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MINERAL RESOURCE POTENTIAL OF THE WHITE MOUNTAINS AND BIRCH CREEK ROADLESS AREAS, WHITE MOUNTAINS, CALIFORNIA AND NEVADA

SUMMARY REPORT

By

Michael F. Diggles and Richard J. Blakely
U.S. Geological Survey

and

Steven W. Schmauch, Richard L. Rains, David A. Lipton, Richard A. Winters, and Stephen R. L. Iverson
U.S. Bureau of Mines

STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and related acts, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral survey of the White Mountains (A5058) and Birch Creek (5060) Roadless Areas, Inyo National Forest, Inyo and Mono Counties, California, and Esmeralda and Mineral Counties, Nevada. The areas were classified as further planning areas during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

SUMMARY

On the basis of geologic, geochemical, and geophysical investigations and consideration of known mineral deposits at mines and prospects, the resource potential for metallic (gold, silver, lead, zinc, copper, tungsten, uranium and barium) and nonmetallic commodities in the White Mountains and Birch Creek Roadless Areas is low to moderate with local areas of high resource potential. Various of these commodities occur in greater than normal amounts at the Sacramento Canyon to Gunter Creek area, Queen Canyon, Indian and Marble Creeks, upper Cottonwood and upper Crooked Creeks in the White Mountains Roadless Area and west of Birch Creek in the Birch Creek Roadless Area.

Mineral deposits and occurrences are related to the intrusion of Mesozoic plutons into Proterozoic to Permian sedimentary, metasedimentary, and metavolcanic strata. These strata and some of the plutons are hosts for fissure-filling quartz veins, mineralized fault or shear zones, and silicified zones, which contain gold, silver, lead, zinc, copper, uranium, and barite. Silver, lead, zinc, and copper minerals also occur in two replacement bodies and in one tactite body. In another part of the area, metasomatism of metasedimentary and metavolcanic rocks has resulted in the formation of andalusite and rutile; the same process has produced sericite deposits. Widespread Quaternary volcanism and subsequent subaqueous deposition formed pumice deposits at a few places along the western range front.

Resources were identified at nine mines or prospects in the White Mountains Roadless Area, five partly inside the area, and four outside, but near the area (table 1). An additional 51 properties (42 in the area, six partly inside the area, and three outside, but adjacent to it) have identified mineralization.

The most important metallic mines in the area are: (1) the Sacramento mine, with 5,500 tons of measured and inferred marginal reserves containing gold, silver, and copper; (2) the Moulas mine, with 22,000 tons of indicated and inferred marginal reserves containing gold and silver; (3) the Green Monster mine, with 2,600 tons of indicated and inferred marginal reserves containing silver, zinc, and lead, and a smaller amount of higher grade resources; and (4) the Saratoga, Lexington, and Ranger mines, with 1,600 tons of indicated and inferred marginal reserves containing gold and silver.

The most important nonmetallic mine inside the White Mountains Roadless Area, the Colton mine, has 1.2 million tons of indicated and inferred subeconomic sericite resources. The Pacific mine, partly within the roadless area, has 630,000 tons of indicated and inferred reserves and 430,000 tons of indicated and inferred subeconomic resources of sericite. The Champion mine has 250,000 tons of inferred subeconomic resources of andalusite and rutile. The Gunter Canyon area pumice deposits adjacent to the White Mountains Roadless Area have 9.6 million tons of indicated and inferred subeconomic resources.

Resources were identified at 3 mines or prospects in the Birch Creek Roadless Area and at two mines outside, but near the roadless area (table 5). An additional 23 properties (19 in the area and four outside, but adjacent to it) have identified mineralization.

The most important mines in the Birch Creek Roadless Area are: (1) the Gator No. 2 prospect, with 5,900 tons of indicated and inferred subeconomic resources containing silver, lead, and zinc; (2) the Hole in the Wall mine, with 3,700 tons of indicated and inferred resources containing gold, silver, lead, and zinc; and (3) the Del Masso prospect, with 21,000 tons of indicated subeconomic resources containing silver and lead.

INTRODUCTION

Geographic setting

The White Mountains and Birch Creek Roadless Areas encompasses approximately 243 mi^2 and 42 mi^2, respectively, in the Inyo National Forest, Mono and Inyo Counties, California, and Esmeralda and Mineral Counties, Nevada. The terrain is rugged and steep, with relief of about 8,000 ft along most of the west side of the White Mountains. Elevations in the roadless areas range from 14,242 ft above sea level at White Mountain Peak to about 4,500 ft towards

Owens Valley to the west of the range and towards Fish Lake Valley to the east. The climate is arid to semiarid. Most of the vegetation is typical of the Upper Sonoran and Transition zones and consists of sage, rabbit brush, and sparse grasses at lower elevations and pinon pine, juniper, and mountain mahogany on mountain slopes. At higher elevations limber pine and bristlecone pine are present up to timberline. Riparian vegetation includes willow, aspen, wild rose, and grasses.

Access to the region is from the south by a single road near the Ancient Bristlecone Area that runs northward along the crest of the range. In the northern half of the range only undeveloped jeep trails extend part way up some of the canyons. The part of the White Mountains Roadless Area in Nevada contains a number of old unimproved mining roads, some of which are passable in four-wheel-drive vehicles.

Previous studies

A generalized geologic map of the roadless areas within the White Mountains was compiled by McKee and others (1982). The detailed geologic maps that have been published for each of the six 1:62,500-scale quadrangles that encompass the White Mountains and Birch Creek Roadless Areas are: Benton (Crowder and others, 1972); Davis Mountain (Robinson and Crowder, 1973); White Mountain Peak (Crowder and Sheridan, 1972); Mount Barcroft (Krauskopf, 1971); Blanco Mountain (Nelson, 1966); and Bishop (Bateman, 1965) quadrangles. The summary of a geochemical investigation and a geochemical anomaly map was made by Diggles (1983). Data derived from the analyses as well as statistical summaries are in Diggles and others (1982). Summary reports on identified mineral resources, including information on mining history, mining districts, claims, and mineral properties are presented by Schmauch and others (1983) and Rains and Iverson (1983). These reports include tables showing properties with mineral resources, recorded production, and summaries of workings and sample data. A number of reports describing the stratigraphy, structure, economic geology, hydrology, and other aspects of White Mountains geology are listed in McKee and others (1982).

California State and U.S. Geological Survey publications by Hanks (1884), Whiting (1888), Goodyear (1888), DeGroot (1888), Fairbanks (1894), Crawford (1896), Hill (1912), and Knopf (1914) recorded information on early mining activity and on the producing mines in the White Mountains and Birch Creek Roadless Areas. Specific information on various mines, prospects, and mineralized areas has been updated by Tucker (1926, 1927), Tucker and Sampson (1934, 1938), Sampson and Tucker (1940), Eric (1948), Norman and Stewart (1951), Bateman (1956), Jenkins (1957), Wright (1957), and Albers and Stewart (1972). Seven unpublished property examinations were made by the Bureau of Mines and (or) the Geological Survey under the Defense Minerals Exploration Administration (DMEA) program, and several reports on file at the U.S. Bureau of Mines Western Field Operations Center in Spokane, Washington contain detailed descriptions of mining properties in the White Mountains not discussed in this report.

GEOLOGY

The White Mountains include rocks as old as Proterozoic and deposits as young as Holocene. The rocks can be divided into four groups. (1) An upper Proterozoic through Cambrian sequence of carbonate, quartz sandstone, and shale that was deposited in a shallow-marine continental-shelf environment and Ordovician strata that consists of dark argillite, chert, and shale deposited in a deep-water marine environment. The Ordovician rocks were thrust into their present location from sites of deposition 40 mi or more to the northwest. (2) Metavolcanic and metasedimentary rocks similar to Paleozoic and Mesozoic rocks found tens of miles to the northeast in western Nevada occur near White Mountain Peak. They are of a higher metamorphic grade than older rocks nearby, suggesting that they are allochthonous. (3) Mesozoic plutonic rocks of the Inyo batholith, an eastern extension of the Sierra Nevada batholith, are predominantly granodioritic to granitic in composition, but also include monzonite. About half of the roadless area is underlain by granitic rock and 16 discrete plutons have been mapped. Most of these are Jurassic or Late Cretaceous in age but small Triassic plutons are present also (Crowder and others, 1973). (4) Late Tertiary volcanic and sedimentary rocks, especially abundant in the northern part of the White Mountains, include rhyolitic lava flows, ash flows, ash-fall tuffs, and hypabyssal bodies. Most of the Tertiary sedimentary rocks contain a large amount of rhyolitic ash. Andesitic lava flows and lahar deposits are common, and olivine basalt flows are found locally at many places throughout the White Mountains.

GEOCHEMISTRY

The geochemical survey of the White Mountains is based on rock, stream-sediment, and bulk-sediment samples for concentration of nonmagnetic heavy minerals from 386 sites (Diggles and others, 1982). The samples were analyzed by six-step semi-quantitative spectrography for 31 elements by a method similar to that described by Myers and others (1961) and Grimes and Marranzino (1968). Zinc and gold were determined by atomic-absorption spectrometry methods described by Ward and others (1969). Forty-seven samples collected from areas considered geologically favorable for mineralization were analyzed for mercury by a variation of an atomic absorption technique and for uranium by fluorometry (Centanni and others, 1956). Analytical data and statistical summaries of the data are given in Diggles and others (1982). Diggles (1983) described the geochemical anomalies detected in the roadless areas within the White Mountains.

White Mountains Roadless Area

Stream sediments on the west side of the roadless area primarily accumulate during runoff from storms, whereas those on the eastern side are transported by perennial streams. Areas that are geochemically anomalous are the western range front, Indian and Marble Creeks on the east side of the roadless area, and the upper parts of Cottonwood and Crooked Creeks in the southeast. Silver, lead, zinc, copper, gold, arsenic, tungsten, molybdenum, and nonmagnetic iron occur locally in anomalous amounts in a number of samples. Mercury was detected in several samples from the northeastern edge of the area.

Birch Creek Roadless Area

Numerous samples from one drainage basin in the northern part of the Birch Creek Roadless Area contain anomalous amounts of tungsten, bismuth, and silver. One sample from upper Birch Creek also contained anomalous lead and zinc. Three drainages contained anomalous nonmagnetic heavy-mineral concentrate samples. Two such samples were accompanied by slightly anomalous stream-sediment samples. The elements detected are lead, copper, zinc, gold, silver, and tungsten, mostly in upper Birch Creek.

AEROMAGNETIC SURVEY

Aeromagnetic data can provide subsurface geological information insofar as rock magnetization reflects rock type. For example, the most distinctive magnetic anomalies in the White Mountains are caused by plutonic rocks that contain small to moderate amounts of magnetite. The shapes of these anomalies help delineate the subsurface extent of plutonic rocks and the less magnetic sedimentary rocks that they intrude. Determination of subsurface contact geometry is important to mineral assessment because tactite and vein deposits can form near these contacts.

An aeromagnetic survey was flown along east-west flightlines spaced $\frac{1}{2}$ mi apart and at a constant barometric altitude of 14,000 ft across the White Mountains. The resulting data were compiled into contour maps of total magnetic field anomalies from which interpretions were made. The largest magnetic anomaly in the mapped area

occurs over the granodiorite of Mount Barcroft in the southwestern part of the White Mountains Roadless Area. The shape of this anomaly indicates that the southern contact of the pluton with the Campito Formation dips to the south and may extend for several miles below the Proterozoic and Paleozoic sedimentary rocks.

The quartz monzonite of Beer Creek in the Birch Creek Roadless Area also produces a distinctive magnetic anomaly. The shape of the anomaly indicates that the southwestern contact of the pluton dips to the southwest below the Wyman Formation and other Proterozoic, as well as Paleozoic, sedimentary rocks. The same magnetic anomaly overlaps the quartz monzonite of Sage Hen Flat, suggesting that the Proterozoic sedimentary rocks separating the Beer Creek pluton from the Sage Hen Flat pluton form only a thin septum at depth.

The granite of Pellisier Flats and the adamellite of Boundary Peak in the northern end of the White Mountains Roadless Area produce a single anomaly with a shape suggesting that the composite plutonic body broadens with depth. The steep westward dip of the western boundary of these plutons is largely a result of the steep topography on the west side of the White Mountains. Other boundaries represent more gently sloping contacts with Paleozoic and Triassic sedimentary rocks.

A broad magnetic low occurs over the Proterozoic and Paleozoic sedimentary rocks at the southern end of the White Mountains Wilderness, suggesting that these sedimentary rocks form an especially thick sequence in this region and that plutonic rocks are not present. It should be noted, however, that certain plutons in the White Mountains do not produce magnetic anomalies; the quartz monzonite of McAfee Creek and the quartz monzonite of Birch Creek are notable examples. These plutons illustrate that the absence of distinctive magnetic anomalies does not necessarily imply the absence of granitoid rocks at near-surface depths.

MINING ACTIVITY

History and production, White Mountains Roadless Area

The earliest known mining activity around 1861 was in the southern end of the White Mountains. The most important mines included the Sacramento, Twenty Grand, Southern Belle, and Poleta mines, which produced ore containing gold, silver, copper, and lead. Ores from these mines were first processed at the Ida mill in Owensville, near the present town of Laws, California (Clark and Clark, 1978).

The earliest discovery in the northern end of the White Mountains was in 1870 at the Indian Queen-Poorman mine north of the White Mountains Roadless Area. By 1888 it had a 4-stamp mill; operations were continuous until around 1917, then intermittent until 1983. Other silver-, lead-, and zinc-rich areas were found in this area and south to Montgomery Canyon. Whiting (1888) reported that mines in Montgomery Canyon had produced $60,000 worth of metals, but by 1890, most of the rich, easily accessible silver ores had been removed.

Completion of the Carson and Colorado Railroad through the Owens Valley in 1883 made Benton at the north end of the valley a mining center. Goods and machinery were delivered, and the ores and concentrates were shipped to smelters in the Reno and San Francisco areas (Clark and Clark, 1978).

Interest in the nonmetallic deposits, which are located on the west range front between Sacramento and Silver Canyons, began around 1920. A deposit of andalusite in Jeffrey Mine Canyon was mined from 1921 to 1945. Deposits of sericite (referred to in some previous reports as pyrophyllite) flank the andalusite deposits and have been mined since the mid-1940's. Ore from open pits is transported by truck to a grinding mill at Laws, California, for processing. Barite was mined in the Gunter Canyon area from the late 1920's to the late 1950's. Some barite came from the Hobo property, but most of it came from the Gunter Canyon Barite mine adjacent to the roadless area. Production from several pumice deposits from the mid-1920's to 1983 has supplied local and southern California markets with material for abrasives, lightweight aggregate, and related building products (Stewart, 1949). Limestone from Silver Canyon was shipped to soda plants on Owens Lake for production of carbon dioxide gas used in carbonation (Logan, 1947). A small, unspecified amount of limestone from a quarry outside the roadless area, between Coldwater and Piute Canyons, was used for roofing granules (Bateman, 1956).

The only site in the roadless area where placer gold is found is along Crooked Creek, where a deposit of gold-bearing Tertiary stream gravels has been dissected by Crooked Creek. It was discovered in 1861 (Chalfant, 1933). The amount of gold recovered from these gravels is unknown but assumed to be small.

Recorded production from metallic and nonmetallic mines in and near the roadless area is listed in tables 2 and 3.

History and production, Birch Creek Roadless Area

Incomplete records indicate that about 200 tons of ore from four mines in and near the roadless area yielded a total of 49 oz of gold, 2,301 oz of silver, 980 lbs of copper, and 43,072 lbs of lead between 1908 and 1941. These past producers are the Wynne and Ward (164 tons), Hole in the Wall (15 tons), the Charlies Angels nos. 1 and 2 (Gold Wedge) (11 tons), and the Mexican mines (12 tons). Ore was either concentrated by gravity separation or hand sorted before shipment. Additional ore was undoubtedly produced, but has not been recorded. Tucker (1934) reports the Bull Domingo mine (Gator No. 2 prospect) was worked around 1871; it had a small Vaso smelter. Early records of the Gibraltar (Wynne and Ward) mine show that by 1888 some ore with an average value of $80 per ton in gold and silver was shipped (Goodyear, 1888).

Mining districts

Published information on mining districts in the White Mountains is obscure. Hill (1912) indicated that only the White Peak and Deep Springs (Pine Mountain) districts are in the roadless area. Clark (1970) refers to the White Mountains mining district and states that the Sacramento and Twenty Grand mines were the principal lodes.

