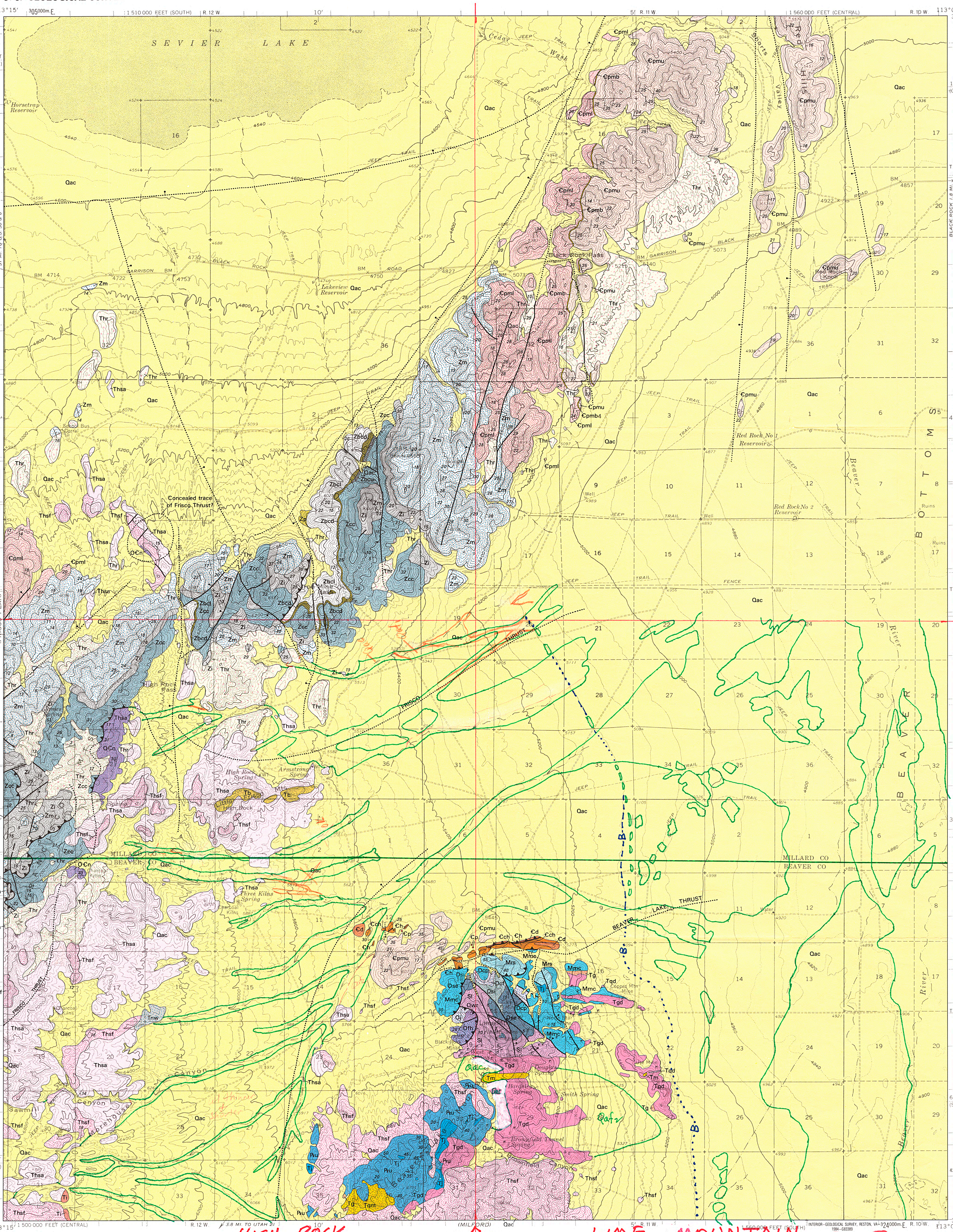
DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY



