#14

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Geologic map of the Beaver 15 minute quadrangle, Beaver County, Utah

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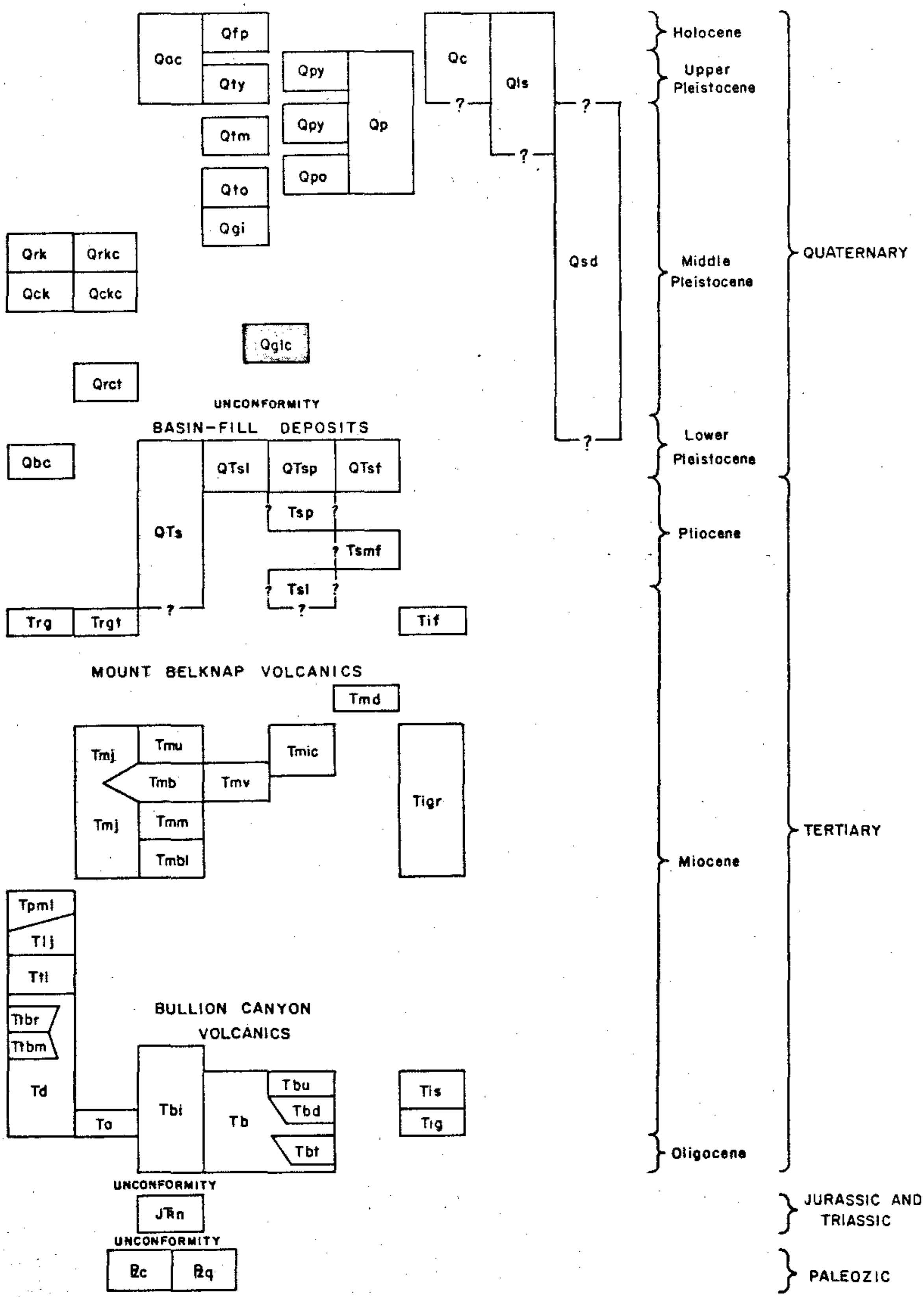
CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

STREAM DEPOSITS (HOLOCENE AND PLEISTOCENE)--Moderately to well-rounded, well-sorted sand and gravel that fill channels and form flood plains and thin strath terraces

Qac Undivided stream and sheetwash alluvium (Holocene and upper Pleistocene)--Light-brown and light-gray silt, sand and gravel. Consists of locally derived sheetwash alluvium on shallow slopes and stream alluvium in small arroyos. Also includes small alluvial fans that form at the mouths of the arroyos. Thickness probably less than 4 m