Prior to 1920, mining districts were important references in locating the general location of claims. If a significant number of claims were located in a small geographical area, smaller districts and (or) subdistricts were developed to better define these locations. More recently, with the increased availability of topographic maps, location by section, township, and range became standard. A study of county mining claim records provided complete information on mining districts, subdistricts and their approximate locations in the White Mountains. The major districts are: Big Pine, including subdistricts Waucoba (Galena); Bishop, including Laws, Black Canyon, Redding Canyon and Poleta subdistricts; Bolton (Botton); Deep Springs, including subdistricts Westgard Pass, Pine Mountain, and Wyman Creek; Montgomery, with White Peak, Cottonwood, Indian and Yellowjacket subdistricts; Oneota (Basalt, Queen, and Buena Vista); Piute, including subdistricts Chalfant, Darkhorse, Gunter Canyon, Silver Canyon, Southern Belle, and Union; White Mountain(s) (Fish Lake Valley or Fish Lake), including subdistricts Benton, Blind Spring(s), Hammil, and Willow; and the Indian mining district, including the Cloverpatch subdistrict.

Mining claims, White Mountain Roadless Area

Approximately 6,500 claims have been located in the White Mountains since the early 1860's. The number of workings is several times less than 6,500, indicating that some properties were relocated numerous times. Almost two-thirds of the total claims were located between 1865 to 1885 and from 1960 to 1980. The Silver Consolidated mining claims and the Neptune-Phenix-Creekside Quartz mine were patented for silver minerals and the Champion mine for andalusite. The Champion mine reverted to public domain in 1982. Fifty-three lode and four placer claims were active in

or near the roadless area in 1981.

About 90 percent of the roadless area is open to mineral location. Areas not open include the Ancient Bristlecone Pine Area, the White Mountain Natural Scientific areas, the former Champion mine property, and the power withdrawal sites in Montgomery and Cottonwood Canyons on the west range front. The central part of the White Mountains Roadless Area (see fig. 1) is the proposed Boundary Peak Wilderness; it is not open to mining-claim location after 1983.

Mining claims, Birch Creek Roadless Area

Since 1879, about 1,100 lode and 10 placer claims have been located within the Birch Creek Roadless Area. In 1982, 245 lode claims were valid within the area.

Mineral properties

Locations of 69 of 131 mines and prospects in the White Mountains Roadless Area and 28 of 39 mines and prospects in the Birch Creek Roadless Area examined during this study are shown on the accompanying mineral resource map and on figure 2. Those properties with identified resources are listed alphabetically in tables 1 and 5. Descriptions of all 97 properties are given in tables 4 and 6.

Several properties listed as "unknown" could not be identified by claim notices or through published sources. The numbers in parenthesis following "unknown" represent locations by section, township, and range, with respect to the Mount Diablo Meridian. All of these properties lie within Township 1 North to 6 South and Range 32 to 36 East.

MINERAL RESOURCE POTENTIAL

Definitions

The definitions of mineral resource classifications of mines and prospects are from U.S. Bureau of Mines and U.S. Geological Survey (1980). The measured, indicated and inferred categories reflect decreasing knowledge of the characteristics of a deposit. An attempt has been made to define subeconomic resources and resource potential. The following definitions are the basis for the selection of the properties appearing in tables 1 and 5.

Mineral resources: deposits at mines and prospects classified as reserves are mineral resources believed to be minable at a profit, under current economic conditions. Feasibility studies were conducted to substantiate this classification. Marginal reserves border on being economically producible and include resources that would be producible given changes in economic or technical factors. Subeconomic resources would require a greater improvement in economic conditions and (or) identification of a larger deposit to be mined profitably.

In some cases, identified tonnage and grade estimated at a property may not be sufficient to be classified a resource. However, the deposit might be favorably located for consolidated development with others and with centrally located processing facilities. Because of relatively small tonnages at individual properties, these might be developed by small-scale mining operations, possibly involving portable concentrating equipment. Those properties that may collectively contain resources are included in table 1.

Resource potential: the terms high, moderate, and low resource potential, as used in this report, reflect degrees of probability that undiscovered resources exist. The terms are based on the assessment of sample analysis, apparent degree of geologic continuity and possible mineral deposit type, the extension of deposits from mines and prospects, and the judgement of the evaluator.

Mines and prospects

Resources were identified at nine mines or prospects in the White Mountains Roadless Area, five partly inside the area and four outside, but near the area (table 1). An additional 51 properties (42 in the area, six partly inside the area, and three outside, but adjacent to it) have identified mineralization.

The most important metallic mines in the area are: (1) the Sacramento mine, with 5,500 tons of measured and inferred marginal reserves averaging 0.47 oz gold per ton, 0.3 oz silver per ton, and 0.56 percent copper; (2) the Moulas mine, with 22,000 tons of indicated and inferred marginal reserves averaging 0.23 oz gold and 0.2 oz silver per ton; (3) the Green Monster mine, with 2,600 tons of indicated and inferred marginal reserves averaging 17 oz silver per ton, 4.0 percent zinc, and 0.73 percent lead, and a smaller amount of higher grade resources; and (4) the Saratoga, Lexington, and Ranger mines, with 1,600 tons of indicated and inferred marginal reserves averaging 0.41 oz gold per ton, and 0.54 oz silver per ton.

The most important nonmetallic mine inside the White Mountains Roadless Area, the Colton mine, has 1.2 million tons of indicated and inferred subeconomic sericite resources. The Pacific mine, partly within the roadless area, has 630,000 tons of indicated and inferred reserves and 430,000 tons of indicated and inferred subeconomic resources of sericite. The Champion mine has 250,000 tons of inferred subeconomic resources of andalusite and rutile. The Gunter Canyon area pumice deposits adjacent to the White Mountains Roadless Area have 9.6 million tons of indicated and inferred subeconomic resources.

Resources were identified at three mines or prospects in the Birch Creek Roadless Area and at two outside, but near the roadless area (table 5). An additional 23 properties have identified mineralization.

The most important mines in the area are: (1) the Gator No. 2 prospect, with 5,900 tons of indicated and inferred subeconomic resources averaging 4.0 oz silver per ton, 4.7 percent lead, and 1.9 percent zinc; (2) the Hole in the Wall mine, with 3,700 tons of indicated and inferred resources averaging 0.02 oz gold per ton, 7.3 oz silver per ton, 8.7 percent lead and 7.0 percent zinc; and (3) the Del Masso prospect with 21,000 tons of indicated and inferred subeconomic resources averaging 1.0 oz silver per ton and 2.8 percent lead.

Assessment of mineral resources

Twenty one areas (A-U) in the White Mountains Roadless Area and four areas (V-Y) in the Birch Creek Roadless Area are identified as having anomalous amounts of various metals or nonmetallic commodities (fig. 2). The mineral resource evaluation is based on a combination of geologic, geochemical, geophysical, and known mineral-deposit occurrence information. Areas designated as having resource potential are based on suites of elements occuring in anomalous amounts in geochemical samples, geologic environments favorable for mineral deposits, and presence of mineral claims with potential for additional resources. Figure 2 shows the locations of the areas and the degree of likelihood of mineral resources.

White Mountain Roadless Area

Areas A, B, and C

Areas A, B, and C are within the White Mountains fault zone. Stream-sediment samples from these areas have anomalous lead, copper and (or) zinc, probably from quartz veins. Molybdenum was also detected in moderately anomalous amounts. Silver was detected in five samples in area A. The resource potential for silver, lead and zinc is low in area A, moderate in area B, and high in area C. The lack of through-going structures in the range-front shear zone makes it difficult to trace mineralized zones for more than short distances.

Area D

The area along the range-front shear zone between Rock Creek and Middle Canyon yielded geochemical samples that suggest argillic alteration with possible accompanying lead-zinc-silver-copper mineralization. There is copper

mineralization at a few mining claims, and the lead, zinc, and silver anomalies in the area probably came from small veins containing this suite of elements. Area D has moderate potential for small deposits of silver, lead, zinc, and copper in quartz veins.

Area E

Stream-sediment samples that yielded anomalous amounts of silver, copper, gold, tungsten, and bismuth were collected from the mouth of Coldwater Canyon. Tungsten is present in small amounts in scheelite-bearing tactite cobbles in the Quaternary fan deposits at the mouth of the canyon. Area E has a low resource potential for gold, silver and copper.

Area F

Two stream-sediment samples containing anomalous amounts of silver, zinc, copper, tungsten, molybdenum and bismuth were collected in the Milner Creek drainage. The area is underlain by granitic, metasedimentary, and metavolcanic rocks that are cut by many small diorite dikes. Area F has a moderate resource potential for silver, zinc, and copper.

Area G

Productive mines in Sacramento Canyon and along Piute Creek, as well as five geochemical samples containing anomalous amounts of arsenic, gold, copper, and nonmagnetic iron, suggest that area G has high potential for small gold resources. The metals are probably from quartz veins in the nearby granodiorite.

Area H

The Claw Nos. 1-3 prospect was worked for uranium although no production is recorded. Mineral resource potential for area H is considered to be low.

Area I

At least two properties are producing sericite from the Lone Tree-Milner Canyon area. Sericite is present in all parts of area I. The potential for additional sericite resources is high.

Area J

Jeffrey Mine Canyon is the site of the Champion mine, a group of nine claims that produced andalusite from 1921 to 1945. Other minerals found in the area include corundum, rutile, sericite, muscovite, alunite, lazulite, and woodhouseite (Kerr, 1932, Wise, 1977). Anomalous amounts of titanium were detected in stream-sediment samples from Jeffrey Mine Canyon. A low resource potential exists in this area for titanium from sericitized and pyrophyllitized rocks.

Area K

There are several small pumice deposits located at lower elevations along the range front. At least four properties have produced pumice in and adjacent to the roadless area between Sacramento and Silver Canyons. The areas designated area K are those where pumice is present. The potential for additional buried pumice resources is high.

Areas L and M

Two mines in upper Gunter Creek have produced barite, the Gunter Canyon Barite mine and Hobo Nos. 1-8. The deposits consist of small secondary veins. Stream-sediment samples from area M contained anomalous amounts of barium. Barite is present in area L and probably present in area M. Barite has a high resource potential in area L and a low resource potential in area M.

Areas N and O

The area south of Queen Canyon has low potential for lead, silver, and zinc resources. The Queen Canyon mine in areas O and three mines nearby, but outside of the roadless area, contain silver and lead in quartz and (or) calcite veins in siliceous shale. Area N has low resource potential and area O has moderate resource potential for silver, lead, and zinc in veins.

Areas P and Q

Lead, zinc, and silver are present in anomalous amounts in four stream-sediment samples from Indian and Marble Creeks. Mineralization occurred in a replacement-type deposit in limestone at the Green Monster mine. In the southern part of the area, small mineral deposits occur near the contact between the quartz monzonite of Marble Creek and the Wyman Formation. The Evergreen mine is in this contact metamorphic zone. Metals present are silver, lead, copper and zinc. Area P had low potential and area Q has high potential for resources of silver, lead, copper, and zinc.

Areas R and S

Stream-sediment samples from west of Cottonwood Basin near the contact between the Reed Dolomite and the quartz monzonite of Beer Creek contain anomalous amounts of bismuth, tungsten, and copper. The Eva Belle mine in area S has lead, copper, and zinc in contact-metamorphosed dolomite and gold and silver in quartz veins in the Reed Dolomite. The Golden Siren mine in area S consists of gold-bearing quartz veins. Area R has low potential and area S has high potential for small lead, copper, zinc gold and silver deposits.

Areas T and U

Metals present in lower Cottonwood and Crooked Creek areas are gold, silver, lead, and tungsten. The metals are mostly in quartz veins and fracture zones in granitoid rocks. Detrital gold occurs in alluvial deposits in area T. Area T has low resource potential and area U has moderate resource potential for gold, silver, and lead.

Birch Creek Roadless Areea

Areas V, W, and X

In areas V, W, and X, silver and lead occur in anomalous amounts in several stream-sediment samples; nonmagnetic heavy-mineral concentrate samples contain anomalous iron. Hemimorphite (hydrous zinc silicate) and lead oxides are present in mines and prospects in Area V. Area V has low resource potential, and areas W and X have moderate resource potential for gold, silver, lead, and zinc.

Area Y

The Burgner-Adams prospect contains fluorspar and additional fluorospar is present in area Y. The area has low potential for additional fluorspar resources.

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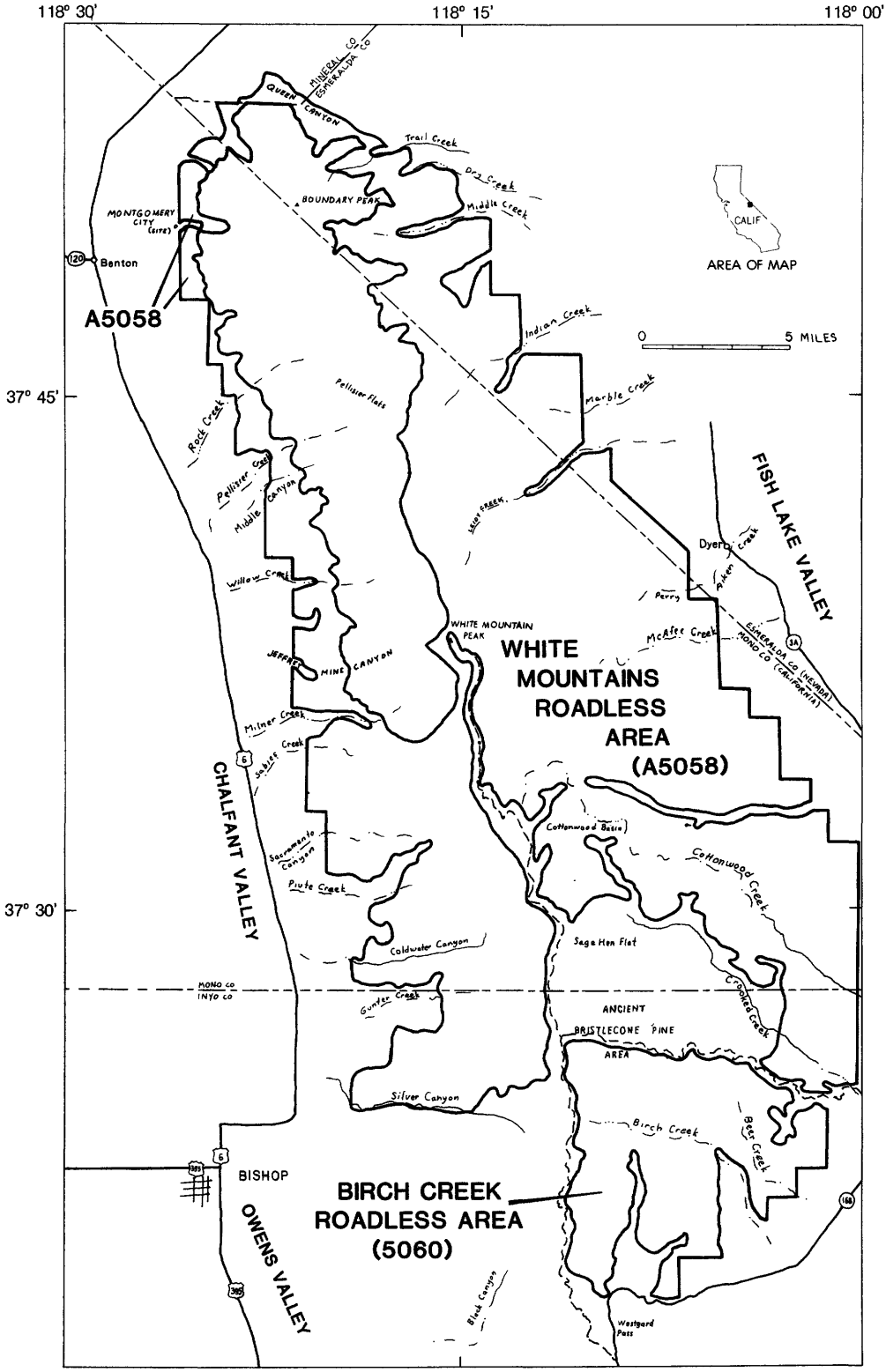


Figure 1.--Index map showing approximate boundaries of White Mountains (A5058) and Birch Creek (5060) Roadless Areas in Inyo National Forest, Inyo and Mono Counties, California, and Esmeralda and Mineral Counties, Nevada.

