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PRELIMINARY GEOLOGIC MAP OF THE RATTLESNAKE HILLS 1:100,000 QUADRANGLE, FREMONT AND NATRONA COUNTIES, CENTRAL WYOMING

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Rattlesnake Hills 1:100,000 Scale Geologic Map

And

Geologic map compilation for the thirty-two 1:24,000 scale 7.5 minute quadrangles comprising the 1:100,000 map

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[Incorporate into an index to mapping sources for explanation.]

7.5 minute Quadrangles

The thirty-two 1:24,000 scale quadrangles comprise the Rattlesnake Hills 1:100,000 map. These are listed below, along with the primary sources of geological information used in their compilations. All geologic units were mapped using a combination of aerial photographic interpretation supplemented by previous mapping listed in the Rattlesnake Hills map references, and scattered field observations. Emphasis for this investigation was on mapping of the Precambrian terrain. Designations of Quaternary terrace gravels (Qtg), Quaternary terraces (Qt), Tertiary quartz latites (Tql), Tertiary volcanics (Tv), etc. are based on previous mapping and field work where such designations are not readily observable in aerial photographs. After compilation, the 1:24,000 quadrangles were reduced to a scale of 1:100,000 and generalized. This was followed by field checks. The Rattlesnake Hills 1:100,000 map incorporates the following 1:24,000 quadrangles.

Barlow Gap – Preliminary 1:24,000 geologic map by Wayne M. Sutherland and W. Dan Hausel, 1999, WSGS PGM 99-2.

Beulah Belle Lake - Aerial photographic interpretation by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002, augmented by G. Langstaff 1:24,000 scale map, 1994, in sections 3-5, & 9 in the northeast corner. Cenozoic interpretations based on J.D. Love (1970) ca. 1:125,000 scale map. Field examinations were conducted on several Precambrian outcrops across the quadrangle.

Blackjack Ranch - Aerial photographic interpretation by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002, augmented by G. Langstaff 1:24,000 scale map, 1994 in the eastern half of the quadrangle, and Van Houten (1964) 1:62,500 scale map in the northwestern corner of the quadrangle. Cenozoic interpretations based on J.D. Love (1970) ca. 1:125,000 scale map. Spot field checks in eastern part of quadrangle.

Black Rock Gap - Aerial photographic interpretation by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002, Cenozoic interpretations based on J.D. Love

(1970) ca. 1:125,000 scale map. Spot field checks in northern part of quadrangle 2001.

Broad Mesa - Geology from Keefer (1970) 1:250,000 scale map, and Crist and Lowry (1972) 1:125,000 scale map, with spot checks from aerial photography by Wayne M. Sutherland, 2002.

Butte Well - Geology after Thompson and White (1951) ca. 1:48,000 scale map, and Love, and others (1979). Adjusted with aerial photographic interpretations by Wayne M. Sutherland, 2002.

Coyote Springs - 1:24,000 geologic map by Paul E. Soister (1967) USGS Map I-481. Precambrian rocks in the southwestern part of map, and north-trending fault in northeastern part of map were interpreted by Wayne M. Sutherland using aerial photographs, 2002. Precambrian outcrops in the southwestern part of the quadrangle were spot checked in the field.

Double Butte - Geology after Thompson and White (1951) ca. 1:48,000 scale map, and Love, and others (1979). Adjusted with aerial photographic interpretations by Wayne M. Sutherland, 2002.

Eightmile Draw - Aerial photographic interpretation by Wayne M. Sutherland, 2002. Cenozoic interpretations in south half of quadrangle based on Love (1970) ca. 1:125,000 scale map. North half of quadrangle augmented by Keefer (1970) 1:250,000 scale map, and Crist and Lowry (1972) 1:125,000 scale map.

Ervay Basin - Aerial photographic interpretation by Wayne M. Sutherland, 2002, in southern forth of quadrangle, based in part on ca.1:42,240 scale map by Bogrett, 1950. Augmented by Barwin (1961) 1:24,000 scale map, Keefer (1970) 1:250,000 scale map, and Crist and Lowry (1972) 1:125,000 scale map.

Ervay Basin SW - Aerial photographic interpretation by Wayne M. Sutherland, 2002,based in part on Langstaff, 1994, 1:24,000 scale map, 1:63,360 scale map by Pekarek, 1974, Van Houten and Weitz (1956) 1:63,360 scale map, Carey, 1951, ca. 1:63,360 scale map, and Bogrett, 1950, ca.1:42,240 scale map. Augmented by Keefer (1970) 1:250,000 scale map, and Crist and Lowry (1972) 1:125,000 scale map, Love (1970) ca. 1:125,000 scale map, and 1:31,608 scale map by Zeller, Soister, and Hyden (1956). Field spot checks in the southern part of the quadrangle.

Garfield Peak - Aerial photographic interpretation by Wayne M. Sutherland, based in part on W. Dan Hausel (1995) 1:24,000 scale map, 1:63,360 scale map by Pekarek, 1974, ca.1:42,240 scale map by Bogrett, 1950. Northeast corner of quadrangle augmented by Keefer (1970) 1:250,000 scale map, Crist and Lowry

(1972) 1:125,000 scale map, descriptions of the Mesaverde Formation by Barwin (1961), and field notes from Alan Ver Ploeg (1986).

Gas Hills – Adaptation from 1:31,680 scale map by Zeller, Soister, and Hayden (1956). No new aerial photographic interpretations or mapping.

Gaylord Reservoir - Geology from Keefer (1970) 1:250,000 scale map, and Crist and Lowry (1972) 1:125,000 scale map, with spot checks from aerial photography by Wayne M. Sutherland, 2002.

Graham Ranch – Aerial photographic interpretation by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002, augmented by Langstaff, 1994, 1:24,000 scale map in sections 31-33 in the extreme northwest corner, and Van Houten (1954) 1:62,500 scale map in the western half of the quadrangle. Cenozoic interpretations based on Love (1970) ca. 1:125,000 scale map. Field examinations were conducted on several Precambrian outcrops across the quadrangle.

Horse Creek Springs - Aerial photographic interpretation by Wayne M. Sutherland. Cenozoic interpretations based on Love (1970) ca. 1:125,000 scale map.

Lankin Dome - Aerial photographic interpretation with reconnaissance field checks by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002. Cenozoic interpretations based on Love (1970) ca. 1:125,000 scale map. Field checks were conducted in the northern part of the quadrangle.

Lone Mountain - Aerial photographic interpretation by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002. Cenozoic interpretations based on Love (1970) ca. 1:125,000 scale map. Field checks were conducted in the northern two-thirds of the quadrangle.

Love Ranch – Adaptation from 1:24,000 photogeologic map by Minard (1980) USGS OFR 80-472. No new aerial photographic interpretations or mapping.

Mc Intosh Meadows - Aerial photographic interpretation with reconnaissance field checks by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002, augmented by Van Houten (1964) 1:62,500 scale map. Cenozoic interpretations based on Love (1970) ca. 1:125,000 scale map. Precambrian outcrops were checked in the field.

McRae Gap - Geology from Keefer (1970) 1:250,000 scale map, and Crist and Lowry (1972) 1:125,000 scale map, with spot checks from aerial photography by Wayne M. Sutherland, 2002.

Miles Ranch – Adaptation from 1:24,000 photogeologic map by Minard (1980) USGS OFR 80-472. No new aerial photographic interpretations or mapping.

Miller Spring - Aerial photographic interpretation by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002, augmented by Langstaff, 1994, 1:24,000 scale map in sections 33-35, 2-4, & 9, 10 in the northwest corner. Cenozoic interpretations based on Love (1970) ca. 1:125,000 scale map. Field examinations were conducted on several Precambrian outcrops across the quadrangle.

Muskrat Basin - 1:24,000 geologic map by Soister (1966) USGS Map I-482. Precambrian rocks in the southwestern and south central part of map were interpreted by Wayne M. Sutherland using aerial photographs, 2002, and were spot checked in the field.

Puddle Springs – 1:24,000 geologic map by Soister (1967) USGS Bull. 1242-C. No new aerial photographic interpretations or mapping.

