Department of Environment and Natural Resources
Division of Financial and Technical Assistance
Geological Survey
7.5 Minute Series Geologic Quadrangle Map 1

Geologic Map of the Rapid City West Quadrangle, South Dakota

By
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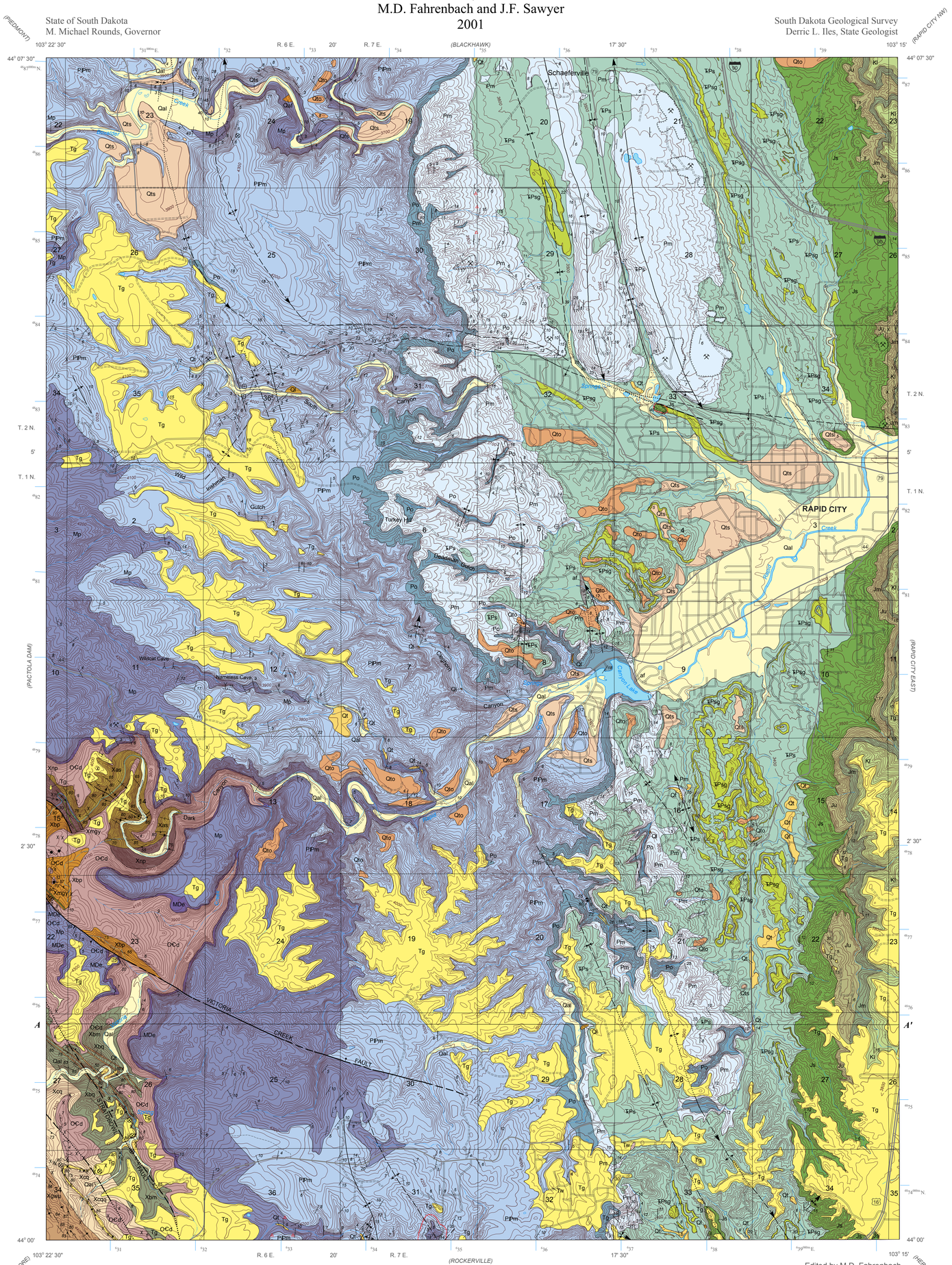
2001