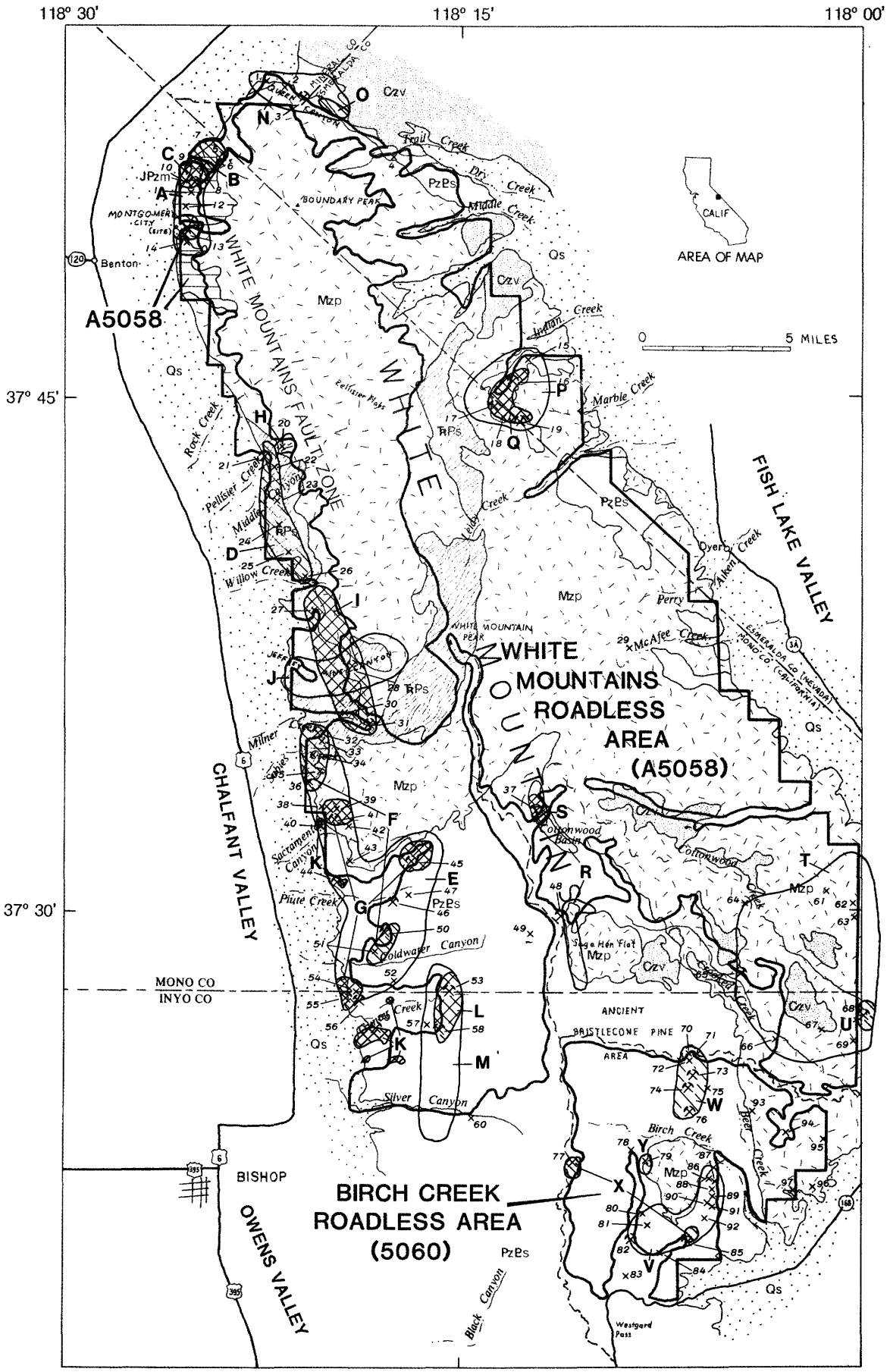


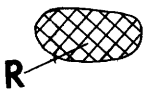
Figure 2.--Map showing generalized geology, mines and prospects, and areas of mineral resource potential in the White Mountains and Birch Creek Roadless Areas. See following page for explanation.

EXPLANATION

Areas with mineral resource potential--See text for discussion of lettered areas

Area of low resource potential

Area of moderate resource potential



Area of high resource potential

^{42} ⚒ Mines with production record--Number refers to tables 1-6

^{40} X Prospect--Number refers to tables 1-6

Roadless area boundary

– – – – Secondary road

Qs Surficial deposts (Quaternary)

Cenozoic v Volcanic rocks (Cenozoic)

Mzp Plutonic rocks (Mesozoic)

TrPs Metamorphosed sedimentary and volcanic rocks (Triassic and (or) Permian)

JPzm Marble (Jurassic to Paleozoic)

PzPs Sedimentary rocks (Paleozoic and Proterozoic)

Table 1.--Properties with mineral resources in and adjacent to the White Mountains Roadless Area

[*, outside the study area; **, partly inside the study area]

Property number (fig. 2)	Property name	Type of occurrence	Classification of resource	Quantity (tons)	Grade and commodity (oz per ton)		(percent)
10	Black Warrior Mine Area	Shear zone---------	Indicated and inferred subeconomic resources----------	16,000	8.5	silver	0.61 lead
10	Black Warrior Mine Area 1/	do----------	do----------	650	6.8	silver	2.0 lead
56	* Bullion	Shear zone-fissure veins----------	do----------	370,000	.07 1.2	gold silver	
28	** Champion Mine	Contact-metasomatic	Inferred subeconomic resources------	250,000	andalusite and rutile		
20	Claw Nos. 1-3	Fissure veins------	Indicated and inferred subeconomic resources----------	27,000			.14 U_3O_8
31	Colton Mine	Contact-metasomatic	Indicated and inferred marginal reserves----------	1,200,000	sericite		
44	** Comstock Pumice Deposit (Piute Mine)	Volcanic-subaqueous	do----------	110,000	pumice		
37	Eva Belle Mine	Shear zone-fissure veins----------	Indicated subeconomic resources-----	7,000	.13 1.2	gold silver	1.0 lead .17 zinc .11 copper
17	Green Monster Mine	Contact-metasomatic	Indicated and inferred marginal reserves----------	2,600	17	silver	4.0 zinc .73 lead
17	Green Monster Mine	do----------	do----------	150	140	silver	4.0 zinc 3.3 lead .7 copper
58	* Gunter Canyon area	Volcanic-subaqueous	do----------	9,600,000	pumice		
16	Mollini Mine	Shear zone--contact-metasomatic---------	do----------	720	19	silver	2.7 lead 1.5 zinc .12 copper
45	Moulas Mine	Fissure veins	do----------	22,000	.23 .2	gold silver	
45	Moulas Mine 1/	do----------	Indicated subeconomic resources-----	9,600	.08 .5	gold silver	
27	** Pacific Mine (main deposit)	Contact-metasomatic	Indicated and inferred reserves-----	630,000	sericite		
27	** Pacific Mine (north deposit)	do----------	Indicated and inferred marginal reserves----------	400,000	sericite		
27	Pacific Mine (south deposit)	do----------	Inferred subeconomic resources------	30,000	sericite		
40	** Sacramento Canyon Pumice Deposit	Volcanic-subaqueous	Indicated and inferred subeconomic resources----------	7,600	pumice		
41	Sacramento Mine	Fissure veins------	Measured and inferred marginal reserves----------	5,500	0.47 .3	gold silver	0.56 copper
41	Sacramento Mine	do----------	Measured and indicated subeconomic resources----------	11,000	.15 .10	gold silver	.32 copper
54	* Saratoga, Lexington, and Ranger	Shear zone-fissure veins----------	Indicated and inferred marginal reserves----------	1,600	.41 .54	gold silver	.06 copper
9	Silver Tiger - S and J Nos. 1-6	Shear zone---------	Indicated and inferred subeconomic resources----------	45,000	4.5	silver	.58 zinc
50	** Twenty Grand Mine	Shear zone-fissure veins----------	do----------	12,000	.03 1.4	gold silver	
50	** Twenty Grand Mine 1/	do----------	do----------	8,000	.06 1.0	gold silver	
68	* Unknown (2, 6, 36)	Fissure veins-----	do----------	8,300	.12 .37	gold silver	1.4 lead

1/ This property would not return enough revenue to be classified as a resource, based on hypothetical production costs for this deposit alone. However, it is favorably located for possible consolidated development with other deposits, and viewed collectively, they represent resources.

Table 2.--Recorded production from metallic lode deposits in and adjacent to the White Mountains Roadless Area

[From U.S. Bureau of Mines production records 1/; N.R., not reported; *, outside the study area; **, partly inside the study area]

Property no. (fig. 2)	Property	Year(s)	Tons	Gold (oz)	Silver (oz)	Copper (lb)	Lead (lb)	Zinc (lb)
15	Argentite Maid	1952	5	1.2	200	N.R.	200	750
10	Black Warrior Mine or Blonde Eskimo	1898-1921	14,484	.02	14,666	N.R.	211	N.R.
56	* Bullion	1906	800	145.1	44	N.R.	N.R.	N.R.
--	* Container Mine 2/	1927-1942	540	N.R.	N.R.	N.R.	N.R.	N.R.
22	Copper Queen No. 3 3/ (Copper Queen Nos. 1-3)	1968	4	N.R.	4	104	N.R.	N.R.
37	Eva Bell (Eva Belle Mine) 3/	1901-1976	607	303.7	11,826	6,629	55,284	17,943
19	Evergreen Mine, Queen of the Hills, or Kyle	1925-1963	197	N.R.	13,377	1,062	4,134	446
48	** Golden Siren Mine 3/ (Gladys)	1912	6	6.0	2	N.R.	N.R.	N.R.
17	Green Monster Mine or Alexander	1938-1953	768	7.1	39,800	6,889	48,741	3,792
3	Queen (Queen Canyon Mine) 3/	1935	6	.1	432	161	1,929	N.R.
46	Rainbow or Mono-Piute 3/ (Z and S Mine)	1940-1950	16	14.0	8.0	N.R.	N.R.	N.R.
--	* Red Rock Mine 4/	1928-1954	21,644	N.R.	N.R.	N.R.	N.R.	N.R.
41	Sacramento Mine	1889-1950	119	750.9	115.2	684	3,804	N.R.
16	Silver King (Mollini Mine) 3/	1910-1938	418	62.6	22,077	1,682	8,023	N.R.
55	* Southern Bell or Inyo Gold (Southern Belle Mine) 3,5/	1893-1937	339	1,024.77	182	N.R.	N.R.	N.R.
50	** Twenty Grand Mine 6/	1936	48	11.8	909	1,213	9,100	N.R.
Grand totals:			26,305	2,457.56	102,777.2	18,424	131,426	22,931
Total for study area			2,994	1,290.64	102,551.2	18,424	131.426	22,931

1/ This production data is from one source only. It does not reflect: a) amounts recovered prior to 1889, b) amounts not reported, and c) additional data supplied by claimants. Also, production from mines probably inside the study area, but without confirmed locations was not included.

2/ A total of 81 flasks of mercury were recovered (76 pounds per flask).

3/ U.S. Bureau of Mines production records list the following names: Copper Queen No. 3, Eva Bell, Golden Siren Mine, Queen, Rainbow, Mono-Piute, Silver King, Southern Bell, and Inyo Gold. Through correlation studies these were found to be the same properties as those found in the parentheses.

4/ A total of 2,002 flasks of mercury were recovered (76 lb per flask).

5/ Production from the Southern Belle Mines also included production from other nearby properties.

6/ According to Sampson and Tucker (1940, p. 139-140), 5 cars of $60 ore was shipped from the workings.

Table 3.--Recorded production from nonmetallic lode deposits in and adjacent to the White Mountains Roadless Area

[From U.S. Bureau of Mines production records; *, outside the study area; **, partly inside the study area]

Property no. (fig. 2)		Property	Year(s)	Tons	Commodity	Value
28	**	Champion Mine 1/	1921-1945	26,457	Andalusite	$183,992
31		Colton Mine	1948-1959	6,762	Pyrophyllite (sericite)	28,446
44	**	Comstock Pumice Deposit (Chalfant, H. Comstock, or Piute Mine) 2/	1943	987	Pumice	10,857
58	*	Gunter Canyon Barite Mine	1928-1959	8,535	Barite	67,195
59	*	Gunter Canyon area pumice deposits	1937-1947	22,991	Pumice	313,298
53		Hobo Nos. 1-8	1940	275	Barite	1,450
27	**	Pacific Mine	1945-1983	124,294	Pyrophyllite (sericite)	1,072,671
Grand totals:				190,201		$1,677,909

1/ Production between 1922 to 1936 is about 20,000 tons of 53 percent andalusite. (Varley 1968, p. 107).

2/ Bureau production records usually list owners or operators for nonmetallic commodities. Though correlation studies production was linked to the mine name(s). Also, those names listed were found to be the same property as those in the parentheses.

Table 4.--Summary of mines and prospects with mineral resources or resource potential in the White Mountains Roadless Area

[*, outside the study area; **, partly inside the study area]

Property number (fig. 2)	Name	Summary	Workings and production	Resource/sample data
1	Double Lucky	Poorly exposed shear zones that trend north-northeast and dip 20° to 80° NW. are in siltstone, marble, argillite, and phyllite which have been intruded by quartz monzonite. Shear zones are up to 15 ft thick and contain fault breccia, gouge, minor vein quartz, and small pockets of galena, chalcopyrite, sphalerite, and pyrite.	Nine adits, 15 to 250 ft long; four caved adits, one caved shaft, and ten pits are scattered for about 2,000 ft along a northwest trend.	Of 62 chip and 14 select or grab samples taken, 22 chip and 2 select samples had significant metals values. Of the chip samples, four from shear zones ranged from 0.006 to 0.026 oz gold per ton, seven had from 0.2 to 0.7 oz silver per ton, 13 contained from 0.01 to 0.09 percent copper, and eight had 0.01 to 0.58 percent lead. Of the shear zone chip samples that included quartz, three assayed between 2.3 and 3.2 oz silver per ton, two contained 1.2 to 4.0 percent lead, and four had 0.69 to 2.90 percent zinc. The property has a low potential for silver-lead-zinc resources.
2	Apex-Fawn	Heavily iron-stained, discontinuous quartz veinlets up to 3 in. thick are along a poorly exposed shear zone that trends N. 30 to 35° E. and dips 40° to 55° NW. in argillite and phyllite. Small bodies of granitic rock crop out nearby.	Two inclined shafts (55 ft, 12 ft) a caved shaft, and 13 pits.	Of 14 chip samples, three from sheared phyllite and argillite contained 0.005 to 0.06 oz gold per ton and 0.23 to 2.4 oz silver per ton. Of 13 grab and select samples, four from small quartz veins and iron-stained argillite contained 0.03 oz gold per ton and 0.2 to 3.9 oz silver per ton. One select sample of quartz had 3.35 percent lead and 6.10 percent zinc. A low potential for gold, silver, lead, and zinc resources exists.
3	Queen Canyon Mine (Overlay Nos. 7 and 10 Claims	Silver-lead-zinc-bearing calcite veins are scattered along randomly oriented shear zones in interbedded marble and siliceous hornfels near quartz monzonite. Calcite veins are less than 1.5 ft thick and pinch out in a few feet. They contain galena, sphalerite, and argentite. The marble wallrock contains epidote and pyroxene.	Seven adits with about 1,300 ft of underground workings. Surface excavations include a 200-ft-long cut and three pits. Six tons yielded 0.1 oz gold, 432 oz silver, 161 lb copper, and 1,929 lb lead (U.S. Bureau of Mines production records). An unknown amount of production was combined with the Indian Queen-Poorman Mine (in the Sugarloaf Roadless Area) which probably came from this mine.	Thirty-six samples were taken. Twenty-two from veins and associated shear zones averaged 1.0 oz silver per ton, 0.19 percent lead, and 0.84 percent zinc. Ten of the 22 samples had between 0.5 and 16.7 oz silver per ton, 20 had between 0.01 and 4.8 percent lead, and 21 had between 0.03 and 8.4 percent zinc. The highest-grade samples came from the small vein remnants in stopes. Sampling indicates that the metal values are confined to the veins, which are too small and scattered to constitute resources. They have a low potential for silver, lead, and zinc resources.
4	Ruth E.	Banded limestone and shale strikes N. 44° W. and dips 47° SW. An irregular, sheeted, bedding plane shear zone ranges from 2 in. to 2.5 ft thick and is comprised of limonite- and hematite-stained gouge and silicified rock fragments; malachite stains some fractures. The structure is not exposed beyond the deepest shaft; tactite float was found nearby.	Two inclined shafts, 12 and 25 ft deep, and a 40-ft-long open cut.	Four chip samples from the shear zone had 0.13 to 0.43 percent lead and 0.39 to 1.00 percent zinc. One grab sample contained 0.10 percent lead and 0.31 percent zinc and another had 0.10 percent copper. Four samples of country rock and tactite float contained no significant values. The property has a low potential for lead-zinc resources.
5	Silver King	Highly contorted, recrystallized limestone and marble along the White Mountains fault zone have been intruded by quartz monzonite. At one igneous-sedimentary rock contact, a quartz vein strikes north and dips 25° to 55° west. The vein ranges from 1 to 15 ft thick, averages 5 ft thick, and is exposed for 200 ft along strike and 80 ft down dip. The quartz vein is massive to fractured and most areas are stained by iron-oxide, malachite, and chrysocolla. In one part of the vein are blebs of disseminated chalcopyrite.	A 200-ft-long adit has a 60 ft side drift, a 15 ft winze, several stopes, and a 60-ft-long raise to an upper level. The 40-ft-long upper level extended to the surface, and is now caved. Other workings include two small pits.	Twenty samples, including 15 chip samples were collected. A mineralized portion of the quartz vein contains about 6,000 tons with a weighted average of 0.50 percent copper. Three grab samples from two dumps and one stockpile contained 0.3 oz gold per ton and 4.5, 0.9, and 9.2 percent copper. One chip sample of quartz contained 0.01 oz gold per ton. The property has a moderate potential for copper resources.
6	Silver Button	Quartz monzonite forms an irregular north-trending contact with massive, fractured marble, limestone, dolomite and thin beds of shale, slate and quartzite. Primary flow banding and mafic segregations in the granitic rocks are part of the structural deformation caused by the White Mountains fault zone. Silver and copper minerals are found at four locales along an 800 ft portion of the igneous-sedimentary rock contact. Mineralized structures were not observed in place. Float and stockpiles indicate small quartz veins or lenses, siliceous shale, and quartzite contain bands or streaks of finely disseminated argentite and pyrargyrite, chalcopyrite, malachite and azurite stain. Assay results indicate sphalerite may also be present.	One 15-ft-deep shaft, 4 caved adits totaling an estimated 240 ft, and 6 pits are scattered along the contact zone.	Seventeen samples were taken: two chip samples across a shear zone contained 0.05 and 0.09 percent lead, 0.19 and 0.15 percent zinc, and 0.02 and 0.06 percent copper; one had 1.3 oz silver per ton. Two select samples of mineralized quartz, quartzite, and shale had 16.4 and 34.0 oz silver per ton, 0.13 and 0.27 percent lead, 1.45 and 1.20 percent zinc, and one had 0.18 percent copper. One random sample chip of mineralized dolomite contained 20.1 oz silver per ton. Two grab samples of mineralized granitic rock and dolomite contained 11.1 and 1.0 oz silver per ton, 0.61 and 0.14 percent lead, 0.37 and 0.23 percent zinc, and 0.02 and 0.03 percent copper. A moderate potential for silver-copper-lead-zinc resources exists.
7 **	Silver Mule	No mineralized structure is exposed. However, stockpiled material suggests that argillite and quartz stained with malachite and azurite are associated with shear zones. The zones trend northeast and northwest along the northeast-trending White Mountains fault zone between argillite and slate, and granite.	One 52-ft-long adit and two trenches.	Four chip samples of slate, three grab samples of slate-argillite-granite dump material, and one stockpile sample were taken. The only mineralized material found was on the stockpile. A sample assayed 81.2 oz silver per ton, and 0.78 perent copper. Three of the chip samples had 0.01 percent copper; the others were barren. A low potential for silver-copper resources exists.

