

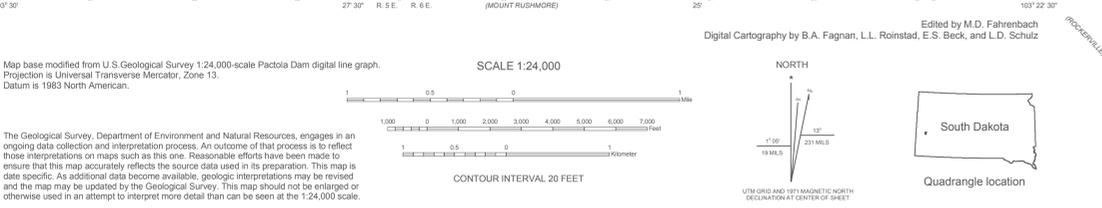
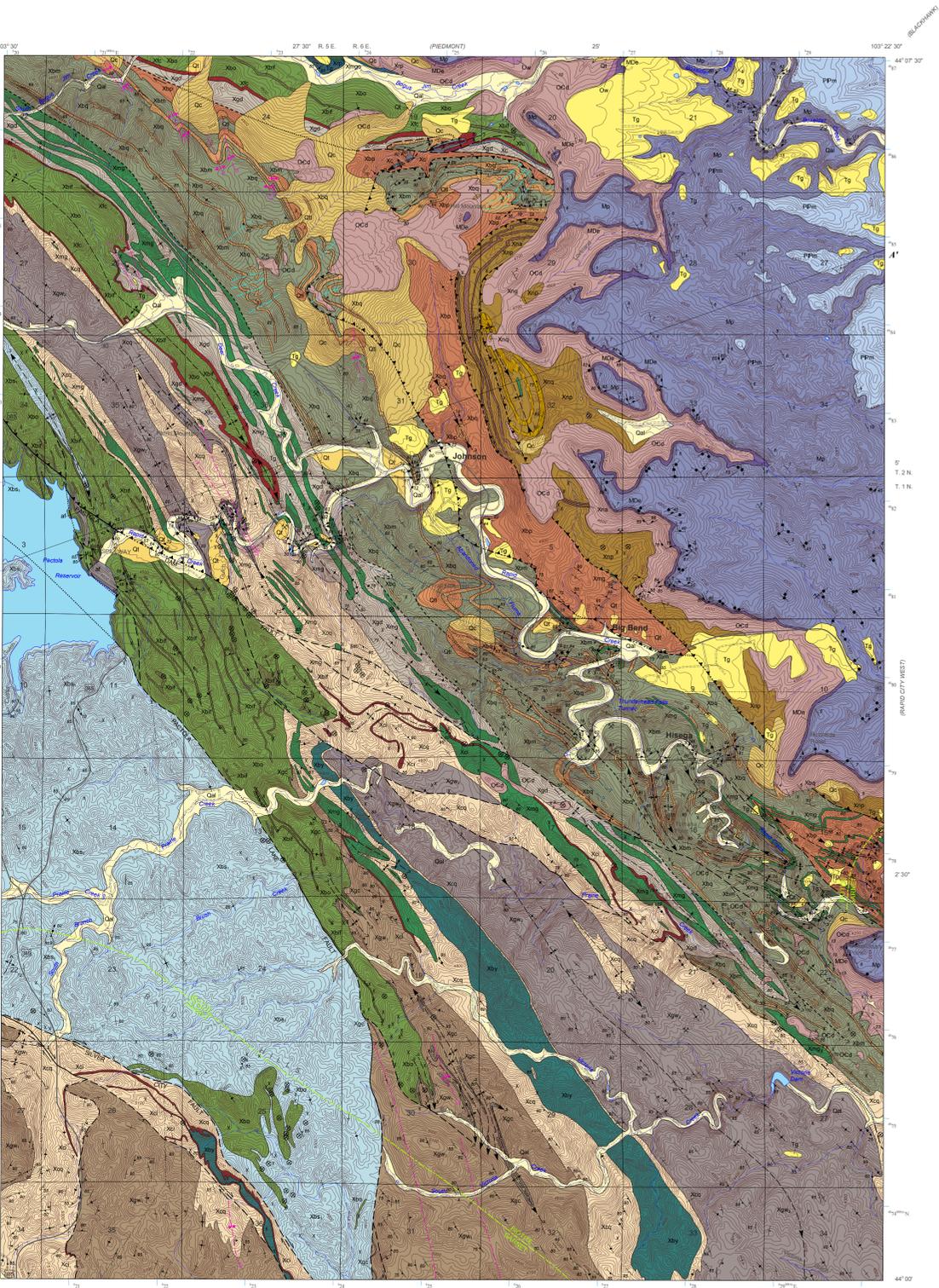


