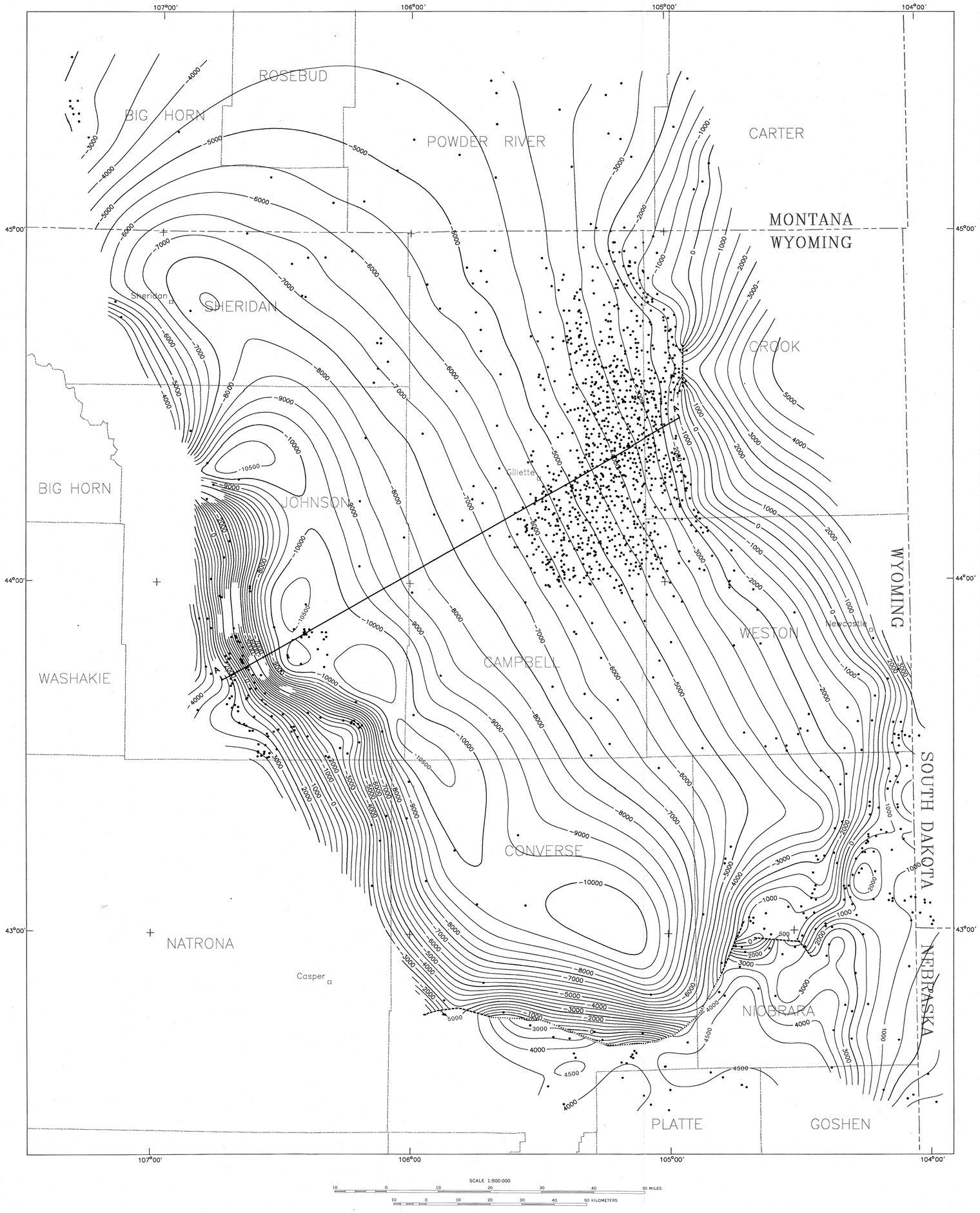
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-2140-B
FOLIO OF THE POWDER RIVER BASIN,
WYOMING AND MONTANA



EXPLANATION

Fault--Dashed where approximately located; dotted where concealed (see explanation of faults in text)

Structure contour--Drawn on top of the Pennsylvanian and Permian Minnelusa Formation (equivalent in part to the Hartville Formation on outcrop in the central and eastern parts of the basin, the Tensleep Sandstone to the west, and the Casper Formation to the south). Elevations not corrected to true depth in wells with inclined or faulted beds, or in deviated boreholes. Contour lines not shown in areas where line spacing is very congested. Datum is mean sea level. Contour interval 500 feet

Borehole--Penetrating the top of the Minnelusa Formation and equivalents

DISCUSSION

This map is one in a series of U.S. Geological Survey Miscellaneous Field Studies (MF) maps showing computer generated structure contours, isopachs, and cross sections of selected formations in the Powder River basin, Wyoming and Montana. This map, cross section and perspective view were constructed from information stored in a U.S. Geological Survey Evolution of Sedimentary Basins data base. This data base contains picks of geologic formation and (or) unit tops and bases, determined from electric resistivity and gamma-ray logs of 8,592 wells penetrating Tertiary and older rocks in the Powder River basin. Well completion cards (scout tickets) were reviewed and compared with copies of all logs, and formation or unit contacts determined by N.M. Denson, D.L. Macke, R.R. Schumann and others. This structure map is based on information from 1,480 of these wells that penetrate the Minnelusa Formation and equivalents.

