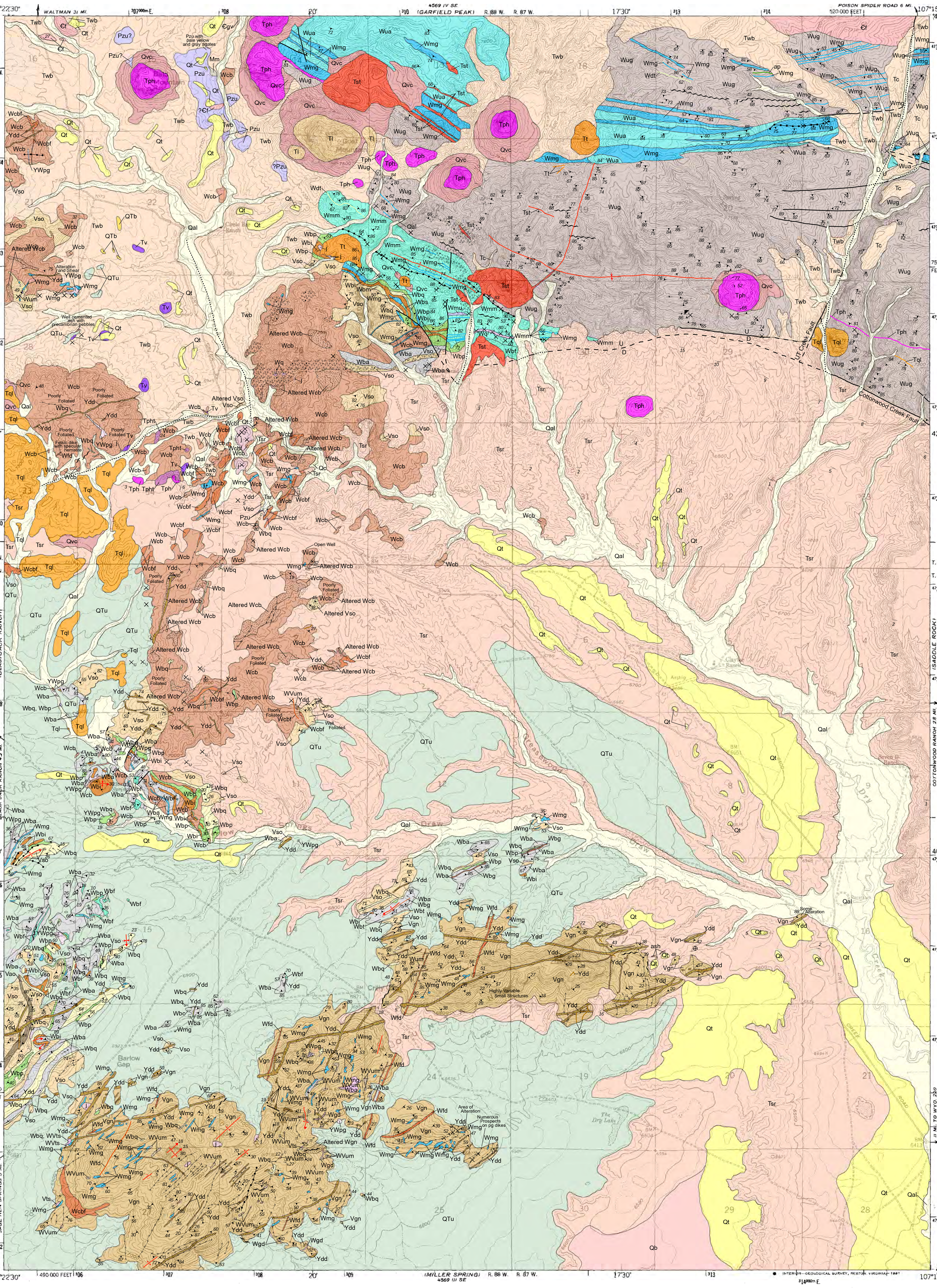
WYOMING STATE GEOLOGICAL SURVEY
Ronald C. Surdam, State Geologist
Laramie, Wyoming