Rongis Reservoir – Geology after Thompson and White (1951), and Love, and others (1979). Adjusted with aerial photographic interpretations by Wayne M. Sutherland, 2002.

Rongis Reservoir SE - 1:24,000 geologic map by Soister (1966) USGS Map I-483. No new aerial photographic interpretations or mapping.

Saddle Rock - Aerial photographic interpretation by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002, augmented by Hausel (1995) 1:24,000 scale map, and Langstaff, 1994, 1:24,000 scale map in the northwestern third of the quadrangle, and Pekarek, 1974, 1:63,360 scale map. Cenozoic interpretations based on Love (1970) ca. 1:125,000 scale map.

Sanford Ranch - Aerial photographic interpretation by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002, augmented by Langstaff, 1994, 1:24,000 scale map along the northern edge of the quadrangle. Cenozoic interpretations based on Love (1970) ca. 1:125,000 scale map. Selected precambrian outcrops were spot checked in the field.

Stampede Meadows - Aerial photographic interpretation by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002. Cenozoic interpretations based on Love (1970) ca. 1:125,000 scale map. Precambrian outcrops across the quadrangle were spot checked in the field.

Stinking Water Creek - Aerial photographic interpretation by Wayne M. Sutherland, based in part in the southwest corner on 1:63,360 scale mapping by

Pekarek, 1974. Cenozoic interpretations in south half of quadrangle based on Love (1970) ca. 1:125,000 scale map. North half of quadrangle augmented by Keefer (1970) 1:250,000 scale map, and Crist and Lowry (1972) 1:125,000 scale map.

Tin Cup Mountain - Aerial photographic interpretation by Wayne M. Sutherland and W. Dan Hausel, 2001 & 2002, augmented by Langstaff, 1994, 1:24,000 scale map in the southern half of the quadrangle, and Van Houten (1964) 1:62,500 scale map across the quadrangle. Cenozoic interpretations based on Love (1970) ca. 1:125,000 scale mapping. Field examinations were conducted on several Precambrian outcrops across the quadrangle.

DESCRIPTION OF

~~GEOLOGIC~~ MAP UNITS

Quaternary

Qal

Alluvium (Qal): ~~Alluvium comprises~~ unconsolidated sand, silt, clay, and occasionally coarse gravels and cobbles, located in and along most drainages within the quadrangle. This unit may include eluvial deposits, slope wash and small alluvial and colluvial deposits (**Qc**) along drainages.

Qc

Qls

Landslide debris (Qls): Locally derived landslide debris from unstable, generally steep slopes. Often involves Paleozoic or Cretaceous units on the steep flanks of uplifts, or Tertiary units on hill slopes or along escarpments such as Beaver Rim.

Volcanic colluvium and volcaniclastics (Qvc): These scattered units are mapped in and near the Rattlesnake Hills portion of the quadrangle where they represent colluvium derived from Tertiary volcanic rocks, and may include various volcaniclastics. Compositions include several varieties of volcanic rocks according to their adjacent extrusive rock types. They may include some Tertiary breccias (?).

Terrace deposits (Qt): Gravel covered terrace (**Qtg**), or cobble, sand, gravel and silt covered terraces cut across sedimentary units along mountain flanks and drainages. These terraces merge in places with eluvial, alluvial and colluvial deposits. Different terrace levels were not designated, although some areas have multiple levels of terraces. These may be the same features shown on some previously mapped geologic quadrangles as pediment gravels (**Qpg**). The distinction between aggradational terraces, and erosional pediments with thin coverings of debris, is beyond the scope of this mapping effort.

Sand dunes (Qsd): Sand dunes and other eolean deposits. Includes both stabilized and unstabilized dunes, and may grade into alluvial deposits in some areas. Very large active sand dunes are present in the southeastern corner of the Stampede Meadow quadrangle and in the southwestern corner of the Black Rock Gap quadrangle in sections 5-8, T.29 N., R.91 W.

Pleistocene Bug Formation (QB): The Bug Formation unconformably overlies the Miocene Split Rock Formation in the southeast corner of the Barlow Gap quadrangle and in the northeastern corner of the Miller Spring quadrangle in Sections 5,7, & 8, T.30 N., and 19, 20, & 29-32, T.31 N., R.87 W. Love (1970) described a section of the Bug Formation about 1 mile south of the southern edge of the Barlow Gap quadrangle as a sequence of pale-brown, pale-green, and white claystone, sandstone, tuff, limestone, and conglomerate. The measured section is topped with five feet of poorly bedded hard white tuffaceous limestone above 78 feet of soft claystone with minor white sandstone and tuff, below which is a ten-foot thick hard greenish-white finely sandy limestone containing abundant shards, some radioactive minerals, and some locally silicified areas.

Ash (Ash): White volcanic ash of possible Quaternary eolian deposition was located during field work below a small terrace in Sections 17 or 18, T.31 N., R. 87 W in the Barlow Gap Quadrangle. The ash is fresh, and may be Quaternary, or it may be a well-preserved ash layer within the Split Rock Fm.

Quaternary / Tertiary

Boulder Deposits (QTb): Volcanic and granitic cobbles and boulders up to 15 feet in diameter form terrace-like deposits. These may have their origin either as part of Quaternary erosion cycles, or as channels within the Tertiary Wagon Bed Formation. These are noted
west of Dry creek in the northwestern part of the Barlow Gap quadrangle in Sec. 22, 27, and 28, T.32N., R.88W.

Tertiary

Pliocene Moonstone Formation (Tm): The Pliocene Moonstone Formation unconformably overlies the Split Rock Formation in the south central part of the 1:100,000 Rattlesnake Hills quadrangle, within the Lankin Dome and Lone Mountain 7.5 minute quadrangles. The Moonstone Formation is a thick sequence of very soft white to brown claystone, shale, and tuffaceous sandstone, with minor amounts of limestone, conglomerate and pumicite. The formation was measured at 1356 feet thick in its type locality extending from section 4 southward to section 34, T.30 N., R. 89 W., as described by Love (1961).

Miocene Split Rock Formation (Tsr): The Miocene Split Rock Formation crops out over the largest area of any geologic formation within the Rattlesnake Hills 1:100,000 quadrangle, and covers much of the area south of Beaver Rim and the North Granite Mountains Fault. It lies unconformably on top of the Oligocene White River Formation. Where the White River is absent (i.e., in the vicinity of the Barlow Gap quadrangle) it lies unconformably on top of the Eocene Wagon Bed Formation. It also overlaps directly onto Precambrian rocks in many areas. In some localities, the White River Formation was extensively reworked into the basal deposits of the Split Rock Formation at the beginning of Miocene deposition, making the contact between the two difficult to pick. Maximum thickness is about 3,000 feet.

Lithologically, the Split Rock Formation, as described by Van Houton (1964) is a massive, well sorted yellowish-gray to grayish-orange volcanic sandstone with persistent beds of coarse conglomerate. The conglomerate beds are composed of angular pebbles and cobbles derived from the Rattlesnake Hills volcanics, and from Precambrian rocks. Much of the finer volcanic material within the formation is projected to have the Yellowstone - Absaroka area as a source (Van Houton, 1964; Love, 1970). The Split Rock Formation sandstones differ from all other Tertiary age sandstones in the vicinity in that they contain conspicuous well-rounded and frosted grains. Irregular chert nodules and silicious aggregates can be found throughout the formation.

The thickness of the Split Rock Formation ranges up to 2732 feet, about 12 miles south of the southern edge of the Rattlesnake Hills 1:100,000 quadrangle. Love (1970) divided the formation into four identifiable units from bottom to top: a lower porous sandstone sequence (up to 500 feet); a clayey sandstone sequence (100 to 300 feet); a silty sandstone sequence (300 to 600 feet); and an upper porous sandstone sequence (1000 feet). Thicknesses are variable.

Rouchou, 1951, found early middle Miocene mammal fossils in the upper part of the Split Rock Formation within the Barlow Gap quadrangle. These were found north of Dry Creek, and south of the North Granite Mountains fault in SWNE Sec.4, and in SENE Sec.10, T.31 N., R.87 W. Love (1970) believed this to be part of his silty sandstone sequence.

