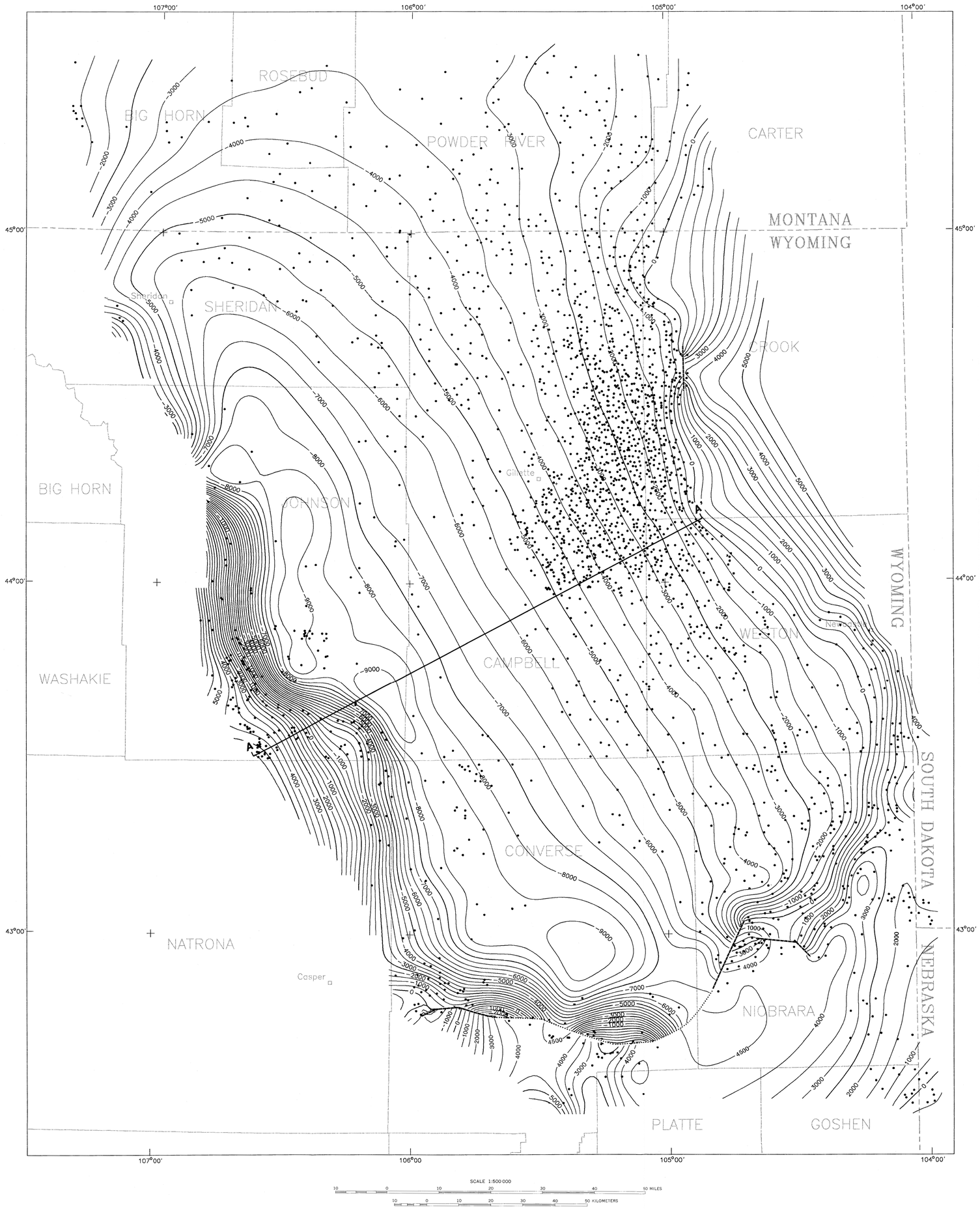
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-2140-C
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 Upper Jurassic Morrison Formation. Elevations not corrected to true depth in wells having 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 Morrison Formation

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. The 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 were determined by N.M. Denson, D.L. Macke, R.R. Schumann, and others. This structure map is based on information from 2,429 of these wells that penetrate the Morrison Formation.

The maps and cross section were generated using Dynamic Graphics Corporation Interactive Surface Modeling (ISM) mapping program, on a VAX 11-780 computer. A rectangular grid representative of the top of the Morrison Formation was first created from the scattered data set, and an elevation 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 grid is 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 cannot show reverse faults in its mapping programs; all 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.

REFERENCES

Cole, G.A., Berg, R.B., Cromwell, V.A., and Sonderegger, J.L., 1982, Energy Resources of Montana: Montana Bureau of Mines and Geology Map GM 28, 2 sheets, scale 1:500,000.

Denson, N.M., and Crysdale, B.L., (in press), Geologic map showing total thickness of coal in the south half of the Powder River basin, northeastern Wyoming: U.S. Geological Survey Miscellaneous Investigations Map I-2131-B, scale 1:200,000.

Diedrich, R.P., Dyka, M.A.K., and Miller, W.R., eds., 1988, Eastern Powder River basin-Black Hills, 39th Annual Field Conference Guidebook: Wyoming Geological Association, 324 p.

