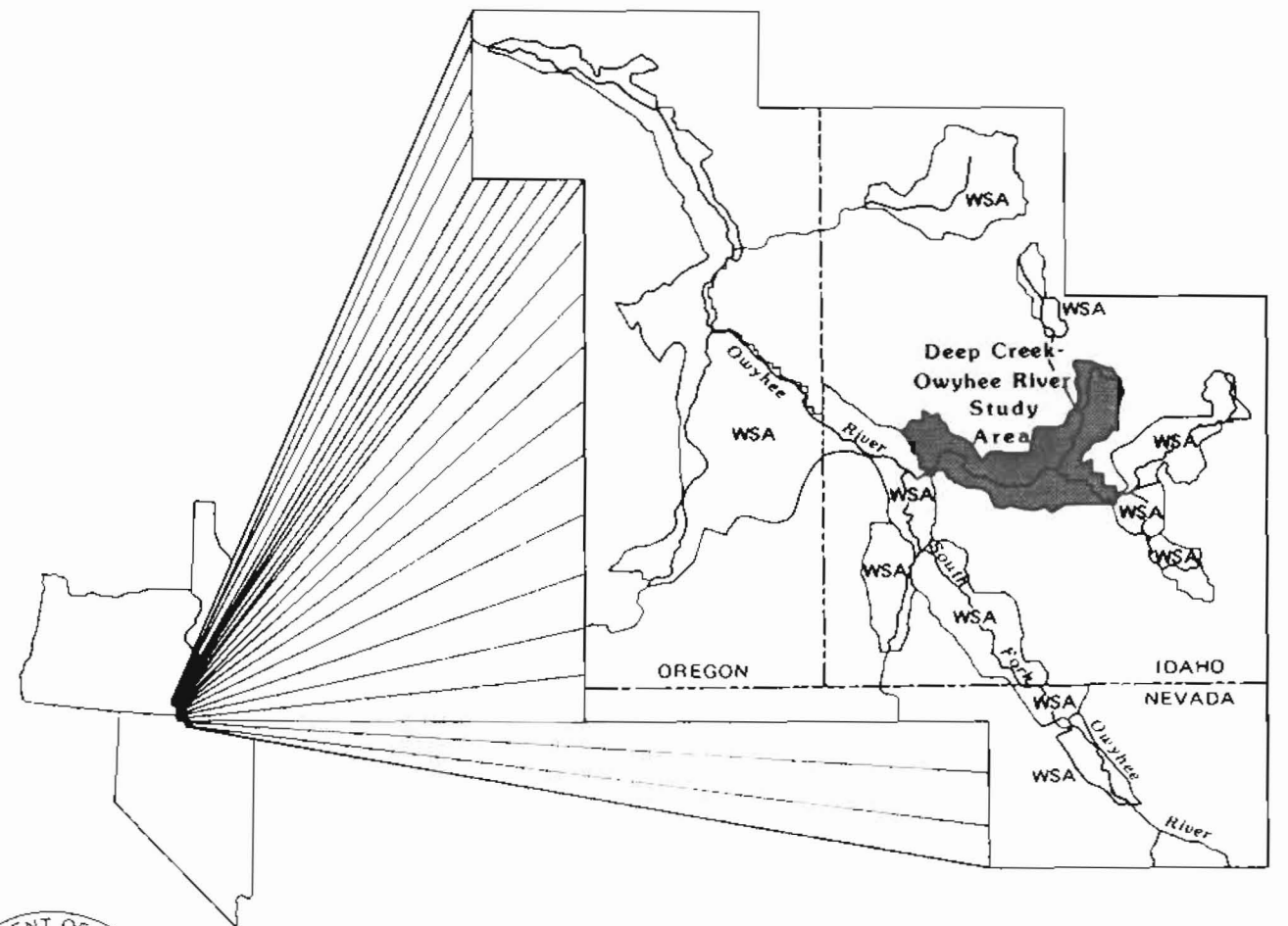
MLA 54-85

Bureau of Mines Mineral Land Assessment/1985
Open File Report

Mineral Resources of the Deep Creek-Owyhee River Study Area, Owyhee County, Idaho



BUREAU OF MINES

UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL RESOURCES OF THE DEEP CREEK-OWYHEE RIVER STUDY AREA, OWYHEE COUNTY, IDAHO

By
Donald O. Capstick and Alan R. Buenler

Western Field Operations Center
Spokane, Washington

UNITED STATES DEPARTMENT OF THE INTERIOR
Donald P. Hodel, Secretary

BUREAU OF MINES
Robert C. Horton, Director

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 a portion of the Deep Creek-Owyhee River Wilderness Study Area (ID-16-49A), Owyhee County, ID.

