

The Peaks and Valleys of Rockies Oil Resource Plays

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ABSTRACT

A review of oil resource play exploration in the Rocky Mountain basins over the last decade found several plays of great commercial regional success, some with only localized commerciality and many more with non-commercial oil. To understand the resulting “peaks”, “islands” and “valleys” of exploration activity, it helps to review the nature of these oil resource systems from a geochemical, applied research, analytical and geological/engineering perspective. Geologists have detailed the success of the Williston, Denver and Powder River basin oil resource plays in numerous publications so this presentation focuses on the plays that failed to find regional commercial success and postulate some of the reasons. Leveraging off the work of others on the criteria required for success, one can then examine the relative strengths, weaknesses and inhibitors of exploratory oil resource targets and gain a better understanding to apply to future exploration. Three main lithologies: siliceous shale, carbonate-rich shale and clastic reservoirs provide a general framework for the assessment. A simple rating system examined the primary essential criteria for each lithology: source rock quality and maturity; oil saturation; and producibility in terms of conductivity and reservoir energy or drive. It also reviewed inhibitors both geochemical and tectonic. Exploration pre-drill predictability seems to decrease in order of the above criteria. Many of the exploration failures had strong to moderate source rock quality and/or maturity but ineffective producibility and/or challenging inhibitors. These very complex, inter-related, multi-dimensional (including time) systems do not lend themselves to simplification. However, a high level rating system can begin to identify the main strengths and weaknesses to guide additional analysis and yield higher commercial exploration success in the future.