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UNITED STATES DEPARTMENT OF THE INTERIOR
(BUREAU OF MINES)

SUMMARY REPORT

MINERAL INVESTIGATION OF THE WHITE CLOUD-BOULDER RARE II AREA
(NO. 4551), CUSTER AND BLAINE COUNTIES, IDAHO

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MLA 59-83

1983

This open file report summarizes the results of a Bureau of Mines wilderness study and will be incorporated in a joint report with the U.S. Geological Survey. The report is preliminary and has not been edited or reviewed for conformity with the U.S. Bureau of Mines standards and nomenclature. Work on this study was conducted by personnel from Western Field Operations Center, East 360 Third Avenue, Spokane, Washington 99202

FOREWORD

The U.S. Bureau of Mines and U.S. Geological Survey jointly conduct mineral surveys of lands which in the U.S. Forest Service Second Roadless Area Review and Evaluation (RARE II) program have been designated for further planning. These evaluations are used in the RARE II program which conforms with the Multiple-Use Sustained-Yield Act of 1960 (74 Stat. 215; 16 U.S.C. 528-531), the Forest and Rangeland Renewable Resources Planning Act of 1974 (88 Stat. 476, as amended; 16 U.S.C. 1601 note), and the National Forest Management Act of 1976 (90 Stat. 2949; 16 U.S.C. 1600 note). Reports on these surveys provide the President, Congress, the U.S. Forest Service, and the general public with information essential for determining the suitability of land for inclusion in the National Wilderness Preservation System.

This report is on the White Cloud-Boulder RARE II area (No. 4551), Idaho.

CONTENTS

	<u>Page</u>
Summary.....	4
Introduction.....	4
Geology related to mineral deposits.....	7
Regional mining activity.....	8
Assessment of mineral deposits.....	8
References.....	15

ILLUSTRATION

Figure 1. Mines and prospects in and near the White Cloud-Boulder RARE II area.....	5
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TABLE

Table 1. Mines and prospects in and near the White Cloud-Boulder RARE II area.....	9
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SUMMARY

No mineral resources were identified during the investigation of the White Cloud-Boulder RARE II area. Only a few claims have been located in the area and only two workings were found. However, there has been considerable exploration and mining activity near the RARE II area. Sand and gravel resources are abundant but similar deposits occur closer to market areas. There are no known coal, oil, or gas deposits.

Most of the RARE II area is underlain by volcanic rocks. The likeliest host rocks for metallic minerals are the metasedimentary rocks exposed in the south part of the area; there is potential for zinc and silver resources at a prospect in that part. Traces of scheelite and powellite were observed in the Kent Peak-Ryan Peak area along hair-line fractures in calcareous country rock. While no significant concentrations of the minerals were found, their presence, a northwest alignment of prospects with similar deposits, and an abundance of dikes near the deposits, suggest that the intrusive system (Summit Creek stock) exposed near the head of Little Fall Creek may extend to the northwest under the RARE II area.

INTRODUCTION

The White Cloud-Boulder RARE II area, covering 56,273 acres (22,774 ha), is about 20 air mi (32 km) north from Sun Valley, Idaho (fig. 1). It is characterized by rough, mountainous topography with elevations ranging to nearly 12,000 ft (3,658 m). The Sawtooth National Recreation Area borders the west and south portions of the RARE II area.

