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**RADIOMETRIC RECONNAISSANCE NEAR
MONTEZUMA, SUMMIT COUNTY, COLORADO**

**By
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**This preliminary report is released without editorial and
technical review for conformity with official standards
and nomenclature, to make the information available to
interested organizations and to stimulate the search for
uranium deposits.**

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GEOLOGY AND MINERALOGY

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ABSTRACT

An area of about 5 square miles centering around Montezuma, Colo. was examined for radioactive materials during the fall of 1952. The region contains abundant northeast-trending steeply dipping fissure veins that cut pre-Cambrian hornblende gneiss and quartz monzonite of Tertiary age. The typical vein minerals are galena, sphalerite, pyrite, and chalcopyrite in a gangue of quartz and barite. Abnormal radioactivity occurs at two prospects on two different veins; the uranium content ranges from 0.001 to 0.007 percent.

INTRODUCTION

A reconnaissance radiometric survey of the region centering around Montezuma, Colo. (fig. 1) was made by the U. S. Geological Survey on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission during a period of about two weeks in October 1952. Montezuma is in the Central Mineral Belt on the west side of the Continental Divide about 12 miles southwest of Georgetown. It is reached by Colorado State Highway 294.

The purpose of the field work was to investigate possible extensions of radioactive vein matter reportedly occurring at the General Teller prospect, and also to examine radiometrically other veins in this region. The area examined extends from Glacier Mountain northeast through Montezuma and beyond to Tiptop Peak (fig. 2) and is at altitudes ranging from 10,250 feet to 12,450 feet. The survey was made chiefly with a scintillation detector supplemented in places with a Geiger counter.

No previous systematic radiometric reconnaissance has, to the writer's knowledge, been made in this area. The base maps (scale 1:62,500) used for this investigation were taken from the published report on the Montezuma quadrangle by Lovering (1935).

GEOLOGY

The country rock consists predominantly of hornblende (Swandyke) gneiss of pre-Cambrian age, which is present south of Montezuma, and quartz monzonite of Tertiary age that crops out north of Montezuma where it forms the southern border of a stock several miles wide. Quaternary glacial till mantles the floor and lower slopes of St. Johns and Deer Creek Valleys.