Geologic Map of the Pactola Dam Quadrangle, South Dakota

J.J. Norton, J.A. Redden, and F.J. Anderson
2008

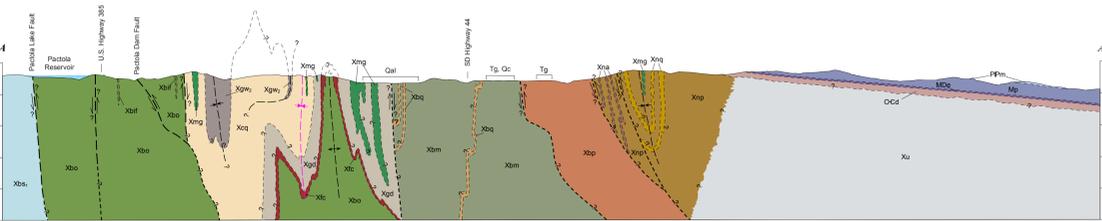
State of South Dakota
M. Michael Rounds, Governor

South Dakota Geological Survey
Derric L. Iles, State Geologist



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

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.



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

EXPLANATION

<p>Quaternary</p> <ul style="list-style-type: none"> Qal Alluvium - Unconsolidated to loosely consolidated, clay, silt, sand, and lenses of gravel. Thickness locally greater than 20 ft (6 m) Qt Terrace deposit - Unconsolidated clay- to boulder-size clasts. Approximate maximum thickness is 20 ft (6 m) Qc Colluvium - Quartzite debris mainly derived from quartzite ridges of the Buck Mountain Formation or lower Deadwood Formation. Bedrock is completely concealed by these deposits. Only larger deposits are shown Qtl Talus deposit - Large, locally derived, angular blocks of quartzite. Typically devoid of soil or tree cover <p>Tertiary</p> <ul style="list-style-type: none"> Tg Gravel deposit - Generally gravel at surface but artificial exposures may disclose pinkish bentonitic beds at depth. Most deposits designated as Tg along Rapid Creek are based on upstream elevations of known deposits of general Tertiary age or deposits of the White River Group. Indicated by bracket on cross section where too thin to show. Thickness ranges from a few feet to possibly as much as 60 ft (18 m) <p>Permian</p> <ul style="list-style-type: none"> Pfpm Minnelusa Formation - Beige, white, gray, and reddish sandstone, shale, limestone, and dolomite. Lower portion is medium- to thick-bedded dolomite, sandstone, shale, and limestone. Well exposed in canyon walls with few outcrops in uplands. Maximum exposed thickness approximately 900 ft (91 m) <p>Pennsylvanian</p> <ul style="list-style-type: none"> Mp Pahasapa Limestone - Light-gray, cream, and tan dolomitic limestone to dolomite. Outcrops in canyon walls weather to a dark gray. The contact with the Minnelusa Formation is an irregular erosional and solution surface commonly with terra rossa. Rarely, bedding may be concordant with the overlying Minnelusa Formation. Thickness ranges from 300-450 ft (91-137 m) Mde Englewood Limestone - Purplish-gray, pinkish, to reddish-brown, thin-bedded, argillaceous limestone and dolomitic limestone. Thickness ranges from 35-65 ft (11-20 m) <p>Mississippian</p> <ul style="list-style-type: none"> Ow Winnipeg Formation - Gray to green, fissile to thin-bedded shale. May contain small, black phosphatic nodules. Thickness 0-20 ft (0-6 m) <p>Devonian</p> <ul style="list-style-type: none"> Ocd Deadwood Formation - Reddish-brown, medium- to thick-bedded sandstone to dolomite. Lower portion is dominantly greenish, glauconitic sandstone, impure limestone, shale, and flat-pebble conglomerate. Thin basal boulder conglomerate surrounds Precambrian quartzite which locally have more than 140 ft (43 m) of erosional relief at the lower contact. Thickness ranges from approximately 100-320 ft (46-98 m) <p>Ordovician</p> <ul style="list-style-type: none"> Xmg Metagabbro - Sills and dikes. Medium-grained except where sheeted or well foliated. Samples from quarry along Prairie Creek have a Pb-Pb zircon age of 1,883 ± 5 Ma (Redden and others, 1990). It is uncertain that all bodies shown as Xmg are of the same age Xmgol Metagabbro (older) - A medium-grained, quartz-bearing sill intruding the Roberts Draw Limestone north of Bogus Jim Creek having a Pb-Pb zircon age of 1,364 ± 15 Ma (Redden and others, 1990) Xgw Metagraywacke - Well-bedded, tan phyllite, schist, and quartzose schist Xcq Metaconglomerate, quartzite, and phyllite - Xcq - Includes considerable phyllite and quartzite. Some black quartzite beds contain abundant carbon. Conglomerate is typically loose packed and clasts range