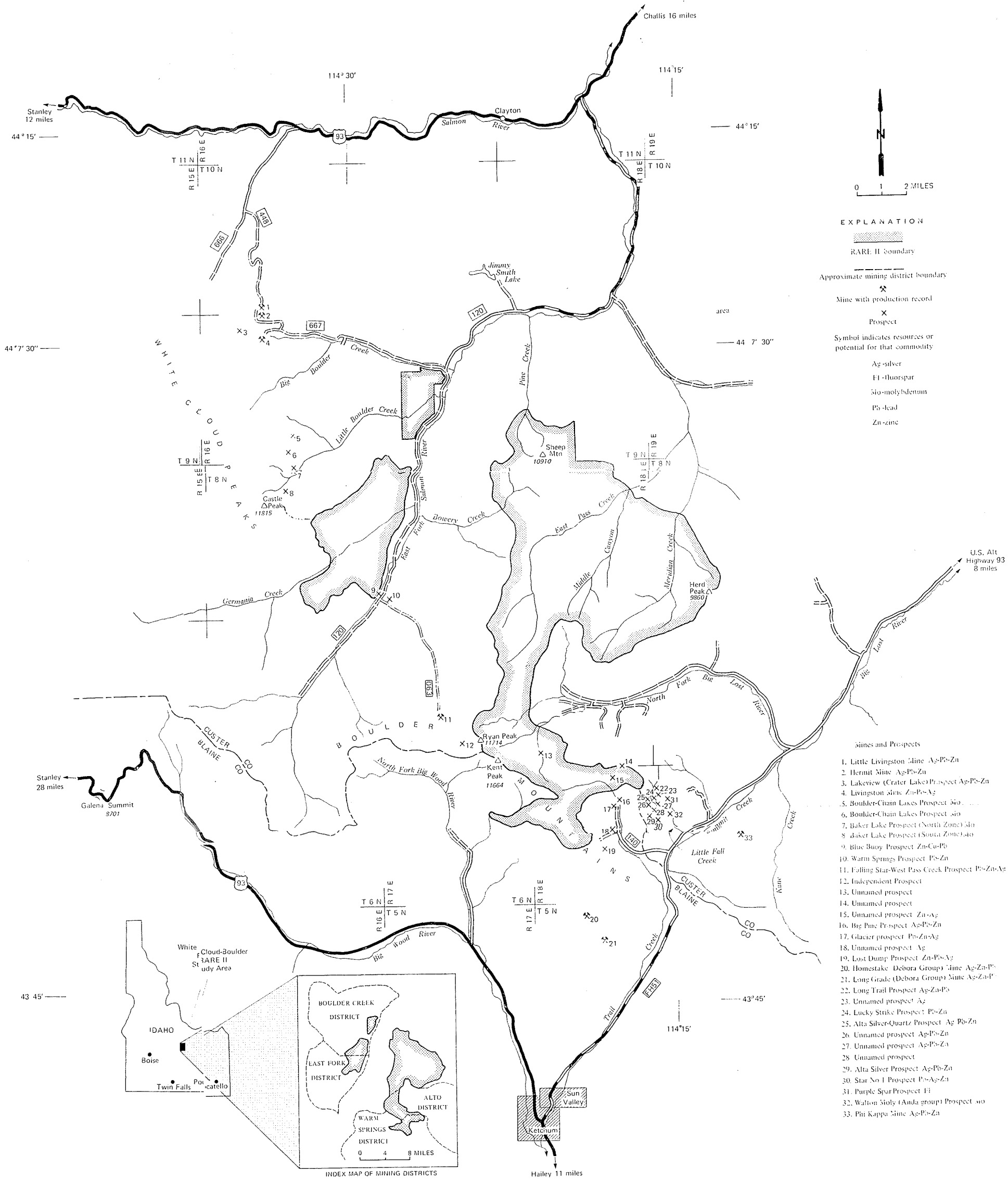


Figure 1. - Mines and prospects in and near the White Cloud-Boulder RARE II area.

Several major geologic studies covering portions of the study area have previously been completed. A masters thesis by Motzer (1978) discusses the volcanic stratigraphy between Germania Creek and Red Ridge, an area east of the White Cloud Peaks. Clyde Ross (1937) describes the geology and mineral resources of the following areas in Custer County: the Bayhorse quadrangle, much of the Custer quadrangle, and the area surrounding Round Valley. He also describes a small part of the Sawtooth quadrangle in Blaine and Custer Counties. The south portion of the RARE II area was addressed during a study of the Wood River region by Umpleby, Westgate, and Ross (1930).

The U.S. Bureau of Mines and U.S. Geological Survey investigated the mineral resources of the eastern part of the Sawtooth National Recreation Area during the early 1970's (Tzchanz and others, 1974). This study included parts of the west and southwest sides of the RARE II area. An investigation of the mineral resources of the proposed Boulder-Pioneer Wilderness by Dover, Mabey, Ridenour, Simons, and Tuckek (1981) covered the south portion of the RARE II area.

During the summer of 1982, Bureau of Mines field investigations of the White Cloud-Boulder RARE II area were conducted by Western Field Operations Center personnel. All available information on geology, mining, and exploration in the area was reviewed, including county mining claim records, prior to field work.

