

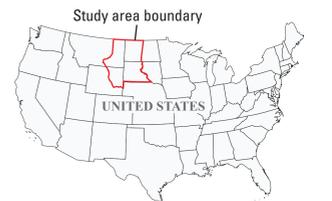
EXPLANATION

Uppermost part of the Pierre Shale surface elevation—Plate 7 shows the elevation from sea level for the uppermost horizon of the Pierre Shale model unit as used in the three-dimensional geologic framework model. Elevation is in meters

2,079.70
 -1,258.25

Northern Great Plains model outline
 —500— Contour—Index contour interval 500 meters. Intermediate contour interval 100 meters. Datum is sea level

Surface structure



References Cited

Blehmle, J.P., 1988, Generalized bedrock geologic map of North Dakota: North Dakota Geological Survey, Miscellaneous Map 28, scale 1:500,000, accessed May 19, 2023, at https://www.dmr.nd.gov/ndgs/documents/Publication_List.pdf#Map28.pdf.

Gelman, S.E., and Johnson, B.G., 2023, Data release for the 3D petroleum systems model of the Williston Basin, USA: U.S. Geological Survey data release, accessed May 19, 2023, at <https://doi.org/10.5066/P7N7010T>.

Lichtner, D.T., Toner, R.N., Wraga, J.M., and Lynds, R.M., 2020, Upper Cretaceous strata in the Powder River Basin—Formation tops database, structure and thickness contour maps, and associated well data: Wyoming State Geological Survey Open File Report 2020-9, 50 p., accessed May 19, 2023, at <https://sds.wyo.gov/upper-cretaceous-strata-in-the-powder-river-basin-formation-tops-database-structure-and-thickness-contour-maps-and-associated-well-data-2020/>.

Love, J.D., and Christiansen, A.C., comp., 1985, Geologic map of Wyoming: U.S. Geological Survey, 3 sheets, scale 1:500,000, accessed March 5, 2023, at <https://sales.usgs.gov/geologic-map-of-wyoming-2014/>. [Released in 2014 by the Wyoming State Geological Survey.]

Martin, J.E., Sawyer, J.F., Fahrnbach, M.D., Tomhave, D.W., and Scholz, L.D., 2004, Geologic map of South Dakota: South Dakota Department of Environment and Natural Resources Geological Survey General Map 10, 1 sheet, 20 p., accessed May 19, 2023, at <https://sdgs.dnr.sd.gov/pubs/gm10.pdf>. [Also available at <https://www.sdgs.dnr.sd.gov/publications/default.aspx>.]

Montana Board of Oil and Gas Conservation, [undated], [MBOGC's Online Oil and Gas Information System]: Montana Board of Oil and Gas Conservation web page, accessed November 2023 at <https://boggps.dnr.mt.gov/online/index/Default.aspx>.

North Dakota Department of Mineral Resources, [undated], Premium subscription service [well data]: North Dakota Department of Mineral Resources database, accessed November 2023 at <https://www.dmr.nd.gov/ndgs/subscription-service.aspx>.

Rodden, J.A., and DeWitt, E., 2008, Maps showing geology, structure, and geophysics of the central Black Hills, South Dakota: U.S. Geological Survey Scientific Investigations Map 2777, 44-p. pamphlet, 2 sheets, accessed November 11, 2023, at <https://doi.org/10.3133/SI2777>.

Soller, D.R., and Garbry, C.P., 2018, Quaternary sediment thickness and bedrock topography of the glaciated United States east of the Rocky Mountains: U.S. Geological Survey Scientific Investigations Map 3922, 2 sheets, scale 1:5,000,000, accessed March 5, 2023, at <https://doi.org/10.3133/SI3922>.

South Dakota Geological Survey Program, 2022, Oil and gas online databases: South Dakota Department of Environment and Natural Resources, accessed October 2022 at https://www.sdgs.dnr.sd.gov/SDGSI/ndgs_databases.aspx.

Spangler, L.R., 2024a, Digital database for a 3D geologic model of the Powder River Basin and Williston Basin regions, USA: U.S. Geological Survey data release, <https://doi.org/10.5066/P7JRS3BV>.

Spangler, L.R., 2024b, Digital database for a 3D geologic model of western South Dakota, USA: U.S. Geological Survey data release, <https://doi.org/10.5066/P7K4Q1H>.

U.S. Geological Survey, 2021, USGS 1 arc-second digital elevation model: OpenTopography, accessed March 2, 2023, at <https://doi.org/10.5069/G01X19WN>.

Vake, S.M., Porter, K.W., Lonn, J.D., and Lopez, D.A., 2007, Geologic map of Montana: Montana Bureau of Mines and Geology Geologic Map of A, 2 sheets, 75 p., scale 1:500,000. [Also available at <https://mbmg.mtech.edu/Pubs/SpecialInterest.aspx#tab-63>.]

Wyoming Oil and Gas Conservation Commission, [undated], WYOGCC data: Wyoming Oil and Gas Conservation Commission database, accessed November 11, 2023, at <https://pdp.wyo.gov/>.

Mapped traces of faults and folds shown on this plate were compiled from published State geological survey maps and are presented for illustrative purposes only. Three-dimensional renderings of these structures are not shown on the plate, but rather are represented at the structural datum as deviations in the structure-contour surfaces, which were autogenerated from the three-dimensional grid without refinement for cartographic effectiveness. The underlying digital data, rather than the contours on the plate, provide the most accurate and useful representation of the subsurface.

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Digital files available at <https://doi.org/10.3133/SI202607>.

Supplemental citation
 Spangler, L.R., 2026, Elevation from sea level for the uppermost horizon of the Pierre Shale unit produced in the three-dimensional geologic model of the northern Great Plains region of Montana, North Dakota, South Dakota, and Wyoming, USA: U.S. Geological Survey Scientific Investigations Report 2026-5127, 81 p., <https://doi.org/10.3133/SI202607>.

Associated data for this publication
 Spangler, L.R., 2024a, Digital database for a 3D Geologic Model of the Powder River Basin and Williston Basin Regions, USA: U.S. Geological Survey data release, <https://doi.org/10.5066/P7JRS3BV>.

Spangler, L.R., 2024b, Digital database for a 3D Geologic Model of western South Dakota, USA: U.S. Geological Survey data release, <https://doi.org/10.5066/P7K4Q1H>.

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Elevation from Sea Level for the Uppermost Horizon of the Pierre Shale Unit Produced in the Three-Dimensional Geologic Model

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 2026