Table 4.--Summary of mines and prospects with mineral resources or resource potential in the White Mountains Roadless Area--Continued

Property number (fig. 2)	Name	Summary	Workings and production	Resource/sample data
8	Silver Pile	Siliceous to calcareous slate and argillite were intruded by granite along an irregular north-trending contact zone. All the rocks have been brecciated, folded and sheared by the White Mountains fault zone. The shear zones are discontinuous and narrow, and some contain quartz and calcite stringers. The silicified shear zones and nearby rocks are stained by limonite, malachite, azurite and chrysocolla. A 700-ft-long portion of the contact zone has been explored; the highest-grade silver values are within a 100 ft segment comprised of malachite and limonite stained argillite.	Three adits, 10, 30, and 130 ft long, five caved adits, and six small pits.	Twenty-seven samples of argillite and granite were collected. Two stockpile samples contained 40.3 and 18.2 oz silver per ton with 0.38 and 0.23 percent copper. These values were substantiated by a chip sample of iron- and copper-oxide stained argillite that had 11.8 oz silver per ton and 0.08 percent copper. Seven other samples, from widely spaced locales, contained from 1.2 to 2.2 oz silver per ton and a trace copper. This property has a moderate potential for silver-copper resources.
9	Silver Tiger-S and J Nos. 1-6	Calcareous argillite, limestone, quartzite, marble and slate have been intruded by aplitic granite and all rocks have been brecciated, sheared and folded by the White Mountains fault zone. Factors controlling localization of the mineralized zones are unclear, but they are most concentrated in brecciated or sheared carbonate rock and in quartz veins and lenses. The largest exposed zone is in a roughly defined block measuring 32 by 42 by 68 ft. Galena, sphalerite, chalcopyrite, and copper carbonate and sulfate minerals occur in the zones as both disseminated blebs and veinlets.	Twenty four adits totaling 1,700 ft, 17 caved adits, 6 shafts (3 caved) from 30 to 140 ft deep, 18 pits and four trenches are scattered for 1.5 mi along a northeast trend.	About 7,200 tons of indicated subeconomic resources average 4.5 oz silver per ton and 0.58 percent zinc. Projected extensions contain 38,000 tons of inferred subeconomic resources. Silver was detected in 82 of 212 samples. Most samples had low copper-lead-zinc values; six had a trace to 0.092 oz gold per ton. A high potential for additional silver-zinc resources exists.
10	Black Warrior Mine area	Intensely sheared and fractured argillite, limestone, marble, and slate in the White Mountains fault zone are intruded by granitic rocks. Mineralized zones along bedding, mainly in calcareous argillite near contacts with slate, contain silver-bearing galena, cerrusite, sphalerite, and secondary copper minerals. Recognized zones trend N. 40-65° W. and dip 15-35° NE. One zone is 165 ft long, 65 ft wide and 9 ft thick.	Thirty-seven adits as long as 380 ft and totaling more than 3,600 ft are in the 132 acre mine area. Twenty caved adits, eighteen pits and trenches and three cabins are also on the property. The mine produced 14,482 oz of silver from 1898 to 1901. Two tons of ore that yielded 0.02 oz gold, 184 oz silver, and 211 lb lead may have come from this property in 1921 (U.S. Bureau of Mines production records).	A mineralized zone in the southern area contains 6,400 tons of indicated and 10,000 tons of inferred subeconomic resources that average 8.5 oz silver per ton and 0.61 percent lead. A small mineralized zone (about 650 tons) in the northeastern area contains 6.8 oz silver per ton and 2.0 percent lead. Silver was detected in 99 of 292 samples, which ranged from 0.2 to 67.0 oz per ton; including a select stockpile sample that contained 277.4 oz silver per ton. Three samples contained 0.005 to 0.012 oz gold per ton. Most samples contained small amounts of lead, zinc, and copper. The area has a moderate potential for additional silver-lead resources.
11	Russell Nos. 1-17	Calcareous metasedimentary rocks, fractured by the White Mountains fault zone are intruded by granite. They contain scattered poorly exposed, 2- to 3-ft-thick and 5- to 10-ft-long, mineralized replacement zones with malachite, azurite, chalcopyrite, and sphalerite.	Ten pits, three adits, and two shafts totaling 162 ft, are scattered over an area of about 115 acres.	Thirty-eight samples were taken: Of 17 chip samples one contained 0.5 oz silver per ton. Chip samples had no copper, lead, or zinc values exceeding 0.25 percent. Of eight grab samples: two contained 1.6 and 5.2 oz silver per ton; two contained 0.28 and 0.73 percent lead; and four contained 0.13 to 3.55 percent copper. Eight of 12 select samples had 0.7 to 4.2 oz silver per ton; seven had 0.10 to 6.7 percent lead; 10 had 0.61 to 24 percent copper; and four had 0.30 to 9.50 percent zinc. Mineralized structures were not continuous or sufficiently exposed to estimate tonnage or average grade. However, there is low potential for silver-copper-zinc resources.
12	Unknown (23, 1, 32)	Calcareous argillite has been intruded by granitic rocks; both rock types have been sheared and deformed in the White Mountains fault zone. Associated with some of the shear zones are 3- to 5-ft-thick, discontinuous, quartz and limonite lenses that contain gold, silver and minor amounts of copper and zinc minerals. The greatest concentrations of those minerals are in close proximity to the igneous-sedimentary rock contacts.	Six adits, 5- to 30-ft-long (one caved), two shafts, 10 and 65 ft deep, and six pits.	Twenty-six samples, including ten chip, eight grab, and eight select, were taken. Of the chip samples, two had 0.3 and 3.6 oz silver per ton. The select samples had as much as 9.1 oz silver per ton and 6.05 percent copper. The mineralized shear zones are widely scattered and not exposed sufficiently to determine resources. A low potential for silver-copper resources exists.
13	Neptune, Phenix, and Creekside Quartz Mine	Interbedded calcareous argillite and crystalline limestone is in contact with quartz monzonite. The White Mountains fault zone has produced numerous en echelon, gouge-filled shear zones that are small-scale and discontinuous in both rock types. Near the contact area, especially in the limestone strata, are fractured, iron-oxide-stained quartz veinlets, stringers and irregular silicified areas. Most quartz is less than 6 in. thick and a few feet long; one vein is 3.3 ft thick. Pyrite, chalcopyrite, malachite, and chrysocolla are associated with the quartz. Three claims were patented in 1889.	Two adits, 105 and 95 ft long, and 11 pits. Several thousand oz of silver were produced (Whiting, 1888, p. 378).	Three chip samples of sheared granite and vein quartz contained 0.2 to 0.5 oz silver per ton and traces of copper. Two chip samples of siliceous limestone contained 0.2 and 0.3 oz silver per ton and 0.02 and 0.13 percent copper. Two select samples of stockpiled quartz and siliceous limestone contained 1.2 and 2.2 oz silver per ton and 1.17 and 2.30 percent copper. Four other select samples of siliceous limestone had 0.2 to 0.4 oz silver per ton and 0.2 to 0.24 percent copper. A low potential for silver-copper resources exists.

Table 4.--Summary of mines and prospects with mineral resources or resource potential in the White Mountains Roadless Area--Continued

Property number (fig. 2)	Name	Summary	Workings and production	Resource/sample data
14	Silver Piñon	Limestone, marble, shale, argillite, and chert have been intruded by granite along an irregular, gradational contact zone. Granitic dikes 5- to 10-ft thick, and xenoliths with calc-silicate mineral assemblages are characteristic of this transition zone. Sturctural deformation of both rock types by the White Mountains fault zone has resulted in numerous discontinuous shear zones 2- to 5-ft-thick and faults. Most mineralized zones are in limestone, usually near dikes, and are characterized by: 1) silicification, including quartz veinlets and quartz veins up to a few inches thick, 2) iron minerals, including local heavy iron-oxide-stain; 3) copper minerals, including copper carbonate stain; 4) thin streaks, about 1/10 in. thick, of black, fine-grained, vitreous pyrargyrite (ruby silver) and (or) argentite (De Groot, 1890, p. 338), surrounded by bands of copper- and iron-oxide alteration; and manganese dendrites.	Five adits, 20 to 95 ft long, 19 caved adits, one caved shaft, eight pits and the ruins of a mill are scattered for 1,600 ft along a northerly trend.	Fifty-one samples were taken: 34 were chip samples across shear zones. Five chip samples had 0.2 to 2.8 oz silver per ton, and one had 28.7 oz silver per ton. Eight chip samples had from 0.01 to 0.43 percent copper. Select samples of stockpiled shear zone material and tactite contained as much as 23.6 oz silver per ton and 0.91 percent copper. There is moderate potential for silver-copper resources.
15	Argentite Maid	A fractured vein of quartz breccia at least 4 ft thick strikes N. 65° W, dips 60° SW, and is associated with a shear zone, up to 4.5 ft thick, in siliceous limestone.	Two shafts (20 and 45 ft deep), one 100-ft adit, and four pits. In 1952, 5 tons of ore yielded 1.2 oz gold per ton, 200 oz silver per ton, 200 lbs of lead and 750 lbs of zinc (U.S. Bureau of Mines production records).	Thirteen samples were taken. Of seven chip samples across the shear zone, one contained 0.15 oz gold and 8.1 oz of silver per ton. Of five quartz and siliceous limestone grab samples, one contained 0.01 oz gold per ton and four contained 1.1 to 2.0 oz of silver per ton. This propery has a low potential for silver resources.
16	Mollini Mine (Good Willie Nos. 1-4)	Along the northeast-trending contact zone between granitic and metasedimentary rocks are 0.8- to 7.8-ft-thick shear zones that contain pods of quartz and veinlets of galena, tetrahedrite, and sphalerite. One mass of quartz is about 30 ft in diameter. Many limits of this deposit are not exposed underground; thick overburden obscures contacts on the surface.	Ten adits with 900 ft of workings, seven caved adits, three shafts, and four pits and trenches are scattered for 800 ft along the contact zone. From 1910 to 1938 about 418 tons yielded 62.6 oz gold, 22,077 oz silver, 1,682 lb copper, and 8,023 lb lead (U.S. Bureau of Mines production records).	In three shear zones and a quartz pod are 540 tons of indicated marginal reserves averaging 19. oz silver per ton, 2.0 percent lead, 1.6 percent zinc, and 0.11 percent copper; and 180 tons of inferred marginal reserves averaging 19 oz silver per ton, 4.9 percent lead, 1.3 percent zinc, and 0.15 percent zinc. Classification as a marginal reserve is based on: proximity to other high-grade silver-lead-zinc deposits which could be developed concurrently, easy access, and location near existing and planned processing facilities. This property has a high potential for additional silver-lead-zinc resources.
17	Green Monster Mine	Interbedded marble, silicious limestone, and argillite strike northeast and dip northwest near an irregular contact with granodiorite. Sphalerite, galena, tetrahedrite, chalcopyrite and pyrite, with minor pyrargyrite and chalcanthite, occur randomly as 1 in. long elongate blebs and in discontinous veinlets, and 1.2- to 10.5-ft-thick. These minerals are in silicified and gouge-filled shear zones up to 35 ft thick in limestone that strikes northeast to northwest and dip steeply.	Four adits, totaling 470 ft, two 15 ft deep shafts, and a small pit are scattered for 700 ft along a northeast contact. From 1938 to 1953 the mine produced 781 tons containing 6.1 oz gold, 40,329 oz silver, 6,916 lbs copper, 46,767 lbs lead, and 5,775 lbs zinc (U.S. Bureau of Mines production records).	An estimated 1,100 tons of indicated and 1,500 tons of inferred marginal reserves average 17. oz silver per ton, 4.0 percent zinc, and 0.73 percent lead. Near the same contact, 600 ft southwest are 150 tons of marginal reserves that average 140 oz silver per ton, 4.0 percent zinc, 3.3 percent lead and 0.7 percent copper. The hanging wall host rocks adjacent to the veins contain similarly high but spotty silver values; therefore a high potential exists for additional silver-lead-zinc resources. A select sample assayed 612 oz silver per ton. Easy access, location near other deposits which could be developed concurrently and proximity of existing and planned processing facilities are factors that influence the classification as a marginal reserve.
18	Silver Consolidated Mining Claims	Replacement pods are associated with localized shears, faults, and breccia zones in recrystallized limestone in a 500 by 700 ft area along the crest of a northeast-trending anticline in limestone and shale. The fold is intruded by quartz monzonite. The pods are composed of silicious, iron-rich, massive to banded limestone with fine grained pyrite, galena, sphalerite, acanthite (argentite), chalcopyrite, tetrahedrite, and native silver. Some pods contain secondary copper minerals along fractures; the largest pod is about 14 ft long and 3 ft thick.	Patented 195 acre claim group with five adits, 23 to 95 ft long; two shafts 11 and 30 ft deep; four trenches and two pits.	Twelve of 34 samples contained traces to 0.096 oz gold per ton; 27 contained detectable silver (17 of those had 0.2 to 0.6 oz silver per ton and ten contained from 1.0 to 88.0 oz silver per ton). Ten of 22 analyzed for copper contained 0.01 to 0.67 percent and two had 2.6 and 2.8 percent. Eleven of 19 analyzed for lead contained 0.01 to 0.45 percent and three had from 1.25 to 3.9 percent lead. Sixteen of 19 contained 0.02 to 3.3 percent zinc and three had from 6.4 to 38.0 percent zinc. The mineralized zones are too small and scattered to constitute resources. The potential for silver-zinc-copper resources is moderate.
19	Evergreen Mine (C and C)	Hornfels, marble and argillite are in contact with a quartz monzonite intrusive. A poorly defined tactite zone exposed in the headwall of the bench cut is at least 150-200 ft long and 75 ft high. Randomly oriented tactite lenses 1.5 to 4.5 ft thick contain disseminations and masses of galena, sphalerite, chalcopyrite and stains of secondary copper-lead minerals. Only a small portion of this zone is accessible; much of the area has a thick cover of colluvium, and has been disrupted by bulldozer activity.	One caved adit and a 500-ft-long bench cut with a headwall of 75 ft. In 1925, 1926, 1940, and 1963, 197 tons yielded 13,377 oz silver, 1,062 lbs copper, 4,134 lbs lead, and 446 lbs zinc (U.S. Bureau of Mines production records).	Of 19 samples taken, three chip samples contained 3.4, 31.6 and 69.5 oz silver per ton, 0.03, 0.18 and 0.47 percent copper, and from 0.25 to 1.22 percent lead; two had 0.16 and 9.10 percent zinc. One chip sample contained 0.013 oz gold per ton. Resources were not determined due to the inaccessibility and limited exposure of the tactite zones. A moderate potential for silver-copper-lead-zinc resources exists.