The maps and cross section were generated using Dynamic Graphics Corporation Interactive Surface Modeling (ISM) mapping program, on a VAX 11-780 computer. A mathematical grid representative of the top of the Minnelusa Formation was first created from the scattered data set, and an elevation value relative to sea level then calculated at each grid node. The structure map, perspective view and cross section were produced from these gridded data. The grids are based on minimum tension surface values rather than individual well data; consequently, contour lines may be drawn differently than if they were hand-contoured, and the cross section is not tied to specific wells.

At the present time, ISM software is not capable of handling reverse faults in its mapping programs, so faults are shown on the map as vertical normal only. Where these normal faults do not approximate the reverse faults they are intended to represent, or in structurally complex areas of the basin, fault traces are omitted from the map.

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Debra Higley and Calae Runge of the U.S. Geological Survey transferred the Powder River basin data base to the VAX 11-780 computer, where it could be utilized for data retrievals. Dave Macke provided helpful comments on how the file was originally created, and thoughtful insights on stratigraphy and structure in the Powder River basin.

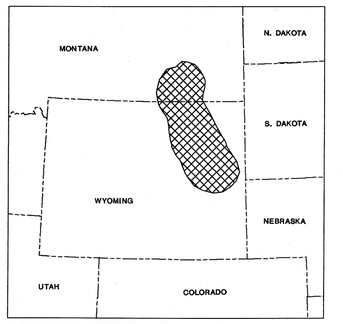
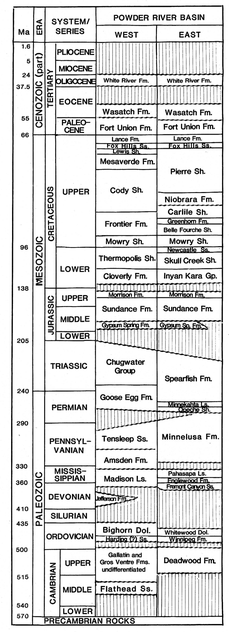


Figure 1.--Index showing location of the Powder River basin, Wyoming and Montana



Modified from Fox and Higley (1987); Love and Christiansen (1985); Hose (1955); Mapel (1959); Lochman-Balk (1972); Sando and Sandberg (1987); Lageson and others (1979)

Figure 2.--Generalized stratigraphic column of sedimentary units in the Powder River basin

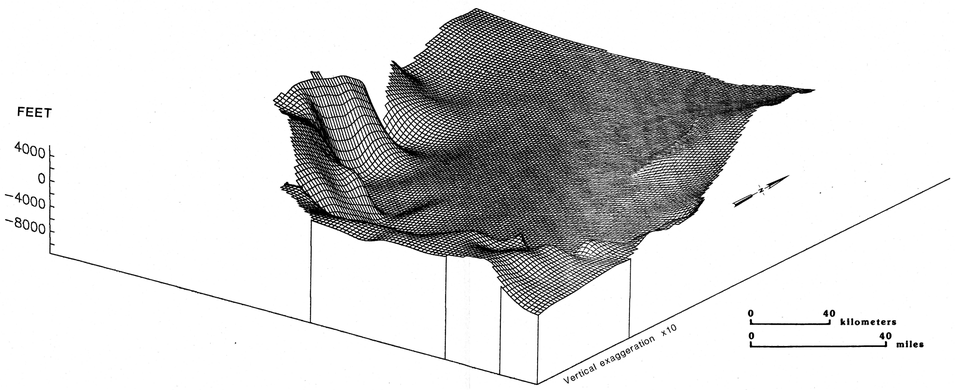
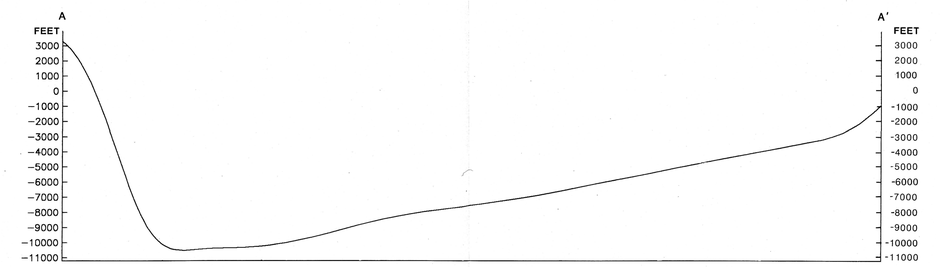


Figure 3.--Perspective view of structure at the top of the Minnelusa Formation and equivalents, Powder River basin



Cross section showing top of the Minnelusa Formation and equivalents, Powder River basin. Vertical exaggeration, x10

MAP SHOWING CONTOURS ON THE TOP OF THE PENNSYLVANIAN AND PERMIAN MINNELUSA FORMATION AND EQUIVALENTS, POWDER RIVER BASIN, WYOMING AND MONTANA

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1990

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