Qfp Undivided flood-plain alluvium (Holocene)--Light-brown to light-gray, medium- to coarse-grained sand and pebbly to bouldery gravel. Forms a broad, slightly dissected surface along the Beaver River and North Creek and towards the Tushar Mountains forms narrow channels inset into older deposits. Numerous seeps and springs indicate that the ground-water level is near the surface of this unit along the Beaver River. Includes massive silt and fine sand containing abundant organic matter and calcium carbonate, deposited in a cienaga environment, that fills deeply excavated channels along lower parts of Wildcat and Indian Creek and their tributaries. Thickness at least 5 m, base covered

Qty Young terrace alluvium (upper Pleistocene)--Light-brown to light-reddish-brown, medium- to coarse-grained sand and pebbly to bouldery gravel. Forms broad, slightly elevated and coalesced former flood plains of Beaver River and North Creek near Beaver. Forms terrace 5-6 m above the modern floodplain of Beaver River near Adamsville, 13 km west of Beaver. Near Manderfield, the same terrace is 3-5 m above Indian Creek. Soil contains a weak argillic B horizon and near Beaver is generally noncalcareous or only weakly calcareous (stage I of Gile and others, 1966) because of high water table. Mainly glacial outwash and associated alluvium of the most recent major glaciation, the Pinedale, which ended about 12,000 to 15,000 yrs. ago. A major source of high quality sand and gravel. Thickness 2-4 m; more than 4 m along Beaver River and North Creek

Qtm Middle terrace alluvium (upper Pleistocene)--Light-gray to light-reddish-brown, medium- to coarse-grained sand and gravel. Forms terrace surface 12-13 m above Beaver River near Greenville, and 10-13 m above Indian Creek near Manderfield. Soil contains a moderately developed argillic B horizon and stage II to stage III Cca horizon (Gile and others, 1966). Mainly glacial outwash and associated alluvium of the Bull Lake Glaciation, here considered to have ended about 140,000 yrs ago. A minor source of moderate quality sand and gravel. Generally 2-4 m thick

Qto Old terrace alluvium (middle Pleistocene)--Light-brown to reddish-brown sand and gravel. Forms terrace surface 16-18 m above Beaver River near Greenville. The same terrace is 60-65 m above Fortuna Canyon west of Wildcat Fields and, just west the west edge of the quadrangle, about 25 m above Indian Creek. Soil contains a well developed, thick argillic B horizon (locally eroded) and a stage III Cca horizon. Considered to be glacial outwash and associated alluvium of the first major glaciation preceding the Bull Lake, about 250,000 years ago. Moderately deformed by normal faults, especially near Greenville. Thick deposits below soil are a major source of high quality sand and gravel. Thickness generally 2-10 m

Qgi Gravel of ancestral Indian Creek (middle Pleistocene)--Poorly exposed light- to reddish-brown sand and gravel present along an old fault(?)-controlled west-trending stream valley between Wildcat and Indian Creeks. Topographically higher than old terrace alluvium (Qto), but inset below gravels of Last Chance Bench (Qglc). Deposition of unit may be related to faulting rather than a climatic event. Projected height above Indian Creek about 35 m. Thickness generally 2-5 m

PIEDMONT-SLOPE AND ALLUVIAL-FAN DEPOSITS (PLEISTOCENE)--A thin mantle of alluvium on bajada slopes and a thicker accumulation of locally derived alluvial-fan deposits near the mountain front. Generally more poorly sorted, more angular and more variable in lithologic composition than terrace and flood-plain alluvium. These units are widespread along the eastern flank of the Mineral Mountains west of the map area, along the northern flank of the Black Mountains, southwest of the map area, and along the western margin of the Tusher Mountains in the eastern part of the map area.