This open file report will be summarized in a joint report published by the 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.

CONTENTS

ILLUSTRATIONS

SUMMARY

A mineral survey of a 67,400-acre portion of the Deep Creek-Owyhee River Wilderness Study Area (WSA) in southwest Idaho was conducted by the U.S. Bureau of Mines in 1984. No mineral resources were identified.

Regionally, diatomaceous earth occurs in lacustrine (lake) sediments. A deposit just outside the northeast boundary and possibly extending into the study area was examined. The property, containing over 4 million tons of diatomite, has been inactive since a few tons were produced in the mid-1930's. GREFCO of Los Angeles, CA, is the present holder of this deposit (BH 1-12 claim group).

Silicified rhyolite containing jasper, chalcedony, and common opal is abundant, but those minerals would be of interest only to hobbyists. The White Point Prospect at the study area's southwestern boundary has intermittently produced minor amounts of these materials.

Volcanic rocks that may be used as dimension stone occur in the study area but do not have unique properties that would make them preferable to other more-accessible deposits closer to markets. Small sand and gravel deposits are limited but might have minor local uses.

Minor placer gold was detected, as is common in the Owyhee River canyonlands; no other significant heavy minerals were found in samples from the sand and gravel deposits.

Oil and gas leases or applications cover the northeast portion and part of the area south of the Owyhee River in the study area; no energy resources are known, although there may have been geophysical activity associated with the leasing.

INTRODUCTION

A mineral survey of part of the Deep Creek-Owyhee River Wilderness Study Area (WSA) 1/ was conducted by the U.S. Bureau of Mines (USBM) and the U.S. Geological Survey (USGS) at the request of the U.S. Bureau of Land Management (BLM). Bureau of Mines personnel researched the mining and mineral exploration history, and evaluated mines, prospects, and mineralized areas within or adjacent to the study area. The USGS studied the area by regional geochemical and geophysical surveys and geologic mapping. Results of the investigations will be summarized in a joint report to assist in determining the suitability of the study area for inclusion into the National Wilderness Preservation System. Although the immediate goal of this and other mineral surveys is to provide data for the President, Congress, government agencies, and the public for

---

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).

land-use decisions, the long-term objective is to insure that the Nation has an adequate and dependable supply of minerals at reasonable cost.

Setting

The Deep Creek-Owyhee River study area's is in southwestern Idaho (fig. 1). It encompasses 30 miles of the Owyhee River, 14 miles of Deep Creek to its confluence with the river, and 12 miles of Dickshooter Creek to its confluence with Deep Creek; included are the canyons and between 1 and 3 miles of adjacent uplands (fig. 2). The area contains 67,400 acres of federal lands administered by the Boise District Office of the Bureau of Land Management. The study area's center is about 106 miles south-southwest of Boise, ID, and 112 miles north-northwest of Elko, NV.

Access to the study area's southeastern portion from Riddle, ID, is westerly about 30 miles by good dirt road, then by poor dirt roads that intercept or bound the southern and eastern sides of the study area. The north-central portion can be reached by traveling about 60 miles south and then southeast by dirt road from Jordan Valley, OR. Other rough, dirt roads provide access to the northern and western portions. Alternate access to the study area southern portion from Jordan Valley during the drier parts of the year is by fording the river along the western boundary at Crutcher Crossing.

The Deep Creek-Owyhee River WSA (ID-16-49A) is adjacent to three other WSAs (fig. 2) which were studied concurrently: Battle Creek WSA (ID-16-49E) to the east (Winters, 1985); Owyhee River Canyon WSA (ID-16-48B) to the west (Gabby and Mayerle, 1985); and Yatahoney Creek WSA (ID-16-49D) to the southeast (Leszcykowski, 1985).

The WSAs are within the Owyhee Uplands, an uplifted volcanic region and part of the Columbia-Snake River Plateau. The terrain in the Deep Creek-Owyhee River WSA is flat to gently rolling, with an average elevation of about 5,200 ft except where river and creeks have cut deep canyons. Relief from the canyon rim, which in many places is precipitous, to the river typically ranges from about 300 to 800 ft, although 1,000 ft near-vertical drops can be found.

