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MINERAL RESOURCE POTENTIAL OF THE TEN MILE WEST ROADLESS AREA, BOISE AND ELMORE COUNTIES, IDAHO

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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 Ten Mile West Roadless Area (W4061), Boise National Forest, Boise and Elmore Counties, Idaho. The Ten Mile West Roadless Area was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

MINERAL RESOURCE POTENTIAL SUMMARY STATEMENT

The Ten Mile West Roadless Area is underlain chiefly by biotite granodiorite of the Idaho batholith and younger leucocratic monzogranite, both rock types of Cretaceous age. These rocks are intruded by Tertiary dioritic and granitic rocks and by numerous dikes that range in composition from diabase to rhyolite. The rocks are cut by faults, of which the principal ones strike northwest and are of regional extent.

The roadless area contains known placer-gold deposits and gold-silver lode deposits. Based on anomalously high values for gold, silver, molybdenum, and lead in stream-sediment samples, and the known distribution of placer and lode deposits, a 3- to 4-mi-wide northwest-trending belt of faulted and hydrothermally altered rocks is defined that has a low mineral resource potential for silver, gold, and molybdenum. Within this belt are localities that have moderate resource potential for one or more of the metals gold, silver, lead, molybdenum, and zinc. Four localities within the belt have moderate resource potential for placer gold. There is also a small area having low resource potential for silver, gold, and copper in the headwaters vicinity of Chapman Creek.

Geothermal lease applications extend into the northern end of the study area. Anomalous quantities of fluorine and uranium were found in some stream-sediment samples, but there is no evidence of areas having resource potential for these elements. Coal, oil, and gas do not exist in the area.

There are 1,135 active lode and placer claims in the study area, including 1,052 lode claims in one group; there are no patented claims, oil and gas leases, or mineral leases.

INTRODUCTION

The Ten Mile West Roadless Area comprises 134 mi^2 in the Boise National Forest, Boise and Elmore Counties, Idaho (fig. 1). The area adjoins the western side of the Sawtooth Wilderness, which is part of the Sawtooth National Recreation Area. The area is about 25 mi northeast of Idaho City, the nearest town; it is reached by unimproved U.S. Forest Service roads leading from State Highway 21. The unimproved road from Trapper Flat to Graham is closed by snow about 9 months out of the year.

The roadless area is typified by steep, rugged, glaciated mountains and valleys. Elevations range from a high of 8,970 ft north of Goat Mountain to a low of 4,850 ft where North Fork Boise River exits the area.

Previous work in the roadless area includes geologic mapping by Reid (1963) along the eastern side, a mineral survey by the U.S. Geological Survey