Geology - Interpreting the past to provide for the future

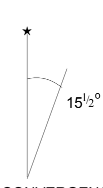
Prepared in cooperation with the
U.S. GEOLOGICAL SURVEY

MAP SERIES 67
Barlow Gap 1:24,000 - scale Geologic Map



SCALE 1:24,000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



UTM GRID CONVERGENCE (GN)
1959 MAGNETIC DECLINATION (MN) AT CENTER OF SHEET
DIAGRAM IS APPROXIMATE

Base map from U.S. Geological Survey 1:24,000-scale topographic map of the Barlow Gap, Wyoming Quadrangle, 1959

Projection: Universal Transverse Mercator (UTM), zone 13
North American Datum of 1927 (NAD 27)
10,000-foot grid ticks:Wyoming State Plane Coordinate System, East Central zone

A digital version of this map is also available on CD-ROM.

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Digital cartography by Alice J. Vogelmann

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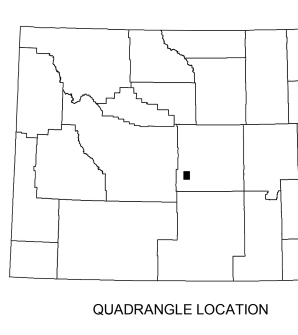
GEOLOGIC MAP OF BARLOW GAP QUADRANGLE, NATRONA COUNTY, WYOMING

by
Wayne M. Sutherland and W. Dan Hausel
2005



QUADRANGLE LOCATION

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Fruchey, B.L., 2002, Archean supracrustal sequences of contrasting origin- the Archean history of the Barlow Gap area, northern Granite Mountains, Wyoming: unpublished M.S. thesis, University of Wyoming, Laramie, 178 p., map scale 1:24,000, and 1:3,000.

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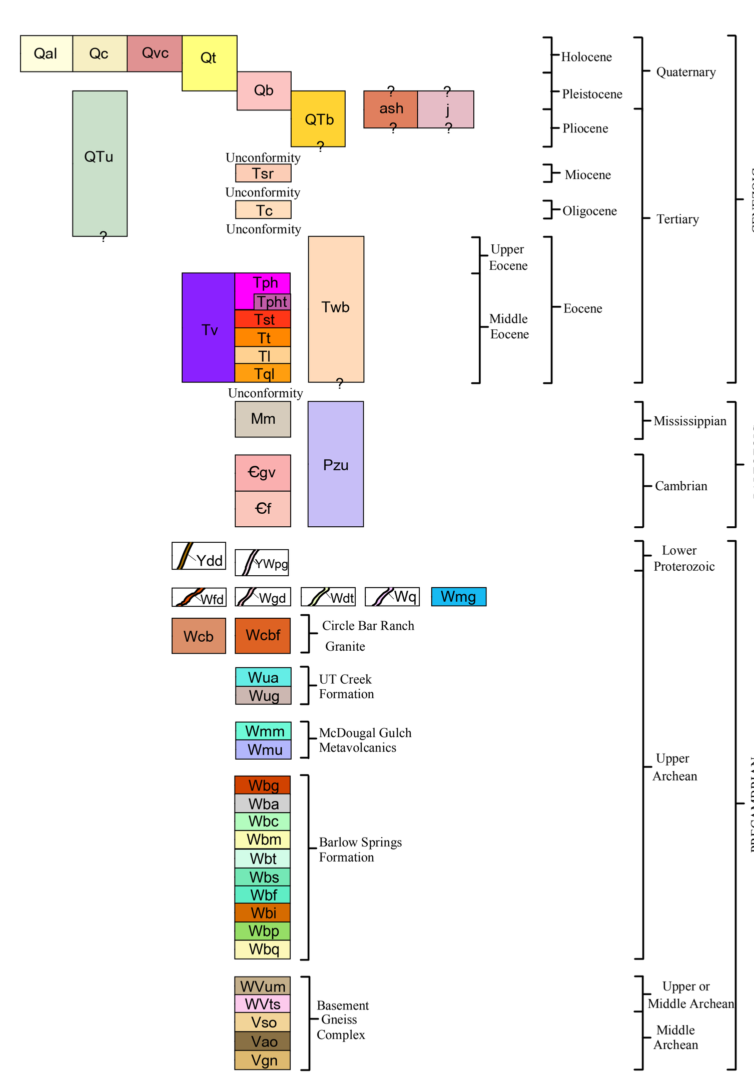
Van Houten, F.B., 1964, Tertiary geology of the Beaver Rim area, Fremont and Natrona counties, Wyoming: U S Geological Survey Bulletin 1164, 99 p.

