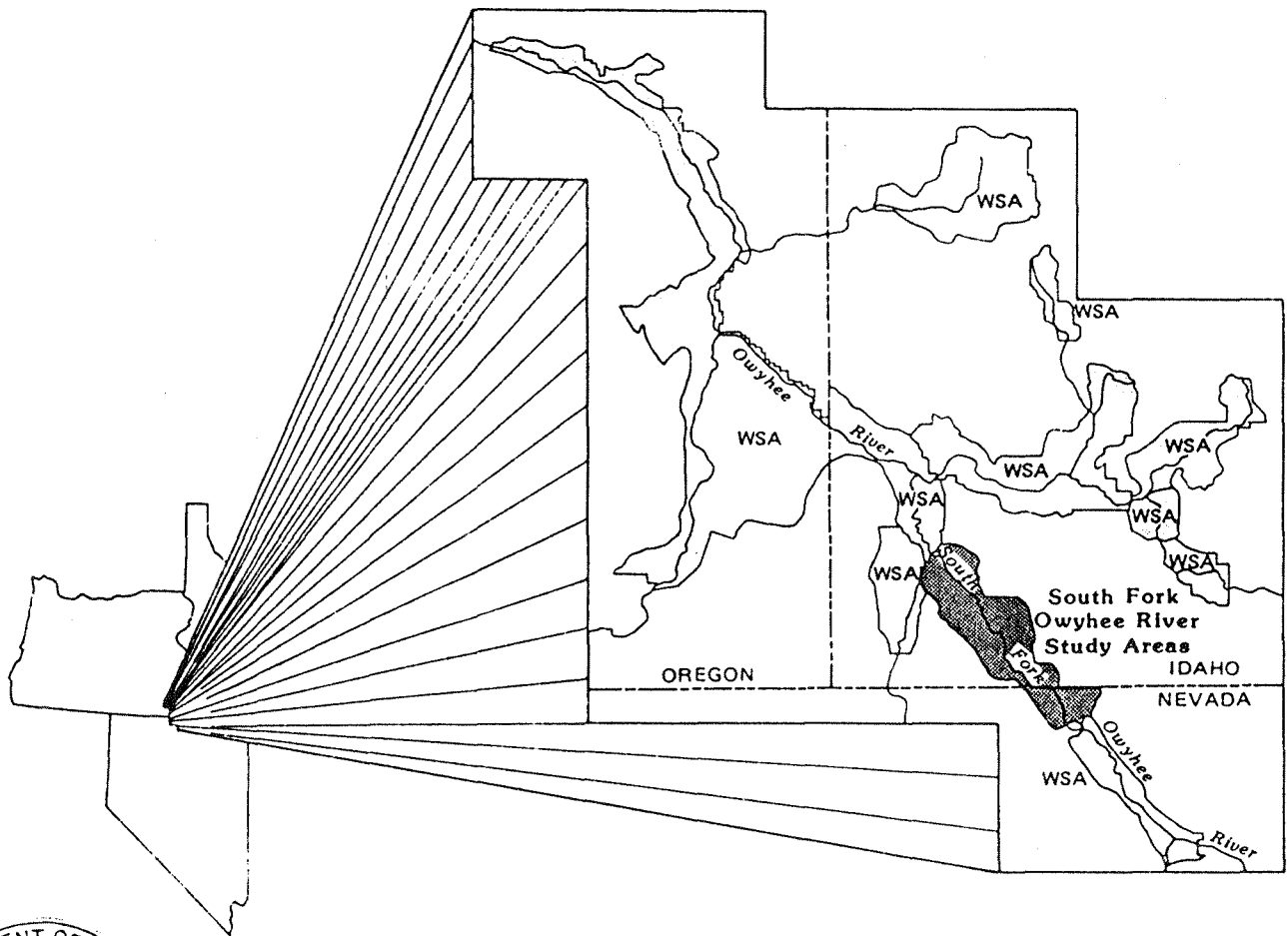


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Open File Report

Mineral Resources of the South Fork Owyhee River Study Areas, Owyhee County, Idaho, and Elko County, Nevada



BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL RESOURCES OF THE SOUTH FORK OWYHEE RIVER
STUDY AREAS, OWYHEE COUNTY, IDAHO, AND ELKO COUNTY, NEVADA

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PREFACE

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and U.S. Bureau of Mines to conduct mineral surveys on U.S. Bureau of Land Management administered land designated as Wilderness Study Areas ". . . to determine the mineral values, if any, that may be present" Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a Bureau of Mines mineral survey of portions of the two South Fork Owyhee River Wilderness Study Areas (ID-16-53 and NV-010-103A), Owyhee County, ID, and Elko County, NV.