The maximum elevation in the study area, about 5,455 ft, is just southeast from a high point called Lambert (5,624 ft) on Lambert Table in the north-central portion. Lambert is one of what appears to be several shield volcanoes in the region, with slopes of only a few degrees and which rise only a few hundred feet above the surrounding terrain. As a consequence of the subdued topography, on-the-ground identification of these volcanoes and other plateau features from topographic maps is difficult. The lowest point in the study area, about 4,260 ft, is on the Owyhee River at the western boundary.

With the exception of the relatively heavy juniper canopy on Juniper Mountain near the study area's northwestern border, only sagebrush, desert grasses, and a few scattered juniper trees grow in the area. The average annual precipitation is less than 10 in. per year, with virtually all of it falling between October and April, much of it as snow. Summer

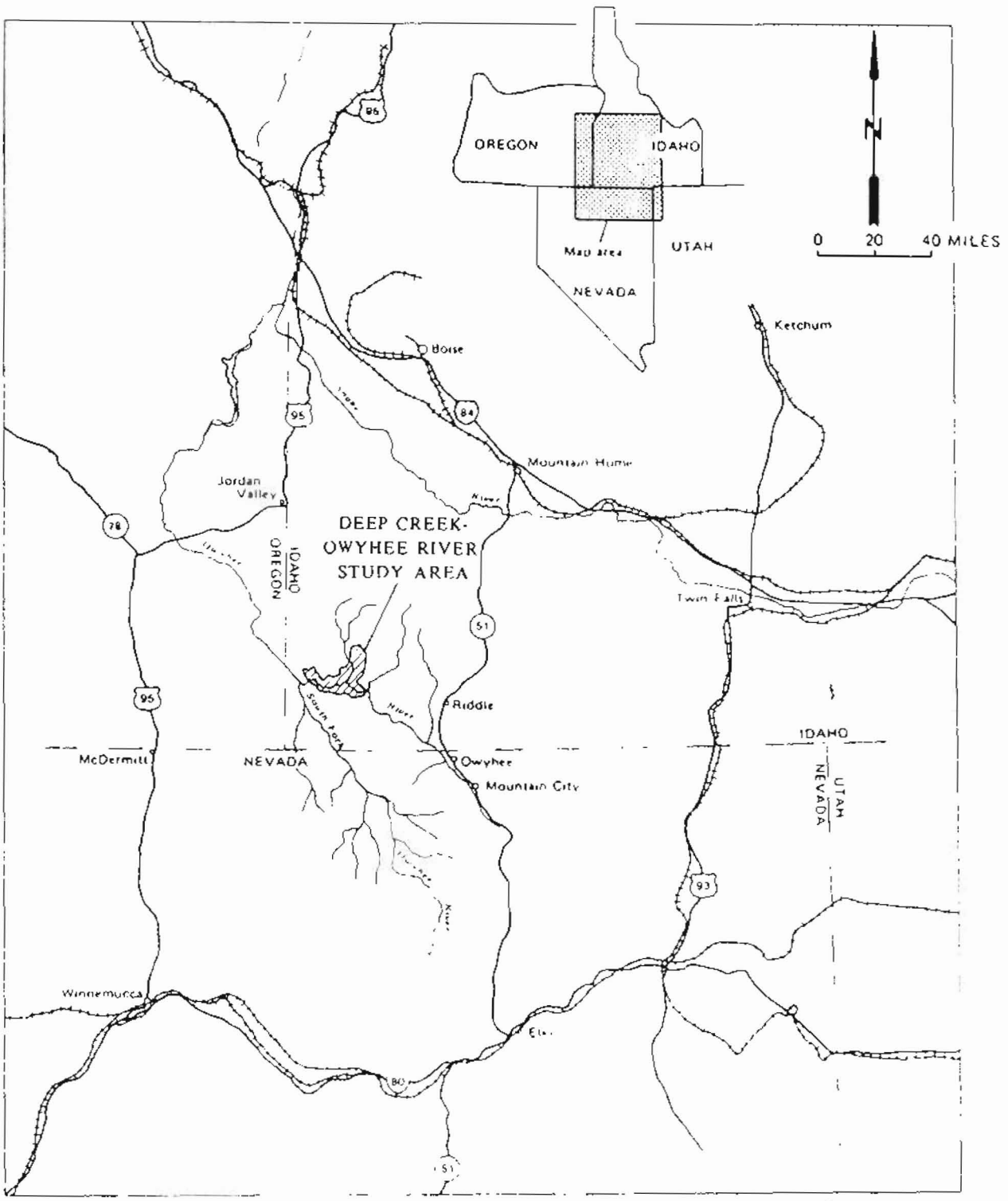


FIGURE 1. – Location map of the Deep Creek-Owyhee River study area, Idaho

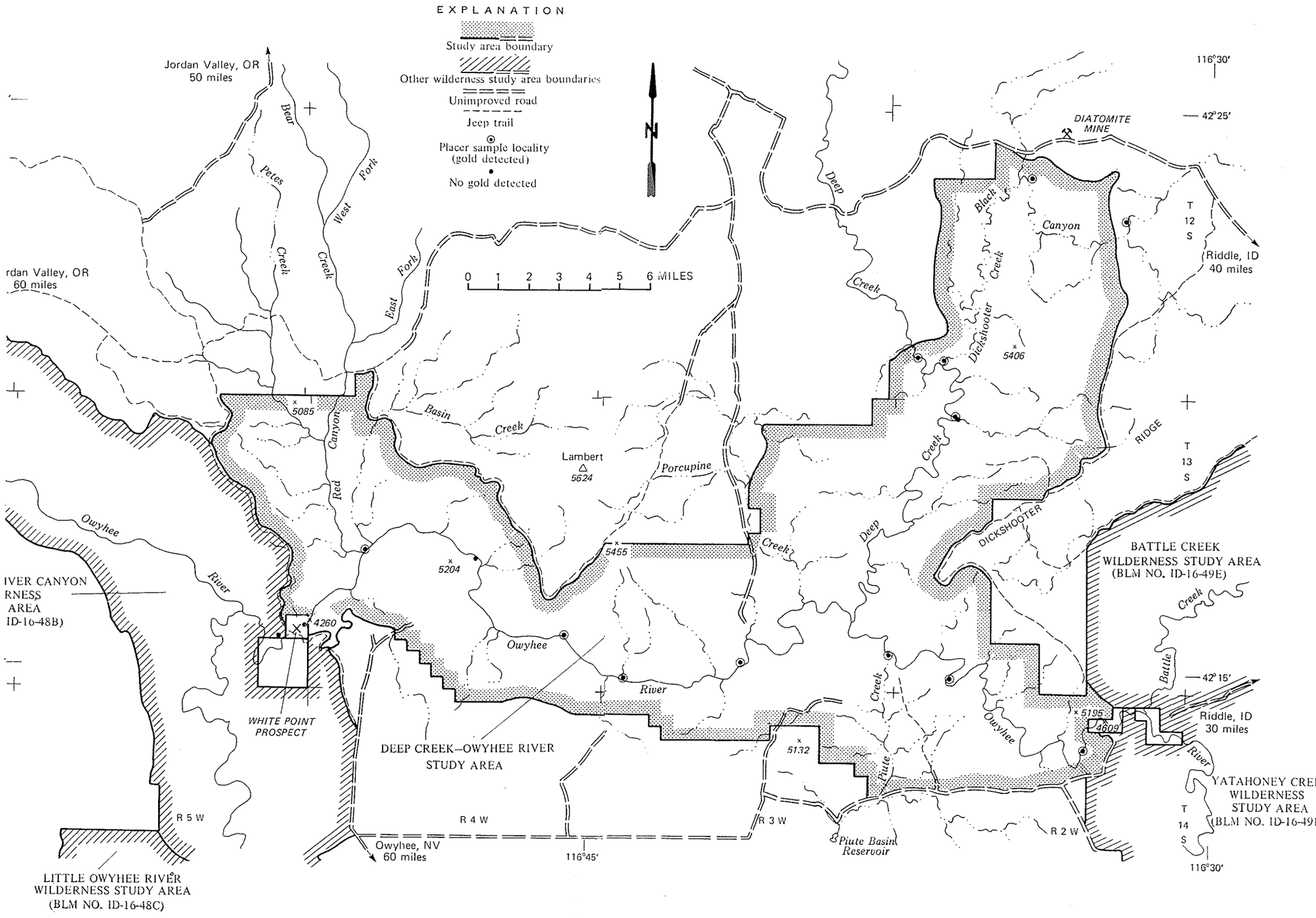


FIGURE 2. – Mines, prospects, and mineralized areas in and adjacent to the Deep Creek-Owyhee River study area

months are hot, and temperatures can often exceed 100 degrees, accompanied by brief cooling associated with isolated thundershowers.