EXPLANATION
CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Quaternary deposits

Qal — **Alluvium**—Unconsolidated sand, silt, clay, coarse gravels and cobbles; may include eluvial deposits, slope wash, and small alluvial and colluvial fans

Qc — **Colluvium**

Qvc — **Volcanic colluvium and volcaniclastics**—Colluvium derived from Tertiary volcanic rocks and volcaniclastics associated with eruptive centers

Qt — **Terrace deposits**—Gravel-cobble-sand-, and silt-covered terraces cut across Tertiary sedimentary units

Qb — **Pleistocene Bug Formation**—Pale brown, pale green, and white claystone, sandstone, tuff, limestone, and conglomerate

ash — **Ash**—Very fine-grained white volcanic ash located in sections 17 and 18, T 31 N, R 87 W

j — **Jasper, jasperoid**—Jasperoid of possible hot springs genesis in sections 35 and 25, T32 N, R 88 W, with very minor outcrops also noted in sections 34 and 26 of same township. Detrital jasper occurs in other parts of the quadrangle

Quaternary and Tertiary Deposits

QTb — **Boulder deposits**—Volcanic and granitic cobbles and boulders up to 15 feet in diameter form terrace-like deposits

QTu — **Undifferentiated Quaternary and Tertiary deposits**—Detailed mapping of the interrelationships between these units was not undertaken in several areas

Tertiary sedimentary rocks

Tsr — **Split Rock Formation (Miocene)**—Massive, well-sorted yellowish-gray to grayish-orange volcanic sandstone with persistent beds of coarse conglomerate; sandstones contain conspicuous well-rounded and frosted grains; chert nodules and silicious aggregates can be found throughout the formation

Tc — **Boulder conglomerate (Oligocene)**—Unsorted, poorly bedded boulder channel deposits along UT Creek

Twb — **Wagon Bed Formation (Eocene)**—Dominated by locally derived volcanic debris, but contains some Precambrian detritus; upper part is poorly sorted, but remainder is generally composed of persistent well-sorted beds of yellowish-green to pale olive and dark greenish-gray sandstone, siltstone, and mudstone; thick ash deposits, both locally derived and from the Yellowstone-Absaroka area, exhibit no bedding or sorting in the middle of the formation (Van Houten, 1964)

Tertiary volcanic and subvolcanic rocks

Tv — **Undifferentiated Tertiary subvolcanic and volcanic rocks**—Peraluminous alkaline and calc-alkaline volcanic and intrusive rocks (classifications from Pekarek, 1977); some alkalics and associated breccias contain disseminated gold (Hausel, 1996)

Tph — **Phonolite**—may also occur as dikes that cut older rocks. Pekarek (1977) reported K – Ar age date of 43.6± 1.0 Ma (mega-annum or millions of years before present) from Tsr Knob

