

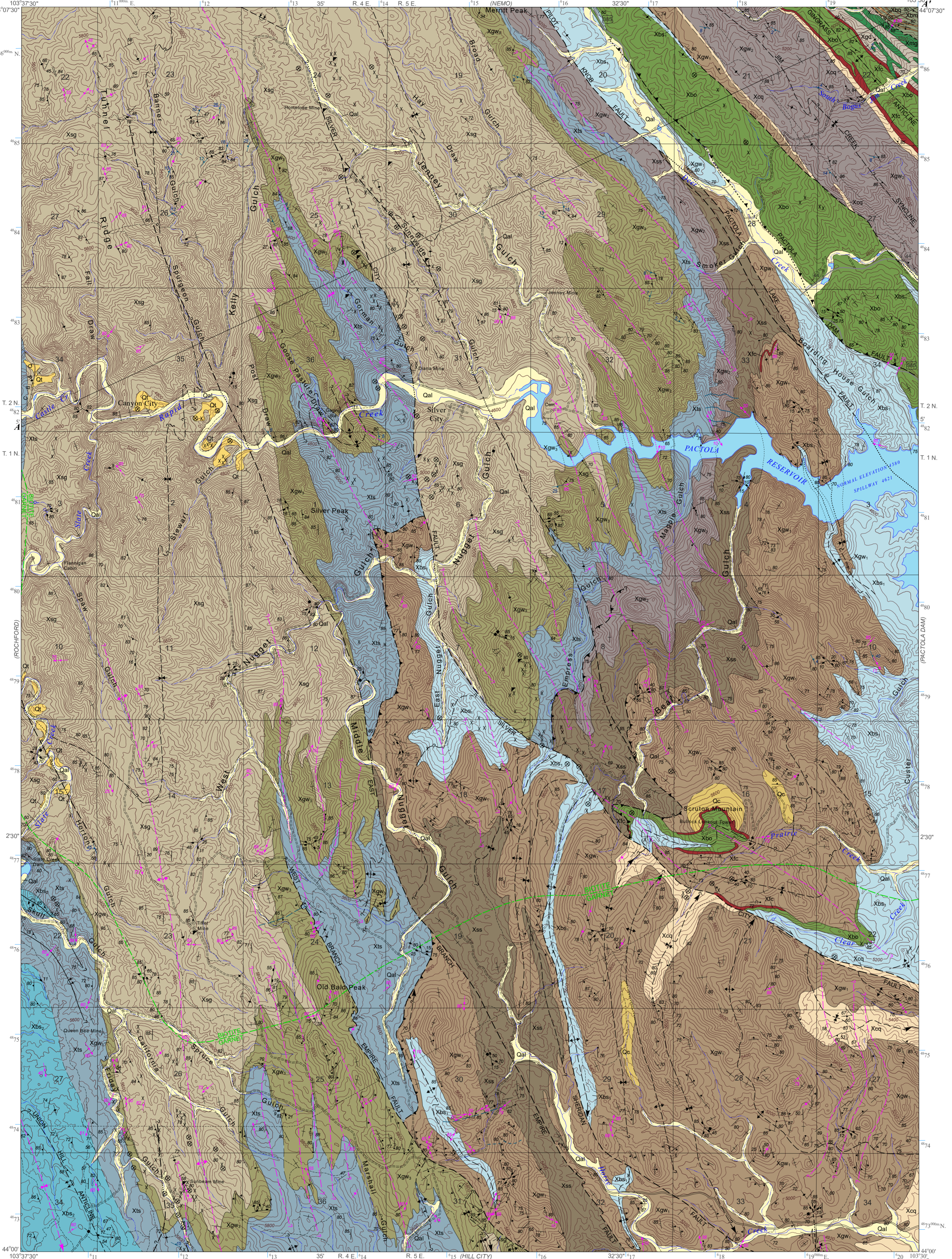
GEOLOGIC MAP OF THE SILVER CITY QUADRANGLE, SOUTH DAKOTA

Jack A. Redden¹, Douglas Alexander¹, and David Nonnast¹
2017

SOUTH DAKOTA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF FINANCIAL AND TECHNICAL ASSISTANCE
GEOLOGIC SURVEY PROGRAM
7.5 MINUTE SERIES GEOLOGIC QUADRANGLE MAP 6

