ment.

At the experimental site in Sanilac County, Michigan, the Antrim Formation is about 200 ft (60 m) thick at 1,200 to 1,400 ft (365 to 425 m) below the surface. Under Task 2, several wells have been drilled into the Antrim layer in three 10-acre plots. Each plot has been subjected to a different fracturing procedure: (a) hydraulic fracturing followed by explosive fracturing; (b) explosive underreaming followed by explosive fracturing; (c) chemical underreaming followed by explosive fracturing.

The plot which appeared, on the basis of permeability studies, well-to-well communications, and various downhole logging studies, to offer the best chance of success in Task 3 was chosen for an in-situ extraction trial. This trial was scheduled to begin in August 1979.

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Cross-Strike Structural Discontinuities—Exploration Rationale for Eastern Plateau Province

Cross-strike structural discontinuities (CSDs) are zones of structural disruption several kilometers wide in the Appalachian and other overthrust belts. CSDs are not faults or fault zones. They typically contain about 1,000 cu km of unusually fractured rock. For example, in eastern West Virginia, one CSD (Parsons lineament) trends west-northwest at least from the Appalachian front to the Intraplateau structural front, with no evidence of basement involvement. The Parsons lineament has double to triple the normal joint intensity in exposed Upper Devonian siltstones. Another CSD (Petersburg lineament) trends west-southwest from the western Valley and Ridge province, and crosses the Appalachian structural front. The Petersburg lineament aligns with Arkle's hinge line, a probable basement flexure under the western and central Plateau province, and has twice-normal joint intensity in exposed Lower Pennsylvanian sandstones. The two CSDs appear to intersect in southern Tucker and northern Randolph Counties, West Virginia.

CSDs and their intersections, particularly beneath intersections of short air-photo lineaments, may comprise highly permeable fractured reservoirs. If the seal is preserved, CSDs can provide a tool for extending exploration into the little-tested eastern Plateau province of West Virginia and adjacent states, where organic-rich Devonian shales are thick and thermally mature.

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Structural Control of Onondaga Reefs (Devonian) in South-Central New York State

The lower Middle Devonian Onondaga Formation is a restricted marine limestone that extends throughout southern New York State. Thicknesses locally range from 15 to about 260 ft (5 to 78 m) with the thicker parts generally attributed to organic reefal buildups. The reefs may be algal and mudbank as well as wave-resistant structures, however, they contain porous sections that form natural-gas reservoirs if coincident with structural closure. Early interpretations considered the reefs and tectonic structures independent; however, recent investigations suggest that incipient folding was the main control on reefal formation.

Structure and isopach maps constructed from tops picked on about 1,400 wells drilled in New York State in the area bounded by 75°30′ and 78°30′ indicate that anticlinal folds are coincident with isopach thicks that indicate reefal buildups. Organic accumulations thus are interpreted as related directly to Appalachian folding. Breaks in trends accompanied by changes in thickness are related to contemporaneous organic reaction to tectonic relief. This relation not only dates the inception of folding but also simplifies exploration for natural-gas reservoirs. Because the reefs are confined to the anticlines, there is no need for stratigraphic tests off structure.

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Revision of U.S. Geological Survey and U.S. Bureau of Mines Coal Resources Classification System

In 1976, the U.S. Geological Survey and U.S. Bureau of Mines published a system of coal-resources classification that incorporated definitions and criteria to be used by the two agencies. This system was adopted by many state geological surveys. However, because of criticism and ambiguities, the two agencies decided to revise, enlarge, and make more precise the definitions and criteria and to include advice, suggestions, and recommendations aimed at guiding those engaged in resource estimation. In addition, a decision was made to include conversion data for the English and metric systems of measurement. Finally, a report was to be written that would be a compendium on the methodologies and criteria for the classification of coal resources and reserves.

Advice from the state geologists of the principal coal-bearing states was solicited. Similarly, the existing 1976 classification system was discussed with representatives of the nations cooperating in the International Energy Agency's (IEA) World Coal Reserves and Resources Data Bank Service. Their comments were considered and incorporated in the revision that is nearing completion.

In 1977, the U.S. Department of Energy took over most of the coal-related functions and personnel of the U.S. Bureau of Mines. The revision is under the auspices of the Department of Energy and the U.S. Geological Survey.

Throughout the revision, every effort has been made not to negate the hundreds to thousands of coal-resource estimates already published or being prepared by geologists and engineers in the United States. Also, foreign resource specialists have indicated that the revision should have international comparisons as an objective. This objective has been accomplished.

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Projection of Favorable Gas-Producing Areas from Paleoenvironmental Data