(THE BARN)
113°15′ 305000m.E. 1 510 000 FEET (SOUTH) R. 12 W. 10′ 5′ R. 11 W. 1 560 000 FEET (CENTRAL) R. 10 W. 113°00′
38°45′
4291000m.N.
760 000 FEET (SOUTH)
150 000 FEET (CENTRAL)
T. 24 S.
31 MI. TO U.S. 50 & 6
BLACK ROCK 1.8 MI.
40′
T. 25 S.
(FRISCO PEAK)
35′
T. 26 S.
680 000 FEET (SOUTH)
70 000 FEET (CENTRAL)
4264000m.N.
38°30′ 113°15′ 1 500 000 FEET (CENTRAL) R. 12 W. 3.8 MI. TO UTAH 21 10′ (MILFORD) 5′ R. 11 W. 1 560 000 FEET (SOUTH) INTERIOR—GEOLOGICAL SURVEY, RESTON, VA—1984—G83389 324000m.E. R. 10 W. 113°00′ 38°30′
(FRISCO) (ADAMSVILLE)

Base from U.S. Geological Survey 1:62,500, 1960
10,000-foot grid based on Utah coordinate system, central and south zones
1000-meter Universal Transverse Mercator grid ticks, zone 12

14½° TRUE NORTH MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1984

SCALE 1:48 000
1 ½ 0 1 2 3 MILES
1 .5 0 1 2 3 KILOMETERS
CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

HIGH ROCK D7 LIME MOUNTAIN D8

UTAH
QUADRANGLE LOCATION

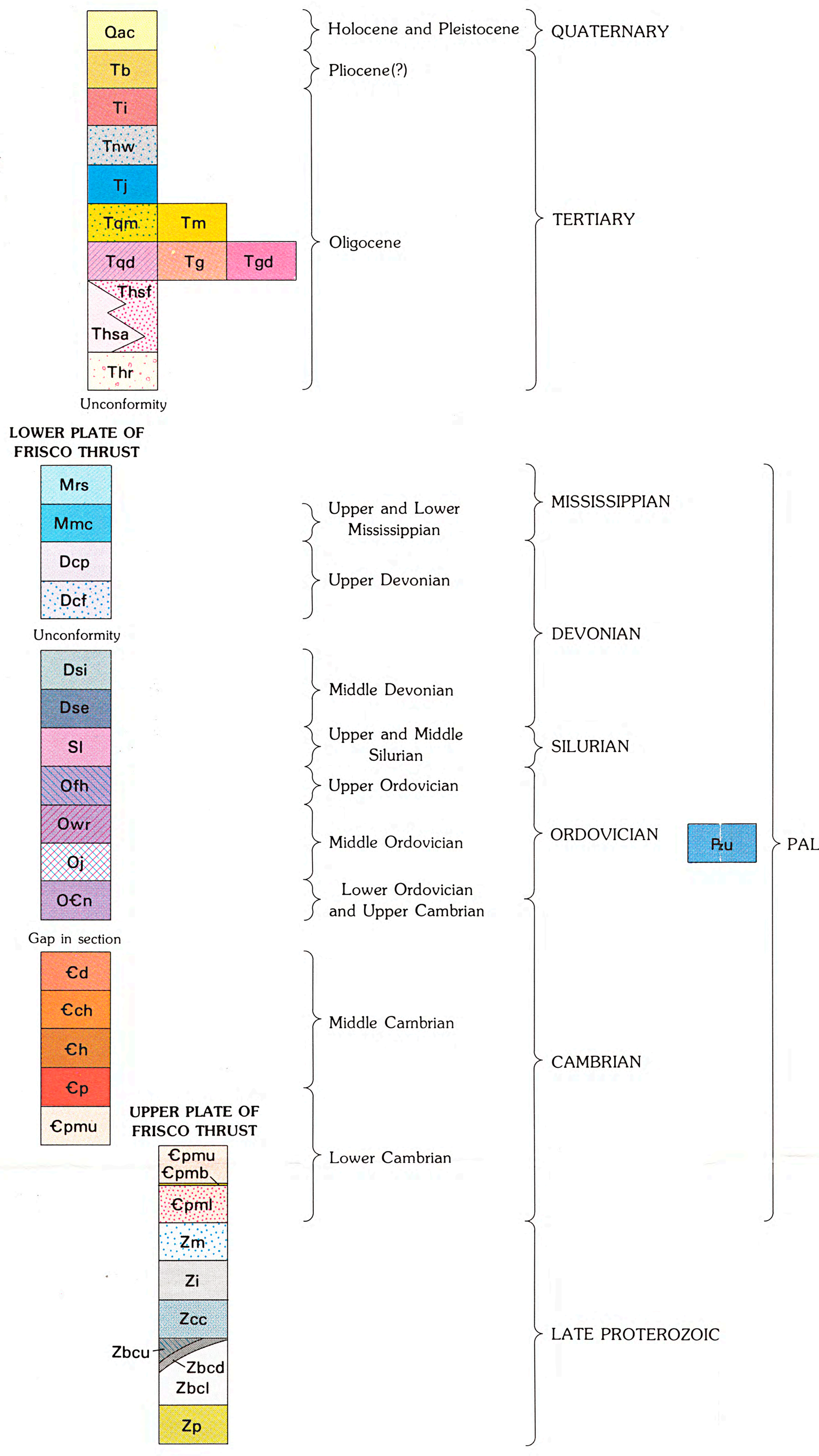
Geology mapped by D. M. Lemmon, H. T. Morris, R. W. Kopf, and H. W. Sundelius, 1960-81