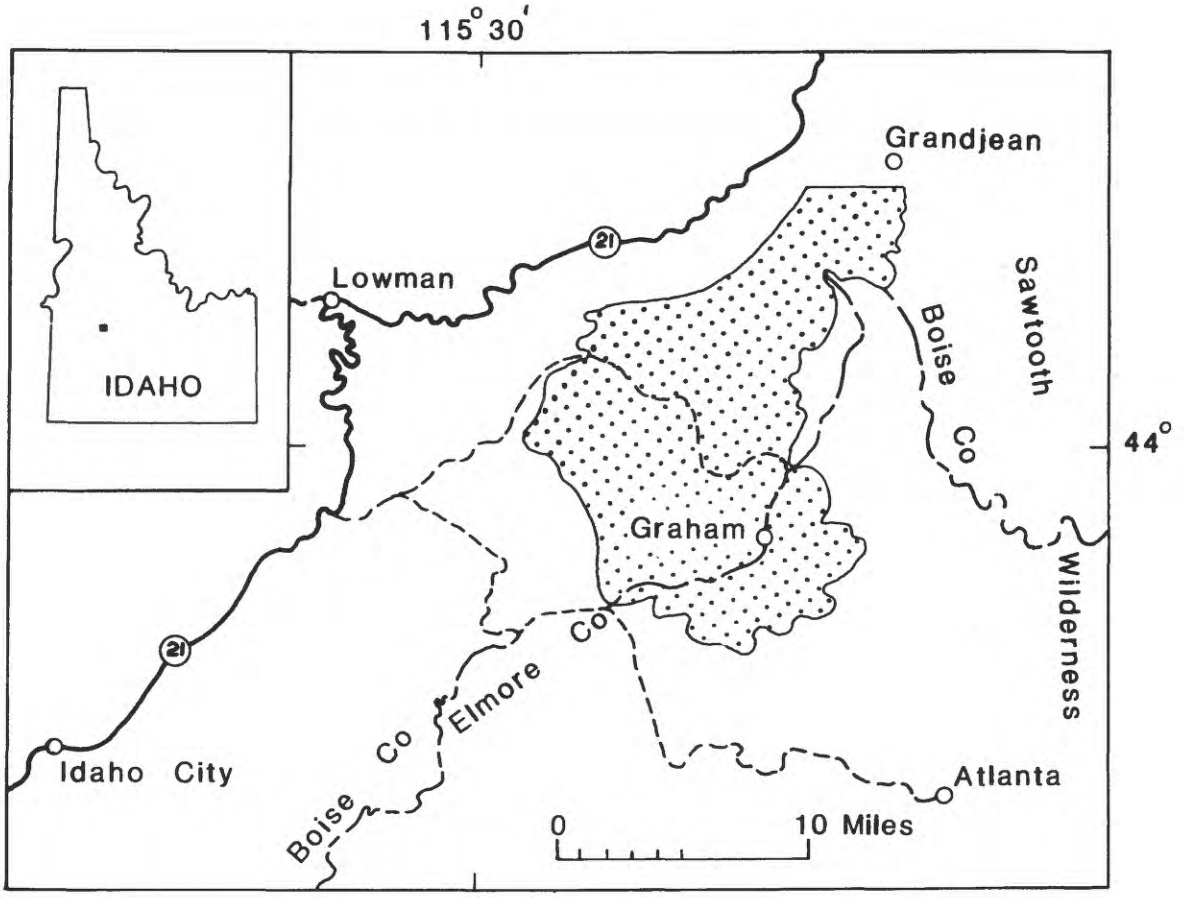


Figure 1.--Index map showing location of Ten Mile West Roadless Area, stippled (W4061), Idaho.

and the U.S. Bureau of Mines of the eastern part of the area (Kiilsgaard and others, 1970), and reconnaissance mapping in the southern part of the area (Ballard, 1928).

The U.S. Geological Survey studied the area during the summer of 1979 and part of the summer of 1980. The work consisted of geophysical studies, geological mapping, and collection and analysis of samples of rocks and stream sediments.

The U.S. Bureau of Mines searched literature and county mining-claim records and performed field examinations in the roadless area from March 1981 to December 1982 (Benham and Avery, 1983). There are no producing mines in the study area; however, six localities of mineral interest were being held by claimants in 1982. Three of these are lode-claim groups at old prospects, and the other three are placer-claim groups in the Crooked River and North Fork Boise River valleys. A total of 1,427 claims have been located in the roadless area. Of these, 1,123 lode claims and 12 placer claims, each of 160 acres, were held in 1982. One block of 1,052 lode claims was held by Tomas Stimpel of Argonaut Mines Ltd., California. Of the abandoned claims, 281 were lode and 11 were placer. Two geothermal-lease applications extend into the northern part of the roadless area. There are no patented claims, oil and gas leases, or mineral leases in the roadless area.

GEOLOGY

Biotite granodiorite of the Idaho batholith of Cretaceous age underlies most of the Ten Mile West Roadless Area (fig. 2). The rock is porphyritic, medium to coarse grained, gray to light gray. It is intensely altered locally, forming conspicuous zones of light-gray to almost white rock along faults. Large exposures of bleached and altered rock occur at the heads of Big and Little Silver Creeks, in the vicinity of Graham Peak, and on Goat Mountain (Kiilsgaard, 1983a). Dikes and stocklike masses of light-gray, fine- to medium-grained leucocratic monzogranite of Cretaceous age intrude the biotite granodiorite. The leucocratic monzogranite is resistant to erosion, forms high points on ridges, and weathers to extensive rubbly scree. Complex dioritic rocks of Tertiary age crop out in the vicinity of Jackson Peak and to the southeast (fig. 2). The rocks range from diorite to monzogranite in composition. The outcrop pattern of the dioritic rocks and a coincident aeromagnetic high (Mabey, in press) suggest a large body of these rocks at shallow depth. The rocks are characterized by abundant hornblende, euhedral biotite, and magnetite, which together make up as much as 35 percent of the rock. Pink monzogranite crops out on both sides of Bear River and at the heads of Taylor and Big Silver Creeks. The rock is identical to that of the Sawtooth batholith of Tertiary age, which is exposed extensively in the Sawtooth Wilderness east of the roadless area. All of the rocks are cut by numerous dikes that range from diabase to rhyolite in composition, with rhyolite and quartz-latite dikes the most common. The dikes are related to the Tertiary intrusive rocks; locally the dikes constitute more than half the volume of exposed rock. Quaternary deposits include recent alluvium along streams, terrace-forming older alluvium, and unconsolidated glacial deposits.

