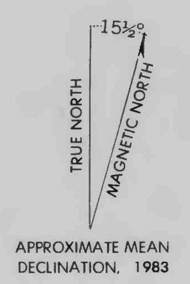
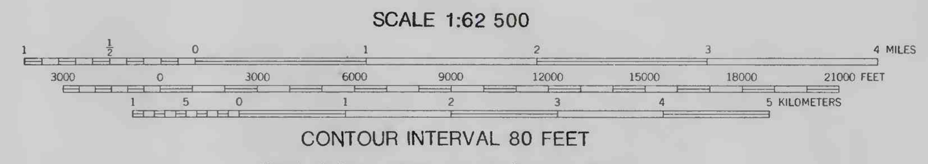
Base from U.S. Geological Survey
Benton, 1962; Davis Mountain, 1963

Geology modified from McKee (1982)





CONTOUR INTERVAL 80 FEET
Dotted lines represent 20-foot contours
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MINERAL RESOURCE POTENTIAL MAP OF THE SUGARLOAF ROADLESS AREA, ESMERALDA AND MINERAL COUNTIES, NEVADA

By

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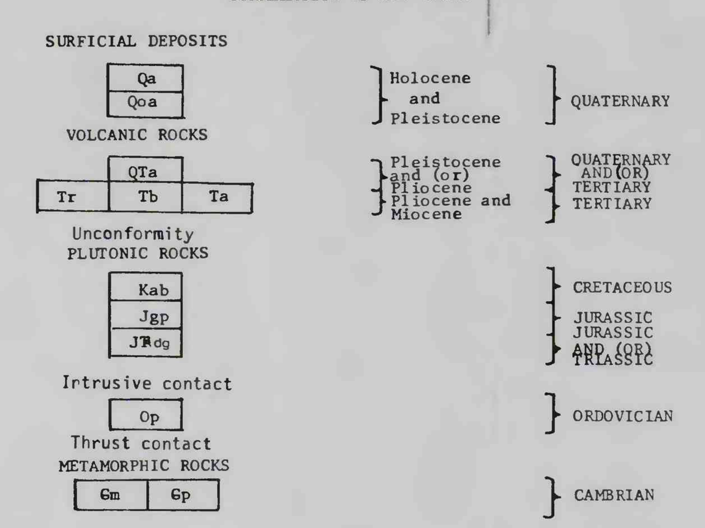
1983

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qa — ALLUVIUM (QUATERNARY)--Unconsolidated gravel, sand, silt, and clay. Includes alluvial fan deposits, talus, and terrace deposits

Qoa — OLDER ALLUVIUM (QUATERNARY)--Unconsolidated gravel, sand, and silt on dissected pediment surfaces or in positions of erosion

QTa — ANDESITIC ROCKS (QUATERNARY AND TERTIARY)--Andesite lava flows and lahars. Flows include both massive and platy varieties

Tr — RHYOLITE (TERTIARY)--Rhyolite lava flows, ash flows, air-fall tuff, and small intrusive bodies. As mapped, includes the Bishop Tuff

Tb — BASALT (TERTIARY)--Predominantly olivine basalt; includes basaltic agglomerate, cinder deposits, and some dikes and plugs

Ta — ANDESITE (TERTIARY)--Andesite lava flows, lahars, and dikes. Flows include both massive and platy varieties

Kab — ADAMELLITE OF BOUNDARY PEAK (CRETACEOUS)--Medium- to coarse-grained, porphyritic biotite quartz monzonite with some large zones of leucocratic quartz monzonite

Jgp — GRANITE OF PELLISIER FLATS (JURASSIC)--Porphyritic, medium-grained biotite-hornblende granite. Includes some fine-grained varieties

JTR dg — HORNBLENDE DIORITE OF QUEEN CANYON (JURASSIC AND (OR) TRIASSIC)--Fine- to medium-grained hornblende diorite. Locally porphyritic with phenocrysts of hornblende and plagioclase