Love's (1970) lower porous sandstone sequence has a base of 50 to 100 foot thick pebble and cobble conglomerate within a mudstone matrix. Above this conglomerate is a thick deposit of well rounded, well sorted volcanic sandstone with local beds of gray vitric tuff and lenses of conglomerate. This sandstone with tuff beds is characteristic of the Split Rock Formation throughout the Sweetwater plateau (Van Houton, 1964). The vitric tuff is often pure enough for use as abrasive pumicite (Love, 1970). Agates, 1 to 4 inches in diameter are found in a hard gray arkosic conglomeratic sandstone 300 to 400 feet above the base of this sequence. These agates, having a thick altered surface layer, contain black manganese dendrites, are radioactive, and fluoresce a brilliant yellow.

The clayey sandstone sequence is almost entirely fine- to medium- grained gray, very soft clayey sandstone. Glass shards are numerous through out this unit (love, 1970). A silty matrix within the sandstone is common throughout this unit, as is the presence of abundant glass shards (Love, 1970).

The silty sandstone sequence is gray to tan, fine- to coarse rounded grains, soft, porous sandstone with a silty matrix, and abundant glass shards. It also contains sparse lenticular limestone and conglomerate(Love, 1961)..

The upper porous sandstone sequence according to Love (1970) is dominated by medium- to coarse-grained gray to buff, massive to coarsely crossbedded sandstone with abundant rounded frosted and clear quartz grains, red hematite-stained grains, and brilliant clear slightly abraided quartz bipyramids. This is accompanied by abundant (0.36% to 5.1% of the sandstone) tiny (0.1 mm) black subrounded magnetite grains. Pure bluish-white pummicite beds as much as 10 feet thick, with curved or rectilinear, pink to colorless shards are included within this sequence.

Sweetwater moss agates (as described by Endlich, 1879, p.113) are found in a conglomerate and sandstone layer in the bottom 100 feet of the upper porous sandstone sequence. These are subrounded, frosted translucent gray to red and brown and contain black manganese
dendrites. The agates are commonly less than 1 inch in diameter, are moderately radioactive, and many fluoresce brilliant yellow. Love (1970) speculated that these may have been derived from the reworking of agates from the lower porous sandstone sequence.

A 6 inch thick zone of chalcedony nodules (angel agates) is found in a medium grained sandstone below a 10 foot thick pummicite bed in the upper porous sandstone sequence. These agates are rounded, 1 to 3 inches in diameter, have a chalky white outer zone of alteration, and fluoresce a brilliant greenish-yellow.

Oligocene White River Formation (Twr): Massive white to orangish-gray sandy tuffaceous siltstone containing local lenses of arkosic sandstone and conglomerate. Sparse bentonititic beds are locally present in the lower part of the formation. The White River crops out primarily along and north of the North Granite Mountains fault system, along Beaver Rim, and near the southwestern edge of the Rattlesnake Hills 1:100,000 quadrangle, in the Graham Ranch and Tin Cup Mountain 7.5 minute quadrangles. Thickness of the White River within the Rattlesnake Hills 1:100,000 quadrangle ranges from 0 to 500 feet (Love, 1970).

Oligocene boulder conglomerate and channel deposits (Tc): Unsorted, poorly bedded bouldery channel deposits along the northeast flank of the Rattlesnake Hills anticline and along UT Creek on the south flank (Pekarek, 1974). Abundant granite gneiss boulders up to six feet in diameter, and hornblende schist boulders up to two feet in diameter are found along UT Creek. Deposit thickness may range up to 30 feet or more. This may be equivalent to either the upper or lower conglomeratic parts of the Oligocene White River Formation (Love and others, 1979).

Middle-Late Eocene Wagon Bed Formation (Twb): This formation primarily crops out north of the North Granite Mountains fault system, and contains some detritus from Precambrian source rocks, but is dominated by locally derived volcanic debris.

The lower half of the formation as described by Van Houton (1964) contains abundant pyroclastic debris along with pebbles and cobbles of trachyte, with the upper half
being dominated by coarse detrital andesite material ranging in size from pebbles to boulders. The upper part of the formation is poorly sorted, where as the remainder is generally composed of persistent well sorted beds of yellowish-green to pale olive and dark
greenish-gray sandstone, siltstone, and mudstone. Persistant ledge-forming mudstones mark the base of the formation. Ash, both locally derived and from the Yellowstone-Absaroka area, form thick deposits exhibiting no bedding or sorting in the middle of the formation (Van Houton, 1964). The middle and upper parts of the formation also contain light- to pale yellowish-gray coarse grained lapilli tuff, biotitic vitric tuff, and tuffaceous sandstone.

The Wagon Bed Formation lies unconformably overlies either pre-Tertiary rocks, or the lower Eocene Wind River Formation (Love, 1970). The Wagon Bed Formation is unconformably overlain by the Oligocene White River Formation and in places by the Miocene Split Rock Formation. The thickness of the Wagon Bed as measured by Van Houton (1964) and Love (1970) ranges from about 130 feet to over 600 feet within the map area.

Jasper (j): Large jasper outcrops within the Barlow Gap quadrangle appear to be derived from hot springs activity are noted in Sec. 35, T.32N., R.88W., with very minor outcrops also noted in Sections 34 and 26. The jasper is banded in colors of red, yellow, and brown, with some breccia, and associated tuffa. These large outcrops appear to be on top of, or intercalated with the Eocene Wagon Bed Formation. Occasional leaf impressions are found in the jasper.

Other areas of jasper and jasperoid occur in faulted and sheared Precambrian rocks and in banded iron formation (same notation [j] is used for these).

Middle and Late Eocene Volcanic and Subvolcanic Rocks: Tertiary peraluminous alkalic and calc-alkalic volcanic and intrusive rock designations are after Pekarek (1977), with outcrop details added by Hausel (1996). The Rattlesnake Hills volcanic field includes parts of the Barlow Gap, Blackjack Ranch, Ervay Basin SW, Garfield Peak, Saddle Rock, and Stinking Water 7.5

minute quadrangles. For detailed rock descriptions, refer to Pekarek, 1974, and Hoch and Frost (1993).

Tertiary volcanics undifferentiated as to type (Tv):

Remnants of lava flows noted in several areas, without specification of rock type (Tvf): These include some outcrops, examined in the field, that were previously mapped by Pekarek (1974) as volcanic breccias within the Wagon Bed Formation. Several of these were mapped by Carey (1951) as lava flows.

Phonolite (Tph):

Phonolite lava (Tpl):

Alkali meta-trachyte (Tat):

Soda trachyte (Tst):

Trachyte (Tt):

Latite (Tl):

Quartz latite (Tql):

Quartz latite agglomerate (Tqla):

Quartz latite breccia flow (qtbf): [This doesn't appear on the explanation]

Rhyolite (Trh):

Early Eocene Wind River Formation (Twdr): Variegated soft, tuffaceous in part, claystone, siltstone, and sandstone with several widespread white tuff beds, and lenses and bed of arkosic conglomerate (Love, 1970). Thickness ranges from 0 to 1000 feet within the map area, but varies greatly from place to place since it was deposited on a surface of considerable local relief. The formation outcrops north of the North Granite Mountains fault, and in the western part of the map area, north of Beaver Rim. It wedges out to the south and west against pre-existing uplands in the northwestern part of the Granite Mountains.

The Wind River Formation is the second most extensive stratigraphic unit within the Rattlesnake Hills 1:100,000 scale quadrangle, and covers a large part of the northern half of the map area. More detailed descriptions of the Wind River Formation can be found in Soister (1968), Keefer (1965), and Love (1970).

Paleocene Fort Union Formation (Tfu): Chalky white to gray, noncalcarious, occasionally arkosic, sandstone, conglomerate and siltstone, interbedded with lenses of dark-brown ferruginous hard sandstone, with sparse carbonaceous shale, coal, and variegated claystone beds. Abundant glauconite occurs in some sandstones, and rock fragments in conglomerates are mostly noncalcarious Paleozoic and Mesozoic rocks (Love, 1970). The Fort Union overlies the Lance Formation with an erosional and/or angular unconformity. In most outcrops, this contact shows up as change from the underlying dull-gray and tan, banded soft shale, claystone, and sandstone to the overlying white sandstone and siltstone interbedded with thin ledgy red-brown ironstone beds (Keefer, 1965). Thickness of this formation within the map area ranges from 200 to 1000 feet. Its outcrop occurs along the north flanks of the Rattlesnake Hills and other uplifts across the northern third of the 1:100,000 scale quadrangle, and in the very northeast part of the map area.

