RELATION OF CENOZOIC GEOLOGIC EVENTS IN THE GRANITE MOUNTAINS AREA, CENTRAL WYOMING, TO ECONOMIC DEPOSITS

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The Cenozoic history of the Granite Mountains of central Wyoming (fig. 1) was one of growth, burial, subsidence, and partial exhumation.

These events affected the stratigraphy and economic resources in the Wind River basin to the north and the Great Divide basin to the south.

The Granite Mountains are unique in Wyoming because they remain partly buried by upper Cenozoic sedimentary deposits, whereas other mountain ranges have been almost entirely exhumed and the Cenozoic sedimentary record thereby destroyed. Preservation of these strata on the Granite Mountains was made possible by subsidence of almost the entire uplift during late Cenozoic time, either prior to or contemporaneously with an epeirogenic uplift that launched the present cycle of regional degradation. The record of progressive burial of this mountain range during the last 60 million years is a classic example of what must have happened to the adjacent mountains. When information on the development of this mountain range is integrated with fragmentary data elsewhere in Wyoming, a reconstruction of the regional history of Cenozoic sedimentation and tectonism becomes possible.

Table 1 (in pocket) summarizes the description of, and economic deposits in, the Cenozoic rocks. The history of the major structural features of the Granite Mountains area (fig. 2) is considered in the following chronologic order:

1. The Granite Mountains uplift and associated lesser folds and faults, all of Laramide age; 2. the Wind River basin; 3. the Great Divide basin; 4. the Wind River Range; 5. the North Granite Mountains fault system; 6. the South Granite Mountains fault system; 7. the Split Rock syncline; 8. the Sweetwater Crossing anticline and the synclines on its northeast and southwest sides; and 9. the Flattop fault and the Cyclone Rim syncline south of it.

Those structural features involved in or affected by a tectonic event during a given interval of geological time are discussed in this numerical order as much as possible and are keyed to block diagrams (figs. 3-12). Tectonic events are closely related to the origin and distribution of valuable economic resources in the Granite Mountains area.

Therefore, an understanding of the geologic history is necessary for efficient development of the known resources as well as for the exploration for new ones.

When each of the enumerated structural features is studied critically, that feature is seen to be the product of a long, complex series of events; few features in any one locality are unrelated, either by cause or by effect, to those in another.

LATE BUT NOT LATEST CRETACEOUS

The Lewis sea (late Campanian and early Maestrichtian) was the last extensive sea in which marine sediments were deposited in central Wyoming. It covered the east half of the Granite Mountains area. Prior to the advance of this sea, however, there had been local uplift and erosion directly south of the Granite Mountains in the area north of the Lost Soldier oil field that resulted in abrupt truncation of the Mesaverde Formation and deposition of Lewis Shale on Cody Shale. Good traps for oil and gas may occur along this unconformity as sandstone 500 feet or more thick pinches out updip against an impervious shale. The sedimentary record across the Granite Mountains has been destroyed; so the configuration and extent of this initial uplift are not known. Figure 3 shows my concept of the landscape at this time.

The fragmentary sedimentary record shows no evidence that the Granite Mountains were being uplifted at this time. Sluggish streams originating along or west of the west border of Wyoming flowed eastward across a low-lying broad coastal plain and built a delta into the Lewis sea in central Wyoming. Coal swamps were abundant, the climate was warm and humid, and numerous ash falls from volcanos probably to the west contributed distinctive yellow, green, and white very fine-grained debris to the carbonaceous sediments of the coastal plain. These deposits comprise the Meeteetse Formation and intertongue eastward with its marine counterpart, the dark-gray soft Lewis Shale.

LATEST CRETACEOUS

The withdrawal of the Lewis sea from central Wyoming was interrupted by many broad oscillations; these influenced the type and thickness of deposits along the west shoreline. The retreat was caused by the first major movement of the Laramide Revolution—the uplift of a northwest-trending area in central Wyoming that roughly coincided with the Granite Mountains and perhaps the