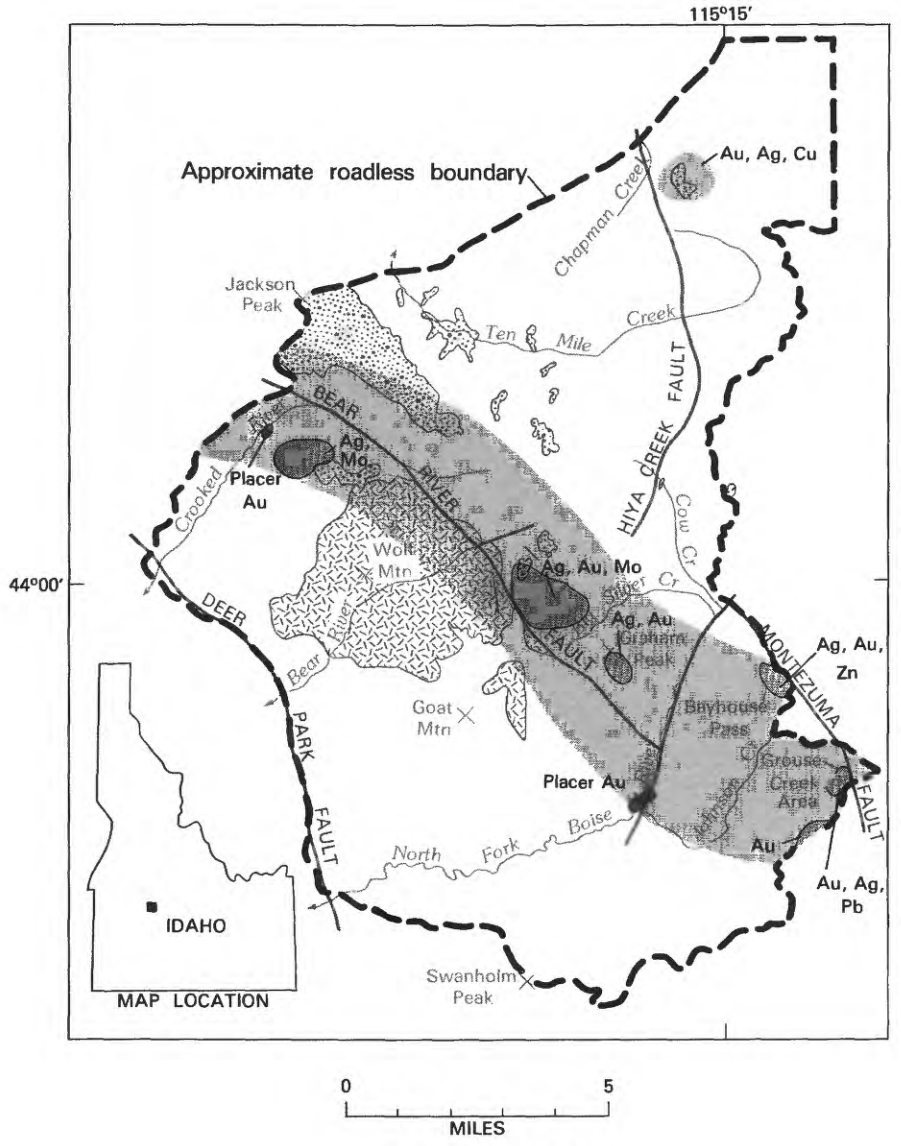
Steep faults are the principal geologic structures of the area. Two of these, the Deer Park and Montezuma faults, are of regional extent. The Deer Park fault is at least 30 mi long and has a scarp that forms the steep mountain front northwest of the North Fork Boise River. The southwest boundary of the roadless area follows the base of this scarp. Height of the scarp suggests a fault displacement of at least 2,600 ft, the downdropped block on the southwest side. The Montezuma fault has been traced from the vicinity of Atlanta northwest to the valley of the North Fork Boise River. Rocks west of the fault are downthrown with respect to those on the east. The Montezuma fault may be offset by a fault inferred to extend northeast along the North Fork Boise River, in which case it may continue on to the northwest as the Bear River fault, or it may cross the North Fork Boise River, but it was not identified northwest of the river. Granitic and dioritic rocks of Tertiary age are exposed near and along the Bear River fault.

Hydrothermally altered rocks, quartz veins, and mineralized deposits are concentrated along the western side of the Montezuma fault and along the Bear River fault. Rocks on the southwest side of the Montezuma fault are downdropped with respect to those on the northeast side, and the downdropped block was broken and made more permeable to mineralizing solutions, consequently, it is more mineralized (Kiilsgaard and others, 1970, p. D17, fig. 7). The Bear River fault may or may not be a faulted extension of the Montezuma fault but control by the fault on location of mineralized localities is evident by the many mineralized outcrops on the eastern side of the fault and to a lesser extent on the western side (fig. 2). The two faults and associated mineral deposits therefore define a northwest-trending belt that extends across the roadless area. A mineralized quartz vein cuts across a rhyolite dike on Graham Peak, which indicates the vein is younger than the dike. If the rhyolite dikes are offshoots from pink monzogranite of the Sawtooth batholith, as is likely, it is probable that the mineralization is related to waning phases of batholith intrusion. The mineralized character of the Sawtooth batholith is described by Kiilsgaard and others (1970), and the relation of mineral deposits to Tertiary intrusive rocks in Idaho is discussed by Bennett (1981).

GEOCHEMISTRY

A total of 584 rock and stream-sediment samples was collected in the roadless area concurrent with geologic mapping. Analytical results of the samples were released in a U.S. Geological Survey report (Kiilsgaard, 1982). Stream-sediment samples that contained element concentrations high enough to be considered anomalous and the sample localities are shown in the geochemical map of the Ten Mile West Roadless Area (Kiilsgaard, 1983b).

An unusually high proportion of the stream-sediment samples contained concentrations of silver and molybdenum. Stream-sediment sample localities anomalous in one or more of the metals silver, molybdenum, copper, and lead are shown in figure 3, as are sample localities of altered or mineralized rock samples that contained 30 ppm (parts per million) or more silver and (or) 5 ppm or more gold (1 troy oz of



EXPLANATION

- Geologic terrane having low resource potential
- Localities having moderate resource potential
- Localities having moderate resource potential for placer gold
- Granite of the Sawtooth batholith (Tertiary)
- Dioritic rocks of Jackson Peak (Tertiary)
- Granitic rocks of the Idaho batholith (Cretaceous)
- Contact
- Fault

Figure 2.--Map showing simplified geology and mineral resource potential of the Ten Mile West Roadless Area, Boise and Elmore Counties, Idaho.

gold or silver per short ton is equivalent to 34.286 ppm). Other analytical information on the altered or mineralized samples is shown in table 3 of the geochemical map of the Ten Mile West Roadless Area (Kiilsgaard, 1983b).