Tpht — **Phonolite tuff**

Tst — **Soda trachyte**—may also occur as dikes that cut older rocks

Tt — **Trachyte**

Tl — **Latite**

Tql — **Quartz latite**—Arrow indicates dip of vein. Pekarek (1977) reprted a K-Ar age date of 44.0 ± 2.6 Ma from this unit at Garfield Peak

Paleozoic rocks

Mm — **Madison Limestone (Mississippian)**—Massive, resistant, medium- to dark-gray limestone containing chert nodules and concretions

Ꞓgv — **Gros Ventre Formation (Cambrian)**—Reddish-orange to red, nonresistant, interbedded very fine-grained sandstone, siltstone, and shale

Ꞓf — **Flathead Formation (Cambrian)**—Arkosic and conglomeratic, resistant buff to red sandstone

Pzu — **Undifferentiated Paleozoic units**—Paleozoic units described above with limited exposures were not separated in the field

Precambrian intrusive rocks

Ydd — **Diabase dikes**—Near vertical, predominately ENE-trending dikes of uniform thicknesses which cross-cut most other Precambrian units and structures; age of these dikes is ~1.46 Ga (giga-annum or billions of years before present) (Chamberlain and Frost, 1995)

YWpg — **Pegmatite veins and dikes**—Pegmatite veins and dikes varying in width up to more than 20 feet; these are cut by the diabase dikes in most places, but appear to cut the diabase dikes at two locations (NE1/4 Sec.24, T31N, R88W; NE1/4NW1/4 Sec.19, T31N, R87W) suggesting two different ages: Archean (Fruchey, 2002), and much younger

Wfd — **Felsic dikes**—Thin, linear NNE-trending (striking N 18° to 21° E) resistant felsic dikes within the granite gneiss

Wgd — **Granodiorite dikes**—Thin granodiorite dikes cross-cut granite gneiss in the southern part of the quadrangle (section 26, T 31 N, R 88 W) at shallow angles (20° to 50°); these dikes are in turn cross-cut by fine-grained felsic dikes, pegmatite dikes, and diabase dikes

Wdt — **Tonalite dikes**—Tonalite dike within metagreywacke of the UT Creek Formation mapped by Hausel (1996)

Wq — **Quartz-hematite breccia veins**—Distinct iron-stained, jasperized quartz breccia vein which may have been an iron-rich exhalite within and conformable to the structure of the McDougal Gulch Metavolcanics; also found in granite within the North Granite Mountains Fault breccia zone; additional quartz breccia veins shown as mineralized veins are hosted by metagreywackes in the UT Creek Formation and in tholeiitic metabasalts of the McDougal Gulch Metavolcanics (Hausel, 1996)

Wmg — **Metagabbro**—Layers and pods of metagabbro that intrude both the granite gneiss complex and the metasedimentary-metaigneous rocks; metagabbro veins are shown as lines

Wcb — **Circle Bar Ranch Granite**—Pink to tan, orange, and gray or leucocratic, medium- to coarse-grained, and porphyritic granite containing xenoliths derived from the Barlow Springs Formation or from older gneiss (Fruchey, 2002); U-Pb analysis of zircons by Langstaff (1995) determined age of ~2.65 Ga

Wcbf — **Fine-grained granite**—Hard, pink, unaltered, fine-grained granite dikes that cross-cut the coarser granite and granite gneiss; more resistant to weathering than the surrounding coarser-grained rocks; may be related to the Circle Bar Ranch Granite. May be shown as a line in places where it is too thin to be shown as an outcrop

Rattlesnake Hills greenstone belt metasedimentary-metaigneous rocks

UT Creek Formation—Dominated by metagreywackes and tuffaceous metagreywackes with intercalated metacherts and metatholeites

Wua — **Asbell Metabasalt**—Weakly foliated to massive, black, fine-grained to aphanitic, iron-rich tholeiitic metabasalts with associated metagabbroic dikes and sills, and limited exposures of both felsic and ultramafic metavolcanic rocks (Hausel, 1996)