from pebble to boulder size indicating debris flow input. Clasts are apparently derived from sedimentary rocks and have variable compositions. Some clasts from eastern exposures were derived from the Buck Mountain Formation. Xcy - Metabasalt, green, fine-grained, locally contains pillow structures. Xcz - Quartzite (metachert) and carbonaceous, iron-stained phyllite; probably contains beds of iron carbonate. Combined units represent a steep slope deposit with local thermal spring deposits Xgc Metagraywacke - Xgw - Tan phyllite, schist, and quartzose schist; well-bedded. Xgc - Thin units of quartzite (metachert) and carbonaceous phyllite; typically sulfide-bearing. Metachert may be in thin beds or up to several meters thick. Probably derived from submarine thermal spring deposits Xqm Buck Mountain Quartzite - Xtm - Grayish-tan phyllite and quartzite. Locally abundant ripple marks occur in beds that were originally thin-bedded siltstones. Xcn - Quartzite, tan to gray, thick bedded, includes sparse, poorly sorted, intraformational conglomerate. Xcp - Dominantly gray to tan phyllite and minor, thin, quartzose beds. Formation locally has abundant ripples indicating a shallow shelf deposit. Thick, dark quartzite beds near Hat Mountain contain carbon-rich algal mats commonly associated with rip-up clasts. Originally named the Buck Mountain Quartzite by Bayley (1972), but quartzite is not dominant Xgd Gingress Draw Slate - Olive drab to tan, thin-bedded. Contains quartzite and metasilicate in exposures south of SD Highway 44 which are very difficult to distinguish from some parts of the Buck Mountain Quartzite. Chlorite-rich phyllite is likely reworked volcanic tuff Xbs Slate and phyllite - Gray to black, thin-bedded, typically carbonaceous. Includes local thin chert beds and beds rich in iron carbonate and sulfide. Derived from black shale. Interfingers with basaltic flows. Xbo, north-northwest of Pactola Reservoir in the Silver City quadrangle Xfc Ferruginous metachert and carbonaceous phyllite - Xfc - Transitional to carbonate facies iron formation. Locally streaked quartzite (metachert). Forms prominent outcrops or occurs as large float blocks Xbo Tholeiitic metabasalt - Xbo - Pillowed, fine-grained. Individual flows decrease in thickness to the west and pinch out into unit Xbs in the Silver City quadrangle. Xbif - Interflow subunit is dominantly metachert but includes carbonaceous and green phyllite. Iron carbonate and sulfide are common, indicating transition to carbonate facies iron formation. Massive metachert lenses indicate a thermal spring origin, but portions are likely reworked tuff. Unit is equivalent to the Hay Creek Greenstone of Bayley (1972) Xrp Roberts Draw Limestone - Gray to tan phyllite, well-bedded, locally with abundant carbonate. Thick-bedded dolomitic marble containing sparse stromatolites occurs in the lower part of the unit in the Piedmont and Nemo quadrangles to the north and northwest. Originally named the Roberts Draw Limestone by Bayley (1972), but limestone beds are very sparse <p>Cambrian</p> <ul style="list-style-type: none"> Xna "Norris Peak rocks" - Xnp - Phyllite, gray to black, poorly exposed. Xna - Meta-arkose, coarse-grained grit, and minor gray to black phyllite. Xnq - Feldspathic quartzite, tan to black, thick-bedded, locally very poorly sorted. Thicker beds commonly contain carbon outlined structures that may be fossils. Sparse associated lithic clasts up to 1-inch diameter, carbon-rich rip-up clasts, and thin carbon-rich layers of probable algal origin indicate a very shallow coastal environment. Some beds are coarse-grained grit containing amoky and blue quartz grains. Units are tentatively correlated with the Estes Formation in the Nemo quadrangle to the north. Area of poor exposure in valley southeast of Norris Peak near Phanerozoic rocks is inferred to be mainly phyllite with isolated quartzite beds Xu