

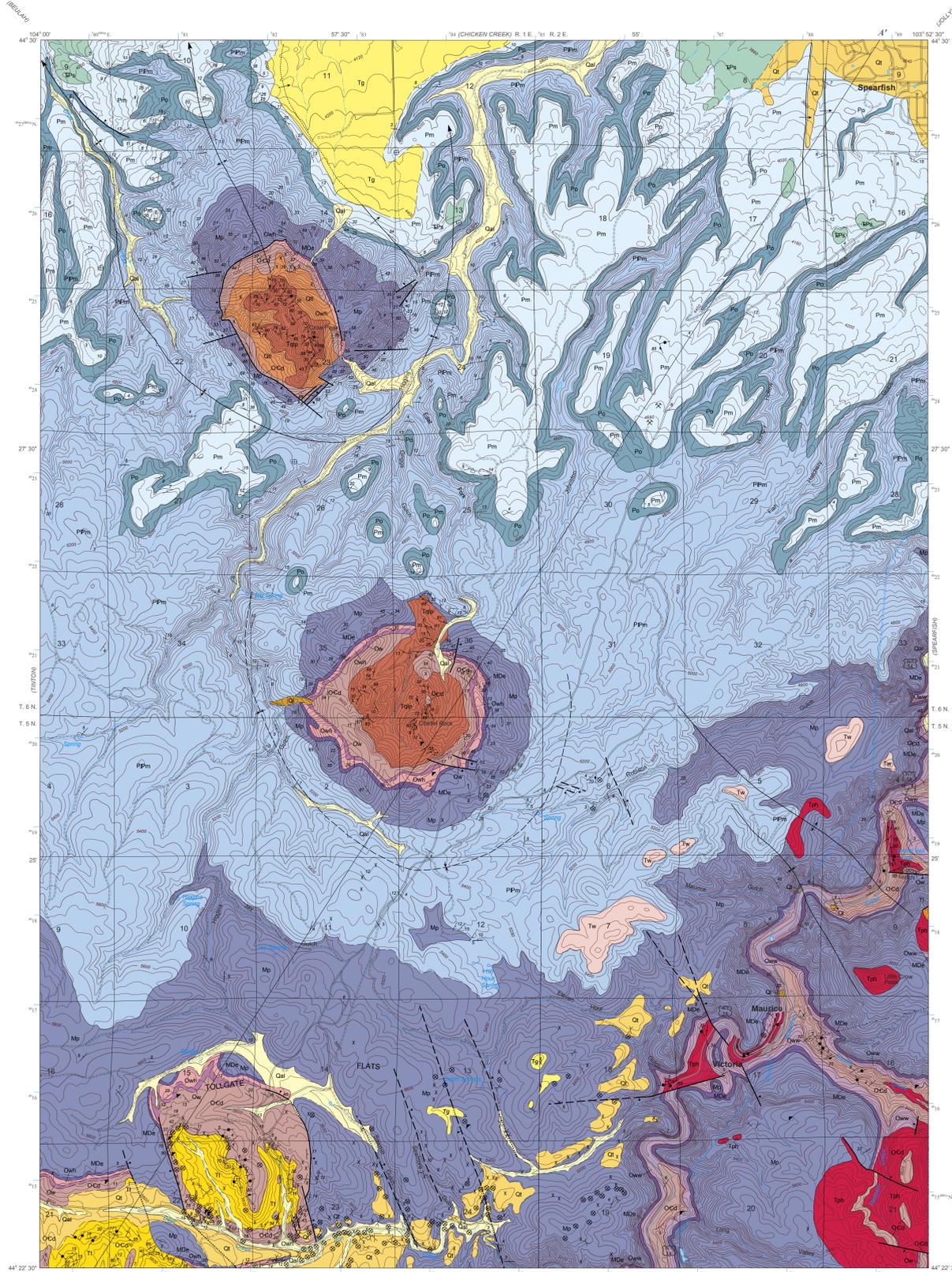


Geologic Map of the Maurice Quadrangle, South Dakota

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2007

State of South Dakota
M. Michael Rounds, Governor

South Dakota Geological Survey
Derric L. Iles, State Geologist



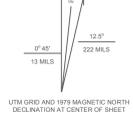
Digital Cartography by B.A. Fagnan, L.L. Roimstad, and E.S. Beck

Map base modified from U.S. Geological Survey 1:24,000-scale Maurice digital line graph. Projection is Universal Transverse Mercator, Zone 13. Datum is 1983 North American.

