Interpretation of Baseline Multicomponent Seismic Data at the Violet Grove CO_2 Injection Site, Alberta

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Abstract

Time-lapse seismic technology has been implemented in the Violet Grove CO_2 injection pilot, in west-central Alberta, Canada, to monitor CO_2 injection and storage in the Cardium Formation. A multicomponent 2.5D surface seismic baseline survey was acquired in March 2005, prior to CO_2 injection. Two synthetic seismograms, which match the surface seismic data well, have been generated by using the logs of two wells at the injection site and an interpretation using both PP and PS seismic data has been made. Several horizons including Ardley, Cardium, Blackstone, and Viking Formations have been picked, and all horizons are quite flat. Key markers have been correlated between the PP and PS datasets and V_p/V_s values were calculated from the compression and shear sonic logs as well as from correlated PP and PS data volumes. The good reservoir of the Cardium Formation has a low V_p/V_s value (1.6-1.8); the shale above and below the Cardium Formation has a relatively high V_p/V_s value (1.8-2.0). The average V_p/V_s between Ardley and Viking horizons is approximately 2.0.

After 9 months of CO_2 injection, the first monitor multicomponent surface seismic survey was completed in December 2005 and is currently being processed. Timelapse seismic analysis will be undertaken in an attempt to track the CO_2 plume in the reservoir and to identify any possible leakage pathways through the caprock.