Four organized mining districts (fig. 1), the Boulder Creek, East Fork, Warm Springs, and Alto, extend into the RARE II area (Ross, 1926). The Boulder Creek mining district includes both the Little and Big Boulder Creek drainages and the East Fork mining district includes the Germania Creek drainage. The south part of the RARE II area is included in the Warm Springs mining district and the southeast part of the area is included in the Alto mining district.

GEOLOGY RELATED TO MINERAL DEPOSITS

The White Cloud-Boulder RARE II area is underlain by Tertiary volcanic rocks and Paleozoic sedimentary rocks. The volcanic rocks are dark porphyritic flow rocks and tuffaceous rocks of intermediate composition (Tschanz and others, 1974) and cover most of the RARE II area north of the North Fork Big Lost River. The sedimentary rocks host many of the mineral deposits in the region and crop out in that portion of the area south of the river. They are mainly carbonaceous argillite and shale, siltstone, conglomerate, limestone, and calcareous sandstone (Dover and others, 1981). These Paleozoic rocks are complexly folded and form an imbricate series of thrust-bounded slices (Dover and others, 1981).

Hypabyssal hornblende quartz porphyry dikes are sporadically exposed near the headwaters of the North Fork Big Lost River and Trail Creek. Dikes north of Ryan Peak are close-spaced, extensively altered, and little is known of their composition (Dover and others, 1981). A porphyritic hornblende-biotite quartz monzonite stock crops out in the Little Fall Creek valley adjacent to the RARE II area and is most likely responsible for most of the mineralization in that area. The dike complex near Ryan Peak, the stock exposed in Little Fall Creek Valley and also along Summit Creek, and another intrusive body southeast, all appear to be located along a N. 60° W. trending line which passes through the RARE II area (Dover and others, 1981).

REGIONAL MINING ACTIVITY

The first prospecting in the general area began in the 1870's. There has been no mineral production in the RARE II area and only a few claims have been located in it. However, there has been considerable mining activity adjacent to the area. The more notable mines and prospects are the Livingston Mine (fig. 1, no. 4), the Baker Lake Prospects (fig. 1, nos. 7, 8), the Homestake Mine (fig. 1, no. 20), the Phi Kappa Mine (fig. 1, no. 33), and the Walton Moly Prospect (fig. 1, no. 32). Most deposits in the area are vein and replacement containing lead, zinc, and silver. Two exceptions are the Walton Moly Prospect, where molybdenite is in quartz veins and disseminated in quartz monzonite, and the Baker Lake Prospects, where molybdenite is disseminated in quartzite.

Only two prospects (fig. 1, nos. 13 and 15) were found in the RARE II area and a brief summary of each appears in table 1.

ASSESSMENT OF MINERAL DEPOSITS

All known mines and prospects in or within 2 mi (3.2 km) of the RARE II area are shown on figure 1 and are described in table 1. The mines and prospects more than 2 mi (3.2 km) from the RARE II area appear on the figure and in the table because they either depict mineral trends or contain significant resources.