Op — PALMETTO FORMATION (ORDOVICIAN)--Dark argillite, shale, quartzite, and chert. Some thin dark limestone beds

Єm — MARBLE (CAMBRIAN)--Includes calc-silicate hornfels

Єp — PHYLLITIC ROCKS (CAMBRIAN)--Includes quartz sericite schist, slate, spotted hornfels, and calc-silicate hornfels

DIKES--Type designated by letter symbol

CONTACT

FAULT—Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side

THRUST FAULT—Dashed where approximately located; dotted where concealed. Sawteeth on upper plate

BOUNDARY OF SUGARLOAF ROADLESS AREA (5296)

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral resource potential survey of the Sugarloaf Roadless Area in the Inyo National Forest, Esmeralda and Mineral Counties, Nevada. The Sugarloaf Roadless Area (5296) was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

SUMMARY

Geologic, geochemical, mineral, and mines and prospects investigations were conducted to evaluate the mineral resource potential of the Sugarloaf Roadless Area in Esmeralda and Mineral Counties, Nev. The principal metallic mineral resources are silver, gold, and mercury, with low potential for lead, zinc, and copper resources. The nonmetallic mineral fluorite (fluorspar) occurs locally. Alunite (potassium aluminum sulfate) formed by alteration of the silicic volcanic rocks is widespread in the southeastern part of the area.

The southwestern part of the area around Queen Canyon has a moderate resource potential for silver and a low resource potential for lead, zinc, and copper. The Indian Queen-Poorman mine is the largest of several past producers in this area and contains 180,000 tons of measured and inferred low-grade resources averaging 2 oz silver per ton. The north-central part of the area south of Sugarloaf mountain has a low potential for gold resources. The Tip Top mine, adjacent to the roadless area, was the largest gold producer in the area. The Brownie mine within the roadless area contains about 8,800 tons of indicated and inferred low-grade rock averaging 0.21 oz gold per ton. The eastern part of the roadless area has a low resource potential for mercury at a number of localities and some gold occurs in this area as well. The Red Rose and the F and L mercury mines have had small production and a number other mines southeast of the roadless area have had significant mercury production. The F and L mine contains 200,000 tons of rhyolite averaging 0.8 lb mercury per ton. At several localities along the west boundary of the roadless area fluorite is found and has been mined at one place outside the roadless area (King-Blue Bell mine).

INTRODUCTION

The Sugarloaf Roadless Area covers 17.5 mi^2 in the northern part of the White Mountains in Esmeralda and Mineral Counties, Nev. It is about 45 mi north of Bishop, Calif., via U.S. Highway 6. Access is by unpaved roads leading eastward into Queen Canyon and southward from Montgomery Pass.

GENERAL GEOLOGY

Rocks of the northern White Mountains in the area that includes the Sugarloaf Roadless Area range from Cambrian to Quaternary in age. The oldest rocks are metamorphosed strata, now phyllite, slate, and marble, that are correlated with Cambrian strata from the southern part of the White Mountains (Crowder and others, 1973). Limestone, shale, and chert of the Ordovician Palmetto Formation are in thrust contact with these Cambrian rocks. Mesozoic plutonic rocks of the Inyo batholith, an eastern part of the Sierra Nevada batholith, intrude the Paleozoic rocks. Lying unconformably on the Mesozoic granitic and Paleozoic metasedimentary rocks are late Cenozoic volcanic rocks and unconsolidated sedimentary deposits.

Structures in the northern White Mountains can be classified in three groups on the basis of style and age. From oldest to youngest, these groups are: (1) thrust faults, thought to have been formed during the middle Paleozoic Antler orogeny, which brought the Ordovician rocks into the White Mountains region from as much as 40 mi to the northwest; (2) small and large open folds, high-angle faults, and some contact metamorphism that is related to emplacement of Jurassic and Cretaceous granitic rocks of the Inyo batholith; and (3) late Tertiary to Holocene uplift of the range by high-angle normal faulting. This basin and range uplift accelerated erosion during the latter part of the Tertiary. Faults of this type are presently active.

