

Stratigraphic Framework, Structure, and Thermal Maturity of Cambrian and Ordovician Rocks in the Rome Trough and Adjoining Cumberland Plateau, Eastern Kentucky, East-Central Tennessee, and Western West Virginia, Robert T. Ryder, Robert D. Crangle Jr., John E. Repetski, and Michael H. Trippi, U.S. Geological Survey, Reston, VA 20192, rryder@usgs.gov

A new southwest- to northeast-trending cross section from the Sequatchie Anticline in east-central Tennessee through parts of the Rome Trough in eastern Kentucky and westernmost West Virginia shows the stratigraphic framework of Cambrian and Ordovician rocks and their style of deformation. The cross section covers a distance of about 288 miles and is constructed from 17 wells that range in depth from about 5,405 to 19,591 feet. The strata consist of intertongued carbonate (limestone and dolomite) and siliciclastic deposits, and the Middle Ordovician Knox unconformity is present across the entire cross section. Structures in the Rome Trough are dominated by a complex array of normal faults, the larger of which are the Irvine–Paint Creek and the Rockcastle River Faults. These normal faults offset Mesoproterozoic basement and overlying lower Paleozoic rocks, and they had variable growth histories that probably included reversals in relative offset. In contrast, the Middle and Upper Ordovician rocks at the southern end of the cross section in Tennessee have been cut by thrust faults of thin-skinned origin.

Drill cuttings from several wells have yielded conodont elements. The identifiable conodonts are used to differentiate strata of Late Cambrian, Early Ordovician, and Middle Ordovician age, and their color alteration index (CAI) values are used to establish the thermal maturity of the rocks. The CAI 1–1.5 values in the Middle Ordovician rocks are consistent with local oil production from rocks of this age in the Cumberland Plateau, whereas the CAI 2–3 values in the Lower Ordovician rocks are consistent with local gas production from Lower Ordovician and Upper Cambrian rocks in the Rome Trough.