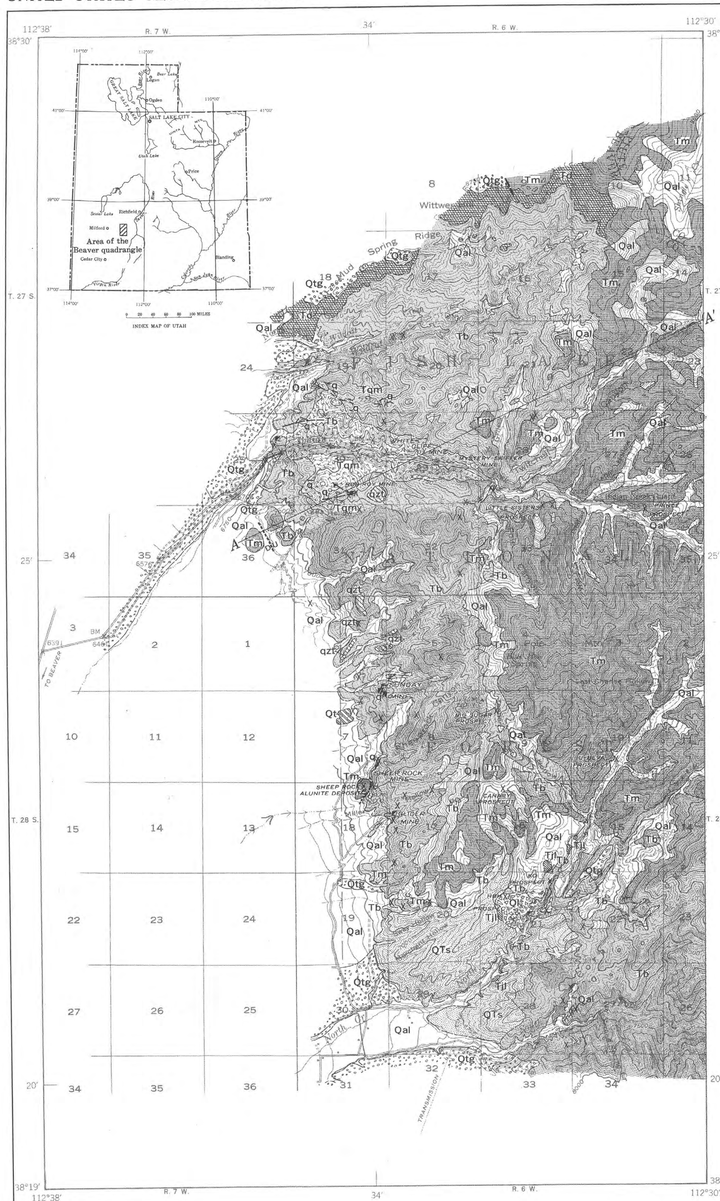
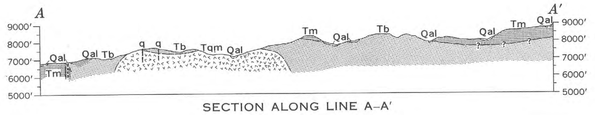


Base map by Topographic Division
U. S. Geological Survey, 1937

Geology mapped in 1936–38



SECTION ALONG LINE A–A'

EXPLANATION

QUATERNARY

Pleistocene and Recent

Qal — Alluvium
Talus, slope wash, alluvial fan and stream channel deposits

Qt — Travertine

Qls — Landslide debris

Qtg — Terrace gravel
Gravel above present drainage levels

UNCONFORMITY

Upper Pliocene or lower Pleistocene

QTs — Sevier River formation
Partly consolidated fanglomerate, sand, and silt mainly of local origin

UNCONFORMITY

TERTIARY

Pliocene(?)

