associates can provide short courses on advanced DHI topics, as well as customized courses on DHIs.

## Instructor Biographies

Rose & Associates, LLP utilizes the best in the business. Period. All our instructors/consultants have served for decades as explorers, developers, risk team members, portfolio planners, and decision makers. We have been able to compile what no other service company can: a collection of global experts in play, prospect, and development analyses who are superb listeners and communicators. R&A provides training, consulting, and software expertise.

### **HENRY S. PETTINGILL**

### **Senior Associate**

Henry S. Pettingill is a Petroleum Geologist and Exploration Manager who has been in the oil and gas industry since 1983. He joined Rose and Associates in 2018 after 16 years with Noble Energy Inc., where he finished his career as Chief Geoscientist. Prior to that, he served as Director of Business Innovation from 2013-2015, and as Director of Exploration Technology from 2002-2013. His responsibilities included overseeing the Global Exploration Portfolio, Risk Analysis, Geoscience Technology, and Staff Development. Prior to joining Noble, he held various technical and managerial positions within Repsol and Royal Dutch/Shell. His assignments have focused on Deepwater Exploration and Appraisal, International Exploration/New Ventures, Exploration Risk Analysis, and Portfolio Management. He has taught classes in Exploration Risk Analysis at the University of Oklahoma, the Nautilus Geosciences Training Alliance, and the Instituto Superior de la Energía (Madrid), and teaches Deep Water Clastics in the Spanish Pyrenees. In 2017, he was recognized by AAPG as one of the industry's "100 Explorationists Who Made a Difference".

Mr. Pettingill holds a BA degree from the University of Rochester and an MSc degree from Virginia Tech (USA). He also completed the Executive Management Program at INSEAD Euroforum (Spain). He is an AAPG Certified Petroleum Geologist, Texas Board of Professional Geoscientists Licensed Geologist, and an active member of AAPG, SEG, and SPE. He is a Trustee Associate of the SEG and AAPG Foundations. Pettingill is chairman of Rose & Associates' DHI Consortium. He serves on the Advisory Board of Virginia Tech Department of Geosciences.

## **ROGER HOLEYWELL**

**Senior Associate**

Roger Holeywell has worked in the petroleum industry since the 1960s and has held positions with Diamond Shamrock (Amarillo & Houston), Texas Oil & Gas (Shreveport & Dallas), and Marathon Oil (Houston). During his career he worked as Senior Exploration Geologist, Exploration Manager, Mapping & Database Supervisor, Corporate Exploration Coordinator, and GIS Manager, among others. He recently retired from Marathon after 37 years of service, having most recently held the position of Geoscience Data Manager.

Roger has degrees in Geology from Texas A&M University (BS) and Brown University (MS), and later in his career earned a Master's Degree in Finance from the University of Texas at Dallas.

Since the early 1990s, Roger has worked in the field of risk analysis and was instrumental in collaborating with Pete Rose to establish the original partnership between R&A and Marathon for software development and marketing. Roger recently celebrated his 20th year as a freelance software developer for R&A. His software projects include MMRA, Portfolio Essentials, Risk Essentials, Multi-zone Master, PlayRA, and Portfolio Rollup. He has also been involved in R&A's DHI Consortium since its inception 15 years ago and is the author of the Consortium's primary software tool, SAAM.

## **ROCKY RODEN, Rocky Ridge Resources Inc.**

**Consultant**

Rocky has owned his own consulting company, Rocky Ridge Resources, Inc., for the last eighteen years and works with numerous oil companies around the world on interpretation technical issues, prospect generation, risk analysis evaluations, and reserve/resource calculations. He has authored or co-authored over 40 technical publications on various aspects of seismic interpretation, AVO analysis, amplitude risk assessment, and geoscience machine learning. He is a principal in the Rose and Associates DHI Risk Analysis Consortium which has involved 85 oil companies since 2001, developing a seismic amplitude risk analysis program and worldwide prospect database. He works with Geophysical Insights on the integration of advanced geophysical technology in machine learning software applications. He is a proven oil finder (45 years in the industry) with extensive knowledge of modern geoscience technical approaches (past Chairman-*The Leading Edge* Editorial Board). As Chief Geophysicist and Director of Applied Technology for Repsol-YPF (retired 2001), his role comprised advising corporate officers, geoscientists, and managers on interpretation, strategy and technical analysis for exploration and development in offices in U.S., Argentina, Spain, Egypt, Bolivia, Ecuador, Peru, Brazil, Venezuela, Malaysia, and Indonesia. He has been involved in the technical and economic evaluation of Gulf of Mexico lease sales, farmouts worldwide, and bid rounds in South America, Europe, and the Far East. Previous work experience includes exploration and development at Maxus Energy, Pogo Producing, Decca Survey, and Texaco. He holds a BS in Oceanographic Technology-Geology from Lamar University and a MS in Geological and Geophysical Oceanography from Texas A&M University.