

EXPLANATION

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

— Structure contour--Drawn on top of the Upper Cretaceous Mowry Shale. 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 Mowry Shale

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 8,392 wells penetrating Tertiary and older rocks in the Powder River Basin. Well completion cards (sour 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 4,956 of these wells that penetrate the Mowry Shale.

The map, perspective view and cross section were generated using Dynamic Graphics Corporation Interactive Surface Modeling (ISM) mapping program, on a VAX 11-780 computer. A rectangular grid representing calculated values (relative to sea level) of the elevation at the top of the Mowry Shale was first created from the scattered data set. The structure map, perspective view, and cross section were then 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 model non-vertical reverse faults in its mapping programs. Faults on the map are modeled as vertical only, and where they 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

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Debra Higley and Calie 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.

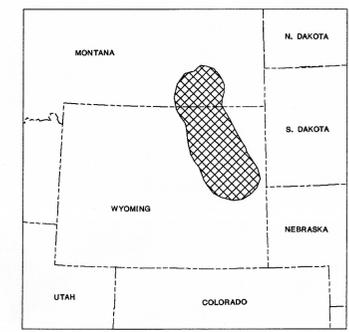


Figure 1.--Index showing location of the Powder River Basin, Wyoming and Montana

MB. I.	SYSTEM/SERIES	POWDER RIVER BASIN	
		WEST	EAST
15	PLIOCENE		
24	MIOCENE		
37	MIOCENE	Wash River Fm.	Wash River Fm.
58	Eocene	Wasatch Fm.	Wasatch Fm.
		Fort Union Fm.	Fort Union Fm.
60	PALEOCENE	Lower Fm.	Lower Fm.
		Messaverde Fm.	Fort Union Fm.
80	UPPER CRETACEOUS	Cody Sh.	Niobrara Fm.
		Frontier Fm.	Carlisle Sh.
90	UPPER CRETACEOUS	Mowry Sh.	Mowry Sh.
		Therapsoids Sh.	Shal Creek Sh.
138	LOWER CRETACEOUS	Obolovay Fm.	Iryan Kara Gp.
		Sundance Fm.	Sundance Fm.
200	MIDDLE CRETACEOUS	Shinarump Sh.	Shinarump Sh.
		Shinarump Sh.	Shinarump Sh.
240	TRIASSIC	Chugwater Group	Spearfish Fm.
		Goose Egg Fm.	Shinarump Sh.
280	PERMIAN	Tensleep Sh.	Minnekahta Fm.
		Ameskan Fm.	Ameskan Fm.
300	PENNSYLVANIAN	Madison Ls.	Madison Ls.
		Madison Ls.	Madison Ls.
380	DEVONIAN	Englewood Ls.	Englewood Ls.
		Englewood Ls.	Englewood Ls.
410	SILURIAN	Bighorn Dol.	Whitesand Dol.
		Bighorn Dol.	Whitesand Dol.
600	ORDOVICIAN	Deerhead Fm.	Deerhead Fm.
		Deerhead Fm.	Deerhead Fm.
610	CAMBRIAN	Flathead Sh.	Flathead Sh.
		Flathead Sh.	Flathead Sh.
640	MIDDLE		
670	LOWER		
970	PRECAMBRIAN ROCKS		

Modified from Fox and Higley (1987); Love and Christensen (1985); Hose (1955); Mapel (1959); Lochman-Balk (1972)

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

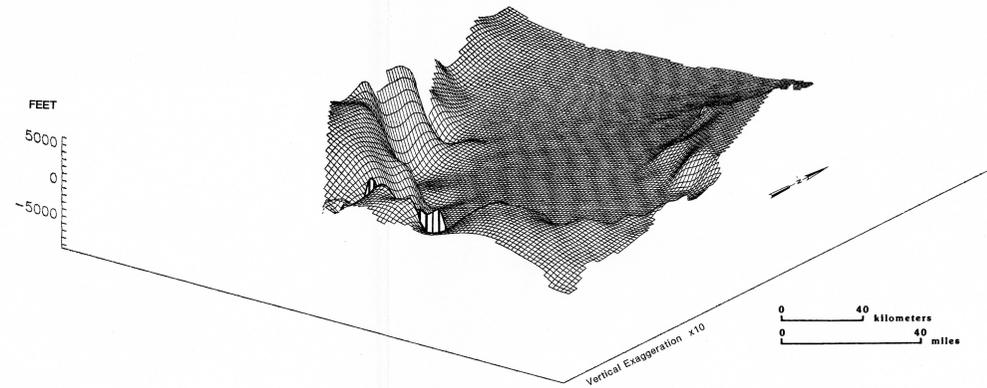
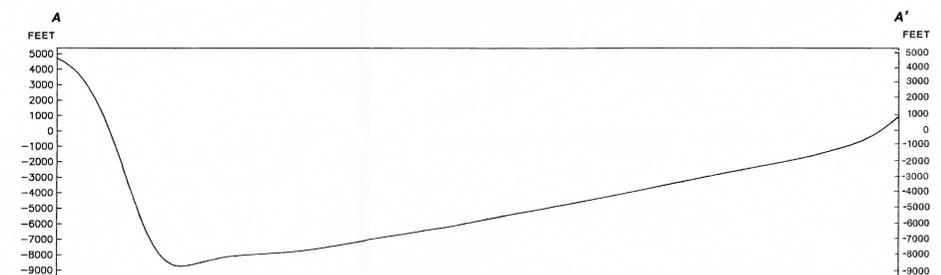


Figure 3.--Perspective view of structure at the top of the Mowry Shale, Powder River Basin



Cross section showing elevation at the top of the Mowry Shale, Powder River Basin. Datum is mean sea level. Vertical exaggeration, x10

MAP SHOWING CONTOURS ON TOP OF THE UPPER CRETACEOUS MOWRY SHALE, POWDER RIVER BASIN, WYOMING AND MONTANA

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