

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Map Showing Volcanic Geology of the
Observation Knoll and The Tetons Quadrangles,
Beaver and Iron Counties, Utah

By

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Open-File Report 79-1611
1979

This report is preliminary and has not been
edited or reviewed for conformity with U.S.
Geological Survey standards.

DESCRIPTION OF MAP UNITS

Qac

ALLUVIUM AND COLLUVIUM (QUATERNARY)--Unconsolidated, poorly sorted stream, fan, slope-wash, and talus deposits. The unit includes detritus of the unit Tbrt as talus aprons around The Tetons and as a mantle on a pediment between The Tetons and Jockey Road. Total thickness probably does not exceed 40 m

Tbrt

FORMATION OF BLAWN WASH (MIOCENE)

Rhyolite member of the Tetons--Light-gray, pink, lavender, or brown porphyritic rhyolite flows and shallow intrusions with only a few small (<1 mm) phenocrysts of smokey quartz, sanidine, and plagioclase in a microcrystalline matrix. Generally flow layered and locally spherulitic and lithophysal with topaz and rare fluorite in vugs. Sanidine from the intrusive rhyolite south of the Staats mine has a K-Ar age of 20 m.y. (Lindsey and Osmonson, 1978)

Tbrp

Rhyolite member of Pink Knolls--Flows and shallow intrusive plugs and dikes of gray to brown strongly porphyritic rhyolite; locally vitrophyric. Phenocrysts of quartz, sanidine, plagioclase, and lesser biotite comprise as much as one-third of the rock. Phenocrysts range widely in size, and within individual outcrops, sanidine and quartz range from small crystals to prominent phenocrysts as much as 3 cm and 1 cm across, respectively

Tbt

Tuff member--A sequence of light-colored, generally loosely consolidated, vitric-lithic ash-flow and minor air-fall tuffs with intervening beds of stratified water-lain tuffs, volcanic sandstones, and conglomerates. The topaz rhyolite at The Tetons is underlain by a strongly welded ash-flow tuff with collapsed pumice lenses of black or brown glass. Tuffs in the unit contain less than 10 percent phenocrysts of quartz, plagioclase, sanidine, and biotite and have abundant pumice lapilli. Fragments of the Lund Tuff Member as much as 25 cm across are typically present, and are especially common in the epiclastic beds.

Scattered fragments of Lund are commonly the only indication of the unit beneath poorly exposed slopes. The unit appears to be comprised of locally derived material, in part representing the precursory explosive facies of younger rhyolite flows and intrusions. Possibly as much as 300 m of this unit is exposed in Blawn Wash

Tbm

Mafic flow member--Gray lava flow with phenocrysts of augite and labradorite; weathers brown with red liesegang bands; zeolite amygdules. In these and adjacent quadrangles the unit ranges from 55 to 60 weight percent SiO₂ and 2.4 to 4.0 K₂O. Thickness 200 m

Tbtg

Garnet-bearing tuff member--Identical to the unit Tbt except for the presence of trace amounts of euhedral dark-red garnet phenocrysts 1-2 mm in diameter. Some of the areas of altered rock designated as unit Tbt on the map may be of this unit. Thickness 210 m in Blawn Wash

Tcb

BAUERS TUFF MEMBER OF THE CONDOR CANYON FORMATION (MIOCENE)-- Strongly welded vitric ash-flow tuff with about 15 percent phenocrysts of plagioclase, sanidine, and biotite in a pale-gray to pink or lavender matrix. Thickness about 10 m. Age--22 m.y. (Fleck and others, 1975)

Ta

ANDESITE (MIOCENE)--Gray andesite with small green pyroxene phenocrysts; weathers to brown chips. Thickness 300 m

Ti

ISOM FORMATION (OLIGOCENE)--Densely welded, vuggy ash-flow tuff with intensely compressed and locally stretched lenticles of light-colored pumice in a purple to red-brown lithoidal matrix. Phenocrysts of plagioclase with minor pyroxene and Fe-Ti oxides comprise less than 10 percent of rock. Commonly weathers into grus. Thickness may be as great as 20 m but is difficult to ascertain because of possible secondary flowage and internal contortion of foliation after emplacement. Age--25 m.y. (Fleck and others, 1975)

Twp

NEEDLES RANGE FORMATION (OLIGOCENE)--Crystal-rich, gray, red-brown to purple-brown (where somewhat altered) ash-flow tuff sheets (the Wallaces Peak, Lund, Wah Wah Springs, and Cottonwood Wash). All tuffs contain 40-50 percent phenocrysts of plagioclase (generally about 25 percent), biotite, hornblende, and quartz. The Needles Range can be divided into mappable parts in several quadrangles.