Fox, J.E., and Higley, D.K., 1987, Thickness of Upper Cretaceous Greenhorn Formation, Powder River basin, Wyoming and Montana: U.S. Geological Survey Open-File Report 87-340-M, scale 1:500,000.

Frezon, S.E., and Finn, T.M., 1988, Map of sedimentary basins in the conterminous United States: U.S. Geological Survey Oil and Gas Investigations Map OM-223, scale 1:5,000,000.

Hose, R.K., 1955, Geology of the Crazy Woman Creek area, Johnson County, Wyoming: U.S. Geological Survey Bulletin 1027-B, p. 33-118.

Lageson, D.R., Maughan, E.K., and Sando, W.J., 1979, The Mississippian and Pennsylvanian (Carboniferous) Systems in the United States--Wyoming: U.S. Geological Survey Professional Paper 1110-U, 38 p.

Laudon, R.B., Curry, W.H. III, and Runge, J.S., eds., 1976, Geology and energy resources of the Powder River, 28th Annual Field Conference Guidebook: Wyoming Geological Association, 328 p.

Lochman-Balk, Christina, 1972, Cambrian System, in Mallory, W.W., ed., Geological atlas of the Rocky Mountain region: Denver, Rocky Mountain Association of Geologists, p. 60-75.

Love, J.D., and Christiansen, A.C., 1985, Geologic Map of Wyoming: U.S. Geological Survey, scale 1:500,000.

Mapel, W.J., 1959, Geology and coal resources of the Buffalo-Lake De Smet area, Johnson and Sheridan Counties, Wyoming: U.S. Geological Survey Bulletin 1078, 147 p.

Sando, W.J., and Sandberg, C.A., 1987, New interpretations of Paleozoic stratigraphy and history in the northern Laramie Range and vicinity, southeast Wyoming: U.S. Geological Survey Professional Paper 1450, 39 p.

ACKNOWLEDGEMENTS

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.

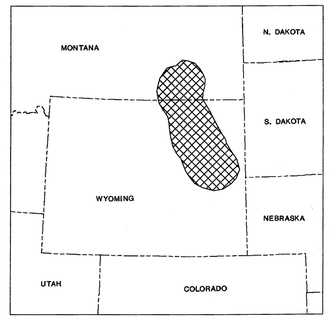
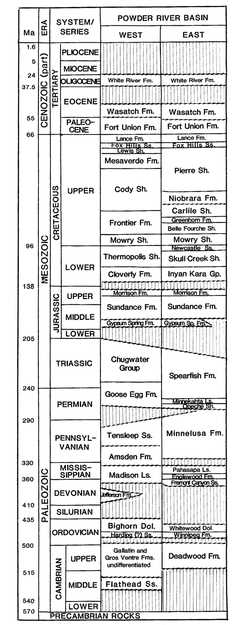


Figure 1.--Index showing location of the Powder River basin, Wyoming and Montana



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

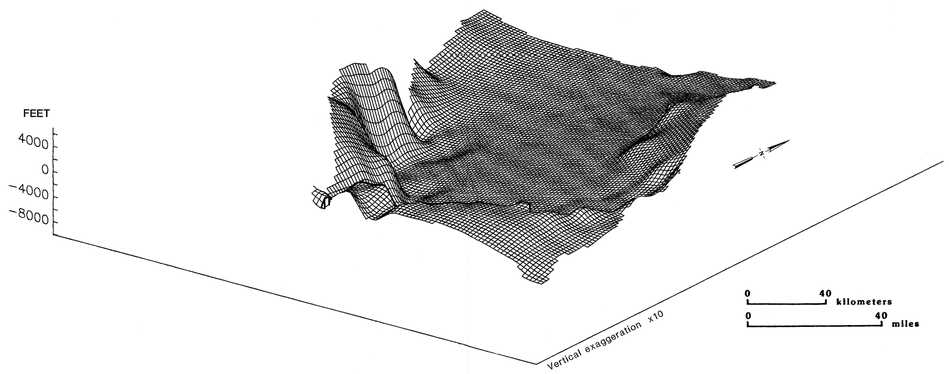
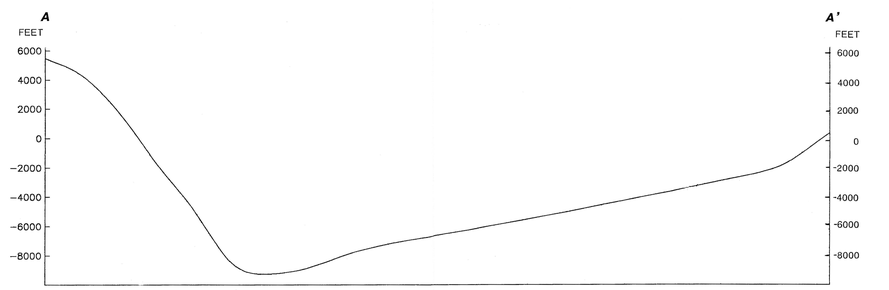


Figure 3.--Perspective view of structure at the top of the Morrison Formation, Powder River basin



Cross section showing top of the Morrison Formation, Powder River basin.
Vertical exaggeration, x10

MAP SHOWING STRUCTURE CONTOURS ON THE TOP OF THE UPPER JURASSIC MORRISON FORMATION, POWDER RIVER BASIN, WYOMING AND MONTANA

By
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1991

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