Most of the large-scale structural features in the Sugarloaf Roadless Area are covered by a thick mantle of Tertiary volcanic and sedimentary rocks. Shear zones in the Tertiary rocks are poorly defined and generally of small scale. Faults or shear zones are recognized in Tertiary rocks at the Brownie mine and at a number of places in the eastern part of the area. These features are not shown in the geologic map as they are too small to be represented at a scale of 1:62,500.

GEOCHEMICAL STUDIES

Samples of rock, stream sediment, and nonmagnetic heavy-mineral concentrates collected by the U.S. Geological Survey were analyzed for 31 elements using a six-step semiquantitative emission spectrographic method (Grimes and Marranzino, 1968). Because of the limited amount of each sample, the nonmagnetic heavy-mineral concentrate was only analyzed spectrographically. All the rock and stream-sediment samples were also analyzed for zinc by atomic-absorption spectrometry (Ward and others, 1969); some of these samples were analyzed for gold by the same technique (Meier, 1980). Stream-sediment samples were also analyzed for uranium using a modification of the fluorimetric method of Centanni and others (1956). Results of the analyses and their geochemical interpretation are given by Donahoe and Chaffee (1983).

MINING HISTORY AND MINING ACTIVITY

The Oneota, White Mountain, Mount Montgomery, Basalt, and Queen's mining districts are known to have covered parts of the Sugarloaf Roadless Area. Production of gold, silver, lead, zinc, copper, and mercury are attributed to mines within this area. Fluorite has been produced as close as 1 mi from the boundary of the roadless area. Table 1 of the accompanying pamphlet lists the recorded production from lode deposits in or near the Sugarloaf Roadless Area; summary descriptions of all properties are in table 2.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Most of the eastern part of the roadless area is underlain by rhyolitic, dacitic, and andesitic rocks. Geochemical anomalies in this area consist predominantly of the element mercury. These anomalies, like most others in western Nevada, are closely and probably genetically related to Tertiary silicic igneous activity. Locally, as near Sugarloaf mountain, gold and silver mineralization is associated with quartz in a large northeast-trending brecciated fault zone. Other faults in the volcanic rocks are not easily detected, but those recognized contain gold and mercury minerals in places. The extensive silicification and alunitization and the presence of mercury and fluorite are further indications of regional alteration of silicic volcanic rocks. Hydrothermal alteration on this large scale suggests the possibility of base and precious metalization at depth.

The western part of the roadless area contains Paleozoic metamorphic rocks, Mesozoic granitic rocks, and Tertiary volcanic rocks. Most of the stream-sediment and panned-concentrate samples from drainage basins in this part of the area contain significant anomalies for many of the elements that are indicative of hydrothermal mineralization and (or) alteration. The anomalous elements include silver, gold, and locally mercury and zinc in the stream-sediment samples, and silver, lead, and locally arsenic, gold, bismuth, cadmium, copper, tin, tungsten, and zinc in the panned-concentrate samples. These anomalies seem to be associated primarily with Paleozoic metasedimentary rocks near their contacts with Mesozoic plutonic rocks. This element association is characteristic of hydrothermal activity and often forms base- and precious-metal vein deposits peripheral to granitic intrusions. Most of the mines and prospects in or near the roadless area are in Queen Canyon, the drainage with the highest anomalous values. Few veins in this area exceed 1.0 ft in thickness or 20 ft in length and most are displaced by northeast- and northwest-trending high-angle faults. Silver and base-metal sulfide concentrations appear to be controlled by these faults.

The three parts of the Sugarloaf Roadless Area that have significant mineral resource potential are : (1) the southwestern part, particularly the Queen Canyon area, which has a moderate resource potential for silver and a low resource potential for lead, zinc, and copper; (2) the north-central part, near Sugarloaf mountain, which has a low resource potential for gold, silver, and fluorite, and (3) the southeastern part which has a low resource potential for mercury.