Table 4.--Summary of mines and prospects with mineral resources or resource potential in the White Mountains Roadless Area--Continued

Property number (fig. 2)	Name	Summary	Workings and production	Resource/sample data
20	Claw Nos. 1-3	Metavolcanic rocks in contact with granitic rocks (Crowder and Sheridan, 1972) are cross-cut by a uranium bearing vein comprised of tremolite-actinolite, calcite, quartz, plagioclase, epidote and magnetite. The vein strikes N. 40° E., dips 35-60° NW., averages 3 ft thick. Only 220 ft of the vein was accessible for examination. Several smaller veins were reported but were not found.	One 12-ft adit.	About 6,000 tons of indicated and 21,000 tons of inferred subeconomic resources that contain 0.14 percent U_3O_8 is estimated in the main vein. Three samples also contained 0.12 to 0.65 percent combined lathanium, scandium and yttrium oxides. Consistently high U_3O_8 values have been reported in additional nearby veins (Wrede, 1979, p. 5). There is moderate potential for additional uranium resources.
21 **	Mountain View and Proctor Mine	Pyrite, galena, and sphalerite are disseminated along three 8-ft-thick, northwest-trending, shear zones in marble and quartzite. The shear zones are up to 400 ft long and 20 ft thick.	Nine adits (two caved) totaling 200 ft, and one trench.	Twenty-six chip samples: Twenty-two assayed 0.2 to 5.2 oz silver per ton; 20 had 0.01 to 0.02 percent copper, 18 contained from 0.05 to 6.05 percent lead; and 19 had between 0.35 and 16.6 percent zinc. Averages were: 0.8 oz silver per ton, 1.11 percent lead, and 2.90 percent zinc. The property has a moderate potential for silver-zinc-lead resources.
22 **	Copper Queen Nos. 1-3	Thin-bedded, fissile shale up to 7 ft thick, strikes N. 70° E., dips 30-77° SE., and is interbedded with recrystallized limestone. The shale has disseminated pyrite and malachite and limonite-stained fractures. The limestone has limonitic zones up to 1.3 ft thick and 25 ft long.	Two adits, 45 and 230 ft long, and one caved adit estimated to be 80 ft long. Bureau of Mines production records indicate that 4 tons yielded 104 lbs copper and 4 oz silver in 1968.	Twelve samples were taken. Two chip samples of shale contained 0.5 and 0.2 oz silver per ton and 0.32 and 1.49 percent copper. One sample of the calcareous limonite zone contained 1.6 oz silver per ton; five additional chip samples of the same material averaged 0.36 oz silver per ton. Three grab samples of shale and limestone from adit dumps contained an average of 0.73 percent copper and 0.27 oz silver per ton. A moderate potential for copper-silver resources exists.
23	Birch Creek area prospects	A thick coating of chrysocolla, malachite, and calcite occurs in 3 in. to 1 ft thick areas of intensely fractured metavolcanic rock. Quartz veins and pods in this area do not contain metallic minerals.	Two adits, 90 and 100 ft long, three caved adits and two pits in widely scattered locations.	Eighteen chip, two grab and one select samples were collected. Three chip samples contained from 0.6 to 1.7 oz silver per ton, and 1.63 to 2.03 percent copper. A select sample of the same material had 1.7 oz silver per ton and 0.85 percent copper. Most of the other samples had traces of copper. A low potential for copper-silver resources exists.
24	Stairway Copper Nos. 1-16	Randomly oriented shear zones, up to 5 ft thick and a few feet long, occur in fractured meta-andesite stained by secondary iron and copper minerals. Shear zones consist of limonitic gouge, meta-andesite, and quartz with blebs of massive chalcopyrite, pyrite, and chrysocolla.	One shaft 165 ft deep, four adits totaling 130 ft, six caved adits estimated to total 200 ft, and five trenches and pits.	Thirty-one samples were taken. Thirteen grab samples from stockpiles had as much as 2.87 percent copper. Thirteen of the 17 chip samples had from 0.01 to 1.07 percent copper. There is moderate potential for copper resources.
25	Little Dipper Group	Fissure-filling quartz veins up to 3.5 ft thick and at least 17 ft long are subparallel with iron-oxide-stained shear zones up to 4 ft thick and 75 ft long. These steeply dipping structures strike N. 48° E. to N. 35° W. in altered andesite.	Three adits 15, 28, and 75 ft long, and two trenches.	Fourteen samples were taken. Six chip samples from quartz and shear zones ranged from 0.4 to 1.1 oz silver per ton. Three grab samples of dump material had from 0.4 to 0.9 oz silver per ton. One chip sample of quartz with malachite had 0.6 percent copper. The property has a low potential for copper-silver resources.
26	Heine B. Nos. 1 and 2	Three parallel, 0.3-0.5 ft-thick quartz lenses in phyllite contain disseminated chalcopyrite with chysocolla halos. The lenses are along a poorly exposed, 9.0-ft thick zone that strikes N. 50° W., and dips 30° SW.	One 28-ft adit and three small pits.	Ten samples were taken: a chip sample from each of the three quartz lenses contained 5.8, 3.1 and 1.2 oz silver per ton and 2.56, 1.24 and 0.48 percent copper. One chip sample of quartz from a pit contained 0.2 oz silver per ton and 0.32 percent copper. Three grab samples of stockpiled quartz had 2.3, 6.6 and 6.8 oz silver per ton and 1.22, 5.50 and 4.20 percent copper; one of the grab samples also contained 0.02 oz gold per ton. This property has a moderate potential for copper-silver resources.
27 **	Pacific Mine	Sericite-bearing schist occurs in a band of felsic metavolcanic rocks that trend north for more than 3 mi along the White Mountains fault zone. The main deposit is more than 800 ft long and 100 ft thick. An additional deposit or extension, about 100 ft thick, lies 400 ft to the north. Three lenses of sericite schist, 160 to 220 ft long, occur at the White Swan Claims 2,000 ft south of the main deposit. Ore grade rock contains mostly sericite with less than 30 percent quartz. This deposit has been described as pyrophyllite in literature.	Two open pits are on the main deposit. The north pit is 200 by 400 ft and has been explored to a depth of 200 ft by five drill holes. The south deposit is developed by a 111-ft-long adit. Ore is crushed and classified at a mill at Laws, California, 4.5 mi northeast of Bishop. The Pacific Mine has produced more than 160,000 tons since 1945, (U.S. Bureau of Mines production records) and continues to produce about 1,000 tons per year on a custom basis. The product is sold under the trade name Chromacal which is used principally as a paint extender.	Approximately 170,000 tons of indicated and 460,000 tons of inferred sericite reserves are in the main deposit. An additional 40,000 tons of indicated and 360,000 tons of inferred marginal reserves were delineated by drilling in the northern deposit. Approximately 30,000 tons of inferred subeconomic resources are at the White Swan Claims. A high potential exists for additional sericite resources.

Table 4.--Summary of mines and prospects with mineral resources or resource potential in the White Mountains Roadless Area--Continued

Property number (fig. 2)	Name	Summary	Workings and production	Resource/sample data
28 **	Champion Mine	A zone of andalusite containing up to 3 percent rutile is 500 ft long, as much as 300 ft wide and 50 ft thick (Jeffery and Woodhouse, 1931, p. 461) and occurs totally within the Cenozoic (?) White Mountains fault zone (McKee and others, 1982). The deposit is described by Melhase, (1925, p. 92), Kerr (1932, p. 618), Sampson and Tucker (1940, p. 149), and Gross and Parwel (1968, p. 494), as irregular stringers, lenses and segregations associated with a 200 ft wide quartz mass and bounded by hydrothermally altered sericite schist and quartz monzonite porphyry. The source of aluminum and the sequence of geologic events are unclear. Several rare minerals occur here.	Workings include a 500 ft long adit with stopes up to 100 ft long, 50 ft wide, and 75 ft high; a 400 ft adit and several pits. Between 1920 and 1945, about 26,457 tons averaging about 53 percent andalusite were mined for the Champion Spark Plug Company (Varley, 1968, p. 108; U.S. Bureau of Mines production records).	Two million tons may remain at the main workings, and as much as 250,000 tons averaging 40 percent andalusite are about 0.75 mi southwest (Varley, 1968, p. 108). Andalusite has been replaced in most of its uses by many substitutes. This deposit has a high potential for additional andalusite and rutile resources.
29	Bobbie D. Lode	A 300-ft-long, 3-ft-thick, quartz vein stockwork, strikes east and dips 32° N., in granodiorite.	One trench and one pit.	One of four chip samples across the stockwork contained a trace of gold. A select sample of stockpiled quartz contained 0.27 percent copper, 14 percent lead, 6 percent zinc, and 0.21 percent WO_3. The prospect has a low potential for lead-zinc-copper resources.
30 **	Inspiration	Hydrothermal alteration of metasedimentary and metavolcanic rocks has produced a zone up to 150-ft-wide and over 400 ft long containing sericite. The boundaries of a second apparently smaller, alteration zone of blocky sericite were not defined.	An open cut with three benches covering an area about 130 by 400 ft, and one 53 ft long adit. The open cut may have contributed to production recorded for the Colton Mine.	Nine samples were taken. In six samples, sericite is a major component; in all nine samples free quartz is a major component. The samples contain 52.1 to 74.6 percent SiO_2 and 10.1 to 35.4 percent Al_2O_3. The property has moderate potential for sericite resources.
31	Colton Mine	A 35- to 120-ft thick zone of hydrothermally altered metavolcanic and metasedimentary rocks contain blocky sericite and lenses up to 12 ft thick. The lenses are concordant with the bedding which strikes northwest and dips southwest.	One adit with 460 ft of workings, one caved shaft, two pits 30 and 80 ft in diameter, and about 1,600 ft of bulldozer cuts. A total of 6,762 tons of sericite were produced from 1948 to 1959 (U.S. Bureau of Mines production records).	The alteration zone contains 1.2 million tons of indicated and inferred marginal reserves of sericite. This property has a moderate potential for additional sericite resources.
32 **	Copper Queen Mine	North-trending shear zones cut north-northeast-striking metasedimentary and metavolcanic rocks and contain discontinous quartz veins up to 4 ft thick and 80 ft long. Siderite, chalcopyrite, and tetrahedrite occur as disseminations and fissure fillings within the quartz. Malachite, azurite, chrysocolla, and limonite occur as stains and coatings on veins and in fractures within the country rock.	Ten adits, 14 to 150 ft long, total 700 ft. Other workings include four pits and a trench.	Seven samples were collected from quartz veins. Three chip samples across the axial plane in the adit had 5.7, 1.0, and 0.9 oz silver per ton and 4.00, 0.44, and 1.04 percent copper, respectively. A random chip sample of numerous quartz veins in the area contained 0.5 oz silver per ton and 0.16 percent copper. A grab sample from a small stockpile had 34.6 oz silver per ton and 21.7 percent copper. The potential for copper-silver resources is moderate.
33	Little Blue Group	Discontinuous quartz veins and pods, locally malachite stained, crop out in a 100 by 200 ft area in phyllite. Most of the copper minerals are concentrated in the axial plane of a small north plunging syncline. Quartz filled the tension fractures, with no vein thicker than 3 ft. The total strike length of the mineralized rock is not exposed, but the known dimensions are 5 ft wide, 10 ft high, and 15 ft long. The massive to crystalline quartz contains blebs of chalcopyrite, and fracture coatings of chrysocolla, malachite, and azurite.	One 15-ft-long inclined adit.	Of 73 chip samples, 20 had from 0.5 to 4.1 oz silver per ton and from 0.11 to 0.84 percent copper. Nine grab samples contained from 0.3 to 3.0 oz silver per ton and from 0.14 to 2.52 percent copper. Two select samples from small stockpiles contained 4.9 oz silver per ton each and 2.29 and 3.72 percent copper. The quartz veins are short, discontinuous, and have widely different but generally narrow widths, and resources could not be determined. A moderate potential for copper-silver resources exists.
34	Copper Kings Nos. 1 and 2	Phyllite and hornfels beds that strike N. 2° to 22° W. and dip 50° to 78° SW. contain at least two quartz pods that are as much as 3.5 ft thick and 10 ft long. The iron-oxide-stained quartz contains blebs of chalcopyrite and bornite and coatings of malachite and azurite.	Three pits and two trenches, 35 and 40 ft long.	Two random chip samples from a quartz pod contained 0.4 and 0.6 oz silver per ton and 0.09 and 0.20 percent copper. A sample from a nearby stockpile contained 24.7 oz silver per ton and 4.23 percent copper. A sample of a stockpile from the 35 ft trench had 11.0 oz silver per ton and 10.30 percent copper. Three samples from dumps had between 0.2 and 0.3 oz silver per ton and 0.4 percent copper. The property has a low potential for silver-copper resources.
35	Mono Copper Nos. 1 and 2	Jointed, blocky phyllite and hornfels strikes N. 20° E., dips 40° SE., and is intruded by quartz monzonite on the east. Untraceable 0.4 to 5 ft thick fault zones and 10 to 40 ft thick intensly fractured zones have stains and botryoidal coatings of malachite, azurite, and chrysocolla. Quartz is associated with the structures, but is not the gangue of the copper minerals.	Two adits, 42 and 43 ft long, two pits, and one caved adit.	Nine chip samples from veins and mineralized rock contained between 0.21 and 1.91 percent copper. Two grab samples from 1 to 5 ton stockpiles contained 3.26 and 5.4 percent copper. Sampling indicated that the intensity of copper mineralization is inversely related to the distance from the granodiorite intrusive. This property has a low potential for copper resources.