Mesozoic

Upper Cretaceous Lance and Meeteetse Formations and Lewis Shale combined (Klml): The Lance Formation is a sequence of interbedded white, buff, and gray, fine- to coarse-grained partly conglomeratic sandstone, black to gray shale and claystone, and black to brown carbonaceous shale and coal (Keefer, 1965). The Lance crops out along the northern flanks of the Rattlesnake Hills and other uplifts across the northern third of the 1:100,000 scale quadrangle, and in the very northeast part of the map area. Its thickness varies from a few hundred feet along the western edge of the mapped area to more than 1000 feet at the eastern edge. The Lance lies unconformably on top of the intertongued Meeteetse Formation and Lewis Shale, or where they are absent, on top of the Mesaverde Formation. The basal beds of the Lance Formation, dominated by massive sandstone, contrasts noticeably with the thin-bedded sandstone, shale, and coal in the Meeteetse Formation and the interbedded shales and sandstones of the Lewis Shale.

The nonmarine Meeteetse Formation is absent west of Muskrat Creek and intertongues with the marine Lewis Shale to the east, ranging in thickness from 0 to more than 600 feet thick. It is composed of white, gray, and buff, soft, fine- to medium-grained sandstone interbedded with yellow to black and bentonitic siltstone, shale, carbonaceous shale and coal (Love, 1970). Abundant spherical calcareous sandstone concretions up to 3 feet in diameter are distinctive of the Meeteetse Formation (Keefer, 1965).

The nonresistant marine Lewis Shale consists of upper and lower, westward projecting tongues of interbedded gray, olive-gray, and buff shale and fine- to medium-grained sandstone. These are separated by an eastward projecting tongue of the Meeteetse Formation. The Lewis Shale is absent in the western part of the map area, but is identified northeast of the Rattlesnake Hills with a thickness of up to several hundred feet (Keefer, 1965).

Upper Cretaceous Mesaverde Formation (Kmv): The Mesaverde Formation is a predominantly nonmarine sequence of sandstone, shale, carbonaceous shale, and coal that overlies, and partially intertongues with the Cody shale. The upper part is characterized by massive white- to light-gray, crossbedded, ridge-forming sandstone, known as the Teapot Sandstone member. The middle member of the formation consists of yellowish-gray sandstone, gray siltstone and shale, and thin coal beds (Love, 1970). The lower, partially marine, Phayles member consists of a basal sandstone bed, an overlying carbonaceous shale, and an upper heterogeneous unit of interbedded sandstone, shale, carbonaceous shale, claystone, and a coquina of brackish-water pelecypods (Barwin, 1961).

Upper Cretaceous Cody Shale (Kc): The Cody Shale, approximately 4500 feet thick along the northeastern flank of the Rattlesnake Hills, is predominantly soft dark-gray clay shale with numerous bentonite and bentonitic shale beds in the lower part. This offshore marine sequence is sandier in the upper part, and contains thin calcareous siltstone, fissile sandstone, and irregular concretionary sandstone beds in the upper few hundred feet. The intertonguing with the overlying Mesaverde Formation separates the Phayles member from the Mesaverde with the gray sandy to silty shale and interbedded buff to tan, poorly consolidated sandstone of the Wallace Creek Tongue of the lower half of the Cody Shale (Barwin, 1961).

Upper Cretaceous Frontier Formation (Kf): Where distinguished, upper part of the Frontier Formation (Kfu), and Wall Creek Sandstone Member (Kfwc). The Frontier Formation is made up of black shale and siltstone interbedded with gray and brown fine- to coarse-grained sandstone. White to yellow bentonite, porcellanite, and thin impure coal beds are found in the lower part (Love and others, 1979). The Wall Creek Sandstone member forms a distinctive ridge within the Frontier Formation. The thickness of the Frontier is about 670 feet (Pekarek, 1977).

Upper Cretaceous Mowry Shale (Kmr): The Mowry is a hard, black, weathering to silver-gray, siliceous and tuffaceous shale that contains abundant fish scales and numerous bentonite beds (Love and others, 1979). It crops out along the north flanks of the Rattlesnake Hills and other uplifts across the northern third of the 1:100,000 scale quadrangle, and is about 380 feet thick (Pekarek, 1977).

Upper Cretaceous Mowry Shale and Lower Cretaceous Muddy Sandstone and Thermopolis Shale combined (Kmrt): See descriptions above and below.

Lower Cretaceous Muddy Sandstone and Thermopolis Shale combined (Ktm): The Muddy Sandstone is light –gray interbedded sandstone, siltstone and sandy shale with variable thickness ranging from about 35 to 100 feet. The 100 to 250 feet of the Thermopolis Formation is described below.

Lower Cretaceous Thermopolis Shale (Kt): 100 to 250 feet of black soft shale of the Thermopolis Formation which hosts thin bentonite layers near the top and bottom, and is interrupted in the middle by a thin silty sandstone (Pekarek, 1977; Love and others, 1979).

Lower Cretaceous Cloverly Formation and Upper Jurassic Morrison Formation combined (KJ): Combined thickness of both units varies from about 170 to 500 feet.

The Cloverly Formation is buff to gray, brown-weathering, fine-grained crossbedded, slabby sandstone at top, underlain by lenticular variegated plastic shale and claystone in the middle, hard brown to gray and buff quartz and chert pebble conglomerate at the base. Thickness is about 70 to 200 feet thick (Pekarek, 1977; Love and others, 1979). The Cloverly Formation lies unconformably on top of the Morrison formation.

The Morrison Formation is variegated silty siliceous claystone and siltstone interbedded with gray to white silty sandstone; white massive sandstone up to 20 feet thick is locally found near the base (Pekarek, 1977; Love and others, 1979). Thickness varies from 100 to 300 feet.

Middle Jurassic Sundance Formation (Js): Buff fine-grained partially glauconitic sandstone interbedded with gray to green and pale-red calcareous shale and gray, partially fossiliferous limestone; thickness varies from about 200 to 365 feet (Pekarek, 1977). The Sundance Formation lies unconformably on top of the Popo Agie Formation or the Nugget Sandstone. The Gypsum Springs Formation, where present, is included within the Sundance Formation.

Cloverly, Morrison, and Sundance Formations combined (KJms): See descriptions above.

Jurassic / Triassic Nugget Sandstone (Jn): Cream to buff, massive to cross-bedded sandstone.

Triassic Popo Agie Formation (dpa): Red shale and siltstone interbedded with minor green shale, tan to white sandstone, gray limestone pellet conglomerate, and dolomitic claystone, with a thickness of about 300 feet (Pekarek, 1977).

Triassic Alcova Limestone Member of the Chugwater Formation (da): Resistant, thinbedded, gray to pinkish-gray, laterally-persistent limestone about 20 feet thick, typically expressed as hogbacks with exposed dip slopes (Pekarek, 1977).

Triassic Chugwater Formation (dc): Approximately 800 feet of red shale interbedded with siltstone and silty sandstone, typically forming broad strike valleys (Pekarek, 1977). In some areas, (dc) may include (da) and (dpa) where outcrops are thin.

Lower Triassic Dinwoody Formation (dd): The Dinwoody consists of 50 to 200 feet of orange to red siltstone, shale, and sandstone. It is identified only in the western part of the map area on the center of the Logan Gulch anticline, in the Rongis Reservoir 7.5 minute quadrangle. It is equivalent to the upper part of the Goose Egg Formation (Keefer, 1970).

Paleozoic

Permian/Triassic Goose Egg Formation (Pge): Approximately 400 feet of orangish-red gypsiferous shale and siltstone interbedded with gypsum layers and gray to purple dense platey limestone and dolomite members that contain abundant chert layers. Upper part includes Early Triassic beds equivalent to the Dinwoody Formation (Pekarek, 1977; Love and others, 1979).

