Strategies for Effective Petroleum Systems Analysis: Tertiary Lacustrine Systems of the Greater Rocky Mountains

Maria N. Slack[1], David A. Wavrek[1], and Curtis W. Slack[2]

[1]Petroleum Systems International Inc., Salt Lake City, UT
[2]Brigham Young University- Idaho, Rexburg, ID

ABSTRACT

Tertiary lacustrine depositional systems developed in a variety of structural settings within the Greater Rocky Mountain region: compressional, transtensional, and extensional basins. While sharing certain traits, each of these basins formed within a unique geographic and stratigraphic setting. These individual settings have a profound influence on the resulting lacustrine system (water budget vs. sedimentation rate vs. accommodation) and invoke a unique set of petroleum system elements and processes. Elements include source rock (quality and quantity), reservoir, seal, and overburden material, while the processes consist of trap formation, and hydrocarbon generation / migration / accumulation. Taken individually, each component yields a partial understanding of the petroleum system, but each needs to be interpreted in a collective manner. A work flow protocol that identifies both critical variables and geologic input is advocated. The successful exploration program will seek to understand the petroleum system as a whole by relating the source rock data, including kerogen kinetics with accurate thermal maturity analysis, to the geographic and stratigraphic framework. This study will compare and contrast petroleum system elements and processes of Tertiary lacustrine systems in the Greater Rocky Mountain region to demonstrate the benefits of comprehensive and detailed petroleum systems analysis. Tertiary lacustrine depositional systems developed in a variety of structural settings within the Greater Rocky Mountain region: compressional, transtensional, and extensional basins. While sharing certain traits, each of these basins formed within a unique geographic and stratigraphic setting. These individual settings have a profound influence on the resulting lacustrine system (water budget vs. sedimentation rate vs. accommodation) and invoke a unique set of petroleum system elements and processes. Elements include source rock (quality and quantity), reservoir, seal, and overburden material, while the processes consist of trap formation, and hydrocarbon generation / migration / accumulation. Taken individually, each component yields a partial understanding of the petroleum system, but each needs to be interpreted in a collective manner. A work flow protocol that identifies both critical variables and geologic input is advocated. The successful exploration program will seek to understand the petroleum system as a whole by relating the source rock data, including kerogen kinetics with accurate thermal maturity analysis, to the geographic and stratigraphic framework. This study will compare and contrast petroleum system elements and processes of Tertiary lacustrine systems in the Greater Rocky Mountain region to demonstrate the benefits of comprehensive and detailed petroleum systems analysis.