Queen Canyon area.—The Indian Queen mine is the most important mining property in the Sugarloaf Roadless Area. A near-surface mineralized zone in Paleozoic phyllite is estimated to contain 170,000 tons of subeconomic (see accompanying pamphlet for definition of subeconomic) resources at an average grade of 2.0 oz silver per ton. There are about 10,000 tons of subeconomic resources averaging at least 2.0 oz silver per ton in the old mine dumps. This mining property has a moderate potential for undiscovered silver resources and low potential for lead, zinc, and copper resources.

In Queen Canyon a large group of claims, known as the Indian Queen project covers several properties including the Indian Queen-Poorman mine. The part of this claim group in the roadless area has a low potential for silver, lead, zinc, and copper resources.

None of the mineral deposits in the Queen Canyon area are presently mineable for profit.

Sugarloaf mountain area.—The most important property in this area is the Brownie mine. Only a small segment of the mineralized zone was accessible; from these limited exposures a total of 8,800 tons of indicated and inferred subeconomic resources with an average graded of 0.21 oz gold per ton was estimated. This property has a moderate potential for additional gold and silver resources.

There are several widely spaced fluorspar properties in and adjacent to the west boundary of the roadless area. Data was insufficient to estimate tonnage and grade. The resource potential for fluorspar is low at the Fluorspar No. 1 and the unknown (SE 1/4 sec. 18, T. 1 S., R. 33 E.) prospects.

Trail Canyon area.—The F and L mine is the most important mine in this area. It has 200,000 tons of mercury-bearing rhyolite averaging 0.8 lb mercury per ton. This property has a low potential for mercury resources.

Alunite (hydrous potassium aluminum sulfate) occurs in the southeast corner of the study area, but little is known about extent or grade of the deposit. Extraction of alumina from alunite is an economically unproven procedure.

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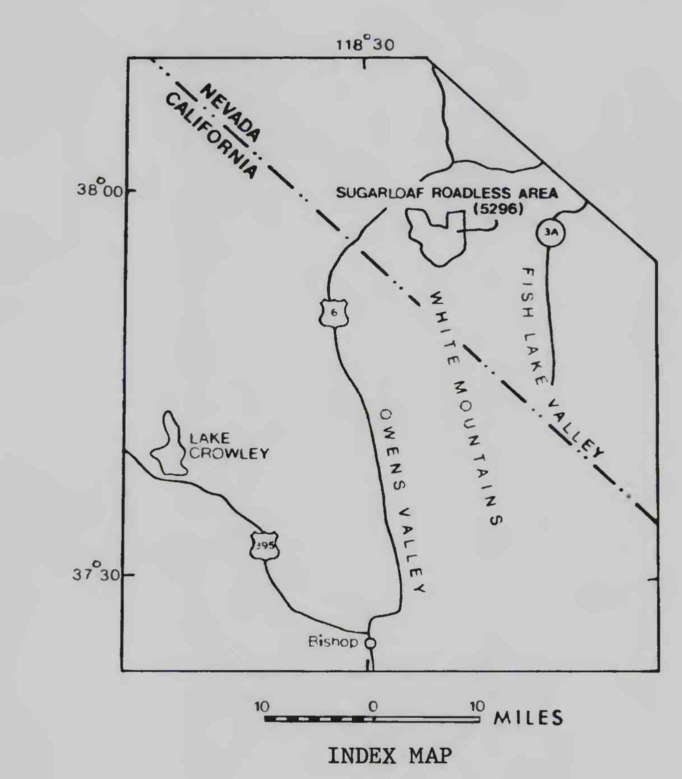

INDEX MAP

Explanatory pamphlet accompanies map

Interior—Geological Survey, Reston, Va.—1983

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