Previous Studies

There have been few geological studies done in the general vicinity of the study area. Most were regional investigations or site specific for distant mineral-producing areas. Studies of the area's geology include those by Hope and Coats (1976), Ekren and others (1981 and 1984), and Bonnichsen and Breckenridge (1982). Studies of the geology, energy, and mineral (GEM) resources were done by Mathews and Blackburn (1983). Reports on uranium potential for lands which include the study area were prepared by Geodata International, Inc. (1980); Bendix Field Engineering Corp. (1982); and Union Carbide Corp. (1982) for the Department of Energy during their National Uranium Resource Evaluation (NURE) program. A previous USBM investigation of the Owyhee River's mineral resources was prepared by Richard Morris in 1976 as an unpublished Wild and Scenic Rivers report. Derby (1981) prepared a BLM management report on the area; Powers (1955?) authored reports on diatomites; Elevatorski (1975) mentions the former diatomite producer, which is just outside the study area's northeast tip; and Silberman (1981?) authored a report on hot springs deposits.

Present Study

Bureau of Mines pre-field, field, and report preparation phases were conducted in 1984 and 1985. Pre-field studies included literature research and examination of Owyhee County and BLM mining and mineral lease records. Bureau of Mines production records were searched and pertinent data compiled. The pre-field search indicated that, with the exception of minor diatomite production just outside the study area's northeast border, little mineral-related activity had occurred inside or near the study area.

During the field-work phase, the diatomite mine and prospects near the area were sampled to establish guides for evaluating diatomaceous sediments in the study area. Elsewhere, areas of obvious rock alteration were searched for evidence of prospecting activity that may not have been recorded. Reconnaissance pan sampling was conducted along the Owyhee River, Deep, and Dickshooter Creeks, and a few of their tributaries to test for placer gold and other heavy minerals.

Samples collected at prospects and at rock and alluvial (possibly placer) localities included 60 of rock, 10 of possible diatomaceous material, and 19 of placer. 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 -- included in this category are the bulk diatomite samples; 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 mine dump, stock pile or exposure, or of any particular fraction (e.g. host rock) or the best

pieces of float. Placer samples were reconnaissance - samples of surficial sand and gravel, generally one level 14-in. panful often partially concentrated on site to check for presence of gold or other heavy minerals in sand and gravel accumulations.

All rock samples were analyzed for gold and silver by fire-assay, for arsenic and antimony by atomic absorption, and for mercury by a special method dependent upon suspected percentage. At least one sample from each locality was analyzed for 40 elements 2/ by semi-quantitative methods 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 concentrated on a laboratory-size Wilfley table. Resulting heavy mineral fractions were scanned with a binocular microscope to determine heavy mineral content; when gold was observed, larger particles were hand-picked and weighed along with fine gold recovered by subsequent amalgamation. Concentrates were also checked for radioactivity and fluorescence.

ACKNOWLEDGEMENTS

The authors are grateful to Tom Seiner, BLM range conservationist, who provided aerial photographs and much useful data, and to John Benedict, BLM outdoor recreational planner, who guided a raft trip down the Owyhee River. Peter N. Gabby and Ronald T. Mayerle of the USBM did the field investigation and contributed to that portion of this report regarding the White Point Prospect.

GEOLOGIC SETTING

The Deep Creek-Owyhee River study area is within the Owyhee Upland geologic subprovince of the Columbia-Snake River province, an extensive volcanic plateau. Rocks exposed in the study area are primarily Miocene, bimodal basalt and rhyolite volcanic rocks (Mathews and Blackburn, 1983, p. 6) with interbedded sediments. Uplift has resulted in a deeply incised river and tributaries. At what appear to be volcanic vents dissected by stream incision, there has been severe brecciation. Field observations also suggested many areas of possible fault brecciation throughout the area. No prospecting evidence was found at these locales. At other such volcanic centers in the United States, vents and faults have been found to sometimes provide conduits for mineral-rich fluids or to act as receptacles for mineral deposition (Eimon and Anctil, 1981, p. 1-17; Rytuba and Glanzman, 1979, p. 109-117; and U.S. Geological Survey and Society of Economic Geologists, 1980, p. 52-135).

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

The oldest rocks, exposed mainly in the lower portions of the Owyhee River canyon, are rhyolitic tuffs and vitrophyres of the Badlands Formation, presently considered part of the Juniper Mountain volcanics (Ekren and others, 1981, map). The younger tuff of Little Jacks Creek Formation is exposed in drainages of Deep Creek and Dickshooter Creek. Regionally, these and other tuffs have been altered by hydrothermal fluids and/or meteoric groundwater (Glanzman and Rytuba, 1979, p. 1-3) into zeolite-rich rock 3/. The rhyolitic rocks are overlain extensively by lacustrine (lake) sediments, which locally contain layers of diatomaceous earth. Banbury Basalt overlies the other rocks and forms the rims of canyons.