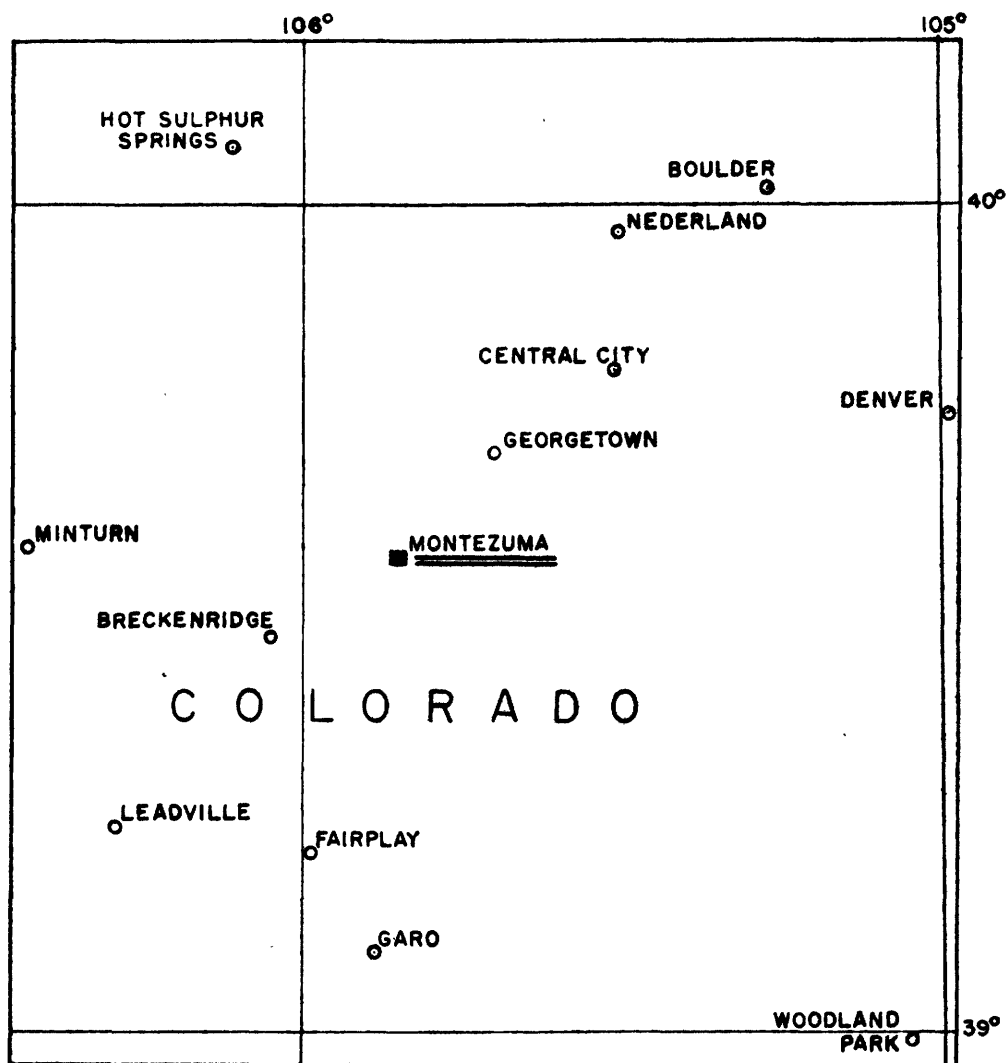
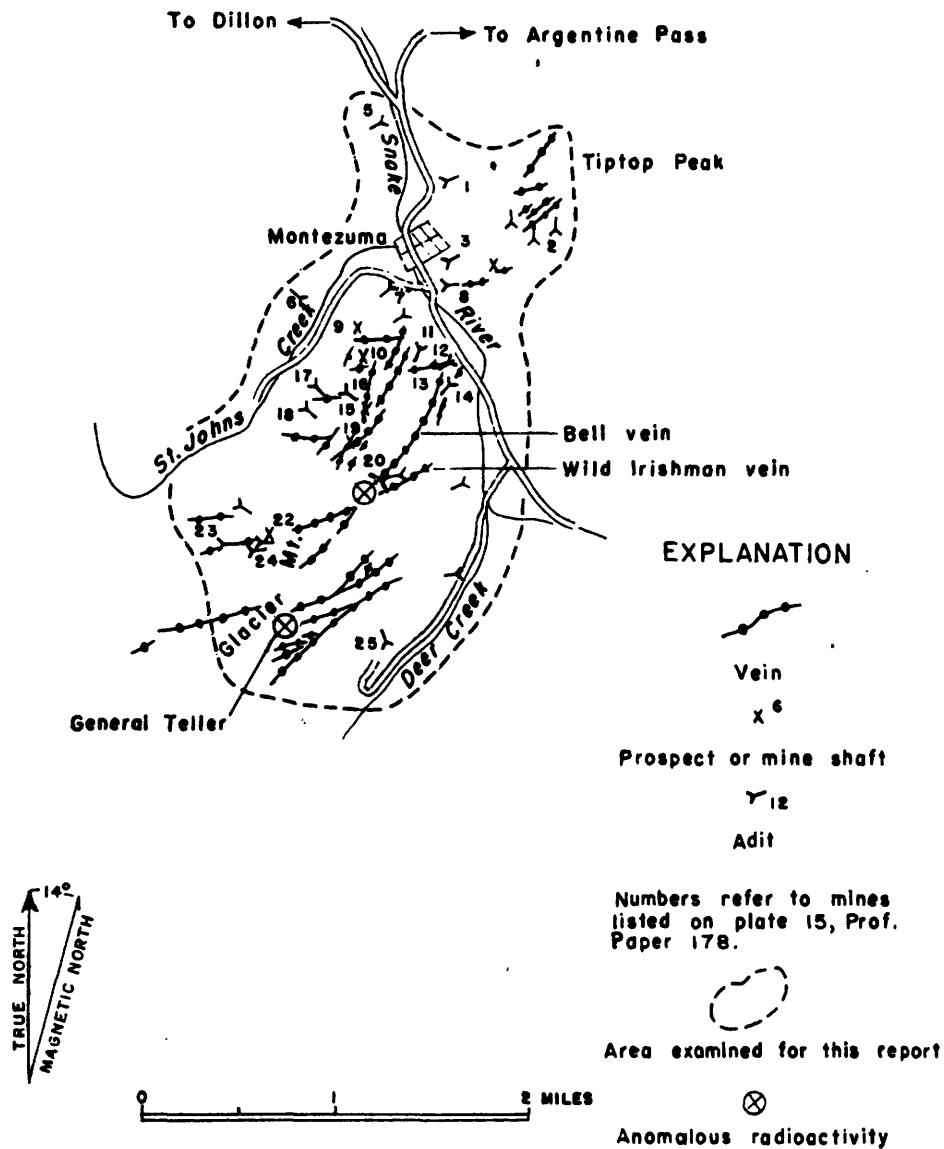


FIGURE 1—INDEX MAP SHOWING THE LOCATION OF MONTEZUMA

10 0 10 20 MILES



From plates 3 and 15, Professional Paper 178 with minor additions and changes.