Permian Phosphoria Formation (Pp): About 350 feet of interbedded chert, limestone, dolomite and siltstone, very fine sandstone, and thin beds of phosphate rock and shale, with a thin basal conglomerate present in many localities. The Phosphoria Formation is interbedded with, and grades into the lower part of the Goose Egg Formation north of the Rattlesnake Hills in complex relationships that are simplified for this mapping project (Zeller, Soister, and Hayden, 1956; Carey, 1959; Keefer, 1966).

Middle Pennsylvanian Tensleep Sandstone (ht): About 200 to 300 feet of gray to tan resistant, massive, fine- to medium-grained crossbedded sandstone with several gray cherty limestones and dolomites in the lower part (Pekarek, 1977; Love and others, 1979).

Early Pennsylvanian Amsden Formation (ha): The Amsden Formation is made up of 125 to 150 feet of nonresistant buff to hematite-red siltstone with local hematite nodules, and minor thin gray dolomite, limestone, and shale, with a persistent white to buff, 20 to 30 foot thick sandstone at the base (Keefer, 1966; Pekarek, 1977; Love and others, 1979). In areas where (ha) is thin, it is occasionally included with (ht). The Amsden Formation lies unconformably on top of the Madison Limestone.

Early Mississippian Madison Limestone (Mm): The Madison Limestone, about 335 feet thick, is a massive, resistant, medium to dark gray limestone containing chert nodules, and is cavernous in part (Pekarek, 1977; Love and others, 1979). The Madison Limestone unconformably overlies the Gros Ventre Formation.

Late Middle Cambrian Gros Ventre Formation (egv): The Gros Ventre Formation consists of about 280 feet of nonresistant reddish-orange to red interbedded very fine grained sandstone, siltstone, and shale (Pekarek, 1977). The Gros Ventre Formation conformably overlies the late Middle Cambrian Flathead Sandstone.

Late Middle Cambrian Flathead Sandstone (ef): Resistant buff to red sandstone in the upper part, resistant arkosic pebble conglomeratic with interbedded sandstone at the bottom, and a separating middle layer of nonresistant siltstone makes up the 520 foot thick Flathead Sandstone. The upper part is cemented with hematite in part, and may contain up to a few percent glauconite (Pekarek, 1977). The Flathead unconformably overlies Precambrian igneous and metamorphic rocks.

Cambrian units undifferentiated (eu): See descriptions above.

Undifferentiated Paleozoic units (gu): These include the Paleozoic units described above, but due to limited exposures and/or limited time for field checking are not subdivided.

Precambrian

Proterozoic diabase or other mafic dikes (d): These are near vertical, predominately ENE trending, relatively linear tholeitic mafic dikes of uniform thicknesses which cross-cut most other Precambrian units and structures. These dikes can be found throughout the Precambrian exposures across the quadrangle. These appear on air photos to be of at least two different ages based on crosscutting relationships noted in several locations. Quartz pegmatite appears also to crosscut the diabase dikes in at least one location.

Archean quartz pegmatite veins and dikes (pg): Pegmatite veins and dikes vary in widths from less than an inch to more than 20 feet. These are simple pegmatites composed quartz and feldspar as the main constituents. These pegmatites can either cross-cut or run parallel to foliation, layering, and structure throughout the area. At one location a pegmatite may crosscut a mafic dike.

Archean granite and light-colored igneous intrusives (gr): Granite and granitic rocks including granites identified by Langstaff, 1994, along with diorite, tonalite, etc. The boundaries between granite and gneiss is often gradational. Layering is evident in many granites. Most contacts were picked from aerial photography followed by spot-checks in the field.

Archean French Rocks tonalite (fgt): Tonalite in the Rattlesnake Hills within the Garfield Peak and Ervay Basin quadrangles as mapped by Langstaff, 1994, augmented by aerial photographic interpretation.

Archean mafic and ultramafic intrusives (mi): Mafic intrusives described by Langstaff, 1994.

Archean metabasalt (mb): Fine grained tholeitic schists of volcanic origin.

Archean UT Creek Formation: This formation is dominated by metagreywackes and tuffaceous metagreywackes with intercalated metacherts and metatholeites in the north central and northeast portion of the quadrangle north of the North Granite Mountains fault (Hausel, 1996). The UT Creek Formation lies stratigraphically above the McDougal Gulch Metavolcanics in the central trough of the Rattlesnake Hills synform. UT Creek Formation metabasalt and associated metagabbros (umb). UT Creek Formation metagreywackes (umg).

Archean McDougal Gulch Metavolcanics (mmb): The McDougal Gulch Metavolcanics, consisting of amygdaloidal metabasalts, porphyritic metabasalts, amphibolite schists, pillow metabasalts, metatuffs, and a thin talc-chlorite schist, lie stratigraphically above and geographically north of the underlying Barlow Springs Formation (Hausel, 1996). The foliation and apparent bedding of this formation is conformable with both the overlying UT Creek Formation and with the underlying Barlow Springs Formation.

Archean Barlow Springs Formation (bs): The Barlow Springs Formation is interpreted as the base of the supracrustal units lying on top of metaigneous rocks within the Barlow Gap quadrangle. Quartzite, metapelite, banded iron formation, metafelsite, and amphibolite gneiss, intruded in places by metagabbro comprise the Barlow Springs Formation. The amphibolite gneisses are both orthoamphibolites (Hausel, 1996) and para-amphibolites, and include metabasalt, tremolite-chlorite schist, anthophyllite gneiss (Bickford, 1977), and metagreywacke which appears to include minor metaconglomerate. The Barlow Springs Formation is reported by Hausel (1996) to be primarily metasedimentary, and lithologically similar to the Goldman Meadows Formation in the South Pass greenstone belt (Hausel, 1991), the Seminoe Formation in the Seminoe Mountains greenstone belt (Hausel, 1994), and Metamorphic Unit 2 in the Copper Mountain supracrustal belt (Hausel and others, 1985).

Barlow Gap Quad
The Barlow Springs Formation crops out in the north central part of the Barlow Gap quadrangle north of the North Granite Mountains fault in the Rattlesnake Hills, and in the southern and central western part of the quadrangle south of the North Granite Mountains fault. It also crops out in the eastern part of the Blackjack Ranch Quadrangle, and was mapped by Langstaff (1994) in the northern part of the Sanford Ranch quadrangle, and in the southern part of the Tin Cup Mountain quadrangle.

The Barlow Springs Formation in the Rattlesnake Hills part of the Barlow Gap quadrangle lies unconformably on top of the Rattlesnake Hills border gneiss complex along its southern edge, and is in conformable contact on the North with the overlying McDougal Gulch Formation. The Barlow Springs Formation crops out in a northwest trend about 7000 feet in length, and up to 900 feet wide. The outcrop is buried to the northwest under the Eocene Wagon Bed Formation, and is truncated to the southeast by the Cottonwood Creek fault (Hausel, 1996). The formation's contact with the underlying border gneiss is partially conformable in its southwestern exposures, but relationships are obscured to the southeast due to structural deformation (Hausel, 1996). The eastern extent of this contact is a fault boundary between the Barlow Springs Formation and the border gneiss.

In the west central and southern part of the Barlow Gap quadrangle, the base of the Barlow Springs Formation is a quartzite, which varies in its relation to the underlying granite gneiss. The contact in some places appears to be conformable, but in most areas includes shearing of the gneiss, occasional shearing in the quartzite, some minor areas of intercalation extending over several feet, and minor areas exhibiting angular relationships between bedding in the quartzite and foliation in the gneiss.

Archean supracrustal and related rocks undifferentiated (sc): Includes mica schists, Ultramafic schists (serpentinites, talc-chlorite schists, actinolite schists), amphibolite schists, and other mafic schists and gneisses, metagreywackes, metabasalts, quartzites, iron formation, and metasedimentary-metaigneous rocks.

West Sage Hen Rocks area

Slivers of supracrustal rocks, primarily schists and quartzites are found on the southern part of these hills in sections 29-32, T.31N, R.89W, trending ENE. Corundum (red sapphires up to ¼ inch diameter) were found in limited extent in one of the schists on the lower south slope of the hills, and aggregates of sillimanite up to 2 inches diameter were found within another schist near the top of the slope.