Tjl — Joe Lott tuff
White, stony, rhyolitic tuff with included small fragments of rhyolite and latite

Tm — Mount Belknap rhyolite
Light pinkish-gray to light brownish-gray tuffaceous rhyolite; stippled overprint indicates alunitized and silicified rock at the Sheep Rock alunite deposit

Td — Dry Hollow formation
Light reddish-brown porphyritic latite

UNCONFORMITY

Miocene(?)

Tqm — Quartz monzonite
Stock of medium-grained quartz monzonite in the Canyon of Indian Creek; stippled overprint indicates silicified and argillized rocks

Tb / qzt — Bullion Canyon volcanics
Latite flows, tuffs and breccias; quartzite inclusions or exposures of underlying bedrock, probably Navajo sandstone, qzt; stippled overprint indicates silicified, sericitized, chloritized and pyritized rock

q — Quartz veins

Contact
Dashed where approximately located

U / D — Fault
Dashed where approximately located; dotted where concealed or inferred. U, upthrown side; D, downthrown side

25 — Strike and dip of beds

Shaft

X — Prospect

Adit

INTRODUCTION

Tertiary volcanic and intrusive rocks underlie a large area surrounding Marysvale in southwestern Utah. Part of the Beaver quadrangle and four complete 15-minute quadrangles, Marysvale, Delano Peak, Sevier, and Monroe, have been mapped to cover the areal extent of these rocks. Mapping in the Beaver quadrangle has been restricted to the northeastern part, the area containing the western part of this volcanic province.

The mapped area of the quadrangle contains the westernmost slopes of the Tushar Mountains, which slopes steeply to the eastern edge of the Great Basin. The area is thoroughly dissected and its topography is extremely rugged, having a maximum relief of more than 3,500 feet. Wildcat, Indian, and North Creeks have developed the most prominent and steeply walled canyons.

The area of about 42 square miles lies about 6 miles northeast of Beaver. A main north-south thoroughfare, United States Highway 91, connects Beaver with Salt Lake City 208 miles to the north. Roads in the canyons of Indian Creek and North Creek allow entry into the area.

The geology of the Beaver quadrangle was mapped by Callaghan, but most of the report was written by Parker from field notes, previous reports, and oral data supplied by Callaghan.

GENERAL GEOLOGY

The two principal volcanic rock units of Miocene(?) and Pliocene(?) ages that are prominent elsewhere in the Marysvale region (Callaghan, 1938, 1939) are also the principal rocks in the Beaver quadrangle. The Miocene(?) rocks are represented by the Bullion Canyon volcanics composed of dark porphyritic andesite or calcic latite flows and pyroclastics. These rocks are intruded by quartz monzonite and mineralized and altered over large areas. The Pliocene(?) rocks are represented by latite of the Dry Hollow formation at the northern margin of the area, by the Mount Belknap rhyolite along the eastern margin, and by the Joe Lott tuff in a small area along the North Fork of North Creek.

Near the mouth of the North Fork of North Creek a large area of gravel probably belongs to the Sevier River formation of late Pliocene or early Pleistocene age. Pleistocene and Recent surficial deposits consist of travertine, terrace gravel, landslide debris, and alluvium.

MIOCENE(?) IGNEOUS ROCKS

Bullion Canyon volcanics.—The Bullion Canyon volcanics are the oldest volcanic rocks in the Beaver quadrangle. They form a crescent-shaped belt of outcrop, which in places is as much as 3½ miles wide, along the western slopes of the Tushar Mountains. At the northern border of the quadrangle these rocks are overlain by latite of the Dry Hollow formation, but southward the Dry Hollow disappears and the Mount Belknap rhyolite rests directly on the Bullion Canyon volcanics. In a few places along the North Fork of North Creek, the Bullion Canyon volcanics are overlain by the Joe Lott tuff. Nowhere in the quadrangle is the base of the Bullion Canyon volcanics exposed.

The Bullion Canyon volcanics in the Beaver quadrangle is in most respects similar to the upper part of this volcanic sequence elsewhere in the Marysvale region. It consists of andesite or calcic latite flows, tuffs, and breccias. Most of the flows are porphyritic with abundant phenocrysts of andesine and are very dark in color; the tuffs and breccias are also dark.