Table 1.--Mines and prospects in and near the White Cloud-Boulder RARE II area

Map no.	Name	Summary	Workings	Sample data/resource estimate
1	Little Livingston Mine	Small irregularly distributed pods of sulfide-bearing quartz and limonite-stained zones containing breccia occur near the contact of argillite and quartzite (Tschanz and others, 1974, p. 475).	One 550-ft-long $\frac{1}{2}$ adit and several caved workings (Tschanz and others, 1974, p. 473).	Nineteen samples: eight assayed from 1.1 to 13.7 oz silver per ton $\frac{1}{2}$, nine assayed from 0.43 to 19.40 percent lead, and ten assayed from 0.11 to 0.94 percent zinc (Tschanz and others, 1974, p. 474). Moderate to high potential for silver-lead-zinc resources.
2	Hermit Mine	N. 35° - 45° W. striking, 45° SW. dipping, sulfide-bearing shear zone in carbonaceous argillite (Tschanz and others, 1974, p. 476-478).	Two adits containing about 1,000 ft of workings, one 20-ft deep inclined shaft, and two pits (Tschanz and others, 1974, p. 476, 478).	Eight samples: two assayed 2.9 and 3.6 oz silver per ton, four assayed from 0.16 to 0.75 percent lead, and three assayed from 0.28 to 2.40 percent zinc (Tschanz and others, 1974, p. 477). Moderate to high potential for silver-lead-zinc resources.
3	Lakeview (Crater Lake) Prospect	Sulfide-bearing quartz occurs along fractures and bedding planes in carbonaceous, calcareous argillite and quartzite (Tschanz and others, 1974, p. 480).	An adit with two winzes, a 15-ft-deep shaft, and several open cuts (Tschanz and others, 1974, p. 478).	Six samples: four assayed from 0.8 to 5.9 oz silver per ton, five assayed from 0.15 to 2.25 percent lead, four assayed from 0.18 to 0.91 percent zinc, and one assayed 3.0 percent antimony. Subeconomic resources are 20,000 tons averaging 1 oz silver per ton, 1.3 percent lead, 0.08 percent zinc, and 0.82 percent antimony (Tschanz and others, 1974, p. 479, 480).
4	Livingston Mine	Sulfide-bearing pods, lenses, and veins in black, carbonaceous argillite containing some limestone and quartz (Tschanz and others, 1974, p. 463-468).	Over 3 mi $\frac{1}{2}$ of underground workings on nine main mine levels (Tschanz and others, 1974, p. 461).	Fifty samples: values ranged to 0.08 oz gold per ton, 48.5 oz silver per ton, 0.24 percent copper, 48 percent lead, 52 percent zinc, 0.189 percent cadmium, 2.6 percent antimony, and 1.74 percent arsenic. Subeconomic resources are estimated to be 50,000 tons averaging 0.005 oz gold per ton, 4 oz silver per ton, 4 percent lead, 5 percent zinc, and 0.02 percent copper (Tschanz and others, 1974, p. 471).
5, 6	Boulder-Chain Lakes Prospects	Disseminated molybdenite occurs locally in lenses of quartzite, hornfels, and tuffite near contact of quartz monzonite with sedimentary rock (Tschanz and others, 1974, p. 337-339).	One caved adit and an unknown number of drill holes (Tschanz and others, 1974, p. 337, 339).	Thirty samples: 27 assayed from 0.005 to 0.35 percent molybdenum disulfide (Tschanz and others, 1974, p. 339) Moderate to high potential for molybdenum resources.
7, 8	Baker Lake Prospects	Molybdenite occurs in zones of contact metamorphosed quartzite. The White Cloud quartz monzonite stock borders the deposit on the west (Tschanz and others, 1974, p. 326-327).	Several short adits and an unknown number of drill holes.	Marginal reserves at the north zone are estimated to be in the order of 100 million tons containing more than 0.08 percent molybdenum disulfide. Marginal reserves at the south zone are in the order of 35 million tons averaging 0.12 percent molybdenum disulfide (Tschanz and others, 1974, p. 333-336).
9	Blue Buoy Prospect	Quartz-calcite vein and stringers in argillaceous limestone (Tschanz and others, 1974, p. 617).	Prospect pits and trenches (Tschanz and others, 1974, p. 617).	Four samples: weighted average of 0.09 percent copper, 0.02 percent lead, and 0.34 percent zinc (Tschanz and others, 1974, p. 617). Low potential for zinc-copper-lead resources.

Table 1.--Mines and prospects in and near the White Cloud-Boulder RARE II area--Continued