Qpy Young piedmont-slope and alluvial-fan deposits (upper Pleistocene)--Light- to light-reddish-brown, poorly to moderately sorted silt, sand, and gravel. Grades into or overlies young terrace alluvium (Qty). Soil contains a weak argillic B horizon and stage I to weak stage II Cca horizon. Has smooth, relatively undissected surface. Thickness generally 2-4 m; fan deposits 2-10 m thick

Qpm Middle piedmont-slope and alluvial-fan deposits (upper Pleistocene)--Light- to light-reddish-brown, poorly to moderately sorted silt, sand, and gravel. Grades into or overlies middle terrace alluvium (Qtm). Soil contains moderately developed argillic B horizon and stage II to III Cca horizon. Surface moderately dissected. Thickness 2-4 m, fan deposits 2-10 m thick

Qpo Old piedmont-slope and alluvial-fan deposits (middle Pleistocene)--Light- to reddish-brown poorly to moderately sorted silt, sand, and gravel. Grades into or overlies old terrace alluvium (Qto). Soil contains a well developed, thick argillic B horizon and stage III Cca horizon. Surface highly dissected; young and middle piedmont alluvium (Qpy and Qpm) are deposited in channels cut into surface of old piedmont alluvium. Thickness 2-4 m

Qp Undifferentiated piedmont-slope and alluvial-fan deposits (upper to middle Pleistocene)--Consists largely of middle and old deposits. Undivided because of poor exposures. Thickness 2-4 m

Qc COLLUVIUM (HOLOCENE AND UPPER PLEISTOCENE)--Light-gray to reddish-brown silty sands to sandy gravels. Forms thin mantle of poorly sorted debris on steep slopes of poorly consolidated basin-fill deposits (QTs). Also includes talus, rock-fall deposits and slope-creep deposits. Generally unstable and subject to further movement if disturbed. Thickness 0-2 m

Qls LANDSLIDE DEPOSITS (HOLOCENE TO MIDDLE PLEISTOCENE)--Includes large cuspate rotational slump blocks (toreva blocks) of unbroken to highly fractured basalt adjacent to the basalt of Cunningham Hill (Qbch) and large masses of landslide debris derived from volcanic rocks of the Tushar Mountains, on the eastern part of map area

Qsd SPRING DEPOSITS (PLEISTOCENE?)--Isolated mass of calcium carbonate-cemented alluvium probably related to spring activity along a major bounding fault of the Tushar Mountains. Only mapped in sec. 7, T. 28 S., R. 6 W, near the Sunday Mine. Age and thickness poorly known

BASALT OF RED KNOLL (MIDDLE PLEISTOCENE)

Qrk Lava flows--Dark-gray to black porphyritic basaltic andesite having a blocky, scoriaceous surface underlain by dense to vesicular rock. Phenocrysts of labradorite and pyroxene make up 30-40 percent of the rock and are set in a glassy to very finely granular matrix

Qrkc Cinder cone--Red to dark-gray basaltic cinders and ash forming a pyroclastic cone. Includes vent for lava flows of basalt of Red Knoll (Qrk)

BASALT OF CRATER KNOLL (MIDDLE PLEISTOCENE)

Qck Lava flow--Dark-gray to black porphyritic basaltic andesite having a blocky, scoriaceous surface underlain by dense to vesicular rock. Phenocrysts of labradorite and subordinate pyroxene make up 40-45 percent of the rock and are set in a glassy to finely granular matrix containing microlites of plagioclase, pyroxene, olivine(?), and opaque minerals

Qckc Cinder cone--Red to dark-gray basaltic cinders and ash forming a pyroclastic cone. Includes vent for lava flows of basalt of Crater Knoll (Qck)

Qglc GRAVELS OF LAST CHANCE BENCH (MIDDLE PLEISTOCENE)--Light- to reddish-brown pebbly sand to sandy gravel resting on a pediment cut across basin-fill deposits (QTs). Soil profile contains a very well developed, reddish-brown argillic B horizon and (or) a well developed stage III to weak IV K horizon (see Gile and others, 1965, for definition of K horizon). When the drainage from the Beaver basin was integrated with that of the Escalante Desert, located about 25 km west of Beaver, a widespread pediment was cut across existing intrabasinal structures developed in the basin-fill deposits. These gravels are underlain locally by channels and lenses of reworked tuff of Ranch Canyon (Qrct). Gravels are extensively deformed by faults that were most recently active in the middle to upper Pleistocene. These faults form a broad north-trending antiform that has almost no structural relief in late Pliocene deposits (QTsl) and it thought to be cored and driven by a shallow sedimentary diapir. Along the margins of the Beaver basin the faults that displace Quaternary deposits are considered to be of tectonic origin and the most recent manifestation of late Teriary uplift of the mountain ranges. Thickness 2-5 m; possibly thicker adjacent to the Tushar Mountains and in buried alluvial channels

