

Sewanee Conglomerate—only the upper few feet of the *Sewanee Conglomerate* is present in all holes.

CONCLUSIONS

It has been noted that stratigraphic units in the Crab Orchard Mountains Group near the eastern margin of the Southern Cumberland Plateau in Bledsoe County, Tennessee show a relatively large thickness variation (morphologic change) over a small area. Vandever

stratigraphic units thicken southward; whereas, the Newton Sandstone and Whitwell Shale thin to the south. The *Sewanee Coal Seam* occurs in the Whitwell as a locally thick seam which likely formed in a small depositional basin that thinned to the south.

LITERATURE CITED

Wilson, C. W., Jr., Jewell, J. W., and Luther, E. T., 1956. Pennsylvanian geology of the Cumberland plateau: Tennessee Division Geology Folio, 21 p.

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SUBSURFACE STRATIGRAPHIC FRAMEWORK OF CRAB ORCHARD MOUNTAIN AND GIZZARD GROUPS (PENNSYLVANIAN) ON WALDEN RIDGE (SOUTH) IN BLEDSOE, HAMILTON AND RHEA COUNTIES, WEST OF GRAYSVILLE, TENNESSEE

RICHARD KETELLE AND RANDALL WILSON
Hensley-Schmidt, Consulting Engineers
Chattanooga, Tennessee 37401
and

RICHARD E. BERGENBACK
University of Tennessee at Chattanooga
Chattanooga, Tennessee 37401

ABSTRACT

A number of bore holes in Pennsylvanian rocks on Walden Ridge South west of Graysville, Tennessee, enabled development of a localized, subsurface stratigraphic framework with marked thickness variation of stratigraphic units, as well as, an east-west geologic cross-section indicating the asymmetric synclinal nature of this part of the Cumberland Plateau.

INTRODUCTION

Recently obtained bore hole (air rotary) and core hole data from Walden Ridge South in Bledsoe, Hamilton and Rhea Counties west of Graysville, Tennessee, have enabled establishment of a subsurface stratigraphic framework for the lower Pennsylvanian Crab Orchard Mountain and Gizzard Groups.

STRATIGRAPHY

C. W. Wilson and others (1956) presented the following stratigraphic subdivision of Pennsylvanian rocks in southern Tennessee:

Crab Orchard Mountain	Rockcastle Conglomerate
	Upper Shale
	Needleseye Sandstone
	Lower Shale
	Newton Sandstone
	Whitwell Shale
Gizzard Group	Sewanee Conglomerate
	Signal Point Shale
	Warren Point Sandstone
	Raccoon Mountain Formation

STRATIGRAPHIC FRAMEWORK

Figure 1 indicates the geographic location of the Brayton and Graysville quadrangles on Walden Ridge South in Bledsoe, Hamilton and Rhea Counties, Tennessee. Bore hole and core hole locations, indicated on Figure 2, are situated in northwestern Hamilton County.

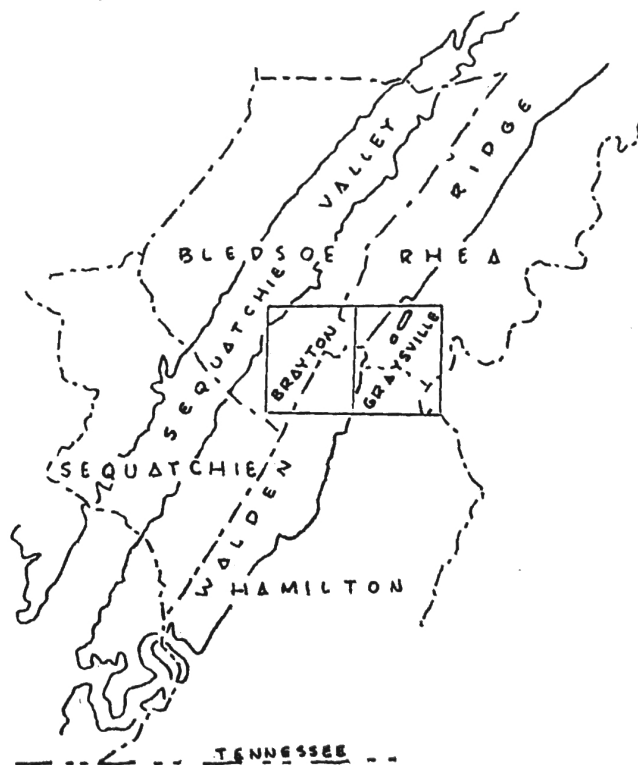


FIG. 1. Location of Brayton and Graysville Quadrangles on Walden Ridge (South), Tennessee.



FIG. 2. Diagram indicating location of bore holes on Walden Ridge South, Northwestern Hamilton County West of Graysville, Tennessee.