Tl

Perhaps it and its parts should be assigned higher stratigraphic rank. Age--29 m.y. (Fleck and others, 1975)
Wallaces Peak Tuff Member--Gray, moderately welded tuff with conspicuous white pumice lapilli. Blocky plagioclase as much as 6 mm across and euhedral biotite and hornblende are prominent but quartz phenocrysts are small and inconspicuous. Only exposed in Blawn Wash where it is 30-60 m thick

Tw

Lund Tuff Member--Strongly welded, commonly with flattened white pumice lapilli; comprised of plagioclase, biotite, as much as 15 percent quartz, and minor hornblende. An apparently unfaulted section between Blawn Wash and Jockey Road is 250 m thick; near The Tetons it is about 250 m thick, whereas near the south edge of the quadrangle apparently unfaulted sections are at least twice as thick
Wah Wah Springs Tuff Member--Strongly welded with prominent hornblende but less than 1-2 percent of small quartz phenocrysts. Flattened pumice lapilli are locally conspicuous. East of The Tetons the unit is at least 120 m thick

Tc

Cottonwood Wash Tuff Member--Strongly welded with prominent euhedral biotite phenocrysts up to 8 mm in diameter and several percent quartz phenocrysts as much as 4 mm; hornblende is inconspicuous in hand sample. Ranges from 0 to 20 m in thickness

Te

ESCALANTE DESERT FORMATION, UNDIVIDED (OLIGOCENE)--A sequence of crystal-poor, lithic, rhyolitic to quartz-latitic ash-flow tuffs, andesitic and rhyolitic lava flows, and volcanic sandstone described by Grant (1978) and Campbell (1978). "The type section for the formation is the northeast flank of hill 6535 (Lund Quadrangle), sec. 6, T. 32 S., R. 14 W. It includes all lithologies from the first ash-flow above the volcanic conglomerate to the base of the Wah Wah Springs Member of the Needles Range Formation" (Grant, 1978, p. 27). The name is taken from the large flat desert valley which extends into the southeast half of the Lund Quadrangle at the southern end of the Wah Wah Mountains

Teb

Beers Spring Member--Green-brown, well-sorted volcanic sandstone. Exposed thickness ranges from 0 to as much as 400 m south of Jockey Road where a local lense of pyroxene-plagioclase-phyric andesite and a firmly welded ash-flow tuff resembling unit Tel are included

Upper quartz latite flow member--Lavender-gray, generally delicately flow layered; weathers into hackly plates and grus; less than 20 percent phenocrysts of plagioclase and biotite; SiO₂ about 67 weight percent and K₂O 4-5 weight percent. About 100 m thick

Tefu

Lamerdorf Tuff Member--Lavender to brown, firmly welded quartz-latitic ash-flow tuff with about 10 percent chalky plagioclase and lesser biotite; dark-colored lithic fragments and intensely flattened pumice lapilli are conspicuous. Between Blawn Mountain and The Seeps the unit includes small amounts of the units Teb and Tefu.

Thickness 50-100 m

Tefl

Lower quartz latite flow member--Similar to the unit Tefu except that plagioclase phenocrysts are larger, less abundant, and the rock breaks down into smooth chips and slabs. Thickness 60-150 m

Tea

Andesite member--Phenocrysts of green pyroxene and plagioclase in a black aphanitic to glassy matrix; weathers into brown blocks. Thickness 0-300 m

Tem

Tuff member of Marsden Spring--Pale-green-gray to white tuff; locally bedded; only a trace of phenocrysts of quartz and feldspar; fragments of pink to purple quartzite are conspicuous. Thickness 0-150 m

Tv

VOLCANIC ROCKS, UNDIVIDED (OLIGOCENE)--Stratigraphic identity uncertain because of intense alteration

P

PALEOZOIC ROCKS, UNDIVIDED--Includes a small unmapped area of Jurassic-Triassic(?) Navajo Sandstone in the southeastern part of the quadrangle

EXPLANATION OF SYMBOLS

— — — CONTACT--Dashed where approximately located

$\frac{D}{U}$ — ··· FAULT--Dashed where approximately located; dotted where concealed. Ball and bar, or "D", on downthrown side

\swarrow^{13} STRIKE AND DIP OF BEDDING

STRIKE AND DIP OF FOLIATION

\nearrow_{58} Inclined

♦ Horizontal

... HYDROTHERMALLY ALTERED ROCKS--Argillized, silicified, or alunitized; contacts and units generalized in altered areas

××× QUARTZ-CALCITE VEINS--Steeply dipping

REFERENCES

- Armstrong, R. L., 1970, Geochronology of Tertiary igneous rocks, eastern Basin and Range Province, western Utah, eastern Nevada, and vicinity, U.S.A.: *Geochimica et Cosmochimica Acta*, v. 34, p. 203-232.
- Campbell, D. R., 1978, Stratigraphy of pre-Needles Range Formation ash-flow tuffs in the northern Needle Range and southern Wah Wah Mountains, Beaver County, Utah: Brigham Young University Geology Studies, v. 25, p. 31-46.
- Fleck, R. J., Anderson, J. J., and Rowley, P. D., 1975, Chronology of mid-Tertiary volcanism in High Plateaus region of Utah: Geological Society of America Special Paper 160, p. 53-61.
- Grant, S. K., 1978, Stratigraphic relations of the Escalante Desert Formation near Lund, Utah: Brigham Young University Geology Studies, v. 25, p. 27-30.
- Lindsey, D. A., and Osmonson, L. M., 1978, Mineral potential of altered rocks near Blawn Mountain, Wah Wah Range, Utah: U.S. Geological Survey Open-File Report 78-114.