This open-file report will be summarized in a joint report published by the U.S. Geological Survey. The data were gathered and interpreted by Bureau of Mines personnel from Western Field Operations Center, East 360 Third Avenue, Spokane, WA 99202. The report has been edited by members of the Branch of Mineral Land Assessment at the field center and reviewed at the Division of Mineral Land Assessment, Washington, DC.

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SUMMARY

A mineral survey of portions of two contiguous WSAs (Wilderness Study Areas) along the South Fork Owyhee River in southwestern Idaho and north-central Nevada was done by the U.S. Bureau of Mines in 1984. The portions of the WSAs, known as study areas, have a combined area of 47,610 acres. The Idaho study area consists of 42,430 acres of the 42,510-acre South Fork Owyhee River WSA (ID-16-53). The Nevada study area consists of 5,180 acres of the 7,840-acre South Fork Owyhee River WSA (NV-010-103A). The Idaho study area is within the Boise District of the Bureau of Land Management, and the Nevada study area is within the Elko District.

In the Nevada study area, no claims or hard rock mineral occurrences are known.

In the Idaho study area, chalcedony and common opal occur in outcrops of silicified rhyolite or lacustrine (lake) sediments at four sites. Each site has small pits, one of which is on a group of two inactive mining claims, the only claims known in the study area. A very small amount of the chalcedony and common opal is suitable for gemstones or mineral specimens; selective mining of these minerals is labor intensive and, therefore, feasible only by hobbyists. The value of these minerals recovered from the study area is estimated at about \$100. One mile outside the study area, the Lu-Lew prospect annually yields small amounts of similar, but somewhat higher quality chalcedony and opal-chalcedony laminates. The sites do not show any evidence of metallic mineral resources.

Regionally, zeolite occurs in altered rhyolite, and diatomite occurs in lacustrine sediments; however, similar occurrences were not noted in related rocks in either study area. Samples from the few small sand and gravel deposits along the South Fork Owyhee River in both study areas contained minor gold, but no other significant heavy minerals. Oil and gas leases or lease applications blanket the areas, but no resources have been identified.

INTRODUCTION

This mineral survey of portions of the two South Fork Owyhee River WSAs (Wilderness Study Areas) 1/, ID-16-53 and NV-010-103A, was conducted by the USBM (U.S. Bureau of Mines) and the USGS (U.S. Geological Survey) at the request of the BLM (U.S. Bureau of Land Management). The USBM researched the mining and mineral exploration history and evaluated prospects and mineralized areas within or adjacent to the study areas.

1/ A WSA is a roadless area or island that has been inventoried by the U.S. Bureau of Land Management and found to have wilderness characteristics as described in Section 603 of the Federal Land Policy and Management Act and Section 2(c) of the Wilderness Act of 1964, (78 Stat. 891).

The USGS studied the areas by regional geochemical and geophysical surveys, and geological mapping. Results of the investigations will be used to help determine the suitability of the areas for inclusion into the National Wilderness Preservation System. Although the immediate goal of this and other USBM mineral surveys is to provide data for the President, Congress, government agencies, and the public for land-use decisions, the long-term objective is to ensure that the Nation has an adequate and dependable supply of minerals at a reasonable cost.

Setting

The contiguous South Fork Owyhee River study areas are in southwestern Idaho and north-central Nevada (fig. 1). They encompass 18 mi (miles) of the northwest-flowing South Fork Owyhee River and its canyon and adjoining upland for about 0.25 to 3.5 mi on either side (fig. 2). The Idaho study area consists of 42,430 acres of the 42,510-acre South Fork Owyhee River WSA (ID-16-53), and the Nevada study area consists of 5,180 acres of the 7,840-acre South Fork Owyhee River WSA (NV-010-103A). The Idaho study area is within the Boise BLM district, and the Nevada study area is within the Elko BLM district. The areas' center is about 115 mi south of Boise, ID, and 105 mi northwest of Elko, NV. The study areas are separated by dirt roads from the Owyhee River Canyon WSA (ID-16-48B), the Little Owyhee River WSA (ID-16-48C), and the Owyhee Canyon study area (fig. 2), which were studied concurrently (Gabby, 1985; Buehler and Capstick, 1985; Capstick and Buehler, 1986).