Undifferentiated Precambrian rocks - Shown only in cross section 	<p>Contact Long dashed where approximately located; short dashed where inferred. Quoted in cross section where indistinct</p> <p>FAULTS</p> <p>Fault Long dashed where approximately located; short dashed where inferred; dotted where concealed; queried where location or continuation indefinite. Bar and ball on downthrown side. Arrows indicate lateral movement. Tc indicates dip direction and amount</p> <p>Thrust fault Long dashed where approximately located; short dashed where inferred; dotted where concealed; queried where location or continuation indefinite. Sawtooth indicates upper plate. Dip of thrust faults inferred to have been steepened by later deformation</p> <p>FOLDS</p> <p>D₁ Folds Shown only where stratigraphic sequence is known. Original plunge angles were low. Later deformation modified earlier low angle plunges. Some of the D₁ folds shown in the general area south of triage may be of later origin. Minor folds not shown</p> <p>Anticline Trace of axial surface; long dashed where approximately located; dotted where concealed; queried where uncertain. Arrow indicates general direction of plunge. Axial surfaces generally steep dipping and locally overturned</p> <p>Syncline Trace of axial surface; long dashed where approximately located; dotted where concealed; queried where uncertain. Arrow indicates general direction of plunge. Axial surfaces generally steep dipping and locally overturned</p> <p>Overturned anticline Approximate location of trace of axial surface and dominant dip direction of limbs. Long dashed where approximately located. Arrow indicates direction of plunge</p> <p>D₂ Folds Generalized trace of axial surface. Long dashed where approximately located; dotted where concealed; queried where uncertain. Axial surface generally steep dipping and parallel to north-northwest foliation. Fold plunges variable due to crossing of earlier folds that are not shown. Arrow shown on axial surface of some folds indicate general dip of limbs. May locally parallel, modify, and accommodate D₁ folds. Many small D₂ folds not shown</p> <p>Anticinal Long dashed where approximately located; short dashed where inferred; dotted where concealed; queried where uncertain</p> <p>Synclinal Long dashed where approximately located; short dashed where inferred; dotted where concealed; queried where uncertain</p> <p>D₃ Folds Generalized trace of axial surface of folds characterized by a northwest trend and right lateral shear. Long dashed where approximately located; dotted where concealed; queried where uncertain. Fold plunges not shown but range from 0-30 degrees depending on attitude of earlier folds</p> <p>D₄ Folds Generalized trace of zones of buckle folds restricted to incompetent rocks and having east-northeast trends. Long dashed where approximately located. Post D₃ in age but timing of deformation uncertain</p> <p>Minor folds Axis and plunge of minor folds predominantly of D₂ and D₃ age</p> <p>STRIKE AND DIP OF BEDDING</p> <p>Inclined Inclined Vertical Vertical Overturned Horizontal Top of bed Direction of younging shown by sedimentary structures</p> <p>STRIKE AND DIP OF FOLIATION</p> <p>Inclined Inclined Vertical Vertical Vertical Horizontal</p> <p>STRIKE AND DIP OF FRACTURES</p> <p>Inclined Vertical Horizontal</p> <p>LINEAR STRUCTURES</p> <p>Mineral lineation Showing bearing and plunge</p> <p>Metamorphic isograd BIOTITE GARNET</p> <p>Artificial fill Covered south and broken rock, indicated only where extensive</p> <p>Open pit mine</p> <p>Mine adit</p> <p>Prospect pit</p> <p>Group of prospect pits</p>
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Index Map of Geologic Data



Letters on Index Map refer to references utilized in map compilation. Reference "a" pertains to the Nemo quadrangle which is northwest of the Pactola Dam quadrangle.

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