SCALE 1:24,000



CONTOUR INTERVAL 40 FEET



Quadrangle location

The Geological Survey, Department of Environment and Natural Resources, engages in an ongoing data collection and interpretation process. An outcome of that process is to reflect those interpretations on maps such as this one. Reasonable efforts have been made to ensure that this map accurately reflects the source data used in its preparation. This map is date specific. As additional data become available, geologic interpretations may be revised and the map may be updated by the Geological Survey. This map should not be enlarged or otherwise used in an attempt to interpret more detail than can be seen at the 1:24,000 scale.

Prepared in cooperation with the
South Dakota School of Mines and Technology

EXPLANATION

Quaternary	Qal Alluvium - Unconsolidated to loosely consolidated clay, silt, sand, and gravel. Deposited in present-day drainages. Estimated maximum thickness 30 ft (9 m)	Qd Terrace deposit - Unconsolidated clay- to boulder-sized clasts. Deposited along and up to 40 ft (12 m) above modern streams. Maximum thickness 65 ft (20 m)	Qtl Talus - Unconsolidated, angular blocks of randomly oriented, locally derived material. Deposited along steep slopes of Crow Peak	Ql Landslide - Unconsolidated debris and randomly oriented blocks of locally derived material. Typically associated with the Winnipeg Formation	Tg Gravel deposit - Unconsolidated to loosely consolidated, clay- to boulder-sized clasts of Precambrian metamorphic, Paleozoic sedimentary, and Tertiary igneous rocks. Estimated maximum thickness up to 30 ft (9 m)	Tw White River Group - Unconsolidated to loosely consolidated, clay- to boulder-sized clasts in pink to brown bentonitic clay. Thickness locally greater than 45 ft (14 m)	Tph Phonolite - Dark gray, dark bluish-gray to greenish-gray with brownish weathering. Aphanitic to porphyritic, with a fine-grained plagioclase groundmass of orthoclase with aegirine, becoming finer-grained along sill margins. Contains less than 1-30 percent phenocrysts of orthoclase, sanidine, and plagioclase up to 0.75 in (2 cm) that are usually zoned, and often kaolinitized. Also contains up to 40 percent Na-pyroxene as crystals as large as 0.31 in (8 mm) often enclosing feldspar and as clots and radial sprays to several millimeters. May have up to 29 percent euhedral grains of nepheline and sodalite up to 0.1 mm with some altered to zeolite. The sill at Rubicon Gulch contains phenocrysts of red biotite with aegirine-augite rims. Accessory minerals include zircon, apatite, hematite, leucocene, titanite, and magnetite. Some intrusions weather along planes of trachytic texture with a platy, foliated appearance, especially along intrusion margins (Sofronoff, 1979)	Tt Trachyte - Gray to brownish-gray with some orange iron oxide staining. May be porphyritic with a fine-grained equigranular potassic feldspar groundmass. Contains up to 2 percent acicular aegirine-augite to 0.12 in (3 mm) having poikilitic feldspar intergrowths and up to 35 percent anhedral to euhedral phenocrysts of plagioclase and sanidine to 0.47 in (12 mm). Feldspars may be kaolinitized and have fracture fillings of hematite or carbonate. The plagioclase has albite twinning and is normally zoned. Has up to 7 percent hematite commonly rimming leucocene, and a trace of euhedral titanite crystals to 0.08 in (2 mm) (Sofronoff, 1979)	Tqlp Quartz latite porphyry - Gray to brownish-gray. Contains up to 30 percent transparent to white, 0.1-0.4 in (3-10 mm) long, zoned and twinned sodic plagioclase phenocrysts in light- to medium-gray aphanitic groundmass of finely crystalline orthoclase with interstitial anhedral quartz. Holocrystalline, hypidiomorphic to granular. Composed of 65-70 