FIGURE 2: MAP SHOWING MINES, PROSPECTS, AND VEINS NEAR MONTEZUMA.

The prevailing strike of the gneiss is northeast; the dips are steep and chiefly to the southeast. The ore deposits within the area examined occur in fissure veins ranging from a few inches to several feet in thickness that, with a few minor exceptions, strike northeast and dip moderately to steeply northwest. The veins are of Tertiary age and are classed as mesothermal. Most of the mines have yielded silver and lead ore. Galena, sphalerite, pyrite, and chalcopyrite are the chief sulfides, although some veins carry appreciable quantities of the silver minerals, miargyrite, proustite, and pyrargyrite. The gangue is chiefly quartz, barite, and ankerite, locally accompanied by siderite, manganosiderite, and fluorite. Most veins in this belt near Montezuma contain a high percent of barite.

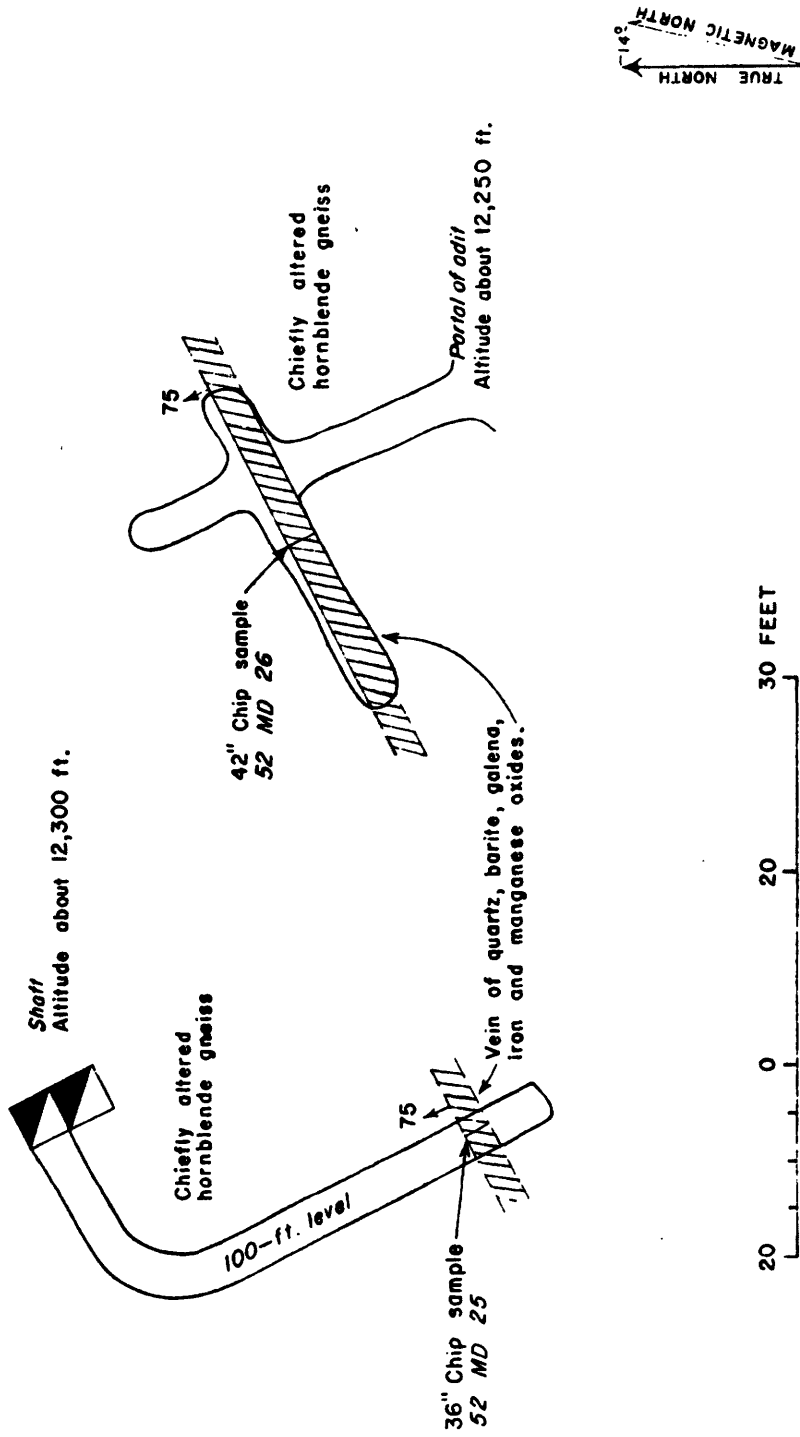
DEPOSITS WITH ANOMALOUS RADIOACTIVITY

Two deposits with anomalous radioactivity--the General Teller prospect and the Bell vein--both high on Glacier Mountain, are known in the region near Montezuma.

General Teller prospect

The General Teller prospect, held by A. R. Rhine of Denver, Colo., is on a fissure vein on Glacier Mountain, a few hundred feet east of the crest of the ridge (fig. 2). It can be reached during summer and early fall by a steep truck or Jeep road from the valley of St. Johns Creek. The underground workings consist of a shaft and lower adit with short crosscuts and drifts (fig. 3).

The vein is poorly exposed at the surface. In the underground workings the vein strikes N. 63° E. and dips 75° NW., and is 36 to 42 inches thick.



From Brunton and tape map by E. N. Harshman, October 1952

FIGURE 3.—PLAN OF UNDERGROUND WORKINGS AT GENERAL TELLER PROSPECT,
SHOWING LOCATIONS OF SAMPLES COLLECTED FOR ANALYSES.

The chief vein minerals--barite, quartz, and galena--are accompanied locally by small amounts of sphalerite, tetrahedrite (?), manganosiderite, limonite, cerussite, malachite, and azurite. The vein matter is slightly oxidized, and most of it is stained by manganese oxide.

Abnormal radioactivity that cannot be accounted for by the wall rocks was detected on the dump and in the adit (fig. 3). In the adit the vein is radioactive along its entire length. The source of the radioactivity is unknown, but possibly it is derived from limonite; no radioactive minerals have been identified. Analyses of the vein material from both the shaft and adit workings, together with selected radioactive material collected from the dump are given in table 1.