Map no.	Name	Summary	Workings	Sample data/resource estimate
10	Warm Springs Prospect	Sulfides, carbonates, and oxides of lead, zinc, and copper in quartz veinlets and lenses along shear zones in calcareous argillite (Tschanz and others, 1974, p. 617).	Two adits, 85 and 145 ft long (Tschanz and others, 1974, p. 617). Low potential for zinc-copper-lead resources.	Six samples: a select sample assayed 3.2 oz silver per ton, 0.21 percent copper, 0.86 percent lead, and 5.6 percent zinc. Five chip samples contained 0.08 percent or less lead, and 0.34 percent or less zinc (Tschanz and others, 1974, p. 617).
11	Falling Star-West Pass Creek Prospect	Sulfide-bearing tactite occurs as small, disconnected, and irregularly shaped masses in limestone near a diorite porphyry intrusion (Tschanz and others, 1974, p. 614).	One adit and several open cuts.	Fifteen samples: 14 contain an average of 1.4 oz silver per ton, 5.86 percent lead, and 5.48 percent zinc (Tschanz and others, 1974, p. 615). Moderate to high potential for lead-zinc-silver resources.
12	Independent Prospect	Pyritized zones in volcanic rocks and limonite-stained aplite dikes (Tschanz and others, 1974, p. 617).	None	Two samples: they assayed no appreciable metals (Tschanz and others, 1974, p. 617).
13	Unnamed prospect	A N. 8° W. trending, 75° NE. dipping, 2-ft thick shear zone in argillite is explored. The shear zone contains traces of pyrite.	A 7-ft long trench.	One 2.0-ft long chip sample across the shear zone contained no significant metallic mineral concentrations.
14	Unnamed prospect	An irregular quartz vein in black, fissile argillite is near an andesite porphyry dike contact. The vein strikes N. 10°-30° E. and dips 75° NW. (Dover and others, 1981, p. 218).	One caved shaft and one sloughed pit (Dover and others, 1981, p. 218).	Two samples assayed no appreciable metallic mineral concentrations (Dover and others, 1981, p. 218).
15	Unnamed prospect	Small shear zones in highly contorted, fissile, gray to black argillite. Small zones of limonite-stained gouge often accompany the shear zones. The main shear, near the portal, strikes N. 5° W. and dips 20° to 30° SW.	One adit 340 ft long including drifts, crosscuts, and stopes.	Three chip samples and one select sample were taken. One chip sample contains 0.3 oz silver per ton and another contains 1.15 percent zinc. Low potential for zinc-silver resources.
16	Big Pine Prospect	A poorly exposed structure trending N. 50° E. and dipping 50° to 55° NW. contains sulfide-bearing pods of quartz (Dover and others, 1981, p. 256).	Two open cuts (Dover and others, 1981, p. 256).	Two samples: they assayed 4.0 and 6.2 oz silver per ton, 0.12 and 0.39 percent copper, 1.43 and 2.96 percent lead, and 0.30 and 2.09 percent zinc (Dover and others, 1981, p. 256). Moderate potential for silver-lead-zinc resources.

Table 1.--Mines and prospects in and near the White Cloud-Boulder RARE II area--Continued