Some of the stream-sediment samples that yielded anomalous metal values are downstream from known mineral deposits, and erosion of these deposits probably created the anomalous metal content in the sediments. Other anomalous sediment samples, however, are from streams where no mineralized occurrences are known upstream from the sample site, and therefore indicate an undiscovered mineral occurrence. Most of the anomalous samples are from stream drainages in the belt of faulted and altered rocks that trends northwest across the area.

A stream-sediment sample (fig. 3) taken from a small tributary to Grouse Creek, contained 500 ppm lead, the highest lead content of any stream-sediment sample taken from the roadless area. The sample site is near but northwest of the drainage that contains the Lone Cabin vein zone, thus the anomalous sample probably reflects erosion from a deposit that was not seen during the roadless area study. A stream-sediment sample taken from a small tributary at Johnson Creek contained 5 ppm silver, 10 ppm molybdenum, and 150 ppm lead, but no mineralized outcrops were seen upstream from the sample site.

Eight stream-sediment samples taken along Big and Little Silver Creeks, contained anomalous concentrations of silver or molybdenum; one sample contained anomalous concentrations of both metals. Silver in the sediments probably was eroded from unexplored quartz veins that crop out on the ridges between Big and Little Silver Creeks and which are discussed under the Graham group of claims. Molybdenum content in samples from the quartz veins ranged from 1 to 90 ppm. The low content of molybdenum and the limited surface area of exposed quartz veins would appear inadequate to account for the anomalous values of molybdenum in the sediments. Biotite granodiorite on the ridges between Big and Little Silver Creeks is intensely altered and cut by many small quartz veins and silicified zones that were not sampled but which may have contributed molybdenum to the streams. More exploration work is needed in this target area to determine whether it contains deposits of significant value.

The concentration of molybdenum in stream-sediment samples downstream from a quartz vein in the western part of the roadless area and south of Crooked River, is discussed under the heading Red Tiger Claim. The distribution of stream-sediment samples containing anomalous quantities of molybdenum in that area indicates that more mineralization occurs in rocks of stream-headwater areas than was found during the present study. A stream-sediment sample taken from the upper part of Spout Creek contained 10 ppm silver, 150 ppm lead, and 200 ppm copper; however, no mineralized outcrop was seen upstream from the sample site. Another sediment sample taken from the lower part of the same stream contained 20 ppm molybdenum. Similarly, a sediment sample taken from the next drainage to the north contained 15 ppm molybdenum. Four stream-sediment samples taken from small tributaries to Crooked River contained anomalous concentrations of molybdenum. Collectively, these anomalous samples indicate widespread molybdenum mineralization in the headwater areas of those streams. The entire area from Spout Creek northwest to Crooked River warrants further prospecting.

North of Crooked River, four stream-sediment samples were anomalous in copper content and two stream-sediment samples were anomalous in molybdenum content. The copper could have come from erosion of the dioritic rocks that are exposed upstream from the sample localities, as mafic rocks normally contain more copper than do more felsic rocks such as biotite granodiorite of the Idaho batholith. The molybdenum probably came from other sources. No mineralized outcrops were seen upstream from the sample localities.

A few stream-sediment samples contained anomalous quantities of fluorine or uranium and are listed in table 1 of the geochemical map of the Ten Mile West Roadless Area (Kiilsgaard, 1983b); however, no evidence of significant mineral occurrences of these elements was seen. Fluorspar was found in the pink monzogranite and in at least one quartz vein, and erosion from such sources could account for the fluorine in the sediments. The pink monzogranite and rhyolite dikes are more radioactive than other intrusive rocks of the area and probably contributed the radioactive elements to the sediments.

MINERALIZED AREAS

Lode Claims

Gold Bug claim

The Gold Bug prospect workings are on the ridge between Johnson and Black Warrior Creeks in sec. 24, T. 7 N., R. 10 E. (no. 10, fig. 3 and table 1). Access is by U.S. Forest Service trails 053 and 059. The Gold Bug was originally located in 1903, along with 17 contiguous claims, and an adit, pits, and trenches were dug about that time. All workings are in fine-grained leucocratic monzogranite and within 50 ft of the top of the ridge. The adit, possibly 200 ft long originally, was open for 96 ft. It crosscuts numerous northeast-trending faults, one of which contains as much as 1.7 ft of white gouge.

Several pits and trenches dug on top of the ridge above the adit expose iron-stained zones within the monzogranite. Eighteen samples were taken. Five grab samples from dumps and stockpiles at prospect pits above the adit contained 0.028, 0.274, 0.506, 0.52, and 3.20 oz gold per ton. Two had 0.41 and 2.6 oz silver per ton.

Lone Cabin claim group

The Lone Cabin claims are at the headwaters of Grouse Creek, in sec. 8, T. 7 N., R. 11 E. (no. 9, fig. 3 and table 1). The claims were originally located as the Log Cabin claim group in 1904, but since then have been relocated three times. Access to the property is by U.S. Forest Service trails.

