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Recognition and Regional Correlation of Impact-Related "Ames Crater" Arbuckle and Simpson Reservoir Lithofacies: Abstract

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ABSTRACT

The concentric structural feature known as the "Ames Hole," or "Ames Crater," located on the northern shelf of the Anadarko Basin, contains several heterogeneous and uniquely associated hydrocarbon reservoirs, as well as a locally thick (crater-filling) Middle Ordovician (Simpson shale) source rock. Critical diagnostic structural and morphological features, along with petrographic and shock metamorphism evidence, strongly support an impact origin of the structure. Principle crater reservoirs include extremely brecciated, fractured, and faulted, Cambro-Ordovician Arbuckle Group dolomites, Pre-Cambrian granodiorites, devitrified pseudo-pyroclastic (impact melt) rocks, and a rather homogenous, dolomitic ejecta-fallout breccia, which is present along the rim and flanks of the crater.

Stratigraphic trapping of hydrocarbons associated with the presence of reservoir-quality ejecta-fallout lithologies unconformably present in the upper portion of the Arbuckle Group, and in reworked, arkosic/dolomitic impact-related lithofacies within the overlying basal Simpson Group, may exist both locally and regionally relative to the "Ames Crater". Recognition and regional correlation of Arbuckle ejecta-failout breccias, and arkosic/dolomitic (reworked) Simpson clastics, requires a thorough understanding of the genesis, distribution, structural complexities, and petrographic/petrophysical properties associated with various "Ames Crater" lithofacies. Calibration of log-rock characteristics of ejecta-fallout reservoir lithofacies from key crater rim wells provides the basis for field-wide and regional inferences about lithologies, reservoir quality, and related production characteristics. An awareness and understanding of impact-related "Ames Crater" Arbuckle and Simpson lithofacies should lead to refinement of regional Lower and Middle Ordovician stratigraphy, and create renewed exploration strategies for potential stratigraphic traps.

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1 Solid Rock Resources, Inc., Tulsa, OK