GEOLOGIC MAP OF THE BEAVER LAKE MOUNTAINS QUADRANGLE, MILLARD AND BEAVER COUNTIES, UTAH

By
D. M. Lemmon and H. T. Morris
1984

85% Man Dk 4

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qac ALLUVIUM AND COLLUVIUM (HOLOCENE AND PLEISTOCENE)—Unconsolidated and semiconsolidated talus, stream, and floodplain deposits in mountains; fanglomerate at edges of mountains; and basin-fill deposits in valleys. Total thickness locally may exceed 500 m

Tb BASALT (PLIOCENE?)—Brown-weathering, black, fine-grained flow rock containing small phenocrysts of labradorite, augite, basaltic hornblende, and minor olivine in a partly glassy groundmass. Occurs only as remnant patches of a once much more extensive flow. Maximum thickness about 50 m

Ti ISOM FORMATION (OLIGOCENE)—Typically a single ignimbrite cooling unit consisting of an upper medium- to dark-red, densely welded, vuggy ash-flow tuff (10-15 m thick), which commonly contains small white discoidal inclusions believed to be collapsed pumice fragments, underlain by a basal black or dark-reddish-brown vitrophyre (1-2 m thick). Phenocrysts sparse in both units and include andesine, sanidine, quartz, and biotite. In the San Francisco Mountains, Isom Formation directly overlies Horn Silver Andesite of Stringham (1967)

Tnw WAH WAH SPRINGS TUFF MEMBER OF NEEDLES RANGE FORMATION (OLIGOCENE)—A single isolated exposure of moderately resistant, pink to light-gray, moderately welded dacitic ash-flow tuff. Abundant phenocrysts include plagioclase, quartz, biotite, and hornblende. White pumice lapilli present in some units. This remnant patch of Needles Range Formation only about 20 m thick overlies Horn Silver but not Tgd

30.5 Ma

Tj JASPEROID (OLIGOCENE)—Irregular masses of tan to medium-brown, fine-grained silicified rock. Scattered vugs containing terminated quartz crystals common. Jasperoid most abundant near contact between volcanic units and carbonate sedimentary rocks in areas where both of these rocks are intruded by calc-alkaline plutons. Maximum thickness of largest jasperoid mass about 30 m