The property, referred to by Kiilsgaard and others (1970) as the Upper Grouse Creek property, was examined in 1967 as part of the Sawtooth Primitive Area investigation. The examination in 1981 showed that no appreciable work had been done at the property since the earlier study.

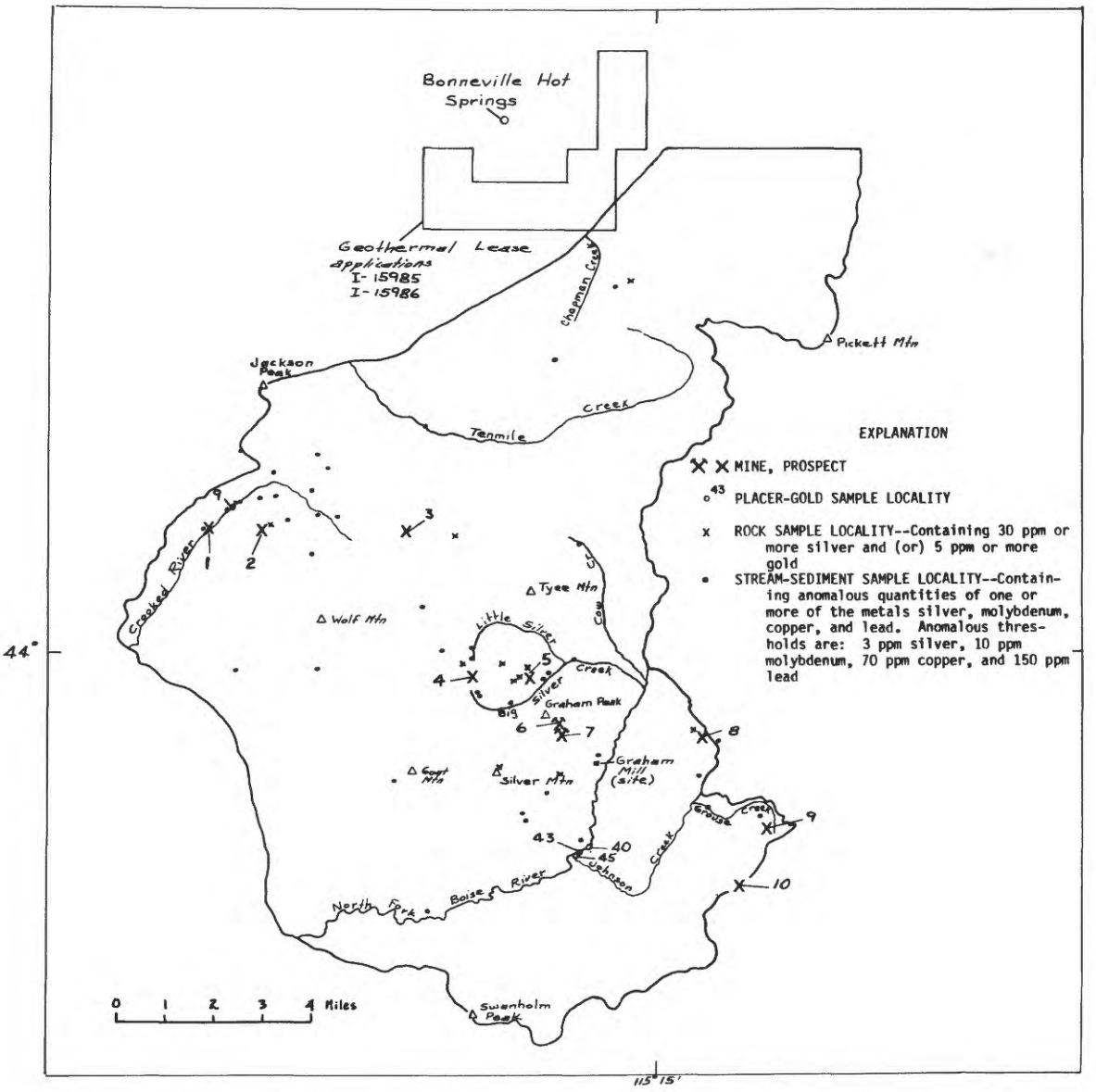


Figure 3.--Map showing mines and prospects and anomalous sample localities in the Ten Mile West Roadless Area.