Access from Owyhee, NV, is westerly 32 mi by dirt road to the southeastern boundary of the study areas. From there, dirt roads mostly bound the eastern border. The western portion of the areas is also mostly bound by dirt roads. It can be reached during drier parts of the year by fording the river just south of the 45 Ranch. Other access to the western portion of the study areas is by dirt road easterly 62 mi from McDermitt, NV.

Within the study areas, the terrain is flat to gently rolling with an average elevation of about 5,200 ft (feet), except where the South Fork Owyhee River and its intermittent tributaries have cut deep canyons. Relief from the rim of the main canyon, which in many places is precipitous, to the river ranges from about 550 to about 800 ft. The highest point, 5,394 ft, is at Bull Camp Butte near the Idaho-Nevada border (fig. 2). The lowest point, about 4,355 ft, is on the South Fork Owyhee River at the northwest boundary of the Idaho study area. Sagebrush, desert grasses, and a few scattered juniper trees cover the area, which receives an average of less than 10 in. (inches) of precipitation per year.

Previous Studies

Geological studies of the region including the study areas were by Hope and Coats (1976), Ekren and others (1981, 1984), and Bonnicksen and Breckenridge (1982). Studies of the geology, energy, and minerals (GEM)

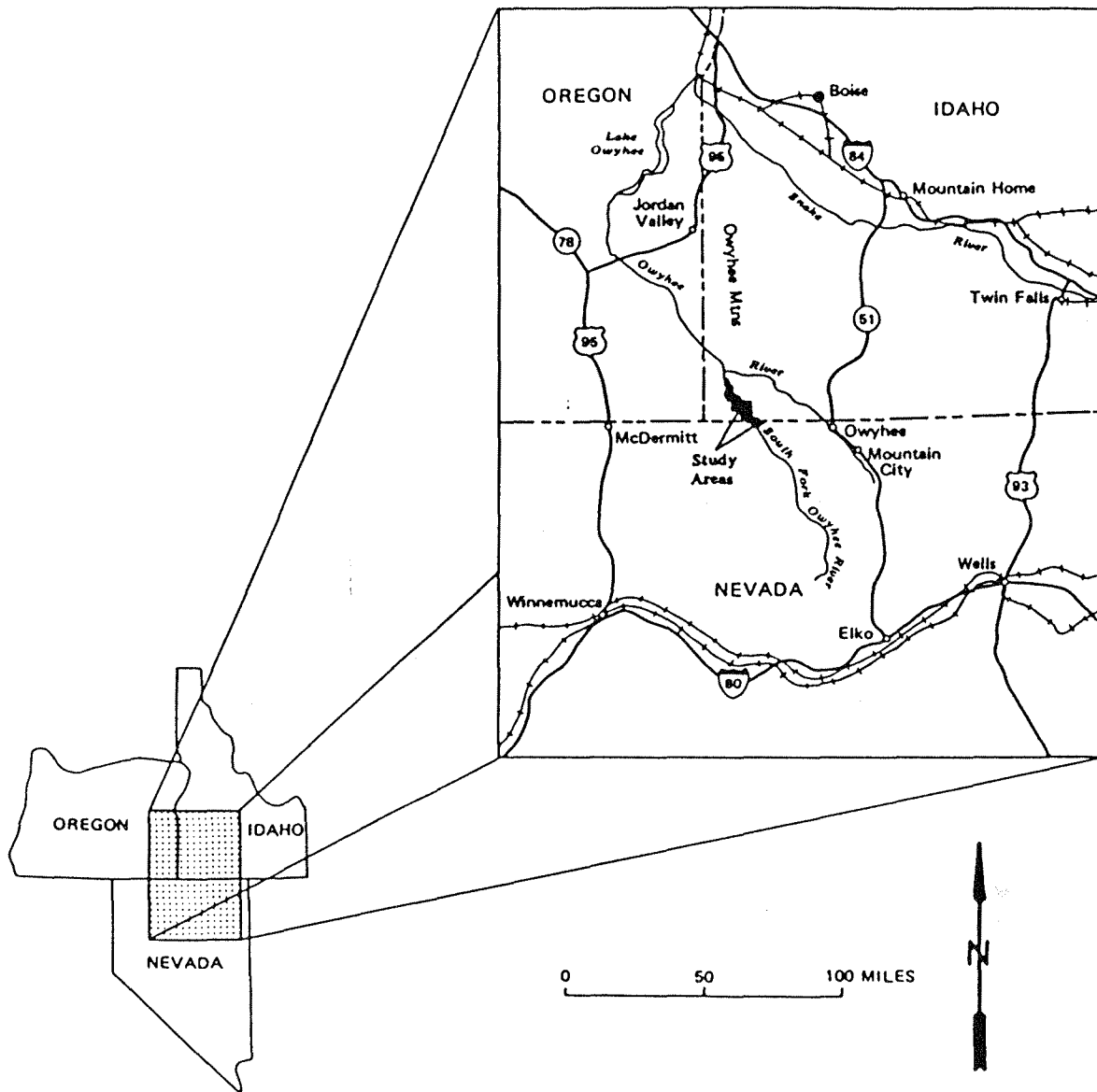
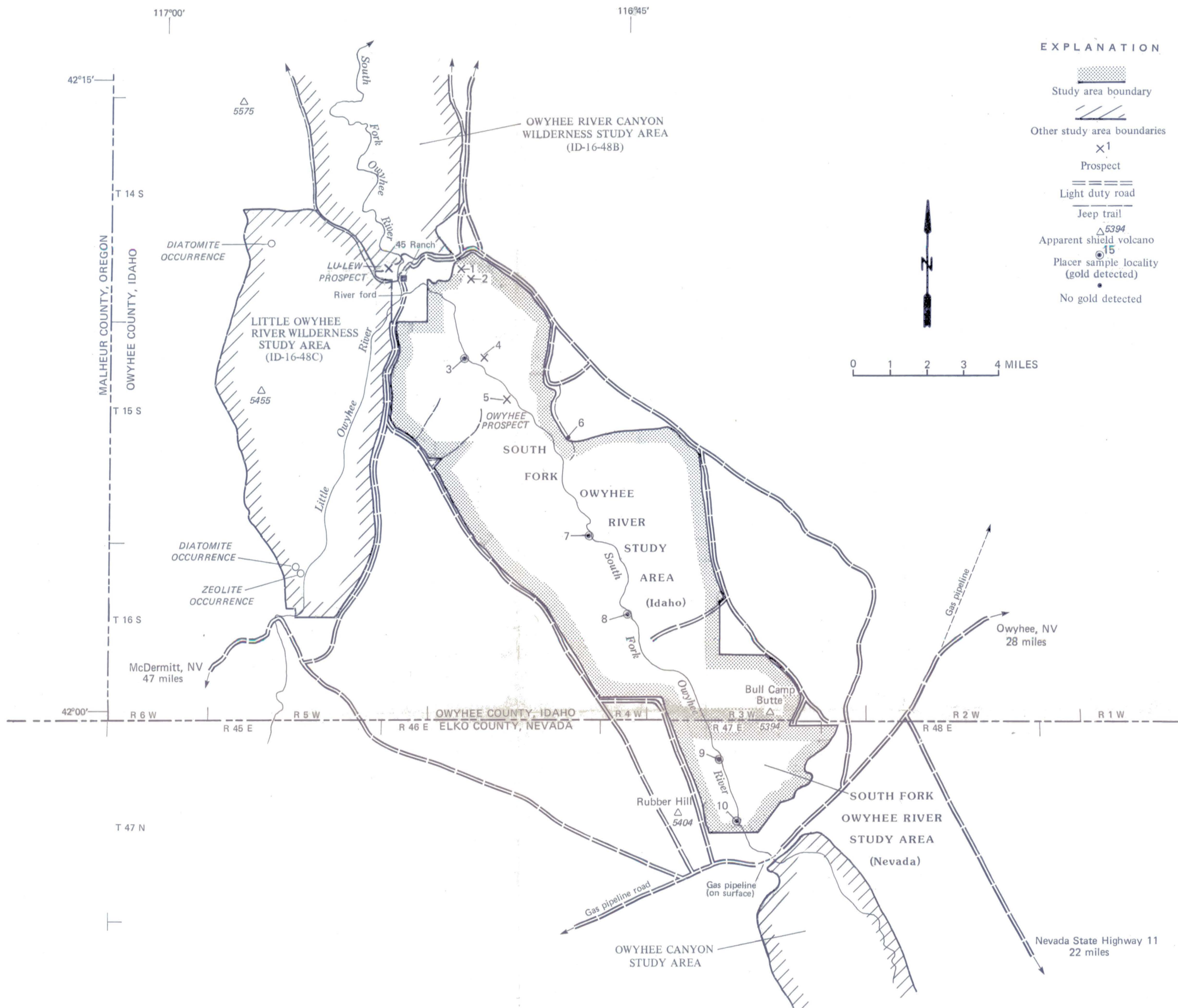