Tqm QUARTZ MONZONITE (OLIGOCENE)—Medium- to light-gray, medium-grained, granular intrusive quartz monzonite composed of about 35 percent each andesine and orthoclase, 10-20 percent quartz, 5 percent each hornblende and biotite, 2 percent each of augite and hypersthene, and accessory apatite, zircon, sphene, rutile, and magnetite

Tm MONZONITE (OLIGOCENE)—Medium-gray, medium- to fine-grained, mostly dikelike intrusive bodies of monzonite composed of about 40 percent each orthoclase and andesine, 15 percent hornblende and other ferromagnesian minerals commonly altered to epidote and chlorite-group minerals, and about 5 percent quartz, along with a few percent apatite, zircon, sphene, rutile, and magnetite

Tqd QUARTZ DIORITE (OLIGOCENE)—Minor dikelike bodies of quartz diorite consisting of 60-65 percent andesine, 5-10 percent orthoclase, 5-15 percent quartz, 5-15 percent each biotite and hornblende, 5 percent augite, and a few percent apatite, sphene, zircon, and magnetite. Magnetite abundant enough in some hand samples to attract a suspended magnet

Tg GRANITE (OLIGOCENE)—Light-gray, medium- to coarse-grained, granular bodies of granite composed of 50-70 percent orthoclase and (or) myrmekitic intergrowths of orthoclase and quartz, 25-50 percent quartz, 5-10 percent biotite and hornblende, and a few percent accessory minerals, chiefly magnetite. Granite bodies chiefly occur near the border zones of large granodiorite and quartz monzonite plutons and may be variants or differentiates of these intrusions

Tigd

Tgd GRANODIORITE (OLIGOCENE)—Medium- to light-gray, medium-grained, granular granodiorite composed of about 40-50 percent andesine, 15-20 percent orthoclase, 10-20 percent quartz, 5-10 percent each of biotite and hornblende, 5 percent augite, and accessory minerals including hypersthene, sphene, magnetite, and apatite. Most abundant intrusive rock in the Beaver Lake Mountains, constituting the larger plutons. Locally cut by swarms of aplite dikes

HORN SILVER ANDESITE OF STRINGHAM (1967) (OLIGOCENE)—Heterogeneous, medium-gray to reddish-, purplish-, or greenish-gray eruptive rocks ranging in composition from andesite to dacite and quartz latite. In the Beaver Lake Mountains quadrangle most of formation is tuff, agglomerate, and other pyroclastic rocks that contain large and small, discontinuous, tongue-shaped lava flows

34

Thsf Flow rocks—Generally dark-colored, medium- to fine-grained lava containing various combinations of small phenocrysts of andesine, conspicuous hornblende, biotite, augite, quartz, and abundant accessory minerals. In some samples staining techniques indicate abundant fine-grained orthoclase in the groundmass. According to Lemmon, Silberman, and Kistler (1973, p. 24-25) minerals from a pyroxene-hornblende-biotite andesite vitrophyre near southwestern corner of Beaver Lake Mountains quadrangle have K-Ar isotopic ages of 30.8 m.y. (plagioclase) and 34.1 m.y. (hornblende). These minerals contained 0.712 and 0.916 percent K_2O, respectively. Thickness of most extensive flow unit in southern part of quadrangle unknown but exceeds 100 m

Thsa Agglomerate and other pyroclastic rocks—Extensive accumulations of medium-grained agglomerate, medium- and fine-grained tuff, and volcanic conglomerate and sandstone deposited in more distal parts of the Horn Silver volcanic center. Northward from southern part of quadrangle unit contains a diminishing number of interlayered tongues and patches of dark-colored flow rocks. Maximum thickness of the Horn Silver volcanic rocks in Beaver Lake Mountains quadrangle unknown inasmuch as they are block-faulted remnants of a formerly extensive deposit, but in some areas thicker parts of unit probably exceed 500 m