Table 1.--Mines, prospects, and claims in the Ten Mile West Roadless Area

Map No.	Name	Summary	Workings	Sample data
1	Unnamed prospect.	Trench cut into iron-stained granodiorite containing a 0.5-ft-thick quartz vein trending N. 20° E., dipping 49° SE.	A trench, 20 by 4 by 3 ft deep following the quartz vein.	One sample, values were insignificant.
2	Red Tiger claim.	Working cut into rhyolite with quartz vein complex.	A caved adit trending S. 65° W. and probably less than 30 ft long.	Do.
3	Unnamed prospect.	Pits dug in weathered and iron-stained granite cut by andesite dike.	Two pits, one 14 by 13 by 6 ft deep, another 6 by 4 by 2 ft deep.	Two samples, values were insignificant.
4, 5, 6, and 7.	Graham claim group.	Workings are in granitic rocks. They expose mylonitic quartz veins. A relatively large mill was built which operated for 5 days and produced 52 oz of silver.	Four open adits: one 181-ft adit on the Julia claim; two adits on the Cleveland claim with 343 ft of workings; and one 28-ft adit on the Ivanhoe No. 3 claim. Three caved adits and six pits and trenches also are present.	Forty-three samples; one from the Alpha claim (fig. 3, no. 4) adit dump contained 5 oz silver per ton; one from a stockpile of the Julia mine (fig. 3, no. 7) contained 4.1 oz silver per ton; one from a stockpile of the Cleveland mine (fig. 3, no. 6) contained 3.3 oz silver per ton and 0.62 oz gold per ton.
8	Valley Chief claim group.	All workings are in granite and follow altered fault zones and quartz veins. Veins are 2 to 5 ft wide. These geologic structures are also related to the Montezuma fault. Quartz-sericite-pyrite alteration occurs progressively stronger nearer to the fault.	Two caved adits; one is estimated to be 200-300 ft long, and the other is shorter.	Nine samples were taken during the 1967 examination. Two samples of selected dump material assayed 14.6 and 7.3 oz silver per ton; 0.1-0.3 percent copper; 0.7 and 0.4 percent lead; 0.6 and 1.0 percent zinc; and 0.7 percent and a trace of bismuth. Five other samples assayed significant silver--from 0.6 to 3.8 oz/ton.
9	Lone Cabin claim group.	All workings are in leucocratic granite and follow faults and veins trending northeast. Geologic structures are related to the Montezuma fault. Veins contain vuggy quartz, altered granite, and minor disseminated sulfides.	Four caved adits; several prospect trenches and pits.	Twelve rock samples taken. Of these, one select sample assayed 3.5 oz gold per ton, 4.4 oz silver per ton, and 2.0 percent lead; a chip sample from across the 10-in.-thick quartz vein assayed 0.8 oz gold per ton; five grab and select samples assayed from 0.11 to 0.79 oz gold per ton and 0.3-1.5 oz silver per ton.
10	Gold Bug claim.	Adit and prospect pits in fine-grained, iron-stained, leucocratic granite, with some quartz and muscovite pegmatite. Adit crosscuts numerous northeast-trending faults.	A 96-ft adit, five prospect pits, and an opencut 38 ft long and 6 ft deep.	Eighteen samples: two contained 0.52 and 3.20 oz gold per ton; three assayed 0.506, 0.274, and 0.028 oz gold per ton.

The workings consist of four adits, all caved, and several pits and trenches. The two larger adits are estimated to have been about 200 ft long. All of the workings are in leucocratic monzogranite, and explore a northeast-trending vein zone for more than 1,000 ft along strike and through a range in elevation of more than 200 ft. The vein zone is in the downthrown block of the Montezuma fault, ranges from a few inches to as much as 2 ft thick, and consists of altered granitic rocks, gouge, and iron-stained lenses of quartz which contain pyrite and small pods of galena and sphalerite. Twelve samples were taken from the vein zone and prospect dumps. Samples from the vein zone ranged from nil to 0.80 oz gold per ton and from nil to 0.90 oz silver per ton; a selected sample from the dump of the main adit contained about 3.5 oz gold per ton, about 4.4 oz silver per ton, and more than 2.0 percent lead. The caved condition of the workings precluded an estimate of resource tonnage and grade.

Graham group

The Graham claim group (Alpha and Ivanhoe No. 3 claims; Cleveland and Julia mines) consists of 54 claims originally located between 1882 and 1894. Prospect workings are in four groups (nos. 4-7, fig. 3 and table 1) on and near Graham Peak and along the divide separating Big and Little Silver Creeks. Workings consist of four open adits ranging from 28 to 250 ft long, three caved adits estimated to be from 20 to 300 ft long, and six prospect pits and trenches.

A mill was constructed over a period of 2 years and ore was supplied to it by a gravity-powered bucket tram. The original tram, destroyed by a snow avalanche, was essentially rebuilt but was in ruins in 1981. By 1888, the first ore from the Julia and Cleveland mines was stockpiled at the tram leading to the mill. In 1889, the mill operated for 5 days and produced 52 oz of silver. It is not known which of the workings was the source of the silver. In the late 1930's, the mill was dismantled and the scrap metal salvaged.

Prospect workings are in biotite granodiorite on the northeast side of the Bear River fault. The portal of a 181-ft-long adit on the Julia claim is in a rhyolite dike. The adit crosscuts mylonitic quartz veins; the largest vein is followed by a drift and a short raise. An 83-ft-long adit on the Cleveland claim exposes several altered shear zones, and a 28-ft-long adit on the Ivanhoe No. 3 claim was driven in granodiorite and exposes a 2-ft-thick diabase dike and a 2-ft-wide northeast-striking altered zone that contains disseminated pyrite.

Forty-three samples were taken at the workings; they contained from nil to 5 oz silver per ton. One sample from a stockpile of about 150 tons on the Julia claim assayed 4.2 oz silver per ton. Another sample from a 1.5-ton stockpile on the Cleveland claim assayed 3.3 oz silver per ton and 0.062 oz gold per ton. A sample from the 70-ton dump on the Alpha claim assayed 5.0 oz silver per ton. The remaining samples did not contain an appreciable content of metals.