Wug — **Metagreywacke**—Fine- to medium-grained metagreywackes that include subordinate amounts of siliceous pyroclastic beds, tuffaceous metagreywackes, and minor interbedded metachert, graphitic schist, and metafelsite (Hausel, 1996)

McDougal Gulch Metavolcanics—Amygdaloidal metabasalts, porphyritic metabasalts, amphibolite schists, pillow metabasalts, metatuffs, and a thin talc-chlorite schist; conformable with both the overlying UT Creek Formation and with the underlying Barlow Springs Formation; age of **~2.72 Ga** calculated by Fruchey (2002) from analyses of zircons extracted from metadacite within the metabasalt unit

Wmm — **Metabasalt**—Metabasalt with tholeiitic affinity comparable to metabasalts in the South Pass greenstone belt and the Seminoe Mountains greenstone terrane (Hausel, 1996)

Wmu — **Ultramafic schist**–High-magnesian talc-chlorite schist with a relatively high silica content; CaO/Al_2O_3 ratio of 1.4 suggests a basaltic komatiite chemistry (Hausel, 1996)

Barlow Springs Formation—Quartzite, metapelite, banded iron formation, metafelsite, and amphibolite gneiss; intruded in places by metagabbro; base is a quartzite, contact with underlying gneiss varies from conformable to sheared to intercalated to angular; interpreted as the base of the supracrustal units lying on top of metaigneous rocks within the Barlow Gap Quadrangle

Wbg — **Garnet schist**—Linear to oval outcrops within the amphibolite gneiss; outcrops stand out in relief above adjacent amphibolite gneiss, are fluted and grooved, and exhibit a brown to rusty color on weathered surfaces; fresh surfaces are bluish-gray with dense radiating fibrous crystals and scattered red garnets up to ¾ inch across. May be shown as a line in places where it is too thin to be shown as an outcrop

Wba — **Amphibolite gneiss**—Black to dark green, well foliated amphibolite gneiss interbedded with grey micaceous quartzite and overlying banded iron formation; makes up the major portion of the Barlow Springs Formation outcrops; grades into schist in some areas

Wbc — **Metaconglomerate**—Stretched pebbles within some outcrops of amphibolite gneiss chemically appear to be metagreywackes; interpreted to represent channel fills within the basalts

Wbm — **Metabasalt**—Metabasalt mapped by Hausel (1996) in southwestern corner of the Rattlesnake Hills; possible equivalent rocks within the amphibolite gneiss in the southern and western part of the quadrangle lack definitive identifying structures

Wbt — **Talc schist**— Thin layers of talc-tremolite schist noted in Sec.13, T31N, R88W. May be shown as a line in places where it is too thin to be shown as an outcrop

Wbs — **Tremolite-chlorite schist**—Mapped by Hausel (1996) in the southwestern part of the Rattlesnake Hills in Section 25, T32N, R88W; also chlorite schist containing garnets within amphibolite gneiss in the southern part of the quadrangle

Wbf — **Metafelsite**—Pods and layers of metafelsite are most abundant near the upper part of the formation; interbedded with amphibolite

Wbi — **Banded iron formation**—Banded, rusty brown- to black- weathered iron formation ranging from 0 to 70 feet thick overlie the quartzose schist in lower part of the Barlow Springs Formation (Bickford, 1977). The iron formation in the Rattlesnake Hills does not stand out in relief from adjacent rocks, and grades laterally across strata from magnetite rich (oxide-facies) schist to grunerite-rich schist (Hausel, 1996). Iron formation in the southern part of the Barlow Gap quadrangle includes outcrops that form resistant silica-rich ridges, as well as highly oxidized outcrops which exhibit negative relief in relation to adjacent outcrops.