Qrct TUFF OF RANCH CANYON (MIDDLE PLEISTOCENE)--Light-brown, poorly consolidated rhyolitic airfall tuff erupted from volcanoes in the Mineral Mountains (Lipman and others, 1978), 15 km northwest of Beaver. Primary and fluvially-reworked ash-flow material fills deeply excavated channels along Cunningham Wash; elsewhere the unit consists of thin lenses of fluvially deposited silty to sandy pumiceous tuff. Reworked tuff was deposited after an outlet from the Beaver basin had been established at Minersville Canyon, located about 20 km west of Beaver, but before the gravels of Last Chance Bench (Qglc) had been deposited. K-Ar age of 0.55±0.01 m.y. for the tuff of Ranch Canyon was determined by G. A. Izett and J. D. Obradovich (G. A. Izett, written commun., 1980)

Qbch BASALT OF CUNNINGHAM HILL (LOWER PLEISTOCENE)--Dark-gray, scoriaceous to massive basaltic lava flow. Flow filled ancestral valley of Cunningham Wash before through-flowing drainage was established out of the Beaver basin. Location of vent is probably beneath younger flows (Qck or Qrk). Natural remanent magnetic direction of the flow is weakly reversed, with a strong normal overprint. K-Ar age is 1.1±0.3 m.y. (Best and others, 1980). Thickness 1-6 m, but locally greater where deposited in channels

QTs SEDIMENTARY BASIN-FILL DEPOSITS (LOWER? PLEISTOCENE TO UPPER? MIOCENE)--Includes six informal units of poorly to moderately consolidated fluvial and lacustrine deposits that comprise two major sedimentary packages. The upper part of the basin-fill deposits consists of a gradational sequence of lacustrine (QTsl), piedmont (QTsp), and fanglomeratic (QTsf) basin-fill sediments deposited in a closed basin that was occupied by a shallow but perennial lake. The upper basin-fill deposits are early? Pleistocene and late Pliocene in age; younger than the basin-fill deposits of the Sevier River Formation (Pliocene and Miocene) of the High Plateaus, east of the Tushar Mountains. The lower part of the basin-fill deposits are moderately oxidized (in surface exposure), calcalareous and indurated; the upper and lower members (Tsp and Tsl) are fine-grained members separated by a basinward-thinning(?) coarse-grained conglomeratic member (Tsmf). The lower basin fill reflects sedimentation during more saline conditions than the upper part, as evidenced by the presence of gypsum and calcium carbonate, than the upper part of the basin-fill deposits. The lower part is Pliocene and late(?) Miocene and may be largely correlative with younger parts of the Sevier River Formation. As mapped, the undivided basin-fill deposits (QTs) are poorly exposed, generally the coarser-grained facies of the upper part, but may include units of the lower part in uplifted blocks along the eastern margin of the Beaver basin. Deposition occurred concurrently with basin development from at least 9 m.y. ago (or earlier) until drainage from Beaver basin was integrated with the Escalante Desert sometime between 1.1 and 0.5 m.y. ago (Steven and others, 1980).

QTsl Lacustrine facies (lower? Pleistocene and upper Pliocene)--Light-to medium-green silty clay and silt interbedded with well-bedded, light-gray to light-brown fine sand grading laterally into pebbly sand. Ostracode and diatom collections from this unit suggest that the lake-water chemistry varied from fresh to slightly saline and was dominated by Na and K cations relative to Ca and Mg (Forester and Bradbury, 1981). This interpretation is supported by the general lack of carbonate mineralization in the lacustrine beds. Blancan mammal fossils found in this unit by G. A. Izett and J. G. Honey include the zebra *Dolichohippus*, the muscrat *Ondatra* cf. *O. idahoensis* and the microtine rodent *Mimomys meadensis*. The latter two collections suggest a Blancan 5 age of 2.0 to 2.5 m.y. (C. A. Repenning, written commun. to G. A. Izett, 1980). Unit contains four (or more) water-laid tephra beds, the second highest being the 2.0-m.y.-old Huckleberry Ridge ash bed (formerly the Pearlette type B ash; Izett and Wilcox, in press). The Huckleberry Ridge ash bed is widespread in the lacustrine facies from near Minersville Reservoir, 13 km southwest of Beaver, to the northeast side of Cunningham Hill, in the north-central part of the map area. Top of unit eroded. Thickness probably 200-250 m, may be considerably thicker and older in the subsurface near Greenville