Twelve samples of quartz veins and hydrothermally altered rocks were taken from exposures in the vicinity of Graham Peak. The highest silver value from these samples was 50 ppm, equivalent to about 1.5 oz silver per ton. Several northwest-striking quartz veins that range from about 4 in. to 2 ft thick cross the ridge immediately northwest of Big Silver Creek and are believed to be on the Graham group of claims. Six samples were taken in that area, of which one sample, taken across a quartz vein 6 in. thick, contained 45 ppm silver and 43 ppm gold. Two other samples contained 30 ppm silver and 0.05 ppm gold, and 15 ppm silver and 5.5 ppm gold; the other three samples contained lower concentrations of these metals. A sample taken on a ridge 2,300 ft to the northwest and across a 2-ft-thick quartz vein that may be a continuation of the vein sampled on Big Silver Creek ridge, contained 120 ppm silver and 0.10 ppm gold.

Valley Chief claim group

The Valley Chief claims are on Bayhorse Pass in secs. 1 and 2, T. 7 N., R. 10 E. (no. 8, fig. 3 and table 1). The claims were originally located in 1904 as the Black Bear, Goldfish, and Apex. Since then, they have been relocated seven times by various claimants. Access is by U.S. Forest Service trail 059, which begins at the Graham road near the mouth of Silver Creek.

The property, referred to by Kiilsgaard and others (1970) as the Bayhorse prospects, was investigated in 1967 as part of the Sawtooth Primitive Area study. Workings include two caved adits and several prospect pits. The two adits were driven S. 20° W. and S. 40° W.; the former followed a shear zone, but the latter may have crosscut a vein that strikes about N. 40° W., dips 80° SW., and may be traced intermittently at the outcrop for about 1,800 ft. Near the southeast end, the vein is about 4 ft thick where exposed in a prospect pit, and consists of strands of iron-oxide-stained quartz, gouge, and altered country rock. The vein narrows to a thickness of about 1 ft near the northwest end. Brecciated fragments of quartz on the adit dumps contain pyrite, chalcopyrite, sparse galena, sphalerite, and a finely crystalline dark sulfide mineral that may be tetrahedrite. Manganese-oxide stain is common along fracture surfaces of vein material. Leucocratic monzogranite host rock near the vein, which is near the Montezuma fault, is intensely hydrothermally altered with most of the feldspars converted to sericite and clay minerals. Of 10 samples of dump material and vein outcrop, 14.6 oz/ton was the highest silver value, 1.0 percent the highest zinc content, 0.7 percent the highest lead content, and 0.3 percent the highest copper content; a minor amount of bismuth, as much as 0.07 percent, was also detected.

Red Tiger claim

South of Crooked River, near the western side of the roadless area, are two mineralized localities that have been tested by prospect pits (no. 2, fig. 3 and table 1). The localities may be on the Red Tiger claim, where a series of pits as much as 6 ft deep extend N. 45° E. for about 75 ft. No vein was seen in place but blocks of iron-oxide-stained quartz as much as 2 ft thick litter the dumps. A shallow trench and a pit on a ridge 1,500 ft to the southwest explore a quartz vein that strikes N. 45° E., and is probably the same vein explored at the northeast end of the property. Samples of quartz from prospect dumps

contained 65 and 130 ppm silver, respectively. These are relatively low silver values; however, sediment samples from streams that drain the ridge areas, where the prospects are located, contained 50 and 20 ppm molybdenum. These are the highest molybdenum concentrations found in stream-sediment samples in the roadless area. The minor molybdenum content contained in quartz from the prospect pits (23 and 19 ppm molybdenum) is not enough to account for the anomalous content in the stream sediments, which suggests there may be more extensive silver-molybdenum mineralization in the headwater areas of the streams than was seen at the two prospects.

Quartz veins

Many quartz veins were mapped and sampled on both sides of the Bear River fault, but samples from them that contained metal values below the arbitrary values of 30 ppm silver and 5 ppm gold are not shown on figure 3. An exception is an iron-oxide-stained quartz vein that crops out on the ridge between Horseshoe and Pungo Creeks. The vein strikes N. 80° W., dips 75° NE., varies from 2 to 5 ft in thickness, and was traced for about 100 ft. A sample, taken across the vein, contained 170 ppm silver, a high enough value to warrant investigation.

A small iron-oxide-stained brecciated quartz vein that is only 10 in. thick and exposed for a length of about 10 ft crops out in the headwaters area of Chapman Creek. The vein strikes N. 66° E., and dips 45° NW., contains pyrite, specular hematite, grains of realgar and possibly orpiment, fine-grained dark sulfide minerals, and tiny grains of native gold. A sample taken across the vein contained 137 ppm silver but nil gold. Gold, being particulate material in the quartz, could have been absent from the portion of sample that was analyzed. A nearby exposure of Tertiary granodiorite, numerous dikes, conspicuous faults, and a nearby stream-sediment sample that was anomalous in copper content all suggest the area is worthy of investigation.

Placer Claims

Gravel deposits were investigated for placer gold along two major drainage systems: the Crooked River in the central and western portions of the study area, and the North Fork Boise River in the southeastern region (fig. 2).

Three sampling techniques were used during the investigation: (1) reconnaissance pan samples, using a 14-in. gold pan and grizzly, were taken from stream and riverbanks; (2) channels were excavated and sampled in terraces, moraines, and stream and riverbanks; and (3) circular pits, as much as 15 ft deep, were dug into glacial-fluvial gravels using a backhoe, and bulk samples were collected from the bottom and along one side of each pit.