The iron formation often forms two parallel ridges separated by a narrow, less-resistant strike valley, consistently crops out in the same stratigraphic position within the Barlow Springs Formation, and appears in some areas to grade laterally into amphibolite gneiss. Fe_2O_3 content ranges from 12.88% to 37.58% south of the North Granite Mountains fault, and from 15.62% to 64.74% north of the fault. Assays of iron formation samples yielded no significant gold or silver mineralization

Wbp — **Pelitic schist**– Nonresistant rusty- to greenish-brown, micaceous, contorted quartzose schist with thin discontinuous quartzite layers; occasionally show thin layers or large clusters of sillimanite crystals

Wbq — **Quartzite**—Thin, white to tan, occasionally light- to medium-green and fuchsitic, or rusty quartzite varying from layered to massive; vitreous and coarsely crystalline in some areas.; grades into quartzose schist in some areas; forms the base of the Barlow Springs Formation (Bickford, 1977); may be shown as a line in places where it is too thin to be shown as an outcrop

Basement gneiss complex

WVum — **Ultramafic**—Small intrusions of coarse-grained ultramafic material within the basement gneiss complex

WVts — **Talc schist**—Occurs in limited areas adjacent to ultramafic outcrops within the basement gneiss complex

Vso — **Sacawee Orthogneiss**—Strongly foliated, pink to white, weathering tawny to orange, coarse-grained gneiss containing aggregates of aligned biotite; named by Langstaff (1995); age determined as **~3.26 Ga** by Fruchey (2002)

Vao — **Antler Orthogneiss**—Gray, fine-grained, equigranular gneiss made up of 20-30% quartz, 20-25% alkali feldspar, 20-25% plagioclase feldspar, and 25-30% biotite and contrasting distinctly with Sacawee orthogneiss; forms long lenticular bodies within and parallel to the foliation of the Sacawee orthogneiss with contacts varying from sharp to gradational (Fruchey, 2002); dated at **~3.37 Ga** by Langstaff (1995)

Vgn — **Undifferentiated granite gneiss**—Granite gneiss, quartzofeldspathic gneiss, felsic gneiss, hornblende-bearing granite augen gneiss described by Langstaff (1995), and small amounts of amphibolite gneiss, quartzite, fuchsitic quartzite, and metapelite that appear to be incorporated into the granitic gneisses through tight infoldings and/or sheared relationships; forms the higher hills in the southern half of the Barlow Gap quadrangle

MAP SYMBOLS

Formation Contact

Fault—Dashed (and/or queried) where approximately located, dotted where concealed. Arrow indicates dip of fault plane; letters indicate relative vertical movement

Antiform—Trace of axial plane and direction (and dip, where determined) of plunge compiled from source map or determined by field dip measurements and by photo interpretation

Synform—Trace of axial plane compiled from source map or determined by field dip measurements and by photo interpretation.

Shear

Strike and dip of foliation – Where values are not shown, symbol indicates direction of dip only

Vertical foliation

Strike and dip of beds

Strike and dip of joints

Vertical joint

Top of graded bedding

Small fold(s) showing plunge

Isoclinal fold showing plunge

Overturned isoclinal fold showing plunge

Minor open antiformal fold showing bearing and plunge

Minor open synformal fold showing bearing and plunge

Chevron fold showing plunge

Breccia

Altered—Areas of granite, granite gneiss, and parts of the Barlow Springs Formation which were noted in field observations to have undergone alteration of some type; boundaries of altered zones are mostly gradational, and poorly defined; alteration may include oxidation, silicification, epidotization, chloritization, and changes in grain structure

ox **Area of intense oxidation**

Mine adit

Mine shaft

Prospect pit

Probable uranium prospect

Trench

Veins—Arrows indicate direction and dip of vein; numbers indicate dip

Mineralized vein

Pegmatite vein

Wbt **Talc schist vein**

Ydd **Diabase vein**

Wfd **Felsic vein**

Wdt **Tonalite vein**

Wmg **Metagabbro vein**

Wgd **Granodiorite vein**

Wap **Aplite vein**

DISCLAIMERS