Anticlines along the flanks of the mountains produce oil and gas from Paleozoic and Mesozoic rocks. Stratigraphic traps on the structures cut by the mountain block are enhanced by the intersection, and they produce from Cretaceous and Tertiary rocks. Uplift of the mountains was important in creating unconformity and stratigraphic traps in several oil and gas fields and in bituminous sand deposits.

Geophysical work and drilling have shown the flanks of the mountains to be thrust over or to overhang the adjacent basins.

The numerous structural intersections, overhanging flanks, and the facies changes caused by the Uinta Mountains provide good opportunities for continued exploration and success.

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Hydrocarbon Source Potential of Organic Facies of Lacustrine Elko Formation (Eocene-Oligocene), Northeastern Nevada

The Elko Formation, an Eocene-Oligocene lacustrine deposit cropping out in northeastern Nevada, is composed of two distinctly different organic-rich facies: a lignitic, gas-prone siltstone and an oil shale. A third organic-lean facies is represented by mudstones containing small amounts of fine-grained reworked kerogen. The deposit is thermally immature with respect to oil generation.

Geochemical indicators of the two major organic facies are distribution of steranes and diterpanes, presence or absence of a specific triterpenoid biomarker (gammacerane), kerogen form, and Rock-Eval pyrolysis parameters, S_2/S_3 and $(S_1 + S_2)$/TOC. The siltstones are characterized by: (1) vitrinitic kerogen, (2) pristane/phytane ratios slightly greater than 1.0, (3) relatively less negative $\delta^{13}C$ values for kerogen and $C_{15}{}^+$ hydrocarbons, (4) a predominance of C_{29} steranes and small amounts of rearranged steranes, (5) primarily C_{19} and C_{20} tricyclic diterpanes, and (6) a predominance of 17β(H)-22, 29, 30-trisnorhopane with respect to 17α(H) hopanes and 17β(H) moretanes. The oil shales are characterized by: (1) algal kerogen, (2) pristane/phytane ratios less than 0.5, (3) relatively more negative $\delta^{13}C$ values for kerogen and $C_{15}{}^+$ hydrocarbons, (4) a mixture of C_{27}, C_{28}, and C_{29} steranes and 4-methyl steranes, (5) a mixture of C_{19} to C_{26} diterpanes, and (6) a predominance of hopane and moretane and the presence of gammacerane. Hydrous pyrolysis of solvent-extracted oil shale produced a waxy oil-like bitumen whose more "mature" biomarkers and stable carbon isotopic composition resembled the unreacted oil shale.

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Bison Basin, Central Wyoming—Geologic Overview

The northeastern part of the Great Divide basin is a separate, unique, and until recently, little-explored subbasin sometimes called the Bison basin. It is bounded by the Wind River Mountains, Sweetwater-Granite Mountain foreland uplift, Lost Soldier-Wertz structure, and a little-studied very positive east-west structural arch approximately coincident with the Sweetwater-Fremont county line.

A comprehensive seismic, Landsat, and subsurface geologic examination or, better, dissection of the Bison basin was initiated in 1978. Numerous oil and gas prospects were delineated by this study. Since this small, 12 by 40 mi (19 by 64 km) basin is bordered by known reserves of 260 million bbl of oil and 90 million bcf of gas, these prospects proved to be a popular target of the drill bit. At least one of these prospects appears to be productive; others are currently being drilled.

The presence of major east-west wrench faults, a well-documented foreland uplift, until recently undrilled surface and subsurface structures, faults with throw measured in tens of thousands of feet, and an oil seep indicate possible additional hydrocarbon potential in the Bison basin that could exceed presently known reserves. Currently drilling wells and abundant already acquired reflection seismic data are the beginning step in an ongoing exploration program of an interesting, complex, and rewarding small basin with a lot of promise.

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Nacimiento Uplift and Its Similarity to Foreland Uplifts with Associated Production

The Nacimiento mountain front, east flank of the San Juan basin, is a well-documented foreland uplift. Based on detailed surface geology, its northern flank shows strong similarity to the Laramie Range and Owl Creek Mountain-Casper arch foreland uplifts of Wyoming. Petroleum has been discovered beneath these two uplifts by wells drilled through thrusted Precambrian rocks.

Recent exploration for petroleum trapped beneath Rocky Mountain foreland uplifts has provided a wealth of geologic and geophysical data not previously available. These recently published data, both from wells and reflection seismic profiles, show surface geology integrated with subsurface geology. Northern Nacimiento uplift surface geology is so similar to these other well-documented foreland uplifts that subsurface anticlines and/or faulted closures are very probably similar to productive subsurface structures under Wyoming's foreland uplifts. Such structures, if present under Nacimiento foreland uplift, could contain significant quantities of hydrocarbons considering the prolific production from stratigraphic traps in the immediately adjacent San Juan basin.

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Westernmost Structures of Idaho-Wyoming Thrust Belt: Structural Geology of Mt. Putnam and Vicinity, Northern Portneuf Range, Southeastern Idaho

Detailed mapping of Mt. Putnam in the Portneuf Range (Fort Hall Indian Reservation) has revealed the presence of previously unrecognized large-scale overturned folds and thrust faults characteristic of the Idaho-Wyoming overthrust belt. The structure of Mt. Putnam is controlled primarily by a northwest-trending overturned anticline-syncline system that is responsible for the inverted Precambrian Z-Cambrian stratigraphy of the area. Parts of the upper limb of the overturned anticline were sheared off and thrust over more gently dipping strata to the east. This "Bear Canyon thrust" places Precambrian Z-Cambrian Camelback Mountain Quartzite over the Cambrian-Ordovician carbonate sequence.

Mt. Putnam, as well as the rest of the Portneuf Range, is in the upper plate of the Putnam thrust that is exposed 7 km (4 mi) northeast of Mt. Putnam. The thrust is then displaced 5 km (3 mi) to the east by east-trending normal faults interpreted as reactivated tear faults. These faults have created windows through the upper plate Pennsylvanian-Permian Wells Formation, exposing the Ordovician Garden City Formation of the lower plate. South of this offset, the Putnam thrust resumes its southeasterly trend toward the Chesterfield Range and a possible juncture with the Paris thrust.

Ten kilometers (6 mi) west of Mt. Putnam in the Bannock Range are younger over older low-angle faults characteristic of the hinterland of the thrust belt. The area of transition between the two structural styles lies in the Pocatello Range north of Inkom, Idaho, and is presently being remapped in detail.

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Potential for New Stratigraphic Play in Mississippian Midale Anhydrite, Eastern Williston Basin

Midale (Mississippian) production was first indicated in 1953 in Saskatchewan, Canada. The productive unit was defined initially in the subsurface as the carbonate interval between the top of the Frobisher Anhydrite and the base of the Midale Anhydrite. This same nomenclature is used in this paper. In 1953, Midale production was found on the United States side of the Williston basin in Bottineau County, North Dakota. Later exploration extended Midale production westward into Burke County, North Dakota, in 1955. Cumulative production from the Midale is approximately 660 million bbl with 640 million from the Canadian side of the Williston basin.

Initially, hydrocarbon entrapment in the Midale was believed to be controlled by the Mississippian subcrop, with the Burke County production controlled by low-relief structural closure. Petrographic examination of cores and cuttings from the Midale in both Saskatchewan, Canada, and Burke and Bottineau Counties, North Dakota, indicates that production is controlled by facies changes within the unit. Use of a transgressive carbonate tidal-flats model best explains current production patterns and indicates substantial potential for additional production in eastern North Dakota and South Dakota.