Table 4.--Summary of mines and prospects with mineral resources or resource potential in the White Mountains Roadless Area--Continued

Property number (fig. 2)	Name	Summary	Workings and production	Resource/sample data
36	White Mountain Copper Nos. 1 and 2	Quartz diorite forms an irregular contact with phyllite, hornfels, and quartzite that strikes N. 24° to 60° E. and dips 24° to 60° SE. Discontinuous quartz veins or pods, less than 1.0 ft thick and 10 ft long, are mostly in sedimentary rocks. A few outcrops of quartz have blebs of chalcopyrite; malachite stain is more widespread, especially in the sedimentary rocks near the intrusive contact.	Two trenches.	One chip sample of siliceous hornfels with minor quartz contained 0.47 percent copper. Four other chip samples of vein quartz and fracture zones contained a trace copper. One grab sample of a 4 ton stockpile of quartz contained 0.67 percent copper. The prospect has a low potential for copper resources.
37	Eva Belle Mine	Quartz monzonite is in contact with dolomite for at least 3 mi along a northerly trend. A lens of quartz-limonite boxwork occurs in a 30-ft-wide shear zone in dolomite. The lens is 100 ft long, 2.5 to 12.5 ft thick, and contains quartz, limonite, hematite, malachite, lead and zinc carbonates, and minor amounts of pyrite and galena. Similar material on dumps of workings suggest several lenses or pods may exist.	For 4,300 ft along a northwest trend are four adits (with 300 ft of workings) and eight pits. The mine produced a total of 607 tons of ore which yielded 303.7 oz gold, 11,826 oz silver, 6,629 lb copper, 55,284 lb lead, and 17,943 lb zinc in 1901, 1902, 1904, 1975, and 1976 (U.S. Bureau of Mines production records).	About 7,000 tons of indicated subeconomic resources containing 0.13 oz gold per ton, 1.2 oz silver per ton, 1.0 percent lead, 0.17 percent zinc, and 0.11 percent copper remain in the deposit. There is a high potential for additional gold-silver-lead-zinc-copper resources.
38	Mohawk	At least four widely spaced quartz veins, 2 to 8 in. thick and a few feet long, are in quartz monzonite and in a diabase intrusive. The veins strike northeast to northwest and dip 40° to 60° SE. and NE, respectively. The malachite-stained quartz veins contain disseminated chalcopyrite and pyrite.	One 38-ft-long adit, one caved adit, and seven pits.	Of five select samples of stockpiled quartz, four had as much as 0.01 oz gold per ton, a trace silver and 0.8 percent copper; the fifth contained 0.36 oz gold per ton, 1.0 oz silver per ton, and 0.99 percent copper. Two grab samples of a stockpile and dump had 0.02 and 0.05 oz gold per ton, a trace silver, and none detected to 0.39 percent copper. This property has a low potential for gold-copper resources.
39	G. B. and S. Mining and Milling Nos. 1-6	Quartz veins and veinlets up to 5 in. thick occur in diabase dikes within quartz monzonite. The dikes are from 2 to 10 ft thick, trend north, dip steeply east and crop out discontinuously for 3,000 ft. Locally, veins contain blebs of chalcopyrite, with alteration halos of malachite and chrysocolla. Limonite and hematite boxwork is commonly associated with quartz.	Nineteen adits (six caved), one 32-ft-deep shaft, ten trenches, and 13 pits. Total accessible underground development is 356 ft.	Six areas contained mineral occurrences which collectively represent about 1,000 tons of quartz and diabase with a weighted average grade of 0.14 oz gold per ton. Thirty-one of the 83 samples collected contained between 0.006 and 0.680 oz gold per ton; twelve samples contained between 0.2 and 1.0 oz silver per ton; and two had 1.15 and 1.30 percent copper. There is moderate potential for gold-silver-copper resources.
40 **	Sacramento Canyon Pumice Deposit	A deposit of minus 2 in. pumice 135 ft long, 50 ft wide, and exposed to a depth of 66 ft is partly covered by granitic colluvium. Before mining, the deposit was reported to be 500 ft long and 200 ft wide (Sampson and Tucker, 1940, p. 152).	A 200-ft-long trench up to 100 ft wide and 66 ft deep. The deposit was intermittently mined from the mid-1920's to the early 1940's. A scraper moved the pumice to a small storage bin. The screened minus 5/8 in. material was hauled by truck to Bishop, California for local use (see Chesterman, 1956, p. 61). Production was not reported.	The deposit contains 7,600 tons of indicated and inferred subeconomic pumice resources. Potential is high for additional pumice resources at this property.
41	Sacramento Mine	A 1.7- to 2.0-ft-thick quartz vein, associated with an altered diabase dike in hornblende monzonite, is exposed for 380 ft along strike and 600 ft downdip in mine workings. The vein and dike trend north and dip 25° W. The north end of the vein is thinned and fragmented by shearing; the east side is partly overlapped and terminated by a reverse fault. Pyrite and chalcopyrite in the vein are partially oxidized. Gold and silver are associated mainly with limonite and secondary copper minerals. Discrete grains of visible gold were observed in quartz and in siliceous limonite-quartz.	There are four interconnected adits, with about 2,800 ft of drift and crosscut on four levels, and extensive stoping. Some of the stoped areas in the mine are backfilled. An inclined shaft and a 10-ft adit explore the southeast end of the vein. The mine produced 750.9 oz gold, 115.2 oz silver, 684 lb copper, and 3,804 lb lead from 1889 through 1950 (U.S. Bureau of Mines production records).	In the unmined portions of the vein there are 5,500 tons of measured and inferred marginal reserves averaging 0.47 oz gold per ton, 0.3 oz silver per ton, and 0.56 percent copper. An additional 11,000 tons of demonstrated subeconomic resources average 0.1 oz gold per ton, 0.1 oz silver per ton, and 0.32 percent copper. The potential is moderate for additional gold-copper-silver resources at this property.
42	Ora Vista Group area prospects	Three subparallel diabase dikes in granodiorite trend northwest, dip 30° to 45° NE., and are exposed discontinuously for about 100 ft. Milky quartz veins within the dikes range from less than 1 in. to 5 ft thick, and contain patches of siderite, pyrite, chalcopyrite, bornite, and limonite boxworks. Many of the veins are barren; mineralization was erratic and restricted to small areas.	One 17-ft-deep inclined shaft, two adits (each 20 ft long), and 18 pits.	About 120 tons of mineralized quartz contains 0.24 oz gold per ton and occurs in one of the dikes. A total of 26 chip, six select, and one grab samples were collected from the veins in the area. Two select samples from a 4 ton stockpile of iron-oxide-stained quartz by a pit contined 0.094 and 0.015 oz gold per ton, 6.8 and 18.2 oz silver per ton, and 5.3 and 23.0 percent copper. This property has a moderate potential for gold-silver-copper resources.
43	Ray Tom Group	A sequence of phyllite, argillite, slate, and marble is intruded by diorite and aplite. The quartz veins are from a few inches to 7 ft thick, 1 to 36 ft long, trend N. 20° to 45° W., and dip south. Blebs of chalcopyrite and stains of malachite, chrysocolla, and limonite occur in quartz veins and shear zones in metasediments.	One 10-ft-long adit, two trenches, and ten pits are scattered over an area of 1/2 sq mi.	One chip sample of an iron-oxide-stained zone in marble contained 0.41 oz gold and 3.6 oz silver per ton. One select sample from a stockpile of the same material contained 1.9 oz silver per ton. One grab sample of calcite-healed, fractured phyllite contained 0.13 oz gold per ton and 3.4 oz silver per ton. Ten of 19 samples ranged from 0.01 to 0.77 percent copper. There is a low potential for silver-gold-copper resources.

Table 4.--Summary of mines and prospects with mineral resources or resource potential in the White Mountains Roadless Area--Continued

Property number (fig. 2)	Name	Summary	Workings and production	Resource/sample data
44 **	Comstock Pumice Deposit (Piute Mine)	The massive, moderately consolidated pumice deposit is exposed only in the open pit; elsewhere it is covered with fanglomerate at least 10 ft thick. Particles making up this subaqueous deposit vary from fine sand to pebble size. A screen analysis by Chesterman (1956, p. 61) shows that 76.5 percent is minus 1/4 in. to plus 30 mesh in size.	An open pit, 400 ft long, 100 ft wide, and 30 ft deep. The property was mined intermittently from 1941 to 1945. A bulldozer removed overburden and pushed pumice into a storage bin. The minus 1/8 in. undersize, removed by screens, was mostly silica sand. The oversize material was crushed by rollers to pass a 5/8 in. screen and sold at Bishop and other markets in southern California (Chesterman, 1956, p. 61).	From outcrop exposures, at least 110,000 tons of indicated and inferred marginal reserves of pumice remain. Compaction, permeability, and porosity tests confirm its suitability for lightweight aggregate products. This property has a high potential for additional pumice resources.
45	Moulas Mine Group	Slate and hornfels are in contact with a granodiorite pluton. The sedimentary rocks are faulted and sheared in northeast to northwest directions and filled with various amounts of quartz or gouge. The quartz veins range from 0.1 to 7.0 ft thick and 10 to 400 ft long. The longest vein averages about 2 ft thick. It is massive, brittle, often banded with limonite and siliceous limonite. Some areas of the vein have blebs or masses of pyrite, specular hematite, chalcocite, or chalcopyrite and associated malachite stain.	Eleven adits (six caved), three shafts (two caved), 11 trenches, and 20 pits are in a 0.5 by 2.5 mi area. The adits are 20 to 100 ft long, except for the main inclined adit which has over 800 ft of drifts and stoped areas.	In a trench adjacent to the main inclined adit is a quartz vein with 22,000 tons of indicated and inferred marginal reserves, averaging 0.23 oz gold and 0.2 oz silver per ton. In the unmined portion of the inclined adit is 9,600 tons of indicated subeconomic resources averaging 0.08 oz gold and 0.5 oz silver per ton. Of the 184 samples collected from this property, 34 had 0.1 to 1.78 oz gold per ton, 24 had 1.0 to 11.2 oz silver per ton, and 20 had 1.0 to 3.98 percent copper. This property has a high potential for additional gold-silver-copper resources.
46	Z and S Mine (Tramway Z and S Mine)	A bedding plane shear zone strikes N. 45° W., dips 30° to 50° NE. and is exposed for 340 ft underground in argillite and hornfels. A discontinuous quartz vein within the shear zone pinches and swells, but averages 1.0 ft thick.	A 270-ft tunnel, three short adits, and two pits are on the shear zone. Other workings include three pits and a short adit. Sixteen tons yielded 14 oz gold and 8 oz silver from 1940 to 1950 (U.S. Bureau of Mines production records).	About 18,000 tons of the quartz-rich shear zone averages 0.05 oz gold and 0.3 oz silver per ton. Thirty-three samples were collected, including 21 chip samples. Sixteen of these assayed between 0.006 and 0.161 oz gold per ton; 13 between 0.2 and 1.4 oz silver per ton. This property has a moderate potential for gold-silver resources.
47	Unknown (18, 5, 34)	Massive phyllitic hornfels strikes N. 4° to 15° W., dips 50° to 55° NE., and hosts a 0.6- to 3-ft thick discordant shear zone at least 150 ft long. It is comprised of hornfels, iron-oxide-stained gouge, and discontinuous fractured quartz veins with blebs of chalcopyrite and fracture fillings of malachite.	Two adits, 149 ft and 21 ft long, and one small pit.	Of 11 chip samples, three contained 1.02 to 1.98 percent copper and six contained from 0.1 to 0.59 percent copper. Two grab samples from stockpiles had 0.23 and 0.38 percent copper. The property has a low potential for copper resources.
48 **	Golden Siren (Gladys)	Quartz monzonite is in contact with dolomite for at least 3 mi along a northerly trend. Outcrops are few and overburden in the area is thick. Material from dumps indicate gold is associated with thin quartz veins and silicified dolomite. The quartz contains disseminated oxidized pyrite and magnetite.	Eight pits, four adits (one caved) totalling 200 ft, and three shafts (two caved). The open shaft is partly water-filled and reported to be 90 ft deep (Knopf, 1914, p. 113). The workings are widely spaced along a 3,000 ft portion of the quartz monzonite-dolomite contact. Six tons yielded 6.0 oz gold and 2 oz silver in 1912 (U.S. Bureau of Mines production records).	Nine of the 22 chip and grab samples showed at least a trace gold; the three highest grade samples, from stockpiles, assayed from 0.29 to 0.56 oz gold per ton. Gold values were found at widely spaced locales near the igneous-sedimentary rock contact. This property has a low potential for gold resources.
49	Campito Mountain Prospect	Quartz veinlets stained with secondary iron and copper minerals and a north-trending, 3- to 4-ft-thick fracture zone occur in interbedded siltstone and quartzite. Quartz and gouge contain chalcopyrite, bornite, and pyrite.	One 58-ft-long adit.	Of four chip samples, one of gouge with quartz contained 2.71 percent copper and three of the fracture zone contained 0.01 to 0.38 percent copper. One grab sample of quartz from a small stockpile contained a trace of gold, 0.4 oz silver per ton, and 0.98 percent copper. A low potential for copper resources exists.
50 **	Twenty Grand Mine	Northwest-trending, gently dipping faults and shear zones in metasedimentary rocks and quartz monzonite are partially filled by quartz veins 1 to 2 ft thick and 100 to 200 ft long. Quartz is massive to vuggy and brecciated, and contains gold, galena, chalcopyrite, hematite, pyrite, brochanthite, antlerite, malachite, and azurite.	Twelve adits, three caved, one caved shaft, 41 pits and trenches. Forty-eight tons produced in 1936 yielded 11.8 oz gold, 909 oz silver, 1,213 lb copper, 9,100 lb lead (U.S. Bureau of Mines production records). Sampson and Tucker (1940, p. 139-140) reported that five carloads shipped from this property had ore valued at $60 per ton.	Two veins have 12,000 tons of indicated and inferred subeconomic resources with 0.03 oz gold and 1.4 oz silver per ton, and 8,000 tons of indicated and inferred subeconomic resources with 0.06 oz gold per ton and 1.0 oz silver per ton. Of 141 samples, 17 had 0.1 to 1.0 oz gold per ton, 52 had 1.0 to 10 oz silver per ton, six had 1.0 to 5 percent copper, 25 had 1.0 to 5 percent lead, and eight exceeded these ranges. There is low to moderate potential for copper-lead resources, as well as additional gold-silver resources.
51	Moon Group area prospects	Several widely-spaced northwest-trending fault and shear zones in metasedimentary rocks are filled with dikes of diabase, diorite, quartz monzonite, gouge, and quartz veins, lenses, or pods. The longest quartz vein is about 150 ft; the thickest pod or lens is about 5 ft. Gold, galena, pyrite, chalcopyrite, and related secondary minerals are in restricted portions of the quartz, mostly on the north side of Coldwater Canyon.	A total of 1,200 ft of underground development is in 12 adits; the main adit has over 700 ft of drifts and stopes. Other workings include nine shafts, 50 trenches, and 29 pits in a 2.5 sq mi area.	Of 212 samples, 15 had 0.05 to 0.386 oz gold per ton, 20 had 1.0 to 5.2 oz silver per ton, eight had 1.0 to 3.41 percent copper, and 13 had 1.0 to 7.25 percent lead. The metals are localized and erratically distributed in quartz; structures were not sufficiently continuous to determine resources. The potential for gold-silver-copper-lead resources is moderate.

Table 4.--Summary of mines and prospects with mineral resources or resource potential in the White Mountains Roadless Area--Continued

Property number (fig. 2)	Name	Summary	Workings and production	Resource/sample data
52	Joyce and Mark	Quartzite, limestone, calcareous siltstone, and argillite trend northwest and dip northeast. Discontinous quartz and siderite veins up to 2.5 ft thick and shear zones up to 1.5 ft thick cut the rocks. Quartz veins contain galena and chalcopyrite; siderite veins also contain blebs of galena and calcite veinlets.	Three adits, 9, 10, and 25 ft long, one caved adit, and 13 pits.	Of five chip samples, three had traces of gold, five contained 0.2 to 0.6 oz silver per ton, and two contained 0.8 and 2.65 percent lead. Of ten select samples, three assayed from 0.02 to 0.06 oz gold per ton, four contained 1.0 to 5.4 oz silver per ton and 0.95 to 5.2 percent lead; one contained 16.8 percent lead. Of five grab samples, two contained 3.2 and 4.0 oz silver per ton and three had 0.9, 6.9 and 12.0 percent lead. Potential is low for silver-lead resources.
53	Hobo Nos. 1-8	Lenses and irregular bodies of barite up to 120 ft long and 80 ft thick have intruded limestone and marble beds, near slate contacts. Much of the barite is in gradational contact with the strata. Barite occurs in two locations 4,700 ft apart. This property was known as the Cliff property in 1940 (Sampson and Tucker, 1940, p. 151).	Four adits, 20, 37, 40, and 120 ft long, two caved adits, a caved shaft, and two trenches 70 and 100 ft long. The longest adit has about 75 ft of stopes. In 1940, about 275 tons of barite, valued at $1,450, was produced (U.S. Bureau of Mines production records).	A total of 26,000 tons of barite and barite-rich sedimentary rocks contain an average of 58 percent $BaSO_4$, at two locations. Some of the 46 samples from the properties contained other metals. The highest assays were 0.6 percent copper, 1.75 percent lead, and 0.8 oz silver per ton. The property has a moderate potential for barite resources.
54 *	Saratoga, Lexington, and Ranger	A mineralized shear zone, 4 to 5 ft thick, in interbedded limestone and argillite is exposed for 60 ft on the surface and to a depth of 80 ft in the workings. The zone contains from 70 to 90 percent limonite and siderite with discontinuous veins and pods of quartz up to 1.5 ft thick, and veins of chalcedony and calcite. Various amounts of hematite, pyrite, pyrolusite, malachite, chalcopyrite, gold, and silver also occur in the zone.	Four adits totaling 700 ft, one shaft 29 ft deep, and five pits. Production data was reported with the Southern Belle Mine and cannot be separated.	Eight hundred tons of indicated and 800 tons of inferred marginal reserves averaging 0.41 oz gold per ton, 0.54 oz silver per ton, and 0.06 percent copper remain in the deposit. Road access and processing facilities near the property are factors that influence the classification of this small resource. There is a moderate potential for additional gold-silver-copper resources.
55 *	Southern Bell Mine	Intensely folded and faulted argillite, hornfels, phyllite, shale, and marble are broken by steeply-dipping tensional faults that trend N. 30° to 70° W. The 0.1- to 2.9-ft-thick quartz veins that fill these faults contain gold, copper sulfides, and iron oxides.	The main working has several portals, connected by more than 3,900 ft of drifts, stopes and winzes. Surface workings include numerous pits. On the south end of the property are 11 adits, six trenches, four shafts and three pits. The New Year shaft is reported to be 260 ft deep with development on three levels. Combined production from 1893 through 1937 was 1,024 oz gold and 182 oz silver (U.S. Bureau of Mines production records).	Twelve of 24 samples contained 0.016 to 0.216 oz gold and 0.2 to 1.0 oz silver per ton. Six samples contained 0.06 to 3.10 percent copper. Only a cursory examination was performed, mainly to determine if mineralized structures would trend into the study area. The potential for gold-silver-copper resources is high.
56 *	Bullion	A lenticular body of gold-silver-bearing siderite, quartz, and iron oxide occupies the intersection of a northeast-striking limestone-phyllite contact and a northwest-striking tensional fault. The body dips 45° W., extends 390 ft along strike, and about 585 ft down dip, and has an average thickness of 20 ft.	The main working is a 405-ft-long, 45° inclined shaft with seven sublevels 20 to 100 ft long, and areas of extensive stoping. A second shaft intersects this shaft 30 ft below the surface. Other workings include a 110 ft deep shaft with a drift to the surface, a 10 ft adit, and two pits. Bureau of Mines records indicate 800 tons yielded 145.1 oz gold and 44 oz silver in 1906. Other production was combined with the Southern Bell output.	From the analyses of 80 samples, there are 240,000 tons of indicated and 130,000 tons inferred subeconomic resources, containing 0.07 oz gold per ton and 1.2 oz silver per ton. The potential for additional gold-silver-copper resources is high.
57 *	Ira O. Clark	Discontinuous quartz veins, less than 40 ft long and 1 to 2 ft thick, are sporadically distributed in beds of dolomite that are intercalated with phyllite. The veins contain limonite boxwork and siderite, with limonite, malachite and azurite along fractures, and isolated concentrations of galena, pyrite, chalcopyrite, bornite and chrysocolla.	Four adits, 14 to 94 ft long, two caved adits and six pits, are scattered for 700 ft along an east trend.	Sixteen chip and 11 select samples were taken. Three chip samples from veins contained 1.0, 2.2, and 2.0 oz silver per ton; 0.03, 1.83 and 0.09 percent copper, and 2.36, 0.05 and 3.3 percent lead. The remaining chip samples contained less than 0.8 oz silver per ton and 0.27 percent lead. Select samples of mineralized vein material contained up to 6.5 oz silver per ton, up to 5.13 percent copper and up to 12.0 percent lead. This property has a moderate silver-lead-copper resource potential.
58 *	Gunter Canyon Barite Mine	Barite filled the fractured apex of an anticline comprised of schist and slate for about 400 ft. Westerly cross cutting veins are 1 to 3 ft thick and less than 50 ft long. At the fault intersections thicknesses of barite reach 8 ft (Bateman, 1956, p. 83). The structure parallels the study area boundary.	Bateman (1956, p. 83) reported a 200 ft inclined shaft, five short adits, several pits and trenches, and an open cut 30 ft across. Bureau of Mines production records list seven owners or operators that produced 3,074 tons of barite valued at $20,000 from 1928 to 1931. Tucker (1931, p. 545) reported that a former owner indicated production of 62,000 tons.	This mine is adjacent to the study area and was not evaluated. A preliminary Bureau of Mines examination by Johnson (1961, p. 5) estimated "...a deposit of 29,000 tons of indicated reserves...a grab sample contained 95.9 percent $BaSO_4$ and 4.49 specific gravity..." Tucker and Sampson (1938, p. 481) reported 94 percent $BaSO_4$ and 4.2 specific gravity. The potential for barite resources is high.