percent sandstone, 20-25 percent plagioclase, 5-10 percent quartz, less than 1 percent opaque minerals including sparse, unaltered hornblende. Some siliceous phenocrysts are overgrown or replaced by sandstone or altered to sericite. Accessory minerals include magnetite, hematite, biotite, titanite, apatite, and zircon. The biotite crystals may be replacements of pyroxene (Meier, 1981; Fisher, 1969)	Triassic	Lower Triassic	TsPs Spearfish Formation - Red to reddish-brown shale, siltstone, and minor sandstone. Exposed thickness up to 90 ft (27 m)	Permian	Upper Permian	Pm Minnekahta Limestone - Pink, purple-gray, to beige limestone. Very fine-grained, laminated to thin-bedded, locally with a varied appearance. Contains abundant stylonites and small folds. Petrofiferous odor when broken. Typically forms a resistant cliff. Thickness 35-45 ft (11-14 m)	Lower Permian	Po Opeche Shale - Dark-red, orange, to reddish brown shale and siltstone with calcareous sandstone lenses. Loosely consolidated. Upper several feet is purplish from alteration due to ground-water movement. Thickness 80-110 ft (24-34 m)	Pennsylvanian	Upper Pennsylvanian	PPm Minnelusa Formation - Reddish brownish, yellowish, and beige sandstone, shale, and limestone. Upper portion with contorted bedding due to evaporite dissolution. Reddish terra rossa and local conglomerate of angular chert fragments derived from the Pahasapa Limestone occur along lower contact. Thickness approximately 450-525 ft (137-160 m)	Mississippian	Lower Mississippian	Mp Pahasapa Limestone - Gray, beige, to white massive limestone. Very fine- to coarse-grained. Contains several sandstone beds up to 15 ft (5 m) thick. Vuggy, cavernous in the upper 125-150 ft (38-46 m). Typically forms prominent cliffs. Upper contact is an irregular erosional surface. Thickness approximately 500-620 ft (152-189 m)	Devonian	Upper Devonian	MDe Englewood Limestone - Lavender, pink, to purple-gray, argillaceous, dolomitic limestone and shale. Fine- to very fine-grained. Laminated to medium-bedded, typically bioturbated. Locally contains botryoidal, chalcodony-replaced, evaporite nodules. Thickness 35-50 ft (11-15 m)	Ordoevician	Upper Ordoevician	Owh Whitewood Limestone and Winnipeg Formation (undifferentiated)	Owh Whitewood Limestone - Variegated orange, beige, and gray dolomite and dolomitic limestone with local, thin, shaly partings. Finely-crystalline, slightly calcareous. Thin-bedded to massive, bioturbated. Thickness 40-80 ft (12-24 m)	Ow Winnipeg Formation - Lower portion is the Icebox Shale Member; 30-45 ft (9-14 m) of fissile, green to gray shale containing small, black phosphatic nodules. Upper portion is the Roughlock Siltstone Member; 25-35 ft (8-11 m) of greenish-gray to yellowish siltstone and fine-grained sandstone. Total thickness 55-80 ft (17-24 m)	Cambrian	Middle to Upper Cambrian	OCd Deadwood Formation - Lower units are brown, gray, to green massive sandstone overlain by glauconitic shale, minor intraformational conglomerate, and bioturbated siltstone. Middle units are brown to green intraformational conglomerate and glauconitic shale with minor limestone. Upper units are dark green to light gray, bioturbated, glauconitic sandstone and intraformational conglomerate. The uppermost unit is the Scolithus sandstone. Approximately 250 ft (76 m) exposed in Spearfish Canyon	Precambrian	Lower Proterozoic	Xu Undifferentiated Precambrian rocks - Shown only in cross section
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Acknowledgements

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References

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Index Map of Geologic Data



Letters on Index Map refer to references.
Reference "a" pertains to the entire quadrangle.