Table 1.--Equivalent uranium and uranium, General Teller prospect, Glacier Mountain, Montezuma, Colorado *

Sample no.	Location	Description	Equivalent uranium (percent)	Uranium (percent)
52-MD-18	Mine dump at adit portal	Chips of radioactive vein material	0.005	0.004
52-MD-19	do.	do.	.010	.001
52-MD-20	do.	Chips of average vein material	.004	N.D.
52-MD-25	Sample across vein in shaft workings. (See figure 3.)	Chip sample across 36 inches of vein	.002	N.D.
52-MD-26	Sample across vein in adit workings. (See figure 3.)	Chip sample across 42 inches of vein	.005	.007

* U.S.G.S. Trace Elements Laboratory, Denver, Colo.

Trench along Bell vein

High on the east slope of Glacier Mountain a trench about 50 feet long has been dug on the Bell vein at a point a few hundred feet north of the intersection of the Bell vein and the Wild Irishman vein (fig. 2). The Bell vein strikes N. 40° E., dips 50° NW., and ranges from a feather edge to a maximum of 10 inches in thickness. It is composed chiefly of quartz, barite, and manganosiderite, that contain small amounts of galena, chalcopyrite, and sphalerite. Partially oxidized patches of the vein contain limonite, smithsonite, and cerussite in addition to the primary sulfides. Most of the vein is stained by manganese oxide.

The vein, where exposed in the pit is abnormally radioactive. The radioactivity is irregularly distributed over a total length of about 25 feet along the vein; no radioactivity was recorded beyond the limits of the trench. The radioactive material is contained mostly, if not entirely, within the limonite. Exposures of the vein are poor outside of the pit although there are a few shallow workings along its probable extension, and accordingly additional prospecting may disclose other parts of the vein that show anomalous radioactivity. The uranium content of samples taken from the vein are given in table 2.

Table 2.--Equivalent uranium and uranium, Bell vein, exposed
in trench on Glacier Mountain, Montezuma, Colorado *

Sample No.	Description	Equivalent uranium (percent)	Uranium (percent)
52-MD-21	Chips of radioactive vein material	0.004	N.D.
52-MD-22	Selected chips of most radioactive parts of vein material	.009	0.001

* U.S.G.S. Trace Elements Laboratory, Denver, Colo.

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