State of South Dakota
Dennis Daugaard, Governor

South Dakota Geological Survey
Derris L. Iles, State Geologist



EXPLANATION

QUATERNARY

- Qal Alluvium - Silt, sand, gravel to boulders. Unconsolidated to poorly consolidated. Deposited in present-day drainages and on flood plains.
- Qc Colluvium - Unconsolidated, angular rock debris and soil developed along steep slopes.
- Qt Terrace deposit - Unconsolidated to poorly consolidated, subangular to rounded clasts to boulder-size. May occur as equivalent as 100 ft (31 m) above present streams. Typically less than 15 ft (4.5 m) thick.

Unconformity

PRECAMBRIAN

- Xsg Swede Gulch Formation - Slate and phyllite. Gray, black, and greenish-tan, thin- to medium-bedded. Lower portion contains one to two beds of massive streaky ferruginous schist (Bayley, 1972a). Thin subunits are graphitic and pyrrhotite-bearing. Calc-silicate concretions occur locally in quartzose Bouma A metagraywacke subunits. Protolith is schist.
- Xgw Metagraywacke unit 3 - Quartzose schist and phyllite. Tan to gray, thick to thin-bedded. Calcareous and calc-silicate concretions occur locally in quartz-rich Bouma A beds. Protolith is proximal graywacke deposits with minor shale interbeds.
- Xts Tenderfoot Formation - Micaceous phyllite. Green to silver-gray, thin-bedded. Typically has accessory magnetite and ilmenite, locally with malachite-stained muscovite-rich schist and thin spessartine-bearing beds. Includes some metagraywacke subunits which increase in abundance to the north. Formation cannot be distinguished from adjacent metagraywacke units approximately 0.6 mi (1 km) north of the quadrangle. Equivalent to ash flow tuffs in the Rockford area which have a Pb-Pb zircon age of 1.88 Ga (Redden and others, 1990).
- Xbs Schist and phyllite - Biotite-garnet schist and phyllite. Gray, black, and tan, thin-bedded. Some beds may contain abundant garnet, graphite, or pyrite. Unit changes facies to the south in the Hill City quadrangle where a graywacke subunit is inferred to be equivalent to metagraywacke unit 2 (Xgw). The lowermost portion of Xbs may be equivalent to part of the Crevice Formation on the Hill City quadrangle. Protolith is black shale and pelite.
- Xgw Metagraywacke unit 2 - Quartzose schist and phyllite. Tan to gray, thick to thin-bedded. Calcareous and calc-silicate concretions occur locally in quartz-rich Bouma A beds. Protolith is proximal graywacke deposits.
- Xss Schist and phyllite - Schist and phyllite. Tan to gray, thin- to medium-bedded. Some gneissiferous beds occur in the southern part of the quadrangle. Includes distal metagraywacke subunits which increase in abundance to the north.
- Xcq Metaconglomerate, quartzite, and metapelite - Schist, quartzite, and metaconglomerate. Gray, dark-gray, and tan. Generally thin- to thick-bedded. Includes many quartzite and metapelite subunits of metagraywacke which increase in abundance in a general northwesterly direction as metaconglomerate and quartzite decrease. May be equivalent to part of units Xgw and Xss north of the Silver City Fault. Protolith is debris flow deposits.