Figure 3 is a panel diagram showing the subsurface distribution of stratigraphic units belonging to the Pennsylvanian Crab Orchard Mountain and Gizzard Groups: *Rockcastle Conglomerate*—has an erosional upper surface and is indicated in holes 8, 9 and 14. *Vandever Upper Shale*—present in holes 1-15 with entire thickness in holes 8, 9 and 14 where it ranges from 90 feet to 110 feet thick. *Vandever Needleseye Sandstone*—entire thickness in holes 1-15. Thickness ranges from 60 feet in holes 1 and 9 to 120 feet in holes 12 and 13. This unit appears to thicken eastward. *Lower Vandever Shale*—holes 1-16 contain the entire thickness of this unit which ranges from 110 feet in hole 12 to 190 feet in hole 16. This unit appears to thicken eastward. *Newton Sandstone*—present in holes 1-18, with entire thickness in holes 1-16 and erosional upper surface in holes 17 and 18. This unit is thin in holes 8-14 and ranges in thickness from 10 feet in hole 11 to 100 feet in hole 16. This unit appears to thicken eastward. *Whitwell Shale*—entire thickness is present in holes 1-18 with the exception of hole 14. This unit appears to thicken eastward and ranges in thickness from 20 feet in hole 16 to 110 feet in holes 15 and 17. The *Richland Coal* is present in all holes with the exception of hole 14 which was not drilled deep enough to intersect the coal. *Sewanee Conglomerate*—present in all holes (1-18) except hole 14. Usual drilling practice is to drill into the upper part of the *Sewanee Conglomerate* to be sure that the entire *Whitwell Shale* thickness has been determined. Holes 3, 4 and 6 penetrated the entire thickness of the *Sewanee Conglomerate* and in these holes it ranges from 60 to 80 feet thick. *Signal Point Shale*—entire thickness of 50 feet is present in hole 6. *Warren Point Sandstone*—this unit is 120 feet thick in hole 6. A shale layer, approximately 40 feet thick is situated in the middle of the *Warren Point Sandstone*. *Raccoon Mountain Formation*—approximately 270 feet of this unit is represented in hole 6. Two shale units are present in this formation, the upper shale is 60 feet

thick (contains Nelson coal horizon) and the lower is 80 feet thick. A sandstone unit 120 feet thick is present in the *Raccoon Mountain Formation*. The *Raccoon Mountain* overlies the *Mississippian Pennington Formation* in a transitional relationship. The *Pennington Formation* is distinguished by dark-green siltstone and shale.

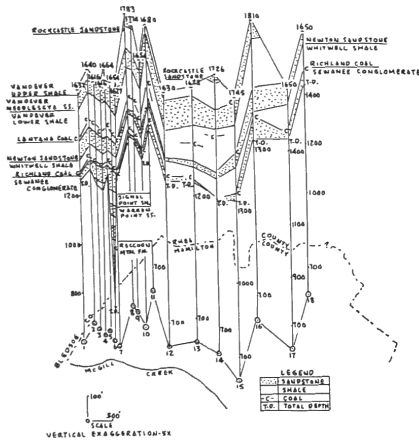


FIG. 3. Panel diagram indicating subsurface distribution of Pennsylvanian Crab Orchard Mountains Group and Gizzard Group in Northwestern Hamilton County, Tennessee.

DISCUSSION

Figure 3 shows that stratigraphic units in the Crab Orchard Mountain Group appear to thicken eastward; however, they show what is likely three-dimensional, localized, depositional thickening and thinning, but at least part of the apparent eastward thickening is due to the fact that they are part of the westward-dipping east limb of the asymmetric Walden Ridge syncline. That is to say, drilling has not determined true stratigraphic thickness.

GEOLOGIC CROSS-SECTION OF WALDEN RIDGE SOUTH

Figure 1 shows the location of the Brayton and Graysville quadrangles in Bledsoe, Hamilton and Rhea Counties over Walden Ridge South in southeastern Tennessee.

The location of three bore holes in Pennsylvanian rocks on Walden Ridge (South) in Bledsoe and Rhea Counties, Tennessee, is indicated on Figure 4.

Bore hole 21, which is a composite of 30 blast holes, is located on the western margin of Walden Ridge (South) near Pitts Gap.

Core hole 22 is situated above an abandoned strip mine and is located several hundred yards north of Pikeville Road which leads to Brayton and Pitts Gap.

Core hole 23 is located near Laurel Brook Sanitarium, on top of the Cumberland Plateau, in the northwestern corner of the Graysville quadrangle.

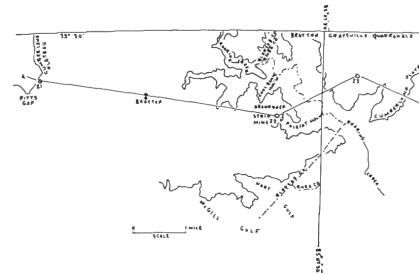


FIG. 4. Location of bore holes on Brayton and Graysville Quadrangles, Bledsoe and Rhea Counties, Tennessee.