Table 4.--Summary of mines and prospects with mineral resources or resource potential in the White Mountains Roadless Area--Continued

Property number (fig. 2)	Name	Summary	Workings and production	Resource/sample data
59 *	Gunter Canyon area pumice deposits	Seven subaqueous, pumice deposits, each about 20 ft thick, are interbedded with layers of pumicite and silica sand. Pumice fragments are angular and 1/16 to 3 in. in diameter (see Chesterman, 1956, p. 60). The limits of most of these deposits are covered by alluvium and colluvium. Most of the workings are on four patented claims owned by the U.S. Gypsum Company.	Eight large pits, 78 shallow pits and trenches, and four large stockpiles of pumice. A total of 23,000 tons worth $310,000 was produced from 1937-1947 (U.S. Bureau of Mines production records).	An estimated 9.6 million tons of indicated and inferred marginal reserves of pumice are in four stockpiles and seven deposits covering about 180 acres. Tests performed on bulk samples indicated that specific gravity ranged from 2.02 to 2.04; bulk dry density ranged from 69.3 to 74.5 lbs per cu ft; and permeability ranged from 2.05 to 2.49 X 10^{-3} centimeters per second. The pumice is suitable for abrasives, light weight concrete and for other related uses. The Gunter Canyon deposits have a high potential for additional pumice resources.
60 **	Rogers Limestone Deposit	Limestone strata are abundant in the southern end of the range. Quartz veins, as long as 48 ft and 1.2 to 4.8 ft thick, occur along northeast- to northwest-trending faults in shale and limestone. Chalcopyrite is disseminated and in patches in quartz veins.	Two adits, 35 and 7 ft long, one 19-ft-deep shaft, and a 61-ft long trench. Before 1926, an unspecified amount of reported high-purity limestone was processed into carbon dioxide at soda plants near Owens Lake (Logan, 1947, p. 245).	Two of the six chip and one select samples, mostly from quartz veins, contained 0.31 and 0.79 percent copper. A sample of limestone contained 50.0 percent CaO, 4.5 percent SiO_2, 1.42 percent Fe_2O_3, 1.59 percent MgO, and 0.92 percent Al_2O_3. The limestone analysis does not indicate high purity (Bowen and others, 1973, p. 15). There is moderate potential for limestone resources.
61	Zisiszit	Discontinuous quartz veins up to 2.5 in. thick occupy shear zones in biotite quartz monzonite. Veins are locally malachite stained, and contain small blebs of pyrite, chalcopyrite, and galena. Veins and shear zones strike N. 86° E. and dip 18-37° SE.	Two adits, 12 and 200 ft long, and one pit.	Four of nine chip samples contained 0.02 to 0.28 oz gold per ton; three of these contained 0.2 to 0.4 oz silver per ton. One grab sample from a stockpile of quartz contained 0.38 oz gold per ton, 0.6 oz silver per ton, 0.10 percent copper, and 2.30 percent lead. One grab sample of quartz contained 0.02 oz gold per ton. Most samples had traces of lead. A low potential for gold resources exists.
62	Unknown (15, 5, 36)	Thin shears and joints occur in iron-oxide-stained fine-grained biotite-hornblende-quartz monzonite. Malachite- and limonite-stained vein quartz with boxworks was found in a stockpile but not in place.	One 26-ft long adit, two caved adits, and two pits.	One chip sample of a shear zone contained 0.05 oz gold per ton. One random chip sample of fractured quartz monzonite contained 0.19 oz gold and 0.4 oz silver per ton. Four grab or select samples from stockpiles contained up to 0.47 oz gold and 0.4 oz silver per ton. The select sample also contained 0.10 percent copper. A low potential for gold resources exists.
63	Double Surprise	A 0.3-ft-thick quartz vein strikes north and dips 10-21° east in quartz monzonite. The vein extends 40 ft down dip to a fault and may persist 400 ft along strike. It consists of quartz with limonite, galena, and oxidized pyrite.	Two adits with a total of 430 ft of workings, and two caved adits.	The vein is estimated to contain 400 tons averaging 0.18 oz gold per ton. Five of 11 samples from the vein contained 0.02 to 3.4 oz silver per ton, and ten contained 0.08 to 24.0 percent lead. The property has a low potential for gold-silver-lead resources.
64	Golden Skyline	Two northwest-trending quartz veins, 1 to 2 ft thick, are in sheared contact with altered granite. The veins are not exposed for more than 2 ft.	One caved adit, one 50-ft-long trench, and one small pit.	Two select samples of stockpiled quartz contained 0.01 and 0.06 oz gold per ton. Two grab samples of quartz from a dump contained 0.50 and 0.46 oz gold per ton. One chip sample across the shear zone and quartz vein had no significant values. This property has a low potential for gold resources.
65	Crooked Creek Placers	Gold-bearing alluvium along a 2-mi-long, 3,200-ft-wide early (?) Tertiary stream channel was deposited on granite bedrock and capped by Tertiary basalt flows. The alluvium, as thick as 200 ft, is well indurated and contains clay and secondary calcite. The gold consists of very small particles.	A "T" shaped adit 450 ft long is in the upper section of gravel. Surface workings include 15 trenches and nine widely spaced pits. About 500 ft east of the adit a bench cut was developed and mined. A 60 cu yd per day gravity concentrating plant operated there in 1981. The production is unrecorded, and assumed small.	Thirty-two of the 35 channel and bulk samples collected from workings contained from 0.4 to 180.8 mg, but averaged 10 mg gold per cu yd. Based on $400 per oz gold, the upper strata contains about 13 cents gold per cu yd, with no other mineral values. Greater concentrations of gold are likely to be found at or near bedrock. Too few exposures of the lower gravel interval precludes a resource estimate. The alluvium has a low potential for placer gold resources.
66	Ridge Runner Nos. 1-5	The country rock is massive, jointed, quartz monzonite. Several fissure veins and irregular masses of quartz outcrop in an area 1,500 ft by 800 ft. Most of the veins are 0.5 to 2 ft thick and less than 20 ft long; the largest mass is 5 ft by 8 ft. Some of the quartz contains streaks and masses of white to honey colored scheelite. The largest mass observed was 2 in by 6 in. Some of the quartz also contains minor amounts of finely disseminated cubic galena. There are approximately 10 tons of 1 to 2 percent scheelite in scattered stockpiles. This is a visual estimate, determined with an ultraviolet light. Hand sorting could produce 10 to 20 tons of direct shipping ore.	Eight trenches and eight pits.	Of three chip samples of quartz; two contained a trace and 0.02 oz gold per ton, 0.4 and 1.0 oz silver per ton. Of 18 grab samples of vein quartz, three had traces of gold, 1.0 to 4.0 oz silver per ton, and 0.02 to 0.11 percent lead. Tungsten assays do not confirm estimates determined by fluorescence under ultraviolet light. Daylight sampling apparently missed areas with tungsten content. The property has a low potential for tungsten-silver resources.
67	Unknown (9/11, 6, 36)	Iron-oxide-stained granitic rocks, decomposed locally, and a roof pendant of alternating beds of shale and sandstone hosts a poorly exposed, east-trending quartz vein system for about 2.3 mi. The fractured vuggy quartz veins are as thick as 5 ft and contain pyrite, pyrolusite, galena, chlorite, and malachite and limonite stain.	Twenty-two pits.	Sixteen select samples of quartz contained from 0.01 to 0.06 oz gold per ton. Of these, ten had 1.2 to 5.2 oz silver per ton and six had 0.1 to 0.8 oz silver per ton. Seven grab samples of quartz contained up to 0.014 oz gold per ton and 1.0 oz silver per ton. Only eight samples contained lead, ranging from 0.3 to 0.80 percent. A low potential for silver-gold resources exists.

Table 4.--Summary of mines and prospects with mineral resources or resource potential in the White Mountains Roadless Area--Continued

Property number (fig. 2)	Name	Summary	Workings and production	Resource/sample data
68 *	Unknown (2, 6, 36)	Galena and pyrite in a 0.6- to 2.5-ft-thick quartz vein, which strikes N. 35° E., and dips gently east in granite. The vein is disrupted by folding, and by normal faults which generally strike northwest and dip southwest.	The main working is a 380-ft-long adit, including a 21-ft-deep winze and about 40 ft of sublevel drift. Other workings include two inclined shafts with 64 ft of drift, one caved inclined shaft, one trench, and three pits.	There are 8,300 tons of indicated and inferred subeconomic resources with a weighted average of 0.12 oz gold per ton, 0.37 oz silver per ton, and 1.4 percent lead. Forty-one of the 49 samples collected were chip samples. The potential for additional gold-silver-lead resources is high.
69	High Bar	A 0.5- to 6-in.-thick galena-bearing, hematite-stained quartz vein strikes N. 73° W., dips 78° NE. and is exposed for 58 ft in hornblende-biotite quartz diorite.	A 24-ft deep shaft with a 58-ft long drift.	Two chip samples of quartz contained 0.6 and 3.6 oz silver per ton, 1.2 and 23.0 percent lead, and a trace gold. One select sample of quartz from the dump contained 5.4 oz per ton silver, 11.5 percent lead, and a trace gold. The potential for silver-lead resources is low.

Table 5.--Properties with mineral resources in and adjacent to the Birch Creek Roadless Area

Index map no.	Property name	Type of occurrence	Classification of resource	Quantity (tons)	Grade	
					oz per ton	percent
72	Gator No. 2 Prospect	Fissure vein	Indicated and inferred subeconomic	5,900	4.0 silver	4.7 lead 1.9 zinc
73	Hole in the Wall Mine	Fissure vein	Indicated and inferred subeconomic	3,700	0.02 gold 7.3 silver	8.7 lead 7.0 zinc
76	Del Masso Prospect	Fissure vein	Indicated and inferred subeconomic	21,000	1.0 silver	2.8 lead
77 *	Mexican Mine	Replacement	Indicated and inferred marginal reserves	270,000	1.7 silver	1.1 lead 1.9 zinc
85 *	Wynne and Ward Mine	Replacement	Indicated and inferred subeconomic	25,000	3.9 silver	2.6 lead 2.5 zinc

In study area - subtotal (rounded): 31,000
Outside study area - subtotal (rounded): 300,000

Total (rounded): 330,000

[*, outside the study area]

Table 6.--Summary of mines and prospects in and near the Birch Creek Roadless Area

[Underlined names indicate mines or prospects with identified mineral resources. "Unknown prospect" indicates the name was not determined.]