Unconformity

Lower Proterozoic

- Xgw Metagraywacke unit 1 - Quartzose schist and phyllite. Tan to gray, thick to thin-bedded. Calcareous and calc-silicate concretions occur locally in quartz-rich Bouma A beds. Protolith is proximal graywacke deposits.
- Xmg Metagabbro - Amphibolite and chloritic amphibole schist. Occurs as gray-green to brownish-black sills and dikes. Age inferred to be ~1.58 Ga which is the Pb-Pb zircon age of a metagabbro sill below tholeiitic pillow basalt of the Hay Creek Greenstone (Xbo) in the Pactola Dam quadrangle, but may be equivalent to younger metagabbro sills (~1.8 Ga) in the Pactola Dam quadrangle (Redden and others, 1990). It is uncertain that all bodies shown as Xmg are of the same age.
- Xqm Buck Mountain Quartzite - Xqm - Quartzite, phyllite, and schist. Gray, tan, to reddish-brown, thin- to thick-bedded (Bayley, 1972a). Protolith is shallow shelf deposits of sandstone, siltstone, and shale. Xsq - Quartzite, beige to dark bluish-gray. Typically thick-bedded, fine- to medium-grained.
- Xgd Gingress Draw Slate - Chloritic phyllite and slate. Olive-green to tan, thin- to medium-bedded (Bayley, 1972a). Contains thin metasilic and quartzite beds in the lower portion which increase in abundance to the east in the Pactola Dam quadrangle, and are difficult to distinguish from parts of the Buck Mountain Quartzite. Age approximately 1.974 +/- 8 Ma (Frei and others, 2008). Protolith is probably a submarine mafic tuff.
- Xbs Reusaw Slate - Xbs - Graphitic slate and phyllite, garnet schist, and biotite phyllite (Bayley, 1972a). Gray, black, to reddish-brown. Fine, very fine-grained, laminated to thin-bedded, and carbonaceous. Includes magnetic cherty ferruginous schist with garnetiferous cummingtonite. Typically contains thin metachert beds, sulfides, iron carbonate, and veinlets of milky quartz. Poorly exposed. Protolith is black shale.
- Xlc Ferruginous metachert - Metachert to magnetic cherty ferruginous schist, locally transitional to carbonate facies iron-formation. Thick-bedded to massive. Typically non-stained, with lenses of minor sulfidic and graphitic phyllite. Resembles cherty interflow facies in the Hay Creek Greenstone (Xbo). Unit Xlc shown in section 33, T. 2 N., R. 5 E. north of Pactola Reservoir is inferred to be at a different stratigraphic level than other occurrences. Protolith is likely submarine thermal spring deposits.
- Xbo Hay Creek Greenstone - Xbo - Tholeiitic metabasalt and amphibolite having pillow structures (Bayley, 1972a). Grayish-green, yellowish-green, to black. Very finely to coarsely crystalline, often having a speckled appearance. May have molds from dissolved amphibole laths. Contains interflow deposits of dark-gray to black carbonaceous phyllite and schist with thin-bedded to massive metachert and carbonate-facies iron-formation. Individual flows in strike belt crossing Pactola Reservoir thin and intertongue with the Reusaw Slate (Xbs) to the northwest in the Nemo quadrangle. Individual flows end approximately 1.2 mi (2 km) north of the Silver City quadrangle boundary. Frei and others (2008) report an age of 2.02-1.97 Ga. Protolith is pillowed greenstone flows containing carbonaceous interflow deposits having chert and carbonate-facies iron-formation.

CONTACTS

- Long dashed where approximately located; dotted where concealed and where projected above land surface in cross section; queried where uncertain.

FAULTS

- Fault - Long dashed where approximately located; short dashed where inferred; dotted where concealed; queried where uncertain. Arrows indicate relative movement.
- Thrust fault - Long dashed where approximately located; dotted where concealed; queried where uncertain. Sawtooth indicate upper plate.

FOLDS (Early Proterozoic)

- Anticline - Showing generalized trace of axial plane and direction of plunge. Long dashed where approximately located; dotted where concealed; queried where uncertain. Minor folds not shown.
- Syncline - Showing generalized trace of axial plane and direction of plunge. Long dashed where approximately located; dotted where concealed; queried where uncertain. Minor folds not shown.
- Overtured anticline - Approximate location of trace of axial plane and dip direction of limbs. Long dashed where approximately located; dotted where concealed; queried where uncertain. Minor folds not shown.
- Overtured syncline - Approximate location of trace of axial plane and dip direction of limbs. Long dashed where approximately located; dotted where concealed; queried where uncertain.