DISCUSSION

Data from three bore holes are summarized on Figure 5 which is an east-west geologic cross-section of Walden Ridge South located near Graysville, Tennessee. The line of cross-section is indicated on Figure 4.

The structure of Walden Ridge South is that of an asymmetric syncline with its axis situated near the eastern margin. Further, the Pennsylvanian stratigraphic sequence, ranging from the *Rockcastle Conglomerate* down through the *Raccoon Mountain Formation*, is given on Figure 5.

Bore hole 21—is a composite of blast holes situated behind the highwall of a reclaimed strip mine located near Pitts Gap, Tennessee. Stratigraphic units penetrated here include the lower part of the Pennsylvanian *Newton Sandstone* and the *Whitwell Shale* which contains mineable thicknesses of both the *Sewanee* and

Richland coal seams.

Core hole 22—This hole penetrated the entire thickness (1025') of Pennsylvanian rocks from the lower portion of the *Rockcastle Conglomerate* to the base of the *Raccoon Mountain Formation*.

Formation thicknesses in this hole are: (1) 51' of *Rockcastle Conglomerate* (with what is considered as a stray seam, because it probably is not the *Nemo*, or the *Morgan Springs Seam*—it is this stray seam that has been stripped near core hole 22), (2) 104' of *Vandever Upper Shale* (the No. 12 coal is located near the top of this stratigraphic unit), (3) 225' of *Vandever Needleseye Sandstone*, (4) 125' of *Vandever Lower Shale*, (5) 70' of *Newton Sandstone*, (6) 40' of *Whitwell Shale* (with the *Richland coal* near the base of this stratigraphic unit), (7) 182' of *Sewanee Conglomerate*, (8) 9' of *Signal Point Shale*, (9) 133' of *Warren Point Sandstone* and (10) 87' of *Raccoon Mountain Formation* (with the *Nelson* and *Goodrich coal seams* situated in the upper part of this stratigraphic unit).

Core hole 23—This hole penetrated 1178' of Pennsylvanian rocks extending from the lower part of the *Rockcastle Conglomerate* through the *Raccoon Mountain Formation*. Stratigraphic unit thicknesses are: (1) 70' of *Rockcastle Conglomerate*, (2) 142' of *Vandever Upper Shale*, (3) 62' of *Vandever Needleseye Sandstone*, (4) 14' of *Vandever Lower Shale*, (5) 220' of *Newton Sandstone*, (6) 130' of *Whitwell Shale* (with the *Richland coal* near the base of this stratigraphic unit), (7) 173' of *Sewanee Conglomerate*, (8) 151' of *Signal Point Shale* (with the No. 7 coal near the top and the No. 6 near the base of this stratigraphic unit), (9) 74' of *Warren Point Sandstone* and (10) 140' of *Raccoon Mountain Formation* (with the *Nelson*

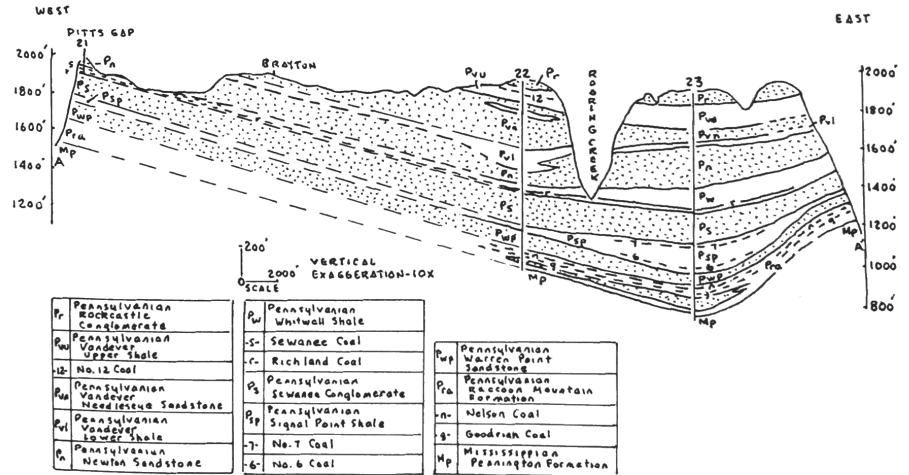


FIG. 5. East-West geologic cross-section of Walden Ridge (South), Bledsoe and Rhea Counties, Tennessee.

and Goodrich coal seams in the upper part of this stratigraphic unit).

Comparison of formation thickness between core holes 22 and 23 (summarized on Figure 5) indicates a pronounced lateral thickness change for all Pennsylvanian stratigraphic units on Walden Ridge South.

Hopefully, additional bore hole and core hole in-

formation will be obtained which should enable determination of the three dimensional morphology of these Pennsylvanian stratigraphic units.

LITERATURE CITED

Wilson, C. W., Jr., Jewell, J. W., and Luther, E. T., 1956. Pennsylvanian geology of the Cumberland plateau: Tennessee Division Geology Folio, 21 p.