Thr CONGLOMERATE OF HIGH ROCK PASS (OLIGOCENE)—Hetergeneous conglomerate containing pebbles, cobbles, and boulders of limestone, quartzite, and other sedimentary rock embedded in a matrix of red-weathering, fine- to medium-grained sandstone, red siltstone, or brown to red sandy shale. Represents an old soil and rubble zone that irregularly covered Paleozoic sedimentary rocks at time of first volcanic eruptions in area that is now the San Francisco Mountains region and compositionally reflects lithologic makeup of local bedrock. Named from exposures near High Rock Pass in west-central part of Beaver Lake Mountains quadrangle. Thickness ranges from about 1 to over 100 m

LOWER PLATE OF FRISCO THRUST

Mrs FORMATION OF ROSE SPRING CANYON (MISSISSIPPIAN)—A partial section of this formation crops out in the northern part of the Beaver Lake Mountains. Consists of medium-bedded, medium-grained, blue-gray, partly cherty limestone, interlayered with a few sparse beds of buff-colored quartzite. Locally weakly bleached and discolored. Thickness of partial section does not exceed 100 m

Mmc MONTE CRISTO LIMESTONE (UPPER AND LOWER MISSISSIPPIAN)—Parts of formation occur in several fault blocks on Lime Mountain in the northern Beaver Lake Mountains. Least altered rocks medium-bedded, dark-bluish-gray, somewhat sandy limestone, but locally similar strata altered to lead-gray, coarse-grained, hydrothermal dolomite, or partly or wholly bleached to white marble in areas adjacent to granitic plutons. Thickest partial sections of Monte Cristo Limestone do not exceed 125 m

Dcp CRYSTAL PASS MEMBER OF SULTAN LIMESTONE (UPPER DEVONIAN)—Medium-dark-gray, thin- to medium-bedded, argillaceous limestone and dolomite. Similar in age and lithology to Pinyon Peak Limestone of Tintic mining district, 180 km north-northeast of quadrangle. Thickness about 45 m

Dcf COVE FORT QUARTZITE (UPPER DEVONIAN)—White to buff or light-gray, massive, somewhat vuggy quartzite with some beds of argillaceous limestone near base. Name as proposed by Crosby (1959) is adopted here. Weathered surface characterized by large shallow pits and indentations. Average thickness about 35 m

Dsi SIMONSON DOLOMITE (MIDDLE DEVONIAN)—Massive, dark-grayish-brown, sugary-textured dolomite having a somewhat striped appearance in areas where it has not been bleached and altered by hydrothermal solutions. In lower plate of Frisco thrust over a large part of southwestern Utah, including Beaver Lake Mountains, upper part of Simonson Dolomite and overlying Guilmette Formation were removed by erosion prior to deposition of Cove Fort Quartzite. Thickness of remaining part of Simonson Dolomite in Beaver Lake Mountains about 100 m

Dse SEVY DOLOMITE (MIDDLE AND LOWER DEVONIAN)—Exposed mostly as incomplete, fault-bounded, partial sections consisting of medium- to light-gray, generally massive, dense to faintly laminated dolomite. Locally bleached and recrystallized by hydrothermal solutions. Most complete section of Sevy in the Beaver Lake Mountains is 150-200 m thick

Sl LAKETOWN DOLOMITE (UPPER AND MIDDLE SILURIAN)—Mostly complete, locally much altered sections of Laketown Dolomite crop out on Lime Mountain. Least altered strata medium- to light-gray, medium- to thick-bedded, medium-grained dolomite. Near Black Rock and Skylark mines strata believed to be Laketown Dolomite altered to dazzling white dolomite marble. Thickest exposed sections do not exceed 200-250 m

Ofh FISH HAVEN DOLOMITE (UPPER ORDOVICIAN)—A partial section of medium- to dark-gray, thick-bedded, granular dolomite occurring within a small thrust fault slice in western part of the Beaver Lake Mountains almost certainly is Fish Haven Dolomite. Remaining thickness of beds about 15-20 m