State of South Dakota
M. Michael Rounds, Governor

South Dakota Geological Survey
Derric L. Iles, State Geologist



Edited by M.D. Fahrenbach

SCALE 1:24,000

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

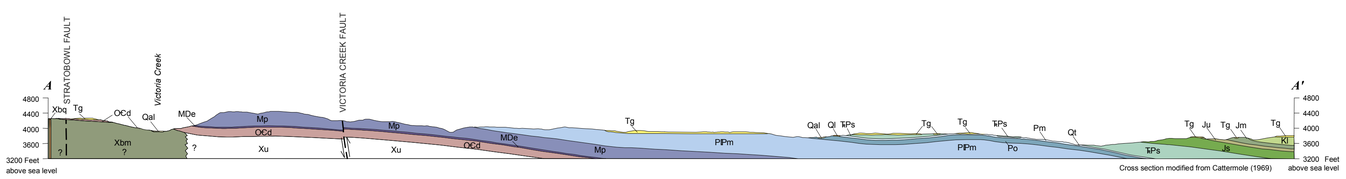
The Geological Survey Program, Department of Environment and Natural Resources, engages in an ongoing data collection and interpretation process. An outcome of that process is to reflect those interpretations on maps such as this one. Reasonable efforts have been made to ensure that this map accurately 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 Program. This map should not be enlarged or otherwise used in an attempt to interpret more detail than can be seen at a scale of 1:24,000.

1 0.5 0 1 Mile
1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet
1 0.5 0 1 Kilometer

CONTOUR INTERVAL 20 FEET

NORTH
1° 10'
21 MILS
12°
213 MILS
UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Quadrangle location



Cross section modified from Cattermole (1969)

EXPLANATION

Quaternary

- Qal — **Alluvium** - Unconsolidated to loosely consolidated, clasts to boulder-size; deposited in present-day drainages. Estimated maximum thickness 40 ft (12 m)
- Ql — **Landslide** - Unconsolidated, randomly oriented, poorly sorted debris of locally derived material deposited along steep slopes
- Qaf — **Alluvial fan** - Unconsolidated, poorly sorted, clasts to boulder-size; deposited at the mouth of present-day drainages
- Qt — **Terrace deposit** - Unconsolidated, clasts to boulder-size; deposited along present-day drainages. Estimated maximum thickness up to 15 ft (5 m)
- Qts — **Sturgis terrace deposit** - Gravel, 75% Precambrian metamorphic and 25% Phanerozoic sedimentary rock types. Occurs 50-100 ft (15-30 m) above Rapid Creek. Thickness 5-40 ft (1.5-12 m)
- Qto — **Older terrace deposit** - Gravel, 85% Precambrian metamorphic and 15% Phanerozoic sedimentary rock types. Occurs 215-320 ft (66-98 m) above Rapid Creek. Thickness 5-20 ft (1.5-6 m)

Unconformity

Tertiary

Oligocene Eocene
- Tw — **White River Group** - Freshwater limestone, white, beige, to gray. Very fine- to medium-crystalline; laminated to thin-bedded. Thickness up to 3 ft (1 m)

Unconformity

Cretaceous

Lower Cretaceous
- Kl — **Lakota Formation** - Sandstone and shale. Sandstone, brown to white, very fine- to coarse-grained, argillaceous, carbonaceous. Shale, gray to brown, sandy to silty. Thickness 125-280 ft (38-85 m)

Disconformity

Jurassic

Upper Jurassic
- Jm — **Morrison Formation** - Shale, siltstone, sandstone, and minor limestone, variegated gray, green, buff, and maroon. Fissile to thin-bedded. Thickness 20-140 ft (6-43 m)

Disconformity

Upper Jurassic
- Ju — **Unkpapa Sandstone** - Sandstone, buff, white, to orange. Fine- to medium-grained, cross-bedded. Where the Unkpapa Sandstone is thick, the Morrison Formation is thin. Thickness 80-250 ft (24-76 m)

Middle Jurassic
- Js — **Sundance Formation** - Shale, siltstone, sandstone, and minor limestone. Green, red, yellow to orange. Thickness greater than 266 ft (81 m)

Disconformity

Triassic

Lower Triassic
- KPsg / KPs — **Spearfish Formation** - Shale and siltstone, red to maroon. Limestone bed up to 3 ft (1 m) thick locally near the top. Gypsum bed (KPsg) up to 20 ft (6 m) thick occurs at the base, with two to three beds near the top of the unit; veins and lenses of gypsum throughout. Thickness up to 440 ft (134 m)

Disconformity

Permian

Upper Permian
- Pm — **Minnekahta Limestone** - Limestone, pink, purple, to beige. Laminated to thin-bedded. Middle and basal beds shaly. Petroliferous, abundant stylolites, locally karstic. Thickness 40 ft (12 m)

