

STRATIGRAPHY AND DEPOSITIONAL ENVIRONMENTS
OF THE UPPER DEVONIAN SPEECHLEY-BALLTOWN INTERVAL
IN NORTH CENTRAL WEST VIRGINIA

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ABSTRACT

The Speechley-Balltown interval represents 600 to 1000 feet of the upper part of the Upper Devonian Chemung Group in north-central West Virginia. Within the study area of this paper (Harrison, Lewis, Barbour and Upshur Counties) this interval consists primarily of siltstone and shale, with irregular occurrences of fine-grained sandstone. Information derived from more than one thousand geophysical logs, one unoriented core, gas production records and regional evidence indicates a relatively shallow marine origin for these sediments. East-west oriented sand trends coalescing in the west to form a fan-like body suggest a submarine channel-fan complex as the depositional environment, which interpretation is supported by geophysical log signatures, and sedimentary structures observed in the core. Sand deposition occurred on a gentle slope, such as a prodelta, interrupting "normal" sedimentation of fine silt and mud.

Increased thickness of the stratigraphic interval in a part of the study area possibly underlain by the eastern flank of the Rome Trough suggests continued basement activity during Late Devonian.

Gas production within this interval is stratigraphically controlled and occurs within both channel and fan sands. The Speechley A sand is recommended as the best gas prospect because of maximum areal extent and aggregate sand thickness.

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CONCLUSIONS

1. The Speechley-Balltown is a sequence of predominantly fine-grained rocks with irregular occurrences of fine-grained sand packages up to thirty feet thick. The interval thickens to the west at a rate of approximately twelve feet per mile in the study area.
2. The Warren shale and Upper Speechley shale are the most consistent and therefore most useful gamma ray log marker beds for this interval. In general, radioactive shales are better marker beds than sands within this interval.
3. Probable depositional environment was the prodelta, where deposition of fine-grained sediments was periodically interrupted by density currents carrying sandier material down a gentle slope in neritic sea depth. Density currents were confined in the east to narrow channels of low sinuosity, coalescing westward into a submarine fan. Maximum sand deposition occurred during Speechley time.
4. Thickness reversals between the lower and upper Chemung stratigraphic sections indicate westward migration of depositional axes with growth of the Catskill delta complex.
5. Only one core was available for this study; additional cores are needed to document lateral as well as vertical variations of sands in this interval, and to confirm the working hypothesis of turbidite origin.
6. Production within the Speechley-Balltown interval is stratigraphically controlled; channel and fan sands act as trap for hydrocarbons probably generated within associated organic-rich shales.
7. Best drilling target is the Speechley A sand both because of areal extent and production record. Low sinuosity and greater sand content of channel trends in the east increase success probability once trends are encountered. Probability of similar untested trends to the north and south should not be overlooked.
8. Future work on the Chemung should include study of the Bradford and Riley, and possibly Warren, sands, especially where cores are available, to better document facies and depositional environments of the Upper Devonian.
9. Coincidence of Upper Devonian depositional patterns and magnetic anomalies invites detailed study of Paleozoic sedimentation trends in this area to determine the nature and extent of basement influence.