North McIntosh Meadows area
A sliver of supracrustal rocks trends NE across the NE Sec.18, T.31N, R.89W, and includes fuchsitic quartzite, actinolite/garnet schist and banded iron formation.

Tin Cup Mountain – Long Creek Mountain area
Banded iron formation is found in the NWNW Sec.27, and in the NENE, SENE Sec.28, T31N, R93W. Banded iron formation in the NESW, and SENW Sec.30, T31N, R92W contains two prospect pits. Iron formation in the western prospect is jasperized.

A large area of mafic schist (peanut schist in part), interpreted to be metagreywacke, is partially exposed in Sections 15, 16, 20, 21, & 22, T31N, R93W. Large areas of this schist are thinly veneered with silt and sand, with exposures only in road-cuts or on hilltops.

Archean Gneisses undifferentiated (gn): Includes granite gneiss, felsic gneiss, amphibolite gneiss, and orthogneisses mapped by Langstaff (1994), or identified during the course of this study. Some of these are described below.

Barlow Gap Quad
Granite gneiss, also referred to as "border gneiss" crops out to form the higher hills in the southern half of the Barlow Gap quadrangle, and outcrops south of and adjacent to Barlow Springs Formation north of the North Granite Mountains fault at the southwest corner of the Rattlesnake Hills (Hausel, 1996). The gneiss is dominately pink, varying to tan, coarsely foliated and course grained. Bickford (1977) described the foliation as being defined by parallelism of biotite plates, and best observed where biotite is abundant. He also noted that locally, elongate tabular porphyroblasts of microcline, or blocky crystals of pink and blue perthitic feldspar paralleled regional lineation.

This gneiss (referred to by Bickford, 1977, as felsic gneiss) lies beneath the Barlow Springs Formation, with foliation in the granite gneiss paralleling its contact with the overlying metasediments in some areas. Although the contact in some places appears to be conformable, most areas exhibit shearing of the gneiss, occasional shearing in the quartzite, some minor areas of gneiss-quartzite intercalation extending over several feet, and minor areas exhibiting angular relationships between bedding in the quartzite and foliation in the gneiss. Angular relationships appear to be greatest within the Barlow Gap quadrangle at the southwest corner of the Rattlesnake Hills.

This gneiss includes granite gneiss, quartzofeldspathic gneiss, felsic gneiss, amphibolite gneiss, and minor quartzite, fuchsitic quartzite, and metapelite (Hausel, 1996). In the southern parts of the Barlow Gap quadrangle, many of the quartzites, metapelites, and some of the amphibolite gneisses appear to be incorporated into the granite gneiss through tight infoldings and/or sheared relationships rather than as conformable layers occurring within the granite gneiss. Minor mylonite was noted within the granite gneiss in the south central part of the Barlow Gap quadrangle.

<u>North McIntosh Meadows area</u>
Serpentinite and ultramafic schist are included within the gneiss in the SE Sec.12, T.31N., R.89W. Tremolite crystals up to 4 inches in length are found within the serpentinite. A prominent layer of amphibolite gneiss (metagabbro) within the gneiss trends NE across the center of Sec. 17, in this same area. Thin slivers of quartzite are relatively common within the gneiss in Sec.18.

Other Map Notations

Approximate boundaries are marked with a line made up of short dashes.

Reclamation Area – RA

B – Banded iron Formation

C – Corundum (ruby or sapphire)

J - Jade

j – Jasper and jasperoid occur in faulted and sheared Precambrian rocks and in banded iron formation. Large jasper outcrops are also found associated with the Eocene Wagon Bed Formation within the Barlow Gap quadrangle.

A - Areas of apparent hydrothermal alteration

G - Oxidized areas or gossans

U – Uranium prospect or occurrence

X - Prospects or mines

F – Fault

SZ - Shear Zones

O -

[Used in south part of map]

Economics

The Rattlesnake Hills 1:100,000 scale quadrangle hosts several known potential economic mineral deposits including metals, precious stones, uranium, petroleum products, and industrial minerals including decorative stone and bentonite. Details of many of these are found in previous reports of the Wyoming State Geological Survey including Bulletins 68, 70, and 71, Report of Investigations 52, and Mineral Report 96-2.

During field investigations the authors came across some interesting mineral occurrences.
Some of these include: (1) A localized zone of potassic alteration enclosed within a broad alteration halo of pervasive propylitic alteration that is found surrounding a narrow shear in the center of a north-trending antiform west of Black Rock Gap in NESESW section 32, T.31N., R.91W. A two-foot channel sample collected across the shear yielded 655 ppb Au, >10,000 ppm Cu, 522 ppm Zn, and 13 ppm Pb. A grab sample yielded 385 ppb Au, >10,000 ppm Cu, 299 ppm Zn, and 11 ppm Pb.

(2) Oxide facies banded iron formations (banded magnetite-chert) found at a couple of localities. For example, a prospect dug in oxidized, low-grade iron formation with some yellow and red jasper was mapped in the SW sec.36, T.31N, R92W. Some
supracrustal rocks (including iron formation, quartzite, and pelitic schist) were found in SWNE Sec.36, T31N, R89W. Banded iron formation was identified in the NWNW Sec.27, and in the NENE, SENE Sec.28, T31N, R93W, and two prospects were found in banded iron formation in the NESW, and SENW Sec.30, T31N, R92W.

Several jade prospects are located in NW part of Beulah Belle Lake 1:24,000 quadrangle and in the eastern part of the Miller Spring quadrangle in sections 9 and 10, T30N, R87W. Typically, the jade occurrences lie within a broad alteration halo, which includes secondary sericite, clinozoisite, zoisite, chlorite, and epidote.

Mineral collectors will want to note the presence of jade pseudomorphs after quartz found at the Fiesta Mine (NWSE Sec.9, T30N, R87W, Miller Spring Quadrangle). These form hexagonal, light-green, nephrite replacements of quartz. Some specimens are as larges as 1.5 inches in diameter and 3 inches in length. Some jade found in the nearby Fiesta #2 prospect (S/2NWNW Sec.2, T.30N, R.88W), includes some apple green jade slicks within the ultramafic schist. Some dark green and black jade slicks are also found at the prospect. Several other other jade prospects are scattered in the Precambrian terrain in the southern half of the Rattlesnake Hills 1:100,000 quadrangle within the Tin Cup district to the south (see Hausel, 1996 and Hausel and Sutherland, 2000).

Nice tourmaline (black schorl) was also discovered in a serpentinite in the SWSE Sec.12, T31N, R89W of the McIntosh Meadows Quadrangle. Specimens of tourmaline, 1.5 inches across and 3 inches in length, were recovered from the serpentinite. Larger crystals were found in place.

Corundum has been reported by various prospectors from several localities in the Rattlesnake Hills 1:100,000 quadrangle. Several of the reports indicate that some gem-quality corundum has been found in alluvium along the Sweetwater River both east and west of Jeffrey City. In addition, Hausel (1997) described a 50-foot-wide ruby-corundum gneiss and schist (Red Dwarf ruby deposit) that has a 5000-foot strike length, and a nearby corundum-bearing serpentinite (13 and 24, T30N, R93W) on the Graham Ranch Quadrangle. The corundum for the most part is low-quality, translucent to transparent, purplish-red corundum enclosed in distinct, emerald green reaction rims. XRD analysis of the reaction rims provided a match for fuchsite, even though much of the material appears to look like zoisite in hand specimen. Possibly, the reaction rim is a mixture of fuchsite and zoisite, or it may be formed of massive fuchsite. Further studies are warranted especially since some of the reaction rim material is translucent to transparent and of potential gem-quality. Some of the corundum from the deposit is potentially of gem-quality. Specimens have been cut into cabochons, and specimens with asterism have been reported by prospectors in the past. A nearby serpentinite contains light-grayish blue, opaque to translucent corundum that average only 2 mm in diameter, but are locally abundant.

Pinkish red sapphires up to one-quarter inch diameter were found within a pelitic schist in NE SE NE section 31, T31N, R89W of the McIntosh Meadows Quadrangle. The corundum at this locality is very limited in extent.