D₂ FOLDS

- Antiform - Approximate location of crestline and direction of plunge. Long dashed where approximately located; dotted where concealed; queried where uncertain.
- Synform - Approximate location of troughline and direction of plunge. Long dashed where approximately located; dotted where concealed; queried where uncertain.
- Undifferentiated D₂ fold - Generalized trace of trace of axial plane. Long dashed where approximately located; dotted where concealed; queried where uncertain.
- Post-D₂ fold zone - Generalized trace of zone of post-D₂ buckle folds which deform bedding, D₂ folds, and have variable attitudes. Long dashed where approximately located; short dashed where inferred.

MINOR FOLDS

- Minor inclined fold - Axis and plunge of single fold, predominantly of D₂ age.
- Minor horizontal fold - Axis and bearing of single fold, predominantly of D₂ age.

STRIKE AND DIP OF BEDDING

- Inclined - Ball indicates top direction of beds known to be in dip direction.
- Vertical - Ball indicates top direction of beds known to be in opposite dip direction.
- Overtured - Ball indicates top direction of beds known to be in opposite dip direction.

STRIKE AND DIP OF D₁ FOLIATION

- Inclined - Top of bed. Direction of younging shown by sedimentary structures.

STRIKE AND DIP OF D₂ FOLIATION

- Inclined - Vertical.

STRIKE AND DIP OF POST-D₂ FOLIATION

- Inclined - Vertical.

STRIKE AND DIP OF FRACTURES

- Inclined - Vertical.

QUARTZ VEIN

- Vertical - First appearance of index mineral noted on side of isograd.

METAMORPHIC ISOGRAD

- BIOTITE - First appearance of index mineral noted on side of isograd.
- GARNET - First appearance of index mineral noted on side of isograd.

OTHER FEATURES

- Mine shaft
- Mine adit
- Group of prospect pits
- Prospect pit

REFERENCES

Bayley, R.W., 1972a, Preliminary geologic map of the Nemo district, Black Hills, South Dakota: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-712, scale 1:24,000.

Bayley, R.W., 1972b, A preliminary report on the geology and gold deposits of the Rockford district, Black Hills, South Dakota: U.S. Geological Survey Bulletin 1332-A, 24 p.

Berg, J.R., 1946, Pre-Cambrian geology of the Galena-Rosbush district, Black Hills, South Dakota: South Dakota Geological Survey Report of Investigations No. 52, 50 p.