QTsp Piedmont facies (lower? Pleistocene to upper Pliocene)--Light- to light-reddish-brown (where oxidized) sequence of interbedded subrounded fluvial-channel and deltaic(?) sand and subangular to subrounded pebble to cobble gravel derived from and coarsening towards, the adjacent mountain slopes. Contains zones of abundant manganese cementation. Best exposed near Utah Highway 91 on the northern and southern sides of Last Chance Bench. Minimum exposed thickness 100 m; base covered

QTsf Fanglomerate facies(lower? Pleistocene to upper Pliocene)--Light-reddish-brown, uniformly coarse-grained, sandy subangular pebble to cobble gravel along the front of the Tushar Mountains. Table Grounds, a high-level depositional surface between North Creek and Beaver River, 5 km northeast of Beaver, is the youngest preserved part of this unit. Base is covered; minimum exposed thickness 100 m. May be several hundred meters thick along the eastern margin of the Beaver basin, where sedimentation and tectonism occurred concurrently

Tsp Upper piedmont member (Pliocene)--Light-reddish-brown and light-brown, moderately oxidized gypsiferous sand, sandy conglomerate, and white calcareous marl. Moderately oxidized and indurated throughout; contains calcium-carbonate-cemented sandstone lenses and discrete calcium-carbonate nodules. Mainly of piedmont origin but may grade southward in the subsurface into a playa facies. About 100-150 m of this member are exposed beneath basalt of Cunningham Hill

Tsmf Conglomerate of Maple Flats (lower? Pliocene)--Light- to light-reddish-brown pebbly sand to boulder conglomerate. Boulders of Tertiary granite (Tigr) and Paleozoic rocks, derived from the Mineral Mountains, are as large as 2 m and commonly mantle the eroded top of the deposit. This unit represents deposition in response to a major phase of uplift and structural development of the Beaver basin; it is mainly exposed in an uplifted horst in northwestern part of mapped area. Thickness probably about 250 m; may thin to feather edge southward in the subsurface

Tsl Lower piedmont member (lower? Pliocene to upper? Miocene)--Oxidized, light-brown, brown, and reddish-brown, slightly gypsiferous silty clay to pebbly sand. Unit only exposed below the conglomerate of Maple Flats (Tsmf). Near Minersville Reservoir, 10 km west-southwest of the mapped area along the Beaver River, the same or slightly older age deposits consist of poorly sorted stream-channel-filling conglomerates containing abundant clasts of rhyolitic pumice; these rocks underlie a basalt dated at 7.6 m.y. (Best and others, 1980). The pumice probably was produced by local rhyolitic eruptions that are also dated at 7.6 m.y. (Stan Evans, Univ. Utah, written commun., 1981), suggesting that the lower piedmont member may be upper Miocene or older. Preliminary data from subsurface drilling suggests that unexposed portions of this member are coarse grained and perhaps as much as 1000 to 1500 m thick. Base is everywhere covered, exposed thickness 75 m

RHYOLITE AND RHYOLITE TUFF OF GILLIES HILL (UPPER MIOCENE)

Trg Rhyolite--White to light-gray, thick, local lava flows and volcanic domes of flow-layered rhyolite. Texture ranges from nearly aphanitic to porphyritic. Rock contains abundant phenocrysts of sanidine, plagioclase, quartz, biotite, and hornblende; quartz phenocrysts commonly partly resorbed. Matrix finely granular and ranges from dense to highly vesicular. K-Ar age about 9 m.y. (S. H. Evans, University of Utah, written commun., 1980)

Trgt Rhyolite tuff--Soft, white zeolitically altered ash-flow tuff interlayered with rhyolite (Trg). The tuff filled a local valley and formed an apron on the northwestern flank of Gillies Hill

Tif FELSITE (UPPER? MIOCENE)--Pink to light-gray locally porphyritic rock consisting mostly of a finely granular to micrographic or spherulitic aggregate of orthoclase, quartz, and some plagioclase. Small phenocrysts of quartz and feldspar present locally. Altered phases contain sparse disseminated pyrite. Forms dikes that cut syenite (Tis) and granite (Tigr). Possibly a phase of the rhyolite of Gillies Hill (Trg)

MOUNT BELKNAP VOLCANICS (MIOCENE)