FIGURE 1. - Location of the South Fork Owyhee River study areas, Owyhee County, ID, and Elko County, NV



EXPLANATION









-  Study area boundary
-  Other study area boundaries
-  Prospect
-  Light duty road
-  Jeep trail
-  Apparent shield volcano
-  Placer sample locality (gold detected)
-  No gold detected

FIGURE 2. - Sample localities in and near the South Fork Owyhee River study areas, Owyhee County, ID, and Elko County, NV

resources were by Mathews and Blackburn (1983a, 1983b). Several reports on uranium potential were prepared for the Department of Energy, during their National Uranium Resource Evaluation (NURE) program, by Geodata International, Inc. (1980), Bendix Field Engineering, Corp. (1982), and Union Carbide Corp. (1982).

Present Study

The USBM study included library research and perusal of Owyhee County, ID; Elko County, NV; and BLM mining and mineral lease records. Bureau of Mines and other records were searched and pertinent data compiled. Field work involved searches for all prospects and claims indicated by pre-field studies to be within the study area and vicinity. Those found were examined and sampled. In addition, ground and aerial reconnaissance was done in areas of obvious rock alteration to check for possible mining-related activities.

During the field study, 25 rock, 4 alluvial (placer), and 10 soil samples were collected in the Idaho study area, and 10 placer samples were collected in the Nevada study area. Rock samples were of four types: 1) chip - a regular series of rock chips taken in a continuous line across a mineralized zone or other exposure; 2) random chip - an unsystematic series of chips taken from an exposure of apparently homogeneous rock; 3) grab - rock pieces taken unsystematically from a dump or of float (loose rock lying on the ground); and 4) select - pieces of rock chosen, generally, from the apparently best mineralized parts of a pile or exposure, or of any particular fraction (e.g. quartz, host rock), or of the best pieces of float. Placer samples were either: 1) reconnaissance - samples of surficial sand and gravel, generally one level 14-in. panful partially concentrated on site to check for presence of gold or other heavy minerals in placers, or 2) channel - a sample taken continuously down a cleaned, nearly vertical bank or pit wall and partially concentrated by panning. Soil samples were of red, limonite-stained, clayey soil at the prospects.

Rock samples were analyzed for gold and silver by fire-assay, for arsenic and antimony by atomic absorption, and for mercury by one of several methods. At least one sample from each locality was analyzed for 40 elements ^{2/} by semi-quantitative spectroscopy to detect unsuspected elements of possible significance. Petrographic examinations were performed to identify selected rock types, alteration suites, and mineral assemblages. Field concentrates of placer samples were further

^{2/} Aluminum, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, calcium, chromium, cobalt, columbium, copper, gallium, gold, iron, lanthanum, lead, lithium, magnesium, manganese, molybdenum, nickel, palladium, phosphorus, platinum, potassium, scandium, silicon, silver, sodium, strontium, tantalum, tellurium, tin, titanium, vanadium, yttrium, zinc, and zirconium.

concentrated on a laboratory-size Wilfley table. Resulting heavy mineral fractions were scanned with a binocular microscope to determine heavy mineral content. All gold detected, being fine particles, was recovered by amalgamation. Concentrates were also checked for radioactivity and fluorescence. Analyses are on file at the Western Field Operations Center, Spokane, WA.

ACKNOWLEDGEMENTS

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GEOLOGIC SETTING

The study areas are within the Owyhee Upland geologic subprovince of the Columbia-Snake River province, an extensive volcanic plateau. Exposed in the study areas are Miocene-age bimodal-volcanic rocks and lacustrine sediments.

In the Idaho study area, the oldest rocks are the Swisher Mountain Tuff, and locally, the lower lobes of the Juniper Mountain Tuff (Ekren and others, 1981). These rhyolitic rocks, composed of tuffs, ignimbrites, and vitrophyres, are exposed in the northern portion of the study area and in lower portions of the main canyon. Regionally, some of the tuffs have been altered by meteoric groundwater into zeolite-rich rocks (fig. 2) (Buehler and Capstick, 1985).