Owr WATSON RANCH QUARTZITE (MIDDLE ORDOVICIAN)—A partial section of buff to light-gray, massive quartzite occurring within a thrust fault slice in western part of the Beaver Lake Mountains believed to be Watson Ranch Quartzite. Partial section about 15 m

Oj JUAB LIMESTONE (MIDDLE ORDOVICIAN)—A few meters of light-blue, medium-bedded, slightly argillaceous limestone underlying buff-colored quartzite in a thrust fault slice in western part of Beaver Lake Mountains identified as uppermost part of Juab Limestone

O€n NOTCH PEAK FORMATION (LOWER ORDOVICIAN AND UPPER CAMBRIAN)—An incomplete section of medium- to light-gray, medium-bedded, dense limestone and somewhat granular dolomite containing scattered chert nodules and poorly preserved trilobite fragments crops out below the Frisco thrust in west-central part of Beaver Lake Mountains quadrangle. Believed to be middle part of Notch Peak Formation. Exposed units about 300 m thick. Rock units known to occur between Notch Peak Formation and Dome Limestone in adjacent areas not exposed in Beaver Lake Mountains quadrangle

€d DOME LIMESTONE (MIDDLE CAMBRIAN)—Several thin incomplete sections of medium-gray, thick-bedded, fine-grained limestone stratigraphically overlying Chisholm Shale in northernmost Beaver Lake Mountains identified as lower part of Dome Limestone. Some of these beds contain scattered pisolitic algal structures, but structures are not abundant enough to suggest identification of these beds as Peasley Limestone. Thickness partial sections average 10-15 m

€ch CHISHOLM SHALE (MIDDLE CAMBRIAN)—Folded and moderately contorted beds of olive-green shale containing thin beds of blue-gray fossiliferous limestone. Thickness about 15 m

€h HOWELL LIMESTONE (MIDDLE CAMBRIAN)—Thin exposures of light- and medium-gray micritic limestone that immediately overlie Pioche Formation or immediately underlie Chisholm Shale in local fault blocks identified as parts of Howell Limestone. Partial sections that adjoin shale of the Pioche Formation possibly part of the Tatow Member of the Pioche, but do not contain phyllitic shale and quartzite interbeds that characterize the Tatow. Faulted segments of Howell Limestone only 5-10 m thick or less

€p PIOCHE FORMATION (MIDDLE AND LOWER CAMBRIAN)—Small isolated exposures of dark-greenish-brown micaceous quartzite, olive-green siltstone, and phyllitic shale near exposures of the Prospect Mountain Quartzite in northwesternmost part of Beaver Lake Mountains identified as parts of the Pioche Formation. Only a few meters of beds exposed

PROSPECT MOUNTAIN QUARTZITE (LOWER CAMBRIAN)

€pmu Upper member—Described below under upper plate of Frisco thrust

UPPER PLATE OF FRISCO THRUST

PROSPECT MOUNTAIN QUARTZITE (LOWER CAMBRIAN)—A very thick unit of light-colored, partly conglomeratic quartzite consisting of an upper member, a chloritized basalt flow member, and a lower quartzite and quartzite conglomerate member

€pmu Upper member—Buff, white, or pinkish-tan, thick- to very thick bedded vitreous quartzite that grades upward in color to brownish to olive green near top. Some zones distinctly cross-bedded. Exposures faulted. Total thickness of unit about 1,700 m

€pmb Basalt flow member—Dark-greenish-gray to bluish-black, chloritized and epidotized basalt lava flow (greenstone) locally containing a few amygdules in upper and lower parts. Greenstone unit is a distinctive widespread marker unit 5-15 m thick

€pml Lower member—White, buff, or pink, locally conglomeratic, arkosic quartzite. In some areas minor zones colored red, purple, and light gray common. Base of member locally marked by a bed of reddish conglomerate. Thickness about 500 m