Crooked River

Gold-bearing alluvium, chiefly from porphyritic granitic rocks and to a lesser degree from andesite and other dike rocks, is deposited in the Crooked River Valley and along Trapper Flat. Quartz veins associated with Tertiary monzogranite and biotite-hornblende-granodiorite (Kiilsgaard, 1983a) are the primary source rock of the gold. Cobbles and boulders composed of monzogranite and biotite-hornblende-granodiorite make up 30-60 percent of the alluvial deposits. The remaining materials are a combination of silt, sand, and gravel which are recent weathered byproducts of the granitic rocks. Clasts of white-quartz vein material, generally less than 0.25 ft thick, are randomly intermixed within this material. Minor amounts of bright, very small, chunky, angular flakes of gold are disseminated within the stream-washed sediments. The gold is neither well sorted nor concentrated. Alluvial deposits of the Crooked River Valley rarely exceed 100 yd in width and are estimated to be less than 15 ft thick. Lateral morainal deposits on both the north and south sides of Trapper Flat limit stream-worked material to a width of 200 yd or less. Thickness of deposits, as determined in backhoe pits, is between 4 and 15 ft.

Twenty-two sites were sampled along Crooked River on or near the King Royale and Trapper Flats Association placer-claim groups. A total of 174 samples was collected, and gold, primarily in trace amounts, was found in 15 of them. No resources were identified. Because of a high water table, gravel at bedrock could not be sampled at 18 of the sites. Site 9, Crooked River, contains 3,400 yd^3 of gold-bearing gravel worth 32 cents/yd^3 (at a gold price of $400/oz).

North Fork Boise River

The area of primary interest for placer-gold deposits along North Fork Boise River is the section between Cow Creek and Johnson Creek (fig. 3). This segment of the valley appears to follow a steep fault. Gravel terraces on each side of the river are covered by a thin veneer of glacial till. A flood plain as much as 1,000 ft wide extends along the floor of the valley; gravel averages 13 ft thick. Country rock is the same biotite granodiorite found at Trapper Flat.

Five placer claims are located along the part of the river within the study area. Fourteen of 22 sites examined contained detectable quantities of gold, but none had significantly high concentrations. Site 40 contains 434,000 yd^3 of gravel containing gold worth 58 cents/yd^3; site 43 has 75,000 yd^3 of gold-bearing gravel worth 89 cents/yd^3; site 45 has 32,000 yd^3 of gravel containing gold valued at $1.22/$yd^3$ (at a price of $400/oz). Large boulders prevented testing bedrock at these three sites.

Eleven placer claims are located along Cow Creek within the study area. Five sites were examined. Of the 23 samples collected, two contained traces of gold. Seven reconnaissance panned samples were collected along Johnson Creek; of these, one sample contained a trace of gold.

GEOTHERMAL ENERGY

The entire study area is classified by the U.S. Geological Survey as valuable prospectively for geothermal steam and associated geothermal resources (Muffler, 1979). Geothermal lease applications nos. I-15985 and I-15986 extend into the northern part of the area (fig. 3). They occupy secs. 4, 7, 8, and 9, T. 9 N., R. 10 E.; secs. 1 and 12, T. 9 N., R. 9 E.; and secs. 28 and 33, T. 10 N., R. 10 E. The lease applications center mainly around Bonneville Hot Springs, which is not in the study area. No hot springs were found in the roadless area.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The Ten Mile West Roadless Area contains four sites with moderate resource potential for placer gold. The location of the lode deposits with respect to faults and hydrothermally altered rocks, the scatter of anomalous stream-sediment samples, and the identified placer-gold occurrences define a northwest-trending belt of geologic terrane that has a low resource potential for silver, gold, and molybdenum. Within this belt are areas that have moderate resource potential for one or more of the metals gold, silver, lead, molybdenum, and zinc. A small area in the headwaters vicinity of Chapman Creek also has a low resource potential for gold, silver, and copper.

The northwest-trending mineralized belt extends completely across the roadless area and continues more than 15 mi to the southeast, beyond the gold-bearing district of Atlanta. Location of the mineralized belt is controlled by the Montezuma and Bear River faults and to some extent by intrusive granitic and dioritic Tertiary rocks that are exposed near and along the faults. Collectively, the geologic features defining the belt make it an attractive site for prospecting.

Small yardages of placer gravel were identified at four specific sites along the North Fork Boise River and Crooked River, the values ranging from \$0.32 to \$1.22/yd^3 in gold (at a gold price of \$400/oz). Placer gold also was found at several other localities along the two rivers, but the gold is disseminated, suggesting it has not been transported far enough for natural concentration to have occurred. Thickness of the gravel prevented testing material near bedrock to determine whether higher gold values occur there. The bright color and shape of the gold flakes suggest the gold was derived from erosion of veins in nearby North Fork Boise River and Crooked River drainages.

Geothermal lease applications extend into the northern end of the study area. Anomalous quantities of fluorine and uranium were found in some stream-sediment samples, but there is no evidence of potential resources of these elements in the area. Coal, oil, and gas do not exist in the area.

There are 1,135 active lode and placer claims in the study area, including 1,052 lode claims in one group; there are no patented claims, oil and gas leases, or mineral leases.

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