The Bullion Canyon volcanics is altered in the areas shown on the map by the stippled overprint. The original minerals of the volcanic rocks for the most part have been destroyed, and their places have been taken by aggregates of sericite, carbonate, chlorite, quartz, and disseminated pyrite. Along many of the quartz veins this alteration has been especially intense in zones that are too narrow to show on the map.

Between Indian Creek and Drag Hollow are scattered masses of quartzite surrounded by the Bullion Canyon volcanics. They are irregular in shape and are of considerable size, ranging from 200 to 1,700 feet long. The quartzite is very similar in lithology to the Navajo sandstone which is exposed in other parts of the Marysvale region. Possibly these quartzite bodies are blocks that were rafted into their present positions during the extrusion of the volcanics, or possibly they represent prominent hills of quartzite that were covered by the volcanics and subsequently exposed by erosion.

Quartz monzonite.—A stock of quartz monzonite has intruded and metamorphosed the Bullion Canyon volcanics at Indian Creek. This intrusive is nearly equigranular with the grain size ranging from 1 to 2.5 mm for the major constituents—plagioclase, orthoclase, quartz, biotite, and augite. The plagioclase is much sericitized and is commonly replaced by orthoclase. Graphic-textured intergrowths of orthoclase and quartz are abundant. The biotite has been largely changed to chlorite, and the augite has been partly replaced by carbonate. Magnetite, apatite, and zircon are accessory minerals.

Veins.—Numerous quartz-carbonate veins are found in the Bullion Canyon volcanics near the quartz monzonite body of Indian Creek; some of the veins cut across the Bullion Canyon volcanics-quartz monzonite contact. Quartz-carbonate veins are also found a few miles south of the exposed intrusive at the Sheep Rock and Sunday mines. These veins have been much prospected and have yielded both gold and silver.

Contact metamorphic rocks.—A zone of metamorphosed Bullion Canyon volcanics borders the Indian Creek quartz monzonite intrusion. Contact metamorphism was sufficiently intense in some places to change all of the original minerals of the latite to a visibly granular aggregate of orthoclase, biotite, epidote, oligoclase, and magnetite. The most notable change is an increase in the proportion of orthoclase, which is the dominant constituent in the metamorphosed latite. In some less strongly metamorphosed latites the original plagioclase is rimmed or only partly replaced by orthoclase, and much of the groundmass is converted to a quartz-orthoclase intergrowth. Some fresh-appearing pyroxene grains are present and possibly were formed during the metamorphism.

PLIOCENE(?) VOLCANIC ROCKS

The Pliocene(?) volcanic rocks exposed in the Beaver quadrangle are the latite of the Dry Hollow formation, the Mount Belknap rhyolite, and the Joe Lott tuff. These rocks rest unconformably upon the Bullion Canyon volcanics and are unconformably overlain by the Sevier River formation.

Dry Hollow formation.—The Dry Hollow formation is restricted to the northern margin of the mapped area, and in its northeasternmost exposures the formation abruptly thins and disappears southward. The formation thickens greatly for several miles to the north and northeast of the quadrangle and is the dominant formation in the region at the head of Clear Creek 8 miles to the north.

Typically the Dry Hollow formation is a light-reddish-brown porphyritic latite. The phenocrysts consist of plagioclase, biotite, altered hornblende, and quartz. Plagioclase crystals are as much as 4 mm across and are mottled with orthoclase. Biotite crystals are unaltered. Hornblende crystals have been destroyed, but their original crystal outlines are preserved by rims of hematite and magnetite. Many of the quartz phenocrysts are embayed and show the effects of resorption. The groundmass is devitrified glass which contains profusely distributed hematite dust and abundant spherulites that average 1 mm in diameter. The dust in the groundmass accounts for the reddish color.

The Dry Hollow is considerably less altered than the underlying Bullion Canyon volcanics, although it contains sporadically distributed alteration products much like those in the Bullion Canyon rocks.

