
Heavy Oil Reservoirs Characterization

(3-day course conducted on PetroSkills platform)

With the conventional hydrocarbon resources growing thinner, heavy oil and bitumen are being looked at as the next resource that could be exploited in the near future. As both heavy oil and bitumen are a global resource, they are fast becoming an asset base for many energy companies. Beginning with the importance of the heavy oil resource, the mechanisms for the formation of heavy oils and bitumen, their phase behavior and physical properties are discussed, which is followed by the geology of two of the most important areas that hold three-fourths of the world's heavy oil reserves.

As the economic development of heavy oil reservoir requires accurate characterization of the rocks as well as the fluids contained therein, next the rock physics properties of heavy oils and their variation is taken up. Bearing in mind that heavy oil properties are different from conventional oil, and that its exploration and production requires special seismic strategies and rock physics models, the geophysical characterization of the heavy oil reservoirs is discussed comprising the determination of elastic parameters from seismic post-stack attributes and pre-stack AVO analysis, employing neural networks and using multicomponent seismic data as well. The latter offers the advantage of characterizing heavy oil formations in terms of V_p/V_s ratio in addition to being able to correlate the P- and S-sections. This is followed by the use of geophysical methods for monitoring the enhanced oil recovery in terms of fire front, CSS steam, or SAGD steam flooding. Finally, the applications of frequency attenuation and seismic tomography methods in imaging the inter-well structure, porosity and lithofacies are discussed.

This course has been designed to provide a practical knowledge and understanding of the above-mentioned techniques and concepts that are used in heavy oil exploration and development.

Learning Outcomes

After attending this course the participants will be able to:

- Make a judicious choice out of the available reservoir characterization options you have, and select those that are suitable for the project.
- Apply the appropriately chosen techniques to your data to extract meaningful information therefrom.
- Evaluate the application of the various techniques discussed during the course.
- Identify the sweet spots within the reservoir zone based on characterization with application of different attributes.

- Integrate the different attribute applications so as to generate a comprehensive characterization of the zone of interest.
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Who should attend?

- Seismic interpreters who wish to extract meaningful information from their data.
- Seismic processors who want to find out different ways to characterize heavy oil formations.
- Stratigraphers and structure geologists who use 3D seismic volumes to prepare detailed reservoir models.
- Reservoir engineers who want to understand about the seismic input to add detail to 3D reservoir models.
- Students of geophysics who wish to become qualified interpreters.