Spectacular specimens of massive red and tawny jasper and jasperized breccia occurs as replacements of fault breccia and gouge along a group of parallel faults in gneiss in the Tin Cup Mountain area (see Hausel, 1996, WSGS MR96-2,) on the Tin Cup Mountain Quadrangle. Several localities with agate and jasper were found within the Rattlesnake Hills 1:100,000 during this project.

Metasedimentary and metavolcanic rocks in the Rattlesnake Hills host large tonnage low-grade gold mineralization in the northeastern part of the Barlow Gap Quad. Mineralization includes epigenetic gold, and disseminated epithermal gold. High-grade gold-bearing exhalatites also occur in the vicinity of UT Creek (see Hausel, 1996, WSGS RI 52).

North McIntosh Meadows area – copper sulfides color a thin (10 ft thick), NE-trending quartz vein within the gneiss in the W½ NE, Sec.18, T.31N, R.89W.

Other localities

Serpentine/talc/asbestos prospect – NENWNE Sec.2, T30N, R88W, Miller Spring Quad.

Large aggregates of black tourmaline occur in a prospect pit in the SWNW Sec.19, T31N, R92W, Tin Cup Mountain Quad.

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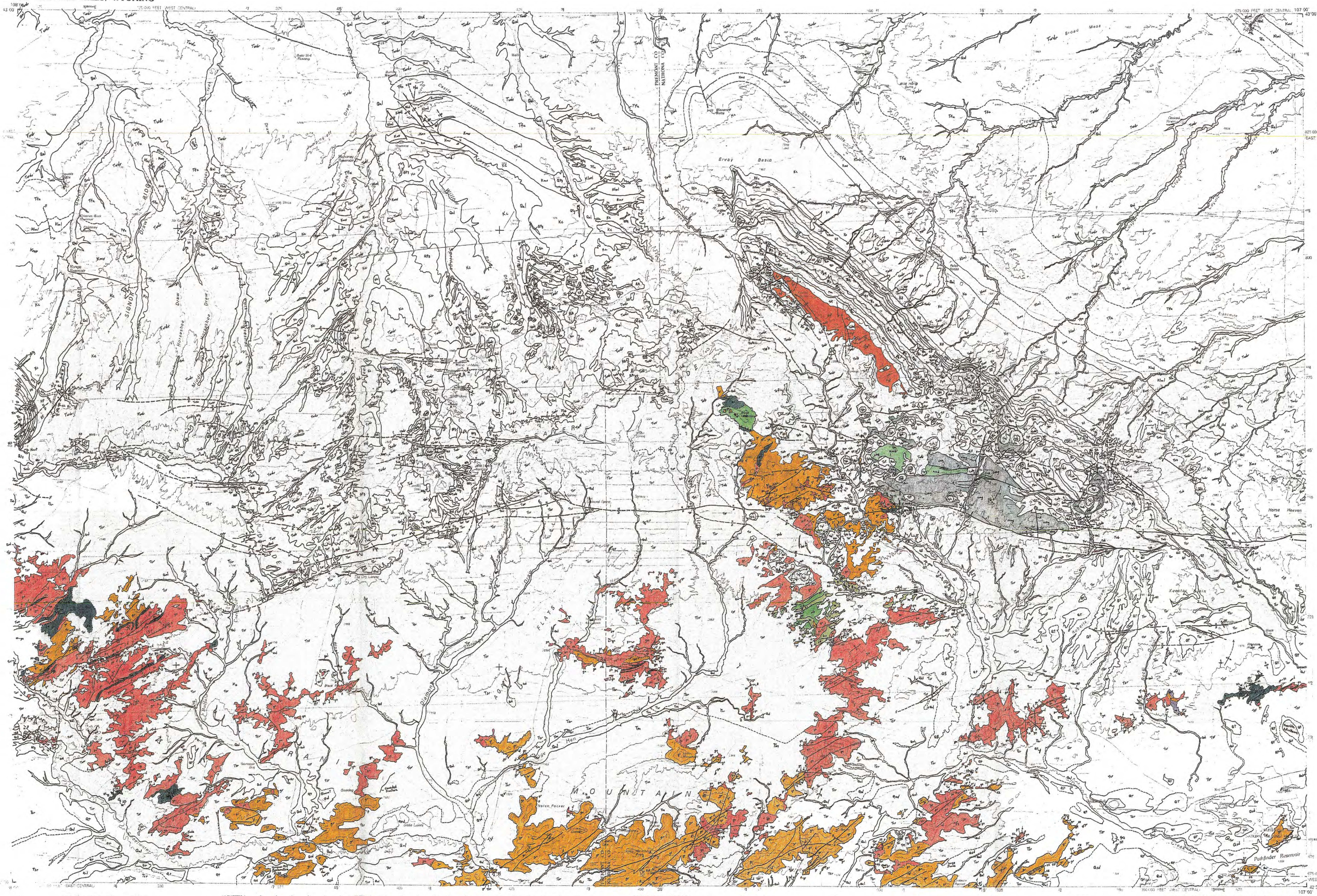
RATTLESNAKE HILLS, WYOMING



SCALE 1:100 000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 20 METERS

RATTLESNAKE HILLS, WYOMING
N4230-W10700/30x60
1981

Preliminary Geologic Map
of the
Rattlesnake Hills
1:100,000 Quadrangle
Fremont and Natrona Counties, central Wyoming

By
Wayne M. Sutherland and W. Dan Hausel

July, 2002

Wyoming State Geological Survey Open File [redacted] Report 2002-2

Prepared in cooperation with the U.S. Geological Survey
2001 STATEMAP Grant award #01HQAG0109

Plate 1 of 2

Quaternary

Qal	Alluvium
Qls	Landslide debris
Qvc	Volcanic alluvium and volcaniclastics
Qt	Terrace deposits
Qtg	Gravel covered terraces
Qsd	Sand dunes and aeolean deposits
QB	Pleistocene Bug Formation

Quaternary/Tertiary

QTb	Boulder deposits

Tertiary

Tm	Pliocene Moonstone Formation
Tsr	Miocene Splitrock Formation
Twr	Oligocene White River Formation
Tc	Oligocene boulder conglom. & channel deposits
Twb	Eocene Wagon Bed Formation

Mid-Late Eocene Volcanic and subvolcanic rocks

Tv	Tertiary volcanics undifferentiated
Tvf	Volcanic flows undifferentiated
Tph	Phonolite
Tpl	Phonolite lava
Tat	Alkalai metatrachyte
Tst	Soda trachyte
Tt	Trachyte
Tl	Latite
Tql	Quartz latite
Tqla	Quartz latite agglomerate
Trh	Rhyolite

Twdr	Eocene Wind River Formation
Tfu	Paleocene Fort Union Formation

Mesozoic

Klml	Cret. Lance, Meeteetse, & Lewis Fms combined
Kmv	Cretaceous Mesa Verde Formation
Kc	Cretaceous Cody Shale
Kf	Cretaceous Frontier Formation
Kfu	Upper part of Cret. Frontier Fm above Kfwc
Kfwc	Cret. Wall Creek Ss in the Frontier Fm
Kmr	Cretaceous Mowry Shale
Kmrt	Cretaceous Mowry, Muddy, & Thermopolis combined
Ktm	Cret. Muddy Ss & Thermopolis Sh combined
Kt	Cretaceous Thermopolis Shale
KJ	Cret. Cloverly & Jur. Morrison Fms combined
Js	Jurassic Sundance Formation
Jn	Jurassic/Triassic Nugget Sandstone
℞pa	Triassic Popo Agie Formation
℞a	Triassic Alcova Limestone
℞c	Triassic Chugwater Formation
℞d	Triassic Dinwoody Formation

Paleozoic

Pge	Permian Goose Egg Formation
Pp	Permian Phosphoria Formation
IPt	Pennsylvanian Tensleep Sandstone
IPa	Pennsylvanian Amsden Formation
Mm	Mississippian Madison Limestone
Ꞓgv	Cambrian Gros Ventre Formation
Ꞓf	Cambrian Flathead Sandstone
Ꞓu	Cambrian Undifferentiated
Pzu	Paleozoic Undifferentiated

Precambrian

gr	Granite Undifferentiated
fgt	French Rocks Tonalite
mi	Mafic & Ultramafic Intrusives
mb	Meta basalt Undifferentiated
umb	UT Creek Formation Metabasalts
umg	UT Creek Formation Metagreywackes
mmb	Mc Dougal Gulch Metavolcanics
bs	Barlow Springs Formation
sc	Supracrustal & related rocks Undifferentiated
gn	Archean gneiss Undifferentiated

RA	Reclamation area
d	Diabase or other mafic dikes
Pg	Quartz pegmatite veins & dikes
Ash	Quat. (?) wind blown volcanic ash
B	Banded iron formation
C	Corundum (ruby or sapphire)
Jade	Jade prospect or occurrence
J	Jasper
A	Alteration
G	Gossan
U	Uranium prospect or occurrence
X	Prospect
	Contact
F	Fault
SZ	Shear zone
	Structural trend
	Anticline or antiform
	Syncline or synform

Details of geologic units are printed in a separate text.