Mount Belknap rhyolite.—The Mount Belknap rhyolite underlies a large area along the eastern boundary of the Beaver quadrangle and is continuous with the great lenticular body of rhyolite that occupies the northern part of the Tushar Mountains in the adjoining Delano Peak quadrangle.

Most of the rhyolite in the Beaver quadrangle is light pinkish gray to light brownish gray and weathers to scaly fragments. Most of it is tuffaceous and contains collapsed-bubble structure, glass shards, and lenses of glass, features that are characteristic of welded tuffs. Spherulites are abundant in the lenses of glass.

A low hill near the mouth of Sheeprock Canyon is composed of light-gray, distinctly banded rhyolite that strongly resembles the gray facies of the Mount Belknap rhyolite found in the eastern slopes of the Tushar Mountains. Like the tuffaceous rhyolite, the banded gray variety contains prominent spherulites. Alunitic alteration has converted the banded rhyolite into an alunite-quartz aggregate, a type of alteration that is unique in the Pliocene(?) group of volcanics. In other parts of the Marysvale region alunitization is confined to the Miocene(?) Bullion Canyon volcanics. This area of alunitic alteration is known as the Sheeprock alunite deposit, and is described in more detail below.

Joe Lott tuff.—Small exposures of the Joe Lott tuff are found in the canyon of the North Fork of North Creek, and the formation probably also underlies some of the area covered by the Sevier River formation near the mouth of the canyon. The tuff originally covered most of the Marysvale region, but much of it has been removed by later erosion. Best exposures of the Joe Lott tuff are found in the Clear Creek basin about 12 miles northeast of the Beaver quadrangle.

The Joe Lott is white to light brownish gray and is a rhyolitic welded tuff. It contains abundant fragments of white stony rhyolite and pumice and commonly includes particles of rock from the Bullion Canyon volcanics and the Mount Belknap rhyolite. Under the microscope the tuff is seen to consist of an aggregate of glass shards and minute crystal fragments of orthoclase and less abundant biotite and quartz.

UPPER PLIOCENE OR LOWER PLEISTOCENE SEVIER RIVER FORMATION

An area of approximately 2 square miles near the mouth of the canyon of the North Fork of North Creek is underlain by material that probably belongs to the Sevier River formation. This formation is a valley-fill deposit, consisting of partly consolidated fanglomerate, conglomerate, sand, and silt, which for the most part have been derived from the nearly highlands.

Diatoms from the Sevier River formation north of Sevier in the Sevier quadrangle have been indentified by K. E. Lohman of the U. S. Geological Survey as being of late Pliocene or early Pleistocene age (Callaghan, 1938).

QUATERNARY DEPOSITS

Stream gravels that were deposited above present drainage channels and have a different surface slope from these channels are mapped as terrace gravels. Such terrace gravels are found at many places along the base of the Tushar Mountains, especially near Wildcat, Indian, and North Creeks. Gravels in present drainage channels, slope wash, alluvial-fan material, and talus have not been separately distinguished and have all been mapped as alluvium.

One small landslide deposit, composed of rock rubble and debris, is in the canyon of the North Fork of North Creek, about a mile from its mouth.

A small deposit of travertine has been formed by a mineral spring half a mile north of the mouth of Sheeprock Canyon.

STRUCTURAL GEOLOGY

The structure of the area mapped in the Beaver quadrangle is relatively simple. So far as the Pliocene(?) rocks are concerned, the area is a structural dip slope as well as a topographic slope. Erosion of these rocks has exposed the older Bullion Canyon volcanics and associated intrusive rocks and mineral deposits. Not enough data on deformation structures within the Bullion Canyon volcanics could be obtained to determine with assurance that the regional dip of the older rocks corresponds with that of the younger rocks.

