

Seismic Reservoir Characterization of the Morrow A Sandstone, Postle Field, Oklahoma

Abstract

Three multicomponent (9-C) seismic surveys were conducted at Postle Field, Oklahoma. Interpretation of the surveys illustrates that the Morrow A sandstone can be detected. The sandstone was previously considered acoustically invisible, yet the combination of multicomponent and time-lapse seismic data has enabled us to detect the reservoir that averages 28 ft thick and is buried beneath 6100 ft of complex overburden.

Although the sandstone is thin, it has a greater elastic impedance contrast than the acoustic impedance contrast. We have found that shear-wave data enables reservoir mapping of at least half the minimum thickness seen on P-wave data. This is because the shear-wave reflectivity contrast between the sandstone and adjacent shale is three times that of P-wave, thus enabling higher definition of the thin sandstone reservoir with shear-wave data. Dynamic changes introduced by water and carbon dioxide flooding enables further delineation of the sandstone in the shale-dominated interval.

Biography – Thomas L. Davis

Tom is currently Professor of Geophysics at Colorado School of Mines. At Mines he guided the leading-edge research of the Reservoir Characterization Project, whose mission is to develop and apply time-lapse (4-D), multicomponent (3-C and 9-C) seismology to improved recovery. He has been an organizer of technical conferences, workshops and continuing education programs for the SEG. Tom was the SEG's Second Vice President in 1989, Distinguished Lecturer in Spring, 1995 and Technical Program Co-Chairman in 1996. He received the C. J. Mackenzie Award from the Engineering College of the University of Saskatchewan in 1997, the Milton B. Dorbrin Award from the University of Houston in 1998, the Colorado School of Mines Dean's Excellence Award in 1999 and the RMAG/DGS Best Paper Award at the tenth annual 3-D symposium in 2004. In 2007 he was awarded the Melvin F. Coolbaugh Memorial Award from Colorado School of Mines.

