styles of deformation both along the 38th parallel faults and within the western Appalachian basin.

Preliminary results indicate the presence of a diversity of structural styles, both basement and detached deformation. Some of the more pertinent observations are: (1) Detached structures extend farther westward than commonly interpreted. (2) A north-south trend of detached folds is southwest of and parallel with Burning Springs anticline. (3) Structural styles along the 38th parallel fault trend include wrench faults, grabens, and down-to-basin faults. A major change in tectonic style occurs across the Cincinnati arch. (4) Detached structures may reflect basement structural trends so that the Cambrian and early Paleozoic basement structures affect the position and trend of upper Paleozoic basement and detached structures.

Exploration for oil and gas largely has been on detached structures within the central Appalachian basin and basement structures farther west. Only the upper part of the stratigraphic section has been tested and there is a vast new virtually untested deep frontier within this "mature" basin. However, high cost of exploration for deep Cambrian-Ordovician targets requires geologists and geophysicists to apply their best talents and techniques to all available data.

TATLOCK, D. B., The Peoples Natural Gas Co., Pittsburgh, Pa., and J. A. GREGO, Consolidated Gas Supply Corp., Clarksburg, W. Va.

Upper Devonian Stratigraphy and Production Potential: Pennsylvanian

A new surge of drilling activity is under way in Pennsylvania, with significant development and exploration for oil and gas reserves in the Upper Devonian sandstones.

Upper Devonian sedimentary rocks are present throughout 80 percent of the Commonwealth. Their origin can be traced to an eastern upland source area "Appalachia" that was elevated, possibly as a result of spasmatic collisions of the North American and North African continental plates during the Acadian orogeny. The clastic deposits spread from this eastern source area as a thick wedge of delta-plain redbeds of continental origin and merged westward into the "Chemung" marine facies.

Oil and gas accumulated in the sand deposits of the "Chemung" facies which are distributed in a northeast-southwest trending belt in western Pennsylvania. Over 500 oil and gas fields lie within this petroliferous belt. Cumulative production has exceeded 1.2 billion bbl of oil and 8.5 Tcf of gas.

Recent new-pool discoveries and successful pool-extension tests in eastern Indiana, Cambria, southern Westmoreland, and Butler Counties, plus untested Upper Devonian sands encountered during deep drilling operations in Westmoreland and Somerset Counties, will provide new areas for gas exploration and development in Pennsylvania.

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Plate Tectonics and Localization of Major Hydrocarbon Accumulations

Most of the major hydrocarbon accumulations are in basins formed during the Mesozoic and the Cenozoic. Many of these basins, their contained sediments, and their structural and stratigraphically trapped oil and gas fields appear to be genetically related to the hypotheses of plate tectonics.

Of particular interest are those basins that formed at plate boundaries. Three fundamental methods of basin development according to type of plate-margin deformation are reviewed: tensional, compressional, and shear-zone. Basin types, structural styles, and sedimentary histories are reviewed for different plate margins.

Significant intracratonic basins have developed as a result of shear-zones "cracking" the cratons. Furthermore, important intracratonic "stand-still" basins and their associated uplifts have resulted from viscosity inhomogeneities within the asthenosphere.

Many major worldwide eustatic changes in sea level appear to be the result of the episodic nature of sea-floor spreading. Accordingly, much of the paleogeographic history of continents appears to be related to the hypotheses of plate tectonics.

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