Tmd Dikes and flows--Several light-gray to buff, small, aphanitic, dikes and lava flows located west of the topographic wall of the Mount Belknap caldera, north of Indian Creek. Fission-track ages are about 16 m.y. (C. W. Naeser, written commun., 1981)

Tmj Joe Lott Tuff Member--Light-gray to light-brown, crystal-poor, slightly to moderately welded, porous to dense alkali rhyolitic ash-flow tuff. Contains about 1.5 percent phenocrysts of quartz, sanidine and plagioclase with traces of biotite and commonly a few percent of small dark xenoliths of aphanitic volcanic rock. Comprises most of the outflow facies of the Mount Belknap Volcanics. Stratigraphic position relative to other isotopically dated units indicates an age of about 19 m.y. Thickness about 10 m, but over 500 m closer to the source (east of map area)

Tmu Upper tuff member--Light- to dark-gray, crystal-poor, rhyolitic, partly welded, intracladera faciesash-flow tuff. Youngest tuff within the Mount Belknap caldera; lithologically similar to the Joe Lott Tuff Member (Tmj)

Tmic Intrusive rock--~~A small,~~ light-gray, porphyritic rhyolite stock containing prominent flow-aligned alkali-feldspars in a granular mosaic of alkali-feldspar and quartz. Located in sec. 10, T. 28 S., R. 6 W.) along the North Fork of North Creek

Tmb Mount Baldy Rhyolite Member--Light-gray to yellowish-brown (where altered), crystal-poor, rhyolitic lava flows, domes, and feeder dikes, consisting largely of a fine-grained granular mosaic of quartz, alkali feldspar, and minor plagioclase, biotite, and hematite. Contorted flow layers common. Erupted largely within the Mount Belknap caldera (Cunningham and Steven, 1979) but locally extends over the margin (topographic wall) of the caldera

Tmv Volcaniclastic rocks--Dominantly volcanic mud-flow breccia and talus breccia derived from erosion of nearby lava flows of the Mount Baldy Rhyolite Member (Tmb). Includes landslide debris and fluviatile sand, and gravel

Tmm Middle tuff member--Light-gray to buff, crystal-poor, slightly to moderately welded, ash-flow tuff. Crops out near the middle of the caldera fill within the Mount Belknap caldera. Tuff is similar to the Joe Lott Tuff Member (Tmj)

Tmbl Blue Lake Rhyolite Member--White to buff, crystal-poor rhyolite lava flows comprising much of the lower part of the exposed fill within the Mount Belknap caldera. Flows are similar to those in the Mount Baldy Rhyolite Member (Tmb)

Tigr GRANITE (MIOCENE?)--White to gray, coarse-grained, porphyritic to hypidiomorphic granular aggregate of orthoclase, plagioclase, quartz, and biotite, with prominent accessory sphene. Quartz consitutes about 25 percent of the rock. Field evidence indicates that the granite cuts the syenite (Tis). May be same age as the Mount Belknap Volcanics

Tpml POTASSIUM-RICH MAFIC LAVA FLOWS (MIOCENE)--Dark-gray to black, vesicular to dense, locally amygdaloidal basalt lava flows, containing plagioclase (rarely as phenocrysts), olivine (commonly altered), pyroxene, and Fe-Ti oxides. Generally contains three or more weight percent K_2O. Deposited against rocks of the formation of Lousy Jim (Tlj) of Sigmund (1979) near Black Ridge in the southeastern part of the map area. K-Ar ages are 21.7±0.8 m.y., 22.1±0.8 m.y. (H. H. Mehnert, written commun., 1980), and 23.2±0.2 m.y. (Best and others, 1980). Thickness about 150 m

Tlj FORMATION OF LOUSY JIM OF SIGMUND (1979) (MIOCENE)--Pinkish-gray and light- to dark-gray, rhyodacite porphyry lava flows and flow breccia. Average composition is 9 percent sanidine, 7 percent plagioclase, 2 percent amphibole, 2 percent clinopyroxene, 1 percent magnetite, 1 percent biotite, and traces of quartz and accessory minerals, in a glassy groundmass (77 percent) containing numerous microlite and devitrification products (Sigmund, 1979). Both straight and contorted flow layering common. K-Ar age is 21.7±0.4 m.y. (Fleck and others, 1975). Maximum thickness about 300 m

