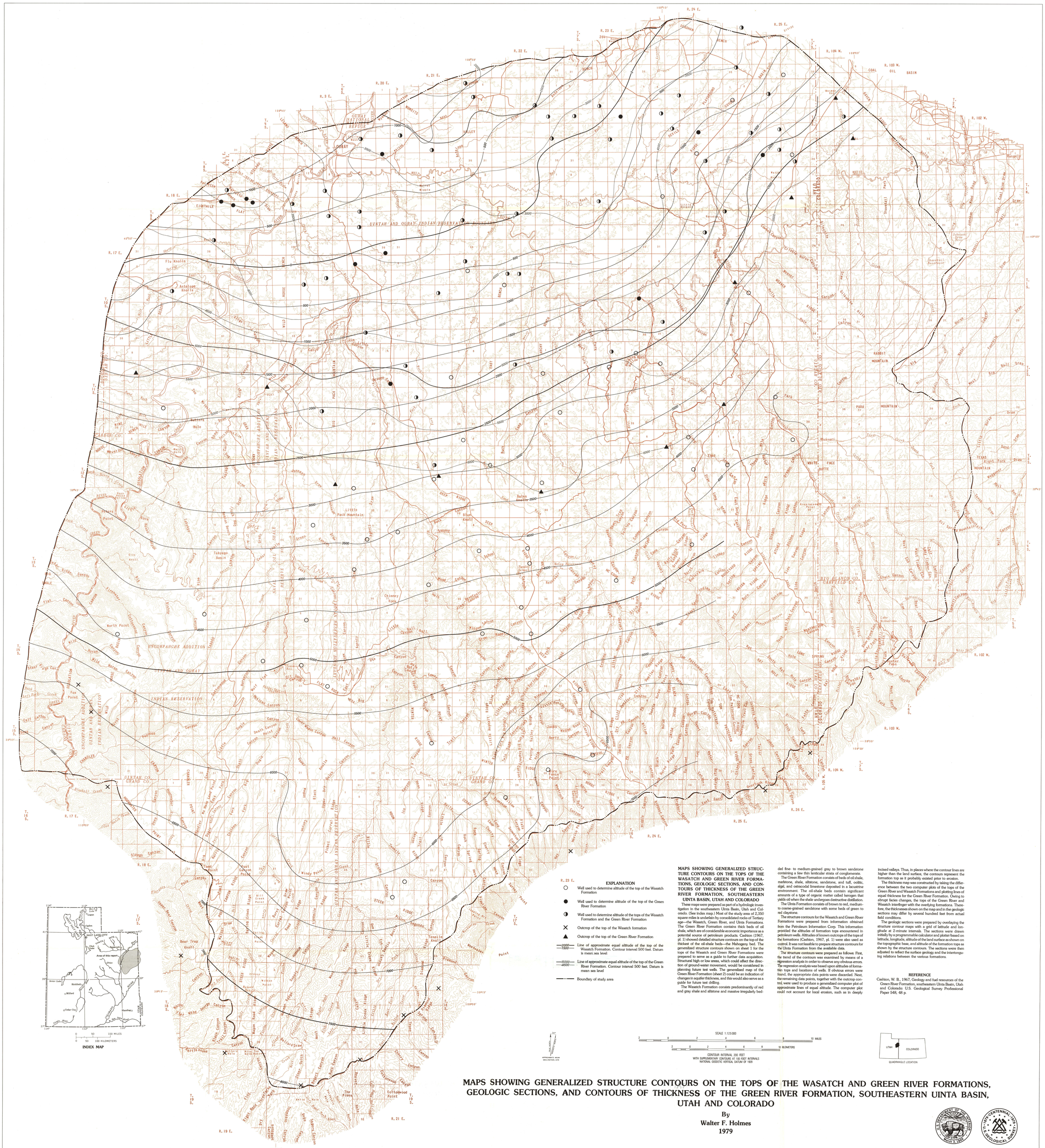

MAPS SHOWING GENERALIZED STRUCTURE CONTOURS ON THE TOPS OF THE WASATCH AND GREEN RIVER FORMATIONS, GEOLOGIC SECTIONS, AND CONTOURS OF THICKNESS OF THE GREEN RIVER FORMATION, SOUTHEASTERN UINTA BASIN, UTAH AND COLORADO

By
Walter F. Holmes
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These maps were prepared as part of a hydrologic investigation in the southeastern Uinta Basin, Utah and Colorado. (See Index map.) Most of the study area of 2,350 square miles is underlain by consolidated rocks of Tertiary age—the Wasatch, Green River, and Uinta Formations. The Green River Formation contains thick beds of oil shale, which are of considerable economic importance as a potential source of petroleum products. Cashion (1967, pl. 1) showed detailed structure contours on the top of the thickest of the oil-shale beds—the Mahogany bed. The generalized structure contours shown on sheet 1 for the tops of the Wasatch and Green River Formations were prepared to serve as a guide to further data acquisition. Structural high or low areas, which could affect the direction of ground-water movement, would be considered in planning future test wells. The generalized map of the Green River Formation (sheet 2) could be an indication of changes in aquifer thickness, and this would also serve as a guide for future test drilling.

The Wasatch Formation consists predominantly of red and gray shale and siltstone and massive irregularly bedded fine- to medium-grained gray to brown sandstone containing a few thin lenticular strata of conglomerate.

The Green River Formation consists of beds of oil shale, marlstone, shale, siltstone, sandstone, and tuff, oolitic, algal, and ostracodal limestone deposited in a lacustrine environment. The oil-shale beds contain significant amounts of a type of organic matter called kerogen that yields oil when the shale undergoes destructive distillation.

The Uinta Formation consists of brown to red, medium- to coarse-grained sandstone with some beds of green to red claystone.

The structure contours for the Wasatch and Green River Formations were prepared from information obtained from the Petroleum Information Corp. This information provided the altitudes of formation tops encountered in petroleum wells. Altitudes of known outcrops of the tops of the formations (Cashion, 1967, pl. 1) were also used as control. It was not feasible to prepare structure contours for the Uinta Formation from the available data.

The structure contours were prepared as follows: First, the trend of the contours was examined by means of a regression analysis in order to observe any obvious errors. The regression analysis was based upon altitudes of formation tops and locations of wells. If obvious errors were found, the appropriate data points were discarded. Next, the remaining data points, together with the outcrop control, were used to produce a generalized computer plot of approximate lines of equal altitude. The computer plot could not account for local erosion, such as in deeply incised valleys. Thus, in places where the contour lines are higher than the land surface, the contours represent the formation top as it probably existed prior to erosion.

The thickness map was constructed by taking the difference between the two computer plots of the tops of the Green River and Wasatch Formations and plotting lines of equal thickness for the Green River Formation. Owing to abrupt facies changes, the tops of the Green River and Wasatch interfinger with the overlying formations. Therefore, the thicknesses shown on the map and in the geologic sections may differ by several hundred feet from actual field conditions.

The geologic sections were prepared by overlaying the structure contour maps with a grid of latitude and longitude at 2-minute intervals. The sections were drawn initially by a programmable calculator and plotter based on latitude, longitude, altitude of the land surface as shown on the topographic base, and altitude of the formation tops as shown by the structure contours. The sections were then adjusted to reflect the surface geology and the intertonguing relations between the various formations.

REFERENCE

Cashion, W. B., 1967, Geology and fuel resources of the Green River Formation, southeastern Uinta Basin, Utah and Colorado: U.S. Geological Survey Professional Paper 548, 48 p.

Base from U.S. Geological Survey
topographic quadrangles 7½-minute series

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