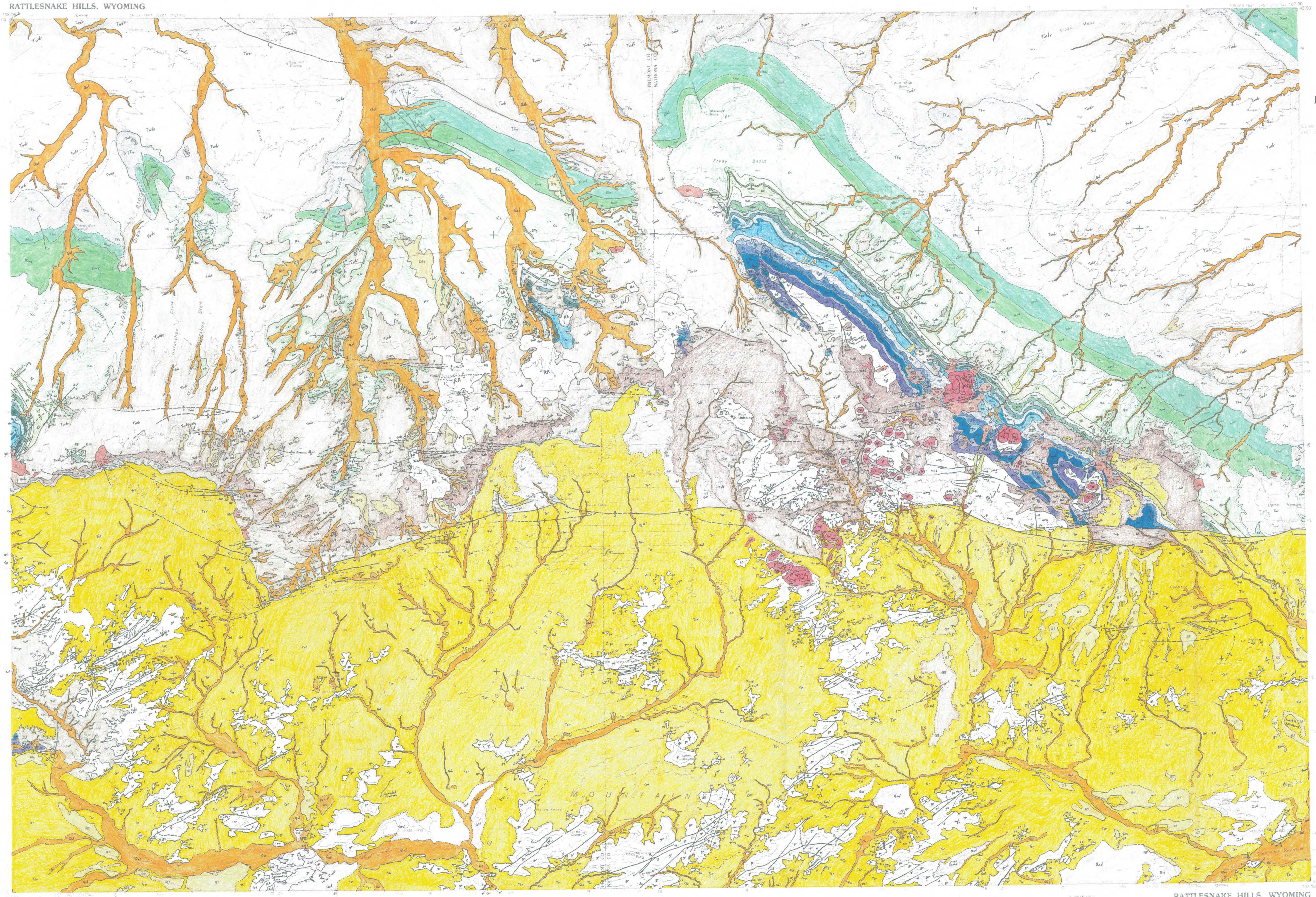


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Plate 2 of 2

Quaternary

- Qal — Alluvium
- Qls — Landslide debris
- Qvc — Volcanic alluvium and volcaniclastics
- Qt — Terrace deposits
- Qtg — Gravel covered terraces
- Qsd — Sand dunes and aeolean deposits
- QB — Pleistocene Bug Formation

Quaternary/Tertiary

- QTb — Boulder deposits

Tertiary

- Tm — Pliocene Moonstone Formation
- Tsr — Miocene Splitrock Formation
- Twr — Oligocene White River Formation
- Tc — Oligocene boulder conglom. & channel deposits
- Twb — Eocene Wagon Bed Formation

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- Tvf — Volcanic flows undifferentiated
- Tph — Phonolite
- Tpl — Phonolite lava
- Tat — Alkalai metatrachyte
- Tst — Soda trachyte
- Tt — Trachyte
- Tl — Latite
- Tql — Quartz latite
- Tqla — Quartz latite agglomerate
- Trh — Rhyolite

- Twdr — Eocene Wind River Formation
- Tfu — Paleocene Fort Union Formation

Mesozoic

- Kml — Cret. Lance, Meeteetse, & Lewis Fms combined
- Kmv — Cretaceous Mesa Verde Formation
- Kc — Cretaceous Cody Shale
- Kf — Cretaceous Frontier Formation
- Kfu — Upper part of Cret. Frontier Fm above Kfwc
- Kfwc — Cret. Wall Creek Ss in the Frontier Fm
- Kmr — Cretaceous Mowry Shale
- Kmrt — Cretaceous Mowry, Muddy, & Thermopolis combined
- Ktm — Cret. Muddy Ss & Thermopolis Sh combined
- Kt — Cretaceous Thermopolis Shale
- KJ — Cret. Cloverly & Jur. Morrison Fms combined
- Js — Jurassic Sundance Formation
- JTRn — Jurassic/Triassic Nugget Sandstone
- TRpa — Triassic Popo Agie Formation
- TRa — Triassic Alcova Limestone
- TRc — Triassic Chugwater Formation
- TRd — Triassic Dinwoody Formation

Paleozoic

- Pge — Permian Goose Egg Formation
- Pp — Permian Phosphoria Formation
- IPt — Pennsylvanian Tensleep Sandstone
- IPa — Pennsylvanian Amsden Formation
- Mm — Mississippian Madison Limestone
- €gv — Cambrian Gros Ventre Formation
- €f — Cambrian Flathead Sandstone

- €u — Cambrian Undifferentiated
- Pzu — Paleozoic Undifferentiated

Precambrian

- gr — Granite Undifferentiated
- fgt — French Rocks Tonalite
- mi — Mafic & Ultramafic Intrusives
- mb — Meta basalt Undifferentiated
- umb — UT Creek Formation Metabasalts
- umg — UT Creek Formation Metagreywackes
- mmb — Mc Dougal Gulch Metavolcanics
- bs — Barlow Springs Formation
- sc — Supracrustal & related rocks Undifferentiated
- gn — Archean gneiss Undifferentiated

- RA — Reclamation area
- d — Diabase or other mafic dikes
- pg — Quartz pegmatite veins & dike
- Ash — Quat. (?) wind blown volcanic ash
- B — Banded iron formation
- C — Corundum (ruby or sapphire)
- Jade — Jade prospect or occurrence
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