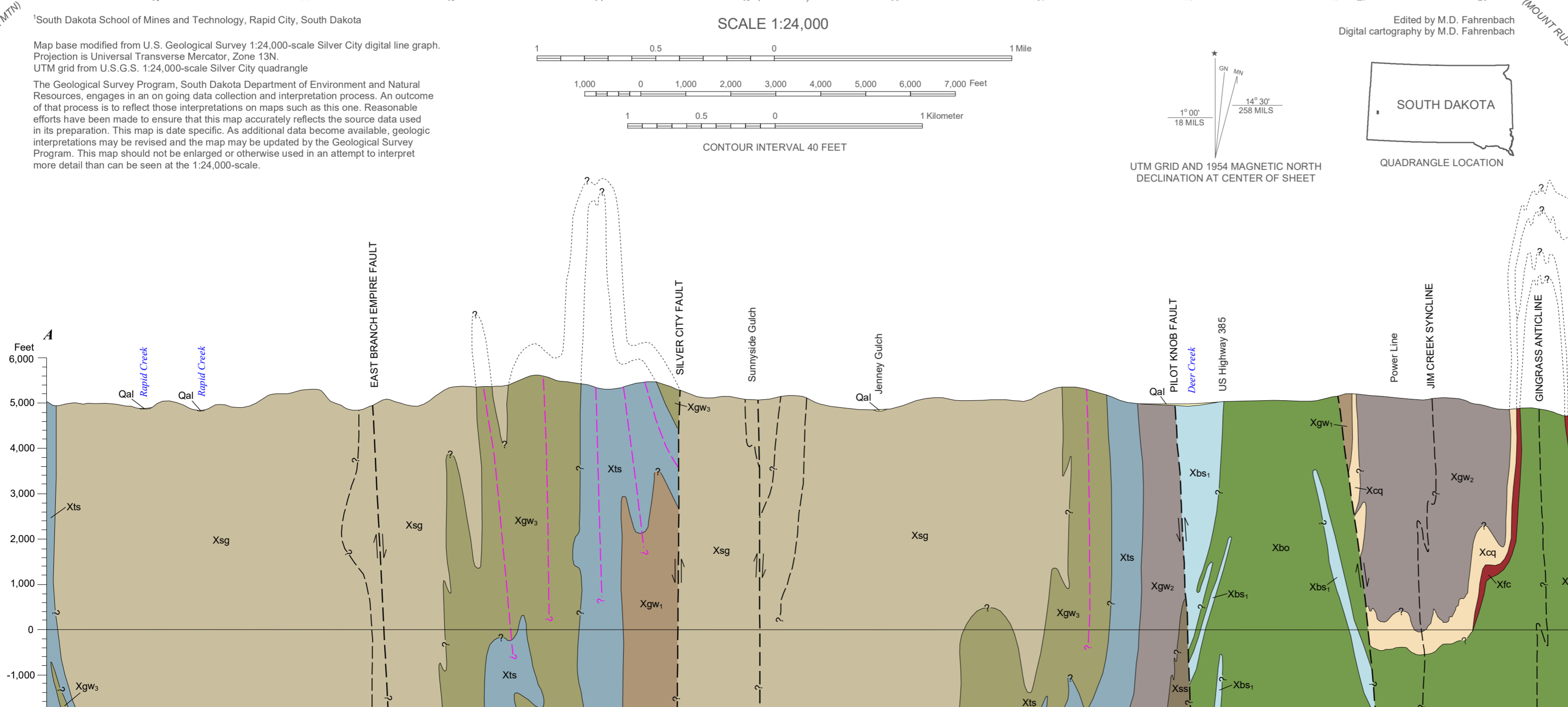
DeWitt, E., Buscher, D., Wilson, A.B., and Johnson, T., 1988, Map showing locations of mines, prospects, and patented mining claims, and classification of mineral deposits in the Silver City 7.5-minute quadrangle, Black Hills, South Dakota: U.S. Geological Survey Miscellaneous Field Studies Map MF-1978-1, scale 1:24,000.

Frei, R., Dahl, P.S., Duke, E.F., Frei, K.M., Hansen, T.R., Frandsen, M.M., and Jensen, L.A., 2008, Trace element and isotopic characterization of Neoproterozoic and Paleoproterozoic iron formations in the Black Hills (South Dakota, USA): Assessment of chemical change during 2.9-1.9 Ga deposition bracketing the 2.4-2.2 Ga first rise of atmospheric oxygen: Precambrian Research, v. 162, p. 441-474.

Redden, J.A., Pelemer, Z.E., Zartman, R.E., and DeWitt, E., 1990, U-Th-Pb geochronology and preliminary interpretations of Precambrian tectonic events in the Black Hills, South Dakota. In Lewry, J.F., and Stauffer, M.R., eds., The Early Proterozoic Trans-Hudson orogen of North America: Geological Association of Canada Special Paper 37, p. 22b-251.

ACKNOWLEDGEMENTS

Prepared in cooperation with the South Dakota School of Mines and Technology. Field work by J.A. Redden was supported by the United States Geological Survey, 1973. The authors thank the West Dakota Water Development District, the South Dakota Geological Survey, and the U.S. Geological Survey, National Cooperative Geologic Mapping Program, EDMAP award 01HOAG0168 for providing financial support.



Scale: 1:24,000. Contour Interval: 40 Feet. UTM Grid and 1954 Magnetic North Declination at Center of Sheet. Quadrangle Location in South Dakota.