Units of Banbury Basalt are the only rocks exposed in the Nevada study area and the southern portion of the Idaho study area, except in the lower parts of the main canyon where they overlie rhyolitic rocks. In the northern portion of the Idaho study area, erosion remnants of units of Banbury Basalt overlie the rhyolitic rocks. The lower units are comprised of small, local basalt flows and extensive, unconsolidated, lacustrine sediments. Regionally, the sediments contain layers of diatomite (fig. 2) (Buehler and Capstick, 1985). The lower units are capped by Banbury Basalt (upper flows) which form the rims of the canyons. Some of the upper flows issued from apparent shield volcanoes in the region (fig. 2). The shield volcanoes have slopes of only a few degrees and rise only a few hundred feet above the surrounding terrain.

In the Idaho study area, along the lacustrine-sediment/rhyolitic-rock contact are silicified outcrops containing chalcedony 3/ and common opal 4/. Three sites examined in the study area, and the Lu-Lew Prospect

3/ Cryptocrystalline quartz.

4/ A hydrated, amorphous form of silica.

(fig. 2), contain silicified outcrops in the lower portion of the sediments or in the upper 30 ft of the rhyolitic rocks. Another site in the study area contains a silicified outcrop associated with a fault or crushed zone in the upper portion of the rhyolitic rocks. The minerals occur as botryoidal linings or fillings in vugs, fractures, or porous layers in the silicified outcrops. Several of the sites have outcrops of leached rhyolite and opaline material, and areas of bright red, limonite-stained, clayey soil adjacent to, or as haloes around, intermittent cold springs or seeps. The location of the silicified outcrops along or near the upper rhyolitic rock contact or in faults and crushed zones (obvious groundwater channelways) indicates that the silica was dissolved from the overlying permeable sediments, transported downward, and precipitated by cold meteoric water.

However, silicified outcrops can be indicators of disseminated precious metal deposits. This type of deposit is formed by hydrothermal fluids which commonly carry significant dissolved silica and possibly sulfur, gold, silver, and minor arsenic, antimony, mercury, thallium, and other minerals. The fluids, driven by a heat source at depth, rise along channelways to the surface where they issue from hot springs. Minerals in the fluids may precipitate or may replace existing rock to form ore deposits at the surface or at shallow depth in faults, fractures, breccia pipes, or permeable zones in the country host rock. Regionally, a number of these deposits occur in association with felsic (rhyolitic-dacitic) volcanic rocks similar to those in the Idaho study area. Faults in the area generally trend northwest to north and may be related to the extensional tectonism that created the Basin and Range Province in Nevada (Mathews and Blackburn, 1983a, p. II-9). Such faults can localize volcanic activity (providing heat sources) and act as channelways for mineralized fluids. Although the silicified outcrops show little evidence of having formed from hydrothermal fluids, samples from these outcrops were assayed for gold and silver, as well as arsenic, antimony, and mercury, to check for the possibility of disseminated precious metal deposits.

PROSPECTS AND MINERALIZED AREAS

The study areas and adjacent region have no history of mining other than minor, unrecorded production of chalcedony and opal-chalcedony laminates suitable for gemstones or mineral specimens 5/. All production came from properties in or adjacent to the northern portion of the Idaho study area. Of these, only the Lu-Lew prospect (fig. 2) is currently claimed. This prospect has probably produced several hundred dollars worth of material during the last several years. Thunder eggs (fist-size, sometimes hollow, spherical aggregations of chalcedony) prized as mineral specimens, are plentiful on the surface at the Lu-Lew prospect and account for part of the production from this property. Chalcedony and common opal may have been recovered from three prospects (fig. 2, nos. 1, 2, and 4) in the Idaho study area. Value of total production from loose surface rock or small pits is estimated at about \$100.

Two inactive claims, at the Owyhee prospect (fig. 2, no. 5), were found in the Idaho study area. This prospect contains minor amounts of chalcedony and common opal, but may have been located for precious metals.

The minerals at all the prospects are similar. The chalcedony is generally translucent and dull gray, milky white, or tan. The common opal is generally light tan and opaque. This lack of bright and interesting colors and patterns in the minerals limits their value and marketability.