Ttl TUFF OF LION FLAT (MIOCENE)--Light-gray to grayish-pink, silicic ash-flow tuff consisting of glass shards, pumice fragments, and volcanic dust, and about 5-15 percent phenocrysts of plagioclase, quartz, sanidine, biotite, and amphibole. Commonly includes a few percent of volcanic xenoliths. In many places shows signs of having been reworked by wind and (or) water. Named for outcrops near Lion Flat, located in the southeastern part of map area. Thickness about 100 m

Td MOUNT DUTTON FORMATION (MIOCENE AND OLIGOCENE)--Gray to dark-gray lava flows, flow breccia, and volcanic mudflow breccia of mafic intermediate composition. Aphanitic to conspicuously porphyritic, containing phenocrysts of plagioclase, amphibole, and pyroxene. Most of this formation belongs to the vent facies according to the terminology of Parsons (1965, 1969) and Smedes and Prostka (1973). K-Ar ages range from 26 m.y. (Fleck and others, 1975) to about 21 m.y. (stratigraphic position relating to other dated units). Thickness in hundreds of meters

Ttbr TUFF OF BEAVER RIVER (MIOCENE)--Brownish- to reddish-gray, crystal-poor, ash-flow tuff, consisting of less than 10 percent phenocrysts of plagioclase, pyroxene, and minor biotite and Fe-Ti oxides, plus several percent volcanic xenoliths, in a densely welded, devitrified matrix of shards, dust, and pumice. Lapped onto flanks of an active volcano of Mount Dutton Formation (Td). Named for outcrops along the Beaver River in the southeastern part of map area. Thickness about 8 m

Ttbm TUFF OF BLACK MOUNTAIN (MIOCENE)--Reddish-brown to brownish-gray devitrified, densely welded, ash-flow tuff, containing a grayish-black basal vitrophyre. Consists of 20-30 percent phenocrysts of plagioclase, pyroxene, minor sanidine, and Fe-Ti oxides, and traces of biotite in a matrix of shards, dust, and pumice. Lapped onto flanks of an active volcano of the Mount Dutton Formation (Td). Named for outcrops on Black Mountain in the southeastern part of map area. Thickness about 10 m

To OSIRIS TUFF (MIOCENE)--Gray, densely welded, crystal-rich, rhyodacitic ash flow tuff containing prominent phenocrysts of plagioclase and pyroxene with minor sanidine, biotite and Fe-Ti oxides. K-Ar age about 22 m.y. (Fleck and others, 1975). Only exposed in northeastern part of map area

BULLION CANYON VOLCANICS (MIOCENE AND OLIGOCENE)--Defined by Callaghan (1939). Consists largely of vent facies rocks interlayered with several named ash-flow tuffs

Tbi Quartz monzonite and latite (Miocene and Oligocene)--Mostly in two stocks in the northeast part of map area. The first and smaller is along Pine Creek and consists of highly porphyritic plagioclase-, biotite-, hornblende-quartz latite. The second intruded the main body of the Bullion Canyon Volcanics (Tb) along Indian Creek and consists of equigranular, fine- to medium-grained quartz monzonite with approximately equal proportions of plagioclase and orthoclase, as much as 20 percent quartz, plus lesser quantities of augite, hornblende, and biotite and minor accessory aptite, zircon, and Fe-Ti oxides

Tb Main body (Miocene and Oligocene)--A heterogeneous assemblage of light- to dark-gray and brown, porphyritic rhyodacite and quartz latite lava flows, flow breccia and volcanic mudflow breccia, characterized by abundant phenocrysts of plagioclase, biotite, and clinopyroxene. Several dark-brown aphanitic lava flows of intermediate composition, containing phenocrysts of clinopyroxene and plagioclase, included in this unit near the southern margin of map area. Thickness in hundreds of meters

Tbu Upper member (Miocene)--Dark-gray to brown, rhyodacite to andesite lava flows and local ash-flow tuffs. Mapped where underlain by the Delano Peak Tuff Member (Tbd) along the Beaver River near Ponderosa Park

Tbd Delano Peak Tuff Member (Miocene)--Reddish-brown, densely welded, crystal-rich quartz latite ash-flow tuff containing phenocrysts of plagioclase, hornblende, Fe-Ti oxides, and minor quartz, biotite, and apatite. Source is the Big John caldera northeast of map area (Steven and others, 1979a). K-Ar age is 21.8 ± 1.0 m.y. (Steven and others, 1979b). Only mapped in one area about 2 km west of Ponderosa Park, southwest corner of map area. Thickness about 15 m