The Mount Belknap rhyolite has been faulted against the older Bullion Canyon volcanics near the mouths of Indian Creek and Sheeprock Canyons, suggesting that a normal fault extends along the base of the mountains at least between these places (section A–A'). The travertine, a mile north of the Sheep Rock mine, probably represents deposits from spring waters that ascended along this fault. Doubtless, other faults occur which have not been recognized in the massive volcanic formations.

MINERAL DEPOSITS

The mining properties in the Beaver area are a part of the Newton mining district which was organized in 1893 (Butler and others, 1920, p. 543). It was originally a gold district, but later exploration also revealed the presence of alunite and uranium.

PRECIOUS METALS

Sheep Rock mine.—The Sheep Rock mine (Butler and others, 1920, p. 557–558; Loughlin, 1915, p. 261) is at the mouth of Sheeprock Canyon about 10 miles northeast of Beaver. The workings, which are now caved, extended to a depth of at least 300 feet and included a shaft and a tunnel.

The mine is on a vein system that strikes N. 20° E. and dips 65°–70° E. The veins are exposed for more than 1,000 feet along this trend on the slope above and east of Sheep Rock. The veins are the quartz-carbonate type similar to those in the higher parts of the Tushar Mountains. Pyrite (or limonite pseudomorphs), native gold, cerargyrite or argentite, and ruby silver have been indentified from the ore. The richest ore was mined from shoots that also carried hydrous manganese oxides. According to Butler and others (1920) all the ore mined down to the 200-foot level was oxidized.

The country rock is dark porphyritic andesite or calcic latite of the Bullion Canyon volcanics. Adjacent to the vein, this rock has been much sericitized, pyritized, and in some places silicified.

Rob Roy mine.—The Rob Roy mine is near the southern border of the Indian Creek quartz monzonite intrusion about 3 miles north of the Sheep Rock mine. Butler and others (1920, p. 557) report that both the intrusive rock and the overlying volcanic rocks were fissured, and the fissures were filled with quartz. The country rock adjacent to the veins is silicified and pyritized. The mine has produced a little rich gold ore.

ALUNITE

In the Marysvale region many vein and replacement deposits of alunite are found in the Miocene(?) Bullion Canyon volcanics. In the Beaver quadrangle, however, the only known alunite deposit, the Sheep Rock, is a replacement deposit in the Pliocene(?) Mount Belknap rhyolite. It is the only deposit known in Pliocene(?) rocks in the Marysvale region.

The Sheep Rock alunite deposit lies about 1,200 feet southwest of the Sheep Rock mine in secs. 17 and 18, T. 28 S., R. 6 W. It was described in considerable detail by Loughlin (1915, p. 258–264) and in less detail by Butler and others (1920).

The deposit is a body of altered banded rhyolite which stands out as a small, rounded prominence on the end of a spur that divides Sheep Rock Canyon and Miller Hollow. Much of the deposit is covered with debris, but on the southwest side altered rhyolite crops out in an area that is 1,200 feet long and as much as 900 feet wide. The deposit is separated from the calcic latite of the Bullion Canyon volcanics on the east by a north-trending normal fault.

The original rhyolite of the deposit has been changed to an aggregate of alunite, quartz, and minor kaolinite which is light gray to light pinkish gray and very fine grained. Alteration has been such that the banded structure of the rhyolite has been preserved. Probably much of the quartz of the alunitized rock is the primary quartz of the rhyolite though, doubtless, some of it was produced in the process of alteration. Most of the feldspar has been replaced by alunite although some of it has been replaced by fine-grained quartz. Two samples taken by Callaghan and analyzed chemically by V. North of the U. S. Geological Survey contain 29.6 percent and 46.1 percent alunite. Aside from pits for claim location or sampling purposes, no alunitized rock has been mined from this deposit.

URANIUM

Uranium deposits occur in the canyons of Indian Creek and North Fork of North Creek. Prospects at Indian Creek were first described by Wyant and Stugard (1951). The following descriptions are based on a written communication by J. F. Powers and A. O. Taylor.

