Society of Petroleum Engineers
Distinguished Lecturer 2014-15 Lecture Season

Shale Sweet Spot Detection with Surface Seismic

Brian E. Toelle
Schlumberger
Discipline: Reservoir Description and Dynamics

Abstract:

One of the greatest revolutions in the history of the oil and gas industry has taken place over the past decade. This revolution is the rise of the shale reservoirs. First drilled in the 1820s these reservoirs did not attract serious attention due to their economics until the late 1990s when the Barnett Shale emerged as an industry "game changer". Numerous other shales rapidly attracted the attention of the industry until today dozens of shales are currently being drilled throughout North America. This revolution is rapidly spreading to many locations throughout the world. Initially these shales were developed using statistical drilling methods in which a large number of horizontal boreholes are drilled throughout the play. Until recently gas prices supported the economics of this approach. But due to their success, an abundance of gas has caused a decrease in gas price and a new economic paradigm has emerged, shale sweet spot drilling. Production from numerous shale plays indicates the existence of these sweet spots. These result from certain geologic conditions, such as increased matrix porosity or TOC, increased micro-fractures and areas with increased brittleness. These reservoir characteristics affect the physical rock properties which, in turn, affect a passing seismic signal. Recent advances in seismic interpretation have demonstrated that these shale reservoir sweet spots can be detected prior to drilling. The ability to locate these sweet spots before drilling significantly impacts the economics associated with these plays. During this presentation a number of these seismic interpretation methodologies will be discussed.

Biography:

Brian E. Toelle is Adjunct Assistant Professor at West Virginia University and an Advisor in Exploration and Geophysics for Schlumberger. He holds BSc, MS, and PhD degrees in geology and has worked in the oil and gas industry for over 33 years. He has authored/co-author 47 professional papers, posters and presentations, received Saudi Aramco's Exploration Professional of the Year Award and the "Performed by Schlumberger Award". His expertise includes Exploration Play and Prospect Generation, Shale Reservoir Geology and Geophysics, Field Development Planning, Underground Gas Storage Field Development, Enhanced Oil Recovery Projects, CO_2 Sequestration Projects and Seismic-based Fracture Detection methods.