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Seismic Images of the Northern West Virginia-Southwestern Pennsylvania Depocenter of the Central Appalachian Basin

Three CDP seismic profiles (1980s vintage) were reprocessed and interpreted to characterize the deep structure of the northern West Virginia-southwestern Pennsylvania depocenter and to identify potential areas for deep gas entrapment. Also known as the Dunkard basin, the depocenter contains as much as 30,000 ft of Paleozoic strata that have been moderately deformed by extensional and contractional tectonics. Line A trends east-west for about 120 mi across northern West Virginia from near the western margin of the Rome trough in Ritchie County, across the eastern margin of the Rome trough in Taylor County, to the Allegheny structural front in Mineral County. Lines B and C are shorter and located north of line A in northernmost West Virginia, western Maryland, and southwestern Pennsylvania. Seismic reflections are correlated with stratigraphic units in the depocenter by a synthetic seismogram for the No. 1 Burley well, Marshall County, West Virginia, that was drilled into Upper Cambrian strata at a total depth of 16,500 ft. The dominant structures on the profiles are foreland-vergent, imbricate fans and ramp anticlines that originated from Alleghanian thin-skinned contractional deformation. The oldest structure imaged on the seismic data is the Rome trough with its eastward-thickening wedge of Cambrian strata and accompanying basement-involved extensional faults. Overall, the Rome trough is an asymmetric graben with large, down-to-the-west normal faults along its eastern margin and minor down-to-the-east faults on its east-dipping west flank. Several intratrough fault blocks are recognized. The deeper parts of the Rome trough are located in discontinuous subbasins across its eastern flank. Partial structural inversion of the Rome trough is indicated by 1) the propagation of several basement faults into Ordovician and younger strata and 2) the presence of deeply rooted anticlines on the original downthrown side of several basement faults. These anticlines may be traps for deep gas.