Disconformity

Lower Permian
- Po — **Opeche Shale** - Shale and siltstone, red to maroon. Purple weathered zone up to 5 ft (1.5 m) thick at the top. Discontinuous bed of gypsum up to 2 ft (1 m) thick at the base. Thickness 90-110 ft (27-34 m)

Disconformity

Pennsylvanian

Upper Pennsylvanian
- PPm — **Minnelusa Formation** - Sandstone, shale, limestone, and dolomite, red, brown, yellow, and beige. Upper third with contorted bedding and breccia. Red shale and siltstone along lower contact. Thickness 560-640 ft (171-195 m)

Disconformity

Mississippian

Lower Mississippian
- Mp — **Pahasapa Limestone** - Limestone and dolomite, white, beige, and gray. Contains thin lenses and beds of gray to brown chert, local solution breccia, and caves. Thickness 300-400 ft (91-122 m)

Devonian

Upper Devonian
- MDe — **Englewood Limestone** - Limestone, dolomite, and shale, pink, mauve, and gray. Laminated to thin-bedded. Thickness 33-63 ft (10-19 m)

Disconformity

Ordovician / Cambrian

Lower Ordovician / Upper Cambrian
- OCd — **Deadwood Formation** - Sandstone, shale, limestone, and intraformational conglomerate, greenish to reddish-brown, glauconitic. Local basal conglomerate. Thickness 150-300 ft (46-91 m)

Unconformity

Precambrian

Lower Proterozoic
- Xgwu — **Metagraywacke (upper)** - Quartz-mica schist, phyllite, and quartzite, gray to brownish and reddish-gray. Dominantly Bouma A, B, and C beds. Protolith is graywacke turbidite deposits
- Xmgy — **Metagabbro (younger)** - Grayish-green to greenish-black sill intruding Xnp and Xbp. Fine- to medium-grained, chloritic. Thickness up to 40 ft (12 m)
- Xcqq / Xcq — **Metaconglomerate and quartzite** - Phyllite, schist, quartzite, metaconglomerate, and chert. Brownish-red to gray. Xcqq is massive quartzite. Protolith is debris flow deposits

Unconformity (?)

- Xbp — **Phyllite and quartzite** - Phyllite and schist with minor quartzite, gray to dark brown. Protolith is shale and sandstone. Equivalent to part of the Buck Mountain Quartzite
- Xbq / Xbm — **Quartzite and phyllite** - Quartzite and phyllite, reddish-brown to gray. Xbq is beige to gray, massive quartzite. Protolith is sandstone and shale. Equivalent to part of the Buck Mountain Quartzite
- Xnp — **Norris Peak Formation** - Phyllite, gray to black, poorly exposed. Tentatively correlated with the Estes Formation in the Nemo quadrangle to the northwest
- Xas — **Meta-arkose and schist** - Also includes quartzite, phyllite, and metaconglomerate; thin-bedded to massive. Protolith is sandstone, shale, and feldspathic sandstone. May be equivalent to part of the Estes Formation
- Xu — **Undifferentiated Precambrian rocks** - Shown only in cross section

Contact
Dotted where concealed

FAULTS

- Fault — Long dashed where approximately located; dotted where concealed. Bar and ball on downthrown side. Arrows indicate lateral movement. Tic indicates dip direction and amount

FOLDS

- Anticline — Showing axial surface and direction of plunge. Long dashed where approximately located; dotted where concealed
- Syncline — Showing axial surface and direction of plunge. Long dashed where approximately located; dotted where concealed
- Monocline — Axis located on steepest part of structure. Long dashed where approximately located; dotted where concealed
- Small anticline — Showing bearing and plunge
- Small syncline — Showing bearing and plunge

STRIKE AND DIP OF BEDDING

- Inclined
- Vertical
- Horizontal

STRIKE AND DIP OF FOLIATION

- Inclined
- Vertical

STRIKE AND DIP OF FRACTURES

- Inclined
- Vertical

KARST FEATURE

- Area of collapse — Due to dissolution of underlying beds
- Dissolution feature — Includes sinkholes, terra rosa soil infill, breccia, and boxwork
- af — Artificial fill — Compacted earth, indicated only where extensive
- Open pit mine or quarry
- Open pit mine or glory hole
- Mine adit or cave
- Trench
- Prospect pit
- Group of prospect pits

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Acknowledgements

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References

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