namely the Murphy and Firetrail thrusts. These younger faults are interpreted to sole into the overlying Absaroka thrust, forming a subsurface duplex zone which may have considerable oil and gas potential. In addition, magnetic data suggest that the Stewart Peak culmination may be positioned over the northwest continuation of the Moxa arch, an anticlinal flexure of authochthonous basement which formed contemporaneously with thin-skinned thrusting.

The Stewart Peak culmination is compared to structural culminations in the Canadian Rockies and the southern Appalachian orogene of Virginia and Tennessee. Culminations are prospective areas for oil and gas, and traps may be formed in a variety of geometric configurations.

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Carboniferous Conodonts

Our understanding of Carboniferous conodont faunas has been significantly advanced in the last several years because of increased interest in these microfossils. Although numerous biostratigraphic zonations have been proposed, especially in the lower Carboniferous, variations in taxonomic and zonal approach preclude a unified worldwide zonation at this time. Carboniferous conodont provincialism does not restrict correlation because globally distributed species occur at most levels in the system. However, paleoecological studies are just beginning and undoubtedly will receive considerable attention in the future. Although significant advances in upper Carboniferous multielement taxonomy have been made, few published attempts at lower Carboniferous conodont apparatus reconstructions have been proffered. Nevertheless, our comprehension of Carboniferous conodont evolution has reached a level where these microfossils will greatly influence decisions by international professional groups working on problems of boundary definitions and correlations, and will aid in paleogeographic reconstructions.

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Barrow Gas Fields, North Slope, Alaska

The Barrow gas fields, located a few miles south of Point Barrow, Alaska, on a northern extension of the Arctic coastal plain, constitute the most northerly producing area in the United States. The South Barrow gas field was discovered in 1949 under the exploration program supervised by the U.S. Navy. The East Barrow field proved productive in 1977, shortly before Congress transferred Naval Petroleum Reserve No. 4 (NPR-4) to the Department of the Interior and renamed it the National Petroleum Reserve in Alaska (NPRA).

The producing areas are regionally high near the intersection of two large structurally positive elements, the Barrow arch and the Meade arch. The section of sedimentary rocks above the metamorphic basement is thin in the producing fields, only about 760 m thick. The accumulations are structurally controlled and produce from a sandstone of Middle Jurassic age. The discovery wells were located on seismic anomalies that border a roughly circular "disturbed zone," of highly faulted rocks with erratic dips, that has been called an astrobleme or a cryptovolcanic structure. Additional untested seismic structures appear to be present in the area.

The older South Barrow field is the larger of the two fields, having original recoverable reserves of about 25 Bcf of gas. The newer East Barrow field has estimated recoverable reserves of about 12 Bcf of gas. The fields furnish fuel for facilities occupied by agencies of the federal government and the native village of Barrow. The costs of developing and producing the gas are high, but recent comparative studies have shown it to be the most economical fuel for the area.

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Development of Secondary Porosity in Reservoir Sandstones by Dissolution of Silicate Mineral Constituents

Although considerable pore space in reservoir sandstones may result from chemical removal of carbonate rock as cement or mineral replacements, significant porosity may develop by direct dissolution of silicate mineral constituents. Feldspar and volcanic rock fragments, in particular, appear highly susceptible to dissolution in many reservoir sands.

Dissolution of detrital feldspar represents a most important source of secondary porosity. Sanidine, orthoclase, and plagioclase occurring as discrete grains or constituents in rock fragments may undergo intense dissolution. Microcline and authigenic feldspar growths, however, are generally much less affected. Early unaltered carbonate cement (pre-feldspar dissolution) in some sandstones indicates that dissolution may occur under alkaline as well as acidic conditions. Although resultant pores may be moldic, most voids contain remnants of undissolved material. In feldspathic sandstones, extensive dissolution can cause weakening and subsequent readjustment of the detrital framework.

Dissolution of volcanic rock fragments (VRFs) may also account for considerable pore space in reservoir sandstones. Finely crystalline volcanic fragments and volcanic glass appear to be especially prone to dissolution. Voids resulting from dissolution of VFRs are commonly moldic appearing and may be characterized by a "skeletal framework" of straight to curvilinear shards and veinlets(?) resembling chert. In some specimens, chloritized VRFs appear to be more susceptible to dissolution than unaltered "fresh-appearing" fragments. As chlorite is relatively soluble under lower pH conditions, this possibly indicates that formation waters attending dissolution were somewhat acidic.

Although dissolution of silicate mineral constituents results in increased porosity, it does not necessarily result in enhanced permeability. In some places, the development of authigenic clay as a dissolution product may serve to constrict pore throats, resulting in a decrease in pore communication.