Map no.	Name	Summary	Workings	Sample data/resource estimate
17	Glacier Prospect	Two northeast-trending, sulfide-bearing, breccia-filled shear zones in dark-gray, siliceous argillite (Dover and others, 1981, p. 256).	One 279-ft long adit, one 15-ft deep shaft, and four pits (Dover and others, 1981, p. 256).	Ten samples: those from the larger breccia-filled zone averaged 0.3 oz silver per ton, 0.59 percent lead, 0.08 percent zinc, and a trace copper. Samples from the smaller zone averaged 0.5 oz silver per ton, 1.94 percent lead, and 0.93 percent zinc. One select sample assayed 13.10 percent lead and 11.40 percent zinc (Dover and others, 1981, p. 256). Moderate potential for lead-zinc-silver resources.
18	Unnamed prospect	Northwest trending shear and breccia zones in interbedded argillite and quartzite with minor limestone (Dover and others, 1981, p. 255).	Eight shallow pits and trenches (Dover and others, 1981, p. 255).	Six samples: they assayed as much as 4.9 oz silver per ton (Dover and others, 1981, p. 255). Low to moderate potential for silver resources.
19	Lost Dump Prospect	A mineralized zone striking east and dipping 45° N. occurs along a contact between a medium-grained quartzite and underlying argillite (Dover and others, 1981, p. 246).	One 35-ft long adit, one caved adit estimated to be 200 to 300 ft long, one trench, and two pits (Dover and others, 1981, p. 246-249).	Five samples: one assayed 0.05 oz gold per ton, three assayed from 0.2 to 0.4 oz silver per ton, five assayed from 0.31 to 8.02 percent lead and four assayed from 0.20 to 9.75 percent zinc. About 2,500 tons average 0.05 oz gold per ton, 0.4 oz silver per ton, 8.02 percent lead, and 9.75 percent zinc (Dover and others, 1981, p. 249). Moderate to high potential for zinc-lead-silver resources.
20	Homestake Mine	A mineralized shear zone has an average strike of N. 25° W. and dips 45° to 75° SW. in argillite (Dover and others, 1981, p. 223).	Workings consist of 13 adits, 3 inclined shafts, and 11 pits. Six adits comprise more than 6,000 ft of underground workings (Dover and others, 1981, p. 225).	Twenty-five samples: 17 assayed from 0.6 to 13.9 oz silver per ton, 15 assayed from 1.04 to 9.38 percent lead, and 21 assayed from 1.12 to 45.5 percent zinc. Indicated subeconomic resources are 730,000 tons averaging 2.4 oz silver per ton, 2.17 percent lead, and 5.67 percent zinc (Dover and others, 1981, p. 227-228).
21	Long Grade Mine	A northwest trending, breccia-filled, mineralized shear zone in gray argillite (Dover and others, 1981, p. 231).	Three adits ranging from 32 to 50 ft long and two inaccessible adits (Dover and others, 1981, p. 231).	Six samples: four assayed from 0.5 to 9.5 oz silver per ton, three assayed from 0.63 to 3.29 percent lead, and five assayed from 0.17 to 10.3 percent zinc. Subeconomic resources are 32,500 tons averaging 2.4 oz silver per ton, 0.7 percent lead, and 4.1 percent zinc (Dover and others, 1981, p. 231).
22	Long Trail Prospect	A sulfide-bearing quartz vein strikes N. 60° W. and dips 55° to 60° NE. (Dover and others, 1981, p. 211).	A caved adit and trenches (Dover and others, 1981, p. 212).	A grab sample from the dump assayed 6.3 oz silver per ton, 2.78 percent lead, and 8.75 percent zinc. Resources are estimated to be 67,000 tons (Dover and others, 1981, p. 212).
23	Unnamed prospect	Vuggy, limonite-stained, honeycomb quartz with small amounts of malachite from vein which may have been as thick as 8 in. ¹ / ₂ (Dover and others, 1981, p. 218).	Two sloughed cuts (Dover and others, 1981, p. 218).	One sample assayed 0.9 oz silver per ton (Dover and others, 1981, p. 218).

Table 1.--Mines and prospects in and near the White Cloud-Boulder RARE II area--Continued

Map no.	Name	Summary	Workings	Sample data/resource estimate
24	Lucky Strike Prospect	Sulfide-bearing quartz vein striking N. 83° W. and dipping 40° NE. in argillite and sandstone (Dover and others, 1981, p. 218).	Small inclined shaft and two caved adits (Dover and others, 1981, p. 218).	One sample assayed 0.2 oz silver per ton, 0.30 percent lead, and 0.02 percent zinc (Dover and others, 1981, p. 218).
25	Alta Silver-Quartz Prospect	Northwest striking, northeast dipping, sulfide-bearing shear zones in calcareous slate with some argillite and sandstone interbeds (Dover and others, 1981, p. 201).	One 300-ft-long adit, one caved adit, one caved shaft, and five small cuts and pits (Dover and others, 1981, p. 201).	Twelve samples: one assayed 0.204 oz gold per ton, ten assayed from 1.2 to 15.8 oz silver per ton, eight assayed from 1.03 to 7.49 percent lead, and eleven assayed from 0.23 to 6.37 percent zinc. Subeconomic resources are estimated at 18,400 tons averaging 4.9 oz silver per ton, 2.4 percent lead, and 2.0 percent zinc (Dover and others, 1981, p. 203, 205).
26	Unnamed prospect	Limonite-stained zone in argillite, structure not visible (Dover and others, 1981, p. 218).	One partially caved adit 15 ft long (Dover and others, 1981, p. 218).	One select sample assayed 5.1 oz silver per ton, 7.56 percent lead, 1.64 percent zinc, and 0.04 percent copper (Dover and others, 1981, p. 218).
27	Unnamed prospect	Northwest trending quartz stringers, veinlets, and veins in gray argillite (Dover and others, 1981, p. 218).	Three cuts (Dover and others 1981, p. 218).	Three samples: they assayed as much as 0.8 oz silver per ton, 0.5 percent lead, and 0.08 percent zinc (Dover and others, 1981, p. 218).
28	Unnamed prospect	Quartz vein as much as 8 in. thick in slate and argillite (Dover and others, 1981, p. 218).	Two small sloughed pits (Dover and others, 1981, p. 218).	Two samples assayed as much as 0.1 oz silver per ton (Dover and others, 1981, p. 218).
29	Alto Silver Prospect	Country rock is argillite with some interbedded slate (Dover and others, 1981, p. 208).	Two caved adits (Dover and others, 1981, p. 208).	Two select samples assayed as much as 5.4 oz silver per ton, 0.92 percent lead, and 1.13 percent zinc (Dover and others, 1981, p. 208). Moderate to high potential for silver-lead-zinc resources.
30	Star No. 1 Prospect	Sulfide-bearing quartz vein striking N. 75° E. and dipping 25° to 35° SE. in siliceous argillite with thinly interbedded limestone and carbonaceous slate (Dover and others, 1981, p. 203).	One adit with stopes (Dover and others, 1981, p. 206).	Twelve samples: one assayed 0.088 oz gold per ton, eleven assayed from 1.5 to 13.9 oz silver per ton, seven assayed from 0.10 to 0.60 percent copper, eleven assayed from 1.23 to 11.0 percent lead, and twelve assayed from 0.29 to 5.08 percent zinc. There are about 500 tons averaging 4.7 oz silver per ton, 4.40 percent lead, 1.85 percent zinc, and 0.13 percent copper (Dover and others, 1981, p. 203, 205). High potential for lead-silver-zinc resources.
31	Purple Spar Prospect	A fault zone trending N. 45° E. and dipping 70° NW. in quartzite and argillite contains veins and veinlets of white, green, and purple fluorite (Dover and others, 1981, p. 204-205).	None	Occurrence of about 1,000 tons of fluorite-bearing rock. Samples taken across fluorite lenses in the main zone contained between 49 and 95 percent calcium fluoride (Dover and others, 1981, p. 205). Moderate potential for fluorite resources.