Tbt Three Creeks Tuff Member (Oligocene)--Dark-gray to reddish-brown, densely welded, crystal-rich quartz latitic ash-flow tuff containing phenocrysts of plagioclase (35 percent), hornblende (9 percent), biotite (3 percent), and quartz (2 percent). Accessory minerals include Fe-Ti oxide minerals and sanidine. Present only in the northeast corner of map area, this is basal ash-flow tuff mamber of the Bullion Canyon Volcanics (Tb). K-Ar age is 27 m.y. (Steven and others, 1979b)

Tis SYENITE (MIOCENE?)--Light- to dark-gray, medium- to coarse-grained, leucocratic, porphyritic to hypidiomorphic granular rock with predominant orthoclase and plagioclase, and lesser amounts of hornblende, clinopyroxene, and sparse biotite. Sphene and Fe-Ti oxide grains common accessory minerals. Feldspars range from predominantly orthoclase to subequal amounts of orthoclase and plagioclase. Very sparse, highly resorbed grains of quartz present locally. Found only in the northwestern part of the mapped area, where it cuts gabbro porphyry (Tig) with which it is closely associated. May be related to 22- to 27-m.y.-old monzonite intrusions near Sulphurdale, about 30 km north of Beaver

Tig GABBRO PORPHYRY (MIOCENE?)--Dark-gray, conspicuously porphyritic rock with phenocrysts of labradorite and clinopyroxene in a felted matrix of plagioclase microlites and Fe-Ti oxide grains. Cuts propylitically altered Bullion Canyon volcanics (Tb) and may be related to 22- to 27-m.y.-old monzonite intrusions near Sulphurdale, about 30 km north of Beaver

J₹n NAVAJO SANDSTONE (JURASSIC AND TRIASSIC?)--Fine-grained, light-brown, well-sorted sandstone. Present as mega-xenoliths or blocks in Tertiary lava flows and intrusive rocks

PALEOZOIC ROCKS

Pzc Carbonate sedimentary rocks and derivative skarn deposits

Pzq Quartzite interbedded with carbonate rock (Pzc)

CONTACT--Approximately located, queried where gradational

GRADATIONAL CONTACT BETWEEN INTRUSIVE AND EXTRUSIVE PARTS OF THE SAME ROCK UNIT--Approximately located

FAULT--Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side. Inclination and direction of dip shown where known

LINEATION--Faint vegetional, tonal or strong topographic alinements on aerial photographs possibly related to faults

ANTIFORM AXIS--Axis of broad, intensely faulted antiform developed primarily in the basin center, lacustrine facies of the upper part of the basin-fill (QTsl), gravels of Last Chance Bench (Qglc), and old and middle alluviums (Qto and Qtm). Axis of the antiform strikes north from the Beaver River, 1 1/2 km west of Greenville, to the Hogsback and is largely coincident with the southward project of the Maple Flats Horst. Growth of the antiform has been concurrent with deposition during Pliocene(?) and Pleistocene time and is thought to be driven by a sedimentary diapir

LANDSLIDE SCARP--Topographic scarps produced by gravitational rotation and slumping of basalt blocks (Qbch) that rest on fine-grained basin-fill deposits. Hachures on downdropped side. Especially well developed southeast of Cunningham Hill

TRACE OF TOPOGRAPHIC WALL OF MOUNT BELKNAP CALDERA--Dashed where approximately located or covered by landslide deposits. Hachures toward caldera

DIKE--Inclination and direction of dip shown where known

QUARTZ VEIN--Inclination and direction of dip shown where known

STRIKE AND DIP OF LAVA FLOWS AND SEDIMENTARY UNITS

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GEOLOGIC MAP OF THE BEAVER 15 MINUTE QUADRANGLE, BEAVER COUNTY, UTAH

By
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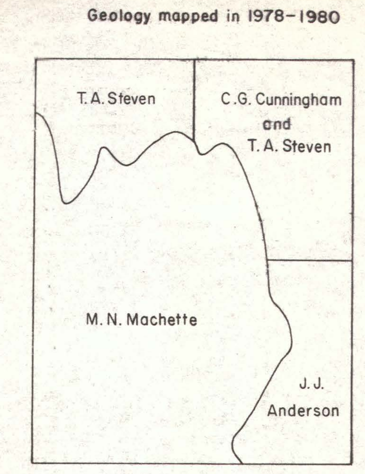
1981



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