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STRATIGRAPHIC CROSS SECTIONS FOR THE UPPER MISSISSIPPIAN-MIDDLE PENNSYLVANIAN UNITS OF BUCHANAN AND DICKENSON COUNTIES, SOUTHWEST VIRGINIA

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The area of this report lies between 37°00' and 37°22'30" north latitudes and 81°45' and 81°22'30" west longitudes. It includes all of Buchanan County and the eastern-most portion of Dickenson County and lies within the Appalachian Plateau physiographic province of Virginia. This study was initially performed as part of a broader hydrologic-geologic study of Buchanan County by the Virginia Division of Mineral Resources for the Water Resources Division, U. S. Geological Survey under contract number 0429. The purpose of that original study was to compile geologic and mining data to evaluate surface-groundwater interactions in the region. The four stratigraphic cross sections are located such that they either emcompass or traverse three drainage basins: Grissom, Ball and Pawpaw creeks of southwestern Buchanan County. Most of the data used in constructing the cross sections were compiled from existing gas test well logs, coal mine maps, existing geologic maps, and the Division's current mapping activities within the study area. Mean sea level was chosen as datum when positioning the columnar sections used to construct the cross sections. This was done in order to show the relationship between the stratigraphy, structure and topography in the region. Since the initial project dealt with only surficial and near-surface stratigraphy, the cross sections of this report have been confined to those units of Upper Mississippian to Middle Pennsylvanian in age.

STRATIGRAPHY

The units discussed in this report are, in ascending order: Bluestone Formation, Pocahontas Formation, Lee Formation, Norton Formation (New River and Kanawha formations, in part), Gladeville Sandstone, and Wise Formation. Virginia stratigraphic nomenclature (Miller, 1974) is used, except in the Jewell Ridge area of eastern Buchanan County where West Virginia nomenclature (Englund, 1981) is used.

In general, the units discussed in this report consist of interbedded conglomerate, sandstone, siltstone, shale, claystone and coal. Lateral facies changes among lithologic units are common, resulting in the complex distribution depicted in the cross sections. Because of their relatively widespread lateral extent, major coal beds were found to be the most reliable horizons for making correlations. However, correlations among the numerous coal beds of the Pocahontas Formation are difficult and, in some cases, questionable.

The lower-most horizon considered in this report is the top of the Bluestone Formation, which was defined as the first occurrence of red or green beds below the Pocahontas coals. The three quartzarenite sandstone members of the Lee Formation, being distinctive in both color and composition, are readily identifiable in well logs, and served as another check in making correlations. As seen in cross section D-D' (Sheet 4), the upper quartzarenite member of the Lee Formation grades laterally into the feldspathic McClure sandstone of the Norton Formation. This agrees with earlier findings of Miller (1974) and Englund (1979). The Gladeville Sandstone appears to have graded from the quartzose sandstone (as described by Miller, 1969, in the type area of Wise County) into a feldspathic sandstone in Buchanan County. Its feldspathic nature is evident in both surface exposures and in well logs. The Gladeville Sandstone of western Buchanan County can be identified by its position in the stratigraphic column. It is an 80 to 100 foot thick massive sandstone immediately below a 60 to 70 foot thick clay-rich coal zone at the base of the Wise Formation.

STRUCTURE

The regional dip at and near the surface is generally much less than 4° to the northwest. This northwestward dip gradually lessens with depth approximately to the base of the Pocahontas Formation, where beds are virtually horizontal. Slight variations in this regional trend exist in the form of very gentle and broad folds. A number of these structural features can be observed on the enclosed cross sections. Those features corresponding to previously mapped structures have been labeled as such (Miller, 1974, p. 14; Hinds, 1918, p. 55-56; Giles, 1921, p. 48-66).

The most significant structural feature within the study area is a high-angle strike-slip fault, the Russell Fork fault (see Sheet 3). The amount of lateral displacement along this fault was estimated as 4 miles by Miller (1974) and Englund (1979). It appears that strata bordering the Russell Fork fault have been locally deformed into a gentle rolling pattern, making relative vertical offset variable along the fault. Vertical displacement where cross section C-C' crosses the fault was estimated to be 80 to 100 feet (see Sheet 3). Another high-angle strike-slip fault, the Pawpaw fault, has been more accurately located through the Division's recent mapping activities in the Prater 7.5-minute quadrangle (Mitchell and Morris, in preparation). The amount of lateral displacement along this fault has not yet been determined, but it appears that vertical offset is less than 20 to 30 feet. For a more detailed discussion of the stratigraphy and structure of this region, see Miller (1974) and Englund (1979).

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