Table 1.--Mines and prospects in and near the White Cloud-Boulder RARE II area--Continued

Map no.	Name	Summary	Workings	Sample data/resource estimate
32	Walton Moly Prospect	Molybdenite occurs disseminated in quartz monzonite and in quartz veins adjacent to the contact between a small quartz monzonite stock and sedimentary rocks (Dover and others, 1981, p. 208).	Several drill holes	Twelve samples: they assayed from 0.10 to 1.91 percent molybdenum disulfide. Inferred subeconomic resources are estimated to be less than 50,000 tons averaging 0.22 percent molybdenum disulfide (Dover and others, 1981, p. 209-211).
33	Phi Kappa Mine	A metasomatically altered, sulfide-bearing limestone bed in a sequence of argillites, limestones, and quartzite. The strata have been intruded by granitic and diabase dikes (Dover and others, 1981, p. 197).	Workings include 4,200 ft of drifts, crosscuts, and stopes. Additional workings include several cuts, pits, and shallow shafts (Dover and others, 1981, p. 197).	Ninety-five samples taken from the main ore zone average 3.2 oz silver per ton, 0.08 percent copper, 3.35 percent lead, and 3.48 percent zinc. Measured reserves are approximately 55,000 tons and indicated reserves are 1.6 million tons (Dover and others, 1981, p. 199).

1/ Metric conversion: tons x 0.9072 = tonnes; oz (troy) per ton x 34.285 = grams per tonne; feet x 0.3048 = meters; inches x 2.54 = centimeters

Mineral deposits and occurrences containing silver, lead, and zinc are abundant at the southeast corner of the RARE II area. Zinc and silver occurrences inside the study area at unnamed prospect 15 are in a north-trending shear zone. Low potential for zinc and silver resources exists at this prospect. Paleozoic metasediments similar to those containing silver, lead, and zinc resources near the heads of Trail and Little Fall Creeks extend westward across the south end of the RARE II area. Traces of scheelite and powellite, tungsten minerals, occur along hairline fractures in the calcareous country rock in the Kent Peak-Ryan Peak area. No significant concentrations of tungsten minerals were found, but the site has moderate potential for resources.

Sand and gravel and stone resources are abundant in the study area, but similar deposits occur outside the area, closer to markets. No coal, oil, or gas deposits have been identified in the study area.

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