Pzu PALEOZOIC STRATA, UNDIFFERENTIATED—White, coarse-grained marble or dolomite marble derived from carbonate rocks of Paleozoic age by thermal metamorphism. General absence of calc-silicate minerals and hornfels indicates that parent strata did not contain significant amounts of chert, sandstone, quartzite, or shale. Thickness not measured or estimated

Zm MUTUAL FORMATION (LATE PROTEROZOIC)—Pink to dark-purplish-red, medium-bedded, mostly coarse-grained, pebble-streaked quartzite. Some parts crossbedded, and one zone just below middle of formation contains several thick beds of maroon, purple, and silver-gray argillite. Total thickness about 635 m

Zi INKOM FORMATION (LATE PROTEROZOIC)—Purplish-red, arenaceous, phyllitic argillite, with some thin and thick zones of olive-green argillite and quartzite. Thickness 140-160 m

Zcc CADDY CANYON QUARTZITE (LATE PROTEROZOIC)—Buff, light-pink, or light-gray, thick-bedded, medium- to coarse-grained quartzite. Upper 15 m consists of dark-brown conglomeratic quartzite and subordinate olive-green argillite and siltstone. Thickness 80-100 m

BLACKROCK CANYON LIMESTONE (LATE PROTEROZOIC)—Chiefly limy argillite, but contains several beds of limestone or marble. One limestone-rich zone mapped separately, dividing formation into three members. Upper member of Blackrock Canyon may be equivalent in part to Papoose Creek Formation of southeastern Idaho (Crittenden and others, 1971)

Zbcu Upper member—Chiefly green argillite, red and green siltstone, and green quartzite, with some minor marbleized limestone beds. Thickness 10-50 m

Zbcd Limestone and(or) dolomite member—Limy argillite containing at least one thick bed and one or more thinner beds of blue-gray dense limestone or gray hydrothermal dolomite locally replaced by iron-oxide minerals. Over a large area this carbonate unit forms top of the Blackrock Canyon Limestone. Thickness 10-50 m

Zbcl Lower member—Gray to pale-green, thin- to medium-bedded argillite and quartzite with several minor lenses and thin beds of brown-weathering arenaceous limestone or dolomite. Some argillite beds contain 10-30 percent calcite or dolomite. Quartzite is dominant rock type in lowermost part of member. Thickness 150-200 m

Zp POCATELLO FORMATION (LATE PROTEROZOIC)—Approximately 20 m of dark-reddish-brown platy argillite exposed below Blackrock Canyon Limestone believed to be uppermost part of Pocatello Formation. Total thickness of complete formation in Beaver Lake Mountains quadrangle unknown

CONTACT

HIGH-ANGLE FAULT—Dashed where approximately located or inferred; dotted where concealed; bar and ball on downthrown side. Arrows show relative movement

THRUST FAULT—Sawteeth on upper plate; dotted where concealed

20 STRIKE AND DIP OF BEDS

REFERENCES CITED

Crittenden, M. D., Jr., Shaeffer, F. E., Trimble, D. E., and Woodward, L. A., 1971, Nomenclature and correlation of some Upper Precambrian and basal Cambrian sequences in western Utah and southeastern Idaho: Geological Society of America Bulletin, v. 82, no. 3, p. 581-602.

Crosby, G. W., 1959, Geology of the South Pavant Range, Millard and Sevier Counties, Utah: Brigham Young University Geological Studies, v. 6, no. 3, 59 p.

Lemmon, D. M., Silberman, M. L., and Kistler, R. W., 1973, Some K-Ar ages of extrusive and intrusive rocks of the San Francisco and Wah Wah Mountains, Utah, *in* Geology of the Milford [Utah] area 1973: Utah Geological Association Publication 3, p. 23-26.

Stringham, B. F., 1967, Hydrothermal alteration near Horn Silver mine, Beaver County, Utah: Utah Geological and Mineral Survey Special Studies, no. 16, 35 p.

For sale by Branch of Distribution, U.S. Geological Survey
Box 25286, Federal Center, Denver, CO 80225