Index map no. (fig. 2)	Name (commodity)	Summary	Workings and production	Sample and resource data
70	Blue Bird Prospect (silver, zinc, lead)	A limonite-stained, fractured, sulfide-bearing shear zone in argillite and limestone strikes N. 28° to 45° E., dips 84° to 88° NW., and averages 1.6 ft thick. It is exposed discontinuously for 400 ft, and contains silver minerals, galena, and sphalerite in blebs. An unmineralized shear zone exposed in a pit strikes N. 32° E., and dips vertically.	Workings consist of a 12 ft adit and four prospect pits.	Four chip samples across the mineralized shear zone averaged 1.1 oz silver per ton, 3.8 percent zinc, and 1.8 percent lead; one grab sample from a 100 lb stockpile assayed 4.6 oz silver per ton, 15.4 percent zinc, and 8.7 percent lead. There is moderate potential for silver-zinc-lead resources.
71	Gator No. 1 Prospect (silver, lead)	A sulfide vein 0.5 ft thick strikes east for 5 ft and dips 80° N. in thin-bedded argillite. The vein contains galena, sphalerite, and pyrite.	Three adits; 195 ft, 90 ft, and 30 ft long, and two pits explore the prospect.	Thirteen samples: one chip sample across the sulfide vein assayed 31.2 oz silver per ton, 28 percent lead; four other samples assayed from 0.8 to 2.3 oz silver per ton. A moderate potential for silver-lead resources exists on the prospect.
72	Gator No. 2 Prospect (Bull Domingo Mine) (silver, lead, zinc)	A sulfide-rich quartz vein 0.7 to 2.8 ft thick, strikes N. 40° E. for 160 ft and dips 60° to 85° SE. in argillite. Argentiferous galena and sphalerite are the principal sulfide minerals. A poorly exposed shear zone lies northwest of, and is roughly parallel to, the main vein. This zone contains quartz stringers with silver, galena, and sphalerite.	A 220-ft adit intersects a 132 ft deep shaft; two other adits totalling 37 ft, two additional shafts totalling 55 ft, and nine pits explore the property. A small amount of ore may have been produced when the shaft was sunk.	About 5,900 tons of indicated and inferred subeconomic resources average 4.0 oz silver per ton, 4.7 percent lead, and 1.9 percent zinc. There is high potential for additional resources along strike and in the parallel shear zone.
73	Hole in the Wall Mine (Wilkerson, Lost Hope Mine) silver, lead, zinc, gold)	Northeast-trending, sulfide-bearing quartz veins and shear zones are in argillite. One vein strikes N. 60° E., dips 65° to 85° NW., and is 0.6 ft thick; another vein strikes N. 35° E., dips vertically, and is 1.3 ft thick. These veins contain silver minerals, galena, and sphalerite.	Four adits totalling 520 ft, two trenches 10 ft long, and nine prospect pits explore the property. In 1923, 15 tons of ore was shipped to a smelter and 83 oz of silver and 6,284 lbs of lead were recovered.	About 3,700 tons of indicated and inferred subeconomic resources with an average grade of 0.02 oz gold per ton, 7.3 oz silver per ton, 8.7 percent lead, and 7.0 percent zinc are on the property. This property has a moderate potential for additional silver-lead-zinc resources.
74	Charlies Angels Nos. 1 and 2 (Gold Wedge) Mine (gold)	North-trending argillite and marble are crosscut by numerous quartz veinlets along joint planes striking N. 20° to 45° E. and dipping about 40° SE. Tucker and Sampson (1934, p. 398) reported gold in stringers of quartz along joint planes and along a 2- to 6-ft-wide silicified zone in schist.	Four shafts [reported by Tucker and Sampson (1934, p. 398) to be 65 to 130 ft deep], two caved adits, five trenches (the longest is 50 ft), and 12 prospect pits are on the property. In 1934, 12 tons of ore yielded 3 oz gold and 1 oz silver.	Thirty-three samples: 11 assayed from 0.010 to 0.132 oz gold per ton and averaged 0.045 oz per ton. Gold values were found in quartz in the dumps. This property has a moderate potential for gold resources.
75	Charlies Angel No. 3 and 4 Prospect (lead)	A limonite-stained, fractured quartz vein occurs in phyllite. The vein strikes from N. 30° W. to N. 35° E., dips 49° W. to vertically, averages 2.8 ft thick, and contains minor blebs of galena.	Workings are three prospect pits and two bulldozer scrapes.	Eight samples: seven chip samples of vein quartz ranged from 0.02 to 0.76 percent lead and averaged 0.29 percent.
76	Del Masso Prospect (silver, lead, zinc)	North-to-northeast striking, milky white, quartz veins containing silver minerals, galena, and sphalerite occur in dolomite and hornfels. The veins, up to 10 ft, thick, are exposed along strike for 1,000 ft, are massive, heavily limonite-stained and brecciated along their edges.	Ten adits total 1,100 ft; seven shafts total 200 ft; 21 pits, and four cabins are on the prospect.	About 21,000 tons of indicated and inferred subeconomic resources with an average grade of 1.0 oz silver per ton and 2.8 percent lead is in the upper 100 ft of one vein in the northeast part of the property. For each additional 100 ft downdip that the mineralized vein extends, it contains about 19,000 tons of additional resources with similar grade. A moderate potential exists for additional silver-lead resources in this quartz vein and others on the property.
77	Mexican Mine 1/ (silver, lead, zinc)	Silver, lead, and zinc minerals replace recrystallized limestone along its contact with quartzite. Fine-grained galena is disseminated, and small crystals of hemimorphite line vugs and open joints in the limestone. Regional trend of the country rock is east, and the dip is 45° to 50° S., but at the deposit limestone beds have various attitudes.	Workings consist of seven adits, two of which total 275 ft; five are caved. One caved adit is reported by Butner (1945, unpublished Bureau of Mines report) to be 800 ft long, a glory hole 100 ft across, two shafts, and two prospect pits. Forty oz of gold, 77 oz of silver, and 1,090 lbs of lead were produced from 11 tons of ore in 1909 and 1910.	There are 270,000 tons of marginal reserves with an average grade of 1.7 oz silver per ton, 1.1 percent lead, and 1.9 percent zinc. Closely spaced drilling may reveal additional tonnages of similar grade. Moderate potential exists of additional silver-lead-zinc resources.
78	Mt. Tom Prospect (silver, lead)	A milky-white, vuggy quartz vein is brecciated and recemented with quartz. It contains traces of galena and limonite pseudomorphs after pyrite. Country rock is thin-bedded, fissile argillite which strikes N. 50° E., and dips 20° NW.	Nine prospect pits explore the property.	Ten grab and chip samples of quartz: one select sample contained 13.4 oz silver per ton and 9.9 percent lead. Four other samples assayed minor silver and lead. The property has a low potential for silver-lead resources.
79	Burgner-Adams Prospect (fluorspar)	Massive, bedded limestone has been intruded by quartz monzonite, forming marble and a tactite deposit containing fluorite. The tactite is primarily garnet and epidote but chlorite, quartz, calcite, pyrophyllite, sericite, wollastonite, and beryl have been reported (Trengove, 1953, unpublished Bureau of Mines report). The fluorite is purple or clear, fine grained, and is in a friable matrix.	An area 600 by 700 ft is crosscut by numerous bulldozer cuts.	Eleven samples of marble and tactite ranged from 0.4 to 41.5 percent and averaged 20.1 percent fluorspar (CaF_2); one grab sample of marble contained 2.2 oz silver per ton; two chip samples of marble contained 0.02 percent tungsten trioxide (WO_3). The property has a low potential for fluorspar resources.

Table 6.--Summary of mines and prospects in and near the Birch Creek Roadless Area--Continued

Index map no. (fig. 2)	Name (commodity)	Summary	Workings and production	Sample and resource data
80	Unknown prospect (NE1/4, sec. 9, T. 7 S., R. 35 E.) (silver, lead)	Three heavily limonite- and malachite-stained, vuggy, milky-white, quartz veins containing pyrite and galena occur in limestone and argillite. The veins strike from N. 8° W. to N. 85° E., dip 59° to 74° W., are 0.25 to 2.8 ft thick, and are exposed discontinuously along strike for as much as 750 ft.	Four shafts totalling 107 ft, one 11 ft adit, and four prospect pits explore the veins.	Eleven samples: eight chip samples across quartz veins assayed as much as 3.6 oz silver per ton and average 1.3 oz silver per ton, 0.87 percent lead, and 0.02 percent copper. One select sample of quartz assayed 0.092 oz gold per ton and 2.1 oz silver per ton. The property has a low ptoential for silver-lead resources.
81	Unknown prospect (SE1/4, sec. 9, T. 7 S., R. 35 E.) (silver)	A quartz vein up to 3 ft thick strikes N. 5° to 15° W., and dips 85° NE. to 85° SW. This milky white, and lightly limonite stained massive vein is exposed for 600 ft. In one locality the vein is sheared. Country rock is recrystallized limestone.	A 200 ft adit and one prospect pit are on the property.	Thirteen chip and one grab samples of quartz: eight chip samples contained 0.2 to 0.8 oz silver per ton; one chip sample contained 1.8 oz silver per ton; the grab sample contained 1.3 oz silver per ton. The property has low potential for silver resources.
82	Mollie Gibson Mine 1/ (gold)	A northwest-striking shear zone about 2 ft thick is exposed in dolomite. The zone is 90 percent baked, friable, iron oxides with calcite along fractures.	Workings consist of three adits totalling 1,180 ft, one trench, and 11 pits.	An occurrence of at least 2,000 tons with an average grade of 0.26 oz gold per ton is in the zone. The property has a moderate potential for gold resources.
83	Tig No. 91 Prospect 1/ (silver, lead)	Branching, limonite-stained quartz veins containing galena, strike from N. 15° W. to N. 30° E. and dip from 68° NW. to 70° NE in dolomite. The vein system is 0.5 to 3.0 ft thick, and is exposed in four outcrops along an 800 ft strike length. A limonite-stained zone 10 ft long is exposed in the adit.	Workings consist of a 26 ft adit, one trench 20 ft long, and three pits.	Six samples: one chip sample of quartz assayed 1.3 oz silver per ton and 2.2 percent lead; one random chip sample of the limonite stained zone assayed 0.032 oz gold per ton. This property has a low potential for silver-lead resources.
84	Tig No. 34 Prospect 1/ (silver)	A heavily limonite-stained quartz vein strikes northeast and dips from 65° SE. to 75° NW. The vein is concordant with recrystallized limestone country rock, and contains up to 30 percent iron oxides and vugs lined with euhedral quartz crystals.	One 20 ft shaft, three adits totalling 55 ft, and three prospect pits explore the vein.	Eight samples: two contained 1.4 and 1.5 oz silver per ton, three contained 0.3 to 0.4 oz silver per ton. Potential for silver resources is low.
85	Wynne and Ward Mine (Gibralter) (silver, lead, zinc)	A 2- to 6-ft thick quartz-rich replacement zone in dolomite has moderate limonite, azurite, and malachite stains along fractures. Galena and sphalerite with minor amounts of chalcopyrite, wulfenite, pyrite, tremolite, scheelite, and stibnite are in the zone. Numerous quartz veins occur in and along the zone. One strikes N. 80° W. to due W., dips 60° to 90° NE., and is 0.5 to 4.5 ft thick.	One shaft, caved at 55 ft, four adits totalling 500 ft and two pits develop the mine. By 1888, ore having an average value of $80 per ton in gold and silver had been shipped. Some selected shipments were valued at $200 or more per ton (Goodyear, 1888, p. 236). In 1908, 1937, and 1941, the mine produced 6 oz gold, 2,140 oz silver, 980 lbs copper, and 35,698 lbs lead.	About 25,000 tons of indicated and inferred subeconomic resources with an average grade of 3.9 oz silver per ton, 2.6 percent lead and 2.5 percent zinc are on the property. Insignificant antimony, copper, gold, molybdenum, and tungsten were detected. This property has a high potential for silverlead-zinc resources.
86	Waterfall Prospect (fluorspar)	Two shear zones occur at a limestone and quartz monzonite contact. One strikes N. 15° E. and dips 50° SE.; the other strikes N. 35° E., and dips 35° NW. The zones are about 20 percent gouge and 80 percent country rock fragments. Fluorite in the shear zones is fine grained and occurs in veinlets up to 0.2 ft thick.	A 190 ft adit and a cut 250 ft long are along the shear zone.	Eleven samples contained from 0.5 to 42 percent fluorspar (CaF_2) and averaged 8.2 percent.
87	Unknown prospect (NW1/4 sec. 1 T. 7 S., R. 35 E.) (silver)	A massive quartz vein up to 5 ft thick strikes N. 80° E. and dips 70° to 80° NW. in siliceous limestone. The quartz is iron- and copper-stained, vuggy, and contains pyrite, hematite pseudomorphs after pyrite, chalcopyrite, and euhedral quartz crystals.	Workings consist of two adits totalling 35 ft, one shaft 40 ft deep, and five prospect pits.	Eleven samples of quartz and limestone: one grab sample of quartz contained 12.4 oz silver per ton, five samples of quartz contained 0.03 to 2.35 percent copper, and one chip sample of quartz contained 0.016 oz gold per ton. This property has a low potential for silver.
88	Hap No. 41 Prospect (silver, lead, zinc)	A shear zone up to 2 ft thick strikes N. 45° E. for 40 ft, and dips 65° NW in siliceous limestone. Within the shear zone is a limonite-stained, fractured, quartz vein containing fine-grained disseminated galena, hemiorphite, and chalcopyrite. Another shear zone striking N. 38° E. and dipping 55° SE. terminates the vein 40 ft below the surface.	A 10 ft adit, two shafts totalling 50 ft, and two prospect pits develop the mineralized shear zone.	An occurrence of at least 400 tons averaging 4.2 oz silver per ton, 8.1 percent lead, and 5 percent zinc is on the property, which has a low potential for silver-lead-zinc resources.
89	Unknown prospect (SE1/4 sec. 2, T. 7 S., R. 35 E.) (silver, lead, zinc)	Massive, siliceous limestone is crosscut by a shear zone ranging in thickness from 0.4 to 2.0 ft, striking N. 5° E. and dipping 50° to 60° SE. The shear zone is lightly iron-oxide and malachite stained and contains euhedral crystals of calcite, quartz, and pyrite.	Workings consist of four adits totalling 90 ft and two prospect pits.	Eight samples: two shear zone samples contained 1.8 and 3.3 oz silver per ton; four shear zone samples contained 0.02 to 1.13 percent copper, 0.06 to 7.9 percent lead, and 0.26 to 1.03 percent zinc; one grab sample contained 24.0 oz silver per ton. This property has a low potential for silver-lead-zinc resources.
90	Unknown prospect (NW1/4 sec. 2, T. 7 S., R. 35 E.) (silver)	A shear zone striking N. 80° E., dipping 50° to 60° SE., occurs in lightly iron-oxide stained, fine-grained limestone. The zone is mostly gouge with about 20 percent country rock fragments. Quartz containing chalcopyrite was found on the dump, but not in place.	Two adits total 30 ft, and three prospect pits are on the property.	Five samples: three assayed 0.3 to 0.9 oz silver per ton and two contained 0.08 to 0.32 percent copper. Potential for silver resources is low.
91	Unknown prospect (NE1/4 sec. 2, T. 7 S., R. 35 E.) (copper, gold)	Massive marble, moderately fractured and iron-oxide stained, strikes N. 70° E., and dips 35° SE. A shear zone strikes N. 55° E., and dips 60° to 85° SE. The zone is 90 percent marble, with up to 10 percent quartz and minor epidote.	One 150-ft adit and three prospect pits explore the shear zone.	Six samples of marble; one assayed 2.17 percent copper and 0.094 oz gold per ton.

Table 6.--Summary of mines and prospects in and near the Birch Creek Roadless Area--Continued

Index map no. (fig. 2)	Name (commodity)	Summary	Workings and production	Sample and resource data
92	Unknown prospect (SE1/4 sec. 2, T. 7 S., R. 35 E.) (silver, copper, lead, zinc)	Shear zones with thin veinlets of quartz trend north, dip 60° to 80° E. and crosscut metasedimentary rocks, predominantly recrystallized limestone. The veinlets are heavily iron-oxide stained, vuggy, and contain up to 0.25 in. pyrite cubes.	Workings are one 65 ft adit, 160 ft of open cuts, five prospect pits, and one shaft.	Thirteen samples; one grab sample of quartz assayed 1.7 oz silver per ton, 0.33 percent copper, 0.16 percent lead and 0.42 percent zinc.
93	Juanita Prospect (copper, lead, tungsten)	An irregular tactite body 20 ft long by 40 ft wide lies along a granodrioite-argillite contact. The tactite is dark redish-brown, consists of 80 percent garnet, 20 percent epidote, and other calcium-silicate minerals in minor amounts. It is heavily iron-oxide and copper stained. A 300 lb stockpile of quartz was found near the tactite, but no quartz was found in place.	Two adits totalling 85 ft in length, 35 ft of open cut, and two prospect pits explore the property.	Eight samples: four chip samples of tactite contained 0.03 to 1.3 percent copper; one grab sample of quartz contained 1.4 percent lead and 0.03 percent WO_3. Because of the small size of the deposit and low grade, this property has a low potential for copper, lead, and tungsten resources.
94	Space Age Prospect (gold, silver)	Massive, limonite-stained quartz veins contain vugs lined with quartz crystals. The veins, in quartz monzonite, are up to 30 ft thick, pinch and swell, strike north to northwest for 3,500 ft, and dip vertically.	Two adits (one 80 ft long and one and one caved), three shafts, five trenches, and 15 prospect pits explore the vein.	Seventy-nine samples: three chip and one grab sample of quartz contained 0.006 to 0.058 oz gold per ton; ten chip and five grab samples of quartz contained 0.3 to 1.6 oz silver per ton. This property has a low potential for gold and silver resources.
95	Silver Queen Prospect (gold, silver)	Discontinuous quartz veins up to 9 ft thick trend NE. and dip about 45° NW. in quartz monzonite; they have been brecciated and healed with silica-rich iron oxides. Very angular quartz fragments up to 3.0 ft in diameter are within the veins.	Five adits totalling 380 ft and 11 prospect pits are on the property.	Eighteen samples: fifteen samples of vein quartz assayeded 0.020 to 0.246 oz gold per ton and averaged 0.075 oz per ton; 15 contained 0.3 to 6.8 oz silver per ton and averaged 1.9 oz silver per ton. This property has a moderate potential for gold-silver resources.
96	Lakeview Prospect (gold, silver)	Massive, fractured, heavily limonite-stained quartz veins 5 ft thick trend N. 40° E. and dip 50° to 85° NW for 2,000 ft in quartz monzonite. The quartz contains less than 1 percent pyrite cubes, which are up to 0.5 in. across, and minor secondary copper stain and traces of galena.	Workings consist of three adits (two totalling 550 ft and one caved) and 11 prospect pits.	Thirty-four samples: fifteen samples of quartz contained from trace to 0.060 oz gold per ton, one contained 0.104 oz gold per ton; 12 samples of quartz assayed between 0.3 and 2.4 oz silver per ton; 19 contained from 0.01 to 0.22 percent copper. The prospect has a low mineral potential for gold-silver resources.
97	Kesef Prospect (gold)	Quartz veins with pyrite-shaped cavities and secondary copper stains occur in quartz monzonite. The veins are 0.1 to 2.0 ft thick, strike N. 60° W., and dip 10° to 20° SW.	One 15 ft adit and six prospect pits are on the property.	Fourteen samples: one 2.5-ft-long chip sample assayed 0.522 oz gold per ton. No other samples had measurable gold.

1/ Outside study area.