5/ Chalcedony is a hard and durable mineral which may be stained by iron, manganese, or other minerals producing various attractive colors and patterns. Good quality material is commonly sold to rockshops or lapidary supply companies, generally for use as gemstones (typically for belt buckles, bolo-ties, bookends, and carvings), mineral specimens, or for resale to lapidary hobbyists. The value of the material is based on (1) ease of cutting and polishing; (2) amount of wasted material; (3) brightness, intensity, translucency, and variety of the colors and their patterns; (4) form, size, and finish of the completed jewelry or mineral specimens; and (5) fashion and demand.

Common opal is soft, brittle, and not rare. However, some of the opal found adjacent to the study area forms layers and fillings in vugs and fractures, and is interbedded with chalcedony. Where the resulting colors and patterns are attractive, the opaline laminate may have value.

Sand and gravel deposits along the South Fork Owyhee River and its tributaries were examined for gold and other heavy minerals (fig. 2, nos. 3, 6-10). Of 14 placer samples, 13 contained gold; values ranged from \$0.01-\$0.06/yd³ (dollar per cubic yard) in 12 samples, and was \$0.75/yd³ in the other (at a gold price of \$350/oz). The gold in each sample was very fine, and amalgamation was used to recover it. Placer and hardrock prospect data are summarized in table 1.

APPRAISAL OF MINERAL RESOURCES

No hardrock mineral occurrences were found in the Nevada study area.

In the Idaho study area, little of the chalcedony and common opal that was found in silicified outcrops or as float is suitable for gemstones or mineral specimens. Any better quality material that might occur would need to be selectively mined by hand. The material would probably be mined only on a recreational basis by hobbyists. There is no evidence at the prospects of genesis by epithermal systems that could have associated precious metals.

The source of the placer gold in sand and gravel deposits along the South Fork Owyhee River in both study areas could not be determined; it probably came from known gold-bearing areas at the head of the river in north central Nevada. The placer deposits are too small and low grade to be minable. The sand and gravel deposits are suitable for aggregate uses but cannot compete with larger deposits closer to markets.

Oil and gas leases or lease applications covered the study areas in 1984, but no resources have been identified.

TABLE 1.--Prospects and mineralized areas in and near the South Fork Owyhee River study areas

Map no. (fig. 2)	Name	Summary	Workings and production	Sample data
<u>Idaho study area</u>				
1	Unnamed prospect (sec. 30, T. 14 S., R. 4 W.).	A zone of deep-red soil, opaline material, and chalcedony about 100 ft wide trends about 200 ft north-northeast along the contact between altered rhyolite and lacustrine sediments; dip of the contact is unknown. About 300 ft northeast of the zone, a red hematite-stained circle of soil 5 ft across is probably an intermittent spring.	Two small pits.	One random chip, five grab, and four soil samples; no significant mineral values. Chalcedony and opal do not have attractive color or pattern.
2	Unnamed prospect (sec. 29, T. 14 S., R. 4 W.).	Four areas ranging from 0.5 to 2.5 acres contain chalcedony and common opal in altered rhyolite or float near the contact with lacustrine sediments. The soil at two of the areas is heavily hematite stained locally; one area contains a layer of silicified rhyolite as much as 18 ft thick, containing much common opal.	Two small pits.	Two chip, seven grab, and six soil samples; no significant mineral values. Chalcedony and opal do not have attractive color or pattern.
3	Alluvial sample locality (sec. 5, T. 15 S., R. 4 W.).	Gravel bar 2,500 ft long, up to 350 ft wide, and 6 ft thick composed of about 90% sand, silt, and clay and 10% pebbles derived from basalts, rhyolites, and lacustrine sediments.	None.	One pan sample contained \$0.04/yd ³ gold <u>1</u> / and a trace of cinnabar.
4	Unnamed prospect (sec. 5, T. 15 S., R. 4 W.).	Red rhyolite exposed along northwest rim of the South Fork Owyhee River Canyon. Exposure is at least 2,000 ft long, up to 30 ft thick, and 500 ft wide to where it is covered by lacustrine sediments. The rhyolite has been silicified and contains numerous quartz veinlets and vugs, fractures, and layers filled with chalcedony and common opal. Trend of rhyolite is northwest, generally parallel to canyon rim, and dip is low to the northeast. A vertical, northeast-trending fault zone about 10 ft thick crosses the exposure.	One small pit.	Two chip and six random chip samples; no significant mineral values. Chalcedony and opal do not have attractive color or pattern.

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