In general, the uranium deposits occur in shear zones in the Mount Belknap rhyolite or in altered zones along faults in the Bullion Canyon volcanics. Uranium minerals in the deposits are chiefly secondary—autunite, torbernite, and minor uranophane(?). An unidentified mineral associated with pyrite in the lower workings of the Mystery-Sniffer mine may be pitchblende.

Uranium mines and prospects and their locations are tabulated below:

Mystery-Sniffer mine	Sec. 28, T. 27 S., R. 6 W.
Little Sisters prospect	Sec. 33, T. 27 S., R. 6 W.
Prince prospect	Sec. 34, T. 27 S., R. 6 W.
U-Beva prospect	Sec. 10, T. 28 S., R. 6 W.
Big Sugar prospect	Sec. 9, T. 28 S., R. 6 W.
Canary prospect	Sec. 16, T. 28 S., R. 6 W.
KO prospect	Sec. 21, T. 28 S., R. 6 W.
HBH prospect	Sec. 21, T. 28 S., R. 6 W.

The principal uranium deposit in the quadrangle is the Mystery-Sniffer. In 1954 it had been explored by 975 feet of underground drifts and crosscuts and by six bulldozer trenches. The deposit is in an intensely argillized zone along a normal fault that separates latite of the Bullion Canyon volcanics from Mount Belknap rhyolite. The irregular zone trends east-west and dips 30° to 60° north for approximately 1,000 feet and ranges in width from 20 to 100 feet; it contains uranium minerals in lenticular shoots. Ore minerals are autunite, torbernite, and pitchblende(?) which occur with purple fluorite, pyrite, and quartz. Selected samples from underground workings ranged from 0.02 to 0.30 percent U_3O_8.

The U-Beva prospect, consisting of several hundred feet of bulldozer trenches, 90 feet of underground workings, and two pits, is in a fault zone in altered Bullion Canyon volcanics just below the contact with the overlying Mount Belknap rhyolite. The zone, which is only a few feet wide, can be traced for about 140 feet. At the surface a mineralized lenticular shoot containing disseminated autunite and torbernite averages 2 feet in width and is about 30 feet in length. Underground the shoot is about 10 inches in width and 14 feet in length. Surface samples averaged less than 0.05 percent U_3O_8, but underground channel samples across the shoot assayed 1.10 percent U_3O_8 for an 0.8-foot cut and 0.42 percent U_3O_8 for a 3-foot cut.

The KO, Canary, Big Sugar, and HBH prospects are all small prospects in altered zones along faults in the Bullion Canyon volcanics. Except for the HBH prospect in which no uranium minerals were identified, the deposits, like others in the area, contain autunite and torbernite. Selected samples assayed 0.095–0.225 percent U_3O_8 for the KO prospect, 0.032 percent U_3O_8 for the Canary prospect, 0.088 percent U_3O_8 for the Big Sugar prospect, and 0.012–0.019 percent U_3O_8 for the HBH prospect.

The Little Sisters and Prince prospects are small prospects that are entirely in the Mount Belknap rhyolite. At the Little Sisters prospect autunite and uranophane(?) locally coat fractures and fill open spaces in brecciated rhyolite along a northwest-trending fault. At the Prince prospect uranophane(?) occurs locally as thin coatings on joint surfaces in the rhyolite. A grab sample from the Little Sisters prospect assayed 0.49 percent U_3O_8; one from the Prince prospect assayed 0.041 percent U_3O_8.

OTHER DEPOSITS

No information is available on the Whitecliff, Sunday, and Glider mines, other than their locations.

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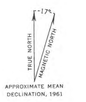
INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—61010

GEOLOGIC MAP OF PART OF THE BEAVER QUADRANGLE, UTAH

By
Eugene Callaghan and Raymond L. Parker

CONTOUR INTERVAL 50 FEET
DATUM IS MEAN SEA LEVEL

1961



MINERAL INVESTIGATIONS
FIELD STUDIES MAP MF-202

For sale by U. S. Geological Survey, price 50 cents