Silicified outcrops containing jasper, chalcedony, and common opal were found in the study area along the sediment-rhyolite contact, in faults and crushed zones, and within the diatomites.

Alluvial occurrences that may contain placer deposits are primarily found in the active stream and river flood plains of present day drainages. The sand and gravel is in scattered bars and is limited in volume.

Linear faults or probable faults in the area generally trend northwest to north. They have similar attitudinal characteristics as those faults produced by the extensional tectonism that created the Basin and Range Province in Nevada (Mathews and Blackburn, 1983, p. 7-8).

MINES, PROSPECTS, AND MINERALIZED AREAS

The Deep Creek-Owyhee River study area has no history of mining inside its boundaries. However, one of Idaho's largest diatomite deposits (Staley, 1964, p. 74) is just outside the area's northeast tip (fig. 2). It produced a "few" tons, probably in the mid-1930's (Powers, 1947, p. 20). The early mining claim history at the property, when the production occurred, is not known.

The White Lava Claim Group was located and amended in 1938-1939, and the Owyhee Processing Company was formed in the late 1930's to expand development of the deposit; no production was reported. Claims covering the deposit are presently known as the BH 1-12 group and are held by GREFCO of Los Angeles, CA, a producer of diatomite-related products.

The diatomaceous earth, also reported as a fuller's earth or clay deposit (Derby, 1981), occurs in a lenticular basin cut in Little Jacks Creek Tuff and overlain by 10 to 20 ft of Banbury Basalt. This freshwater deposit is 1,000 ft north-south by 2,000 ft east-west and has a maximum thickness of 150 ft in the center. It contains an estimated 4.2 million tons of material (Staley, 1964, p. 79) and, in 1947, was Idaho's best "reserve" (Powers, 1947, p. 3) due to its size and absence of much commonly interbedded impurities such as ash and clay. Production

---

3/ Zeolite occurrences were studied in another WSA about 5 miles to the southwest (Buehler and Capstick, 1985).

from this deposit was used for cement admixture, polish, insulation, and filter media (Powers, 1947, p. 20). Another report (Elevatorski, 1975, p. 49) indicates the material was used for "filter aids, pozzolan [cement admixture], and insulation".

The workings at the deposit consist of numerous pits, as well as backhoe and dozer trenches. A 15-ft adit was driven below the basalt into the talus and slopewash. There is a large pit near the main access road, as is a small metal building. Thirteen bulk or chip samples of diatomaceous material were taken in the area of the main workings. Preliminary screening by microscope determined that three of the samples were primarily ash and clay, thus not submitted for further quality tests. Of the 10 remaining diatomite samples, five placed in the highest (best) industrial uses category; the others were determined non-suitable. The three deleted samples were submitted with 24 other non-diatomite samples for assay; they contained no significant mineral values.

Also noted at the GREFCO diatomite deposit was an apparent association of: (1) what may be or have been (intermittent?) low-temperature hot springs; (2) individual mounds up to several tens of feet in diameter, rising several feet above the usual surface level, and centered about or found near the old hot springs; and, (3) pieces of loose rock (float) spreading from the mounds and consisting of opal chips and small, fossilized pieces of animal and plant remains. (This relationship was successfully used as a means of searching for other diatomite occurrences in the study area.)

Two small diatomite occurrences were found within the study area, just south of the production area. One was on the opposite side of the drainage from the past-producing deposit and is probably an isolated erosional remnant of it. The second is situated several miles to the south, and it is also probably an errosional remnant. The small size of the two occurrences did not warrant their sampling.

There has been minor, non-recorded production of jasper, chalcedony, common opal 4/, and thunder eggs 5/ suitable for lapidary or specimen purposes in or near the western part of the study area (Darlene Swisher, personal communication, 1985). All or most would have come from the White Point Prospect (fig. 2) at Crutcher Crossing.

APPRAISAL OF MINERAL RESOURCES

One of Idaho's major diatomite deposits occurs just outside the study area's northeast boundary but does not appear to significantly extend into it. Two other occurrences of diatomite in the study area are too small to be of economic importance.

Silicified animal and plant remains of possible specimen value are associated with probable, and possibly still intermittently active, low-temperature hot springs found at the main diatomite deposit. Neither this site nor other possible hot springs locales within the study area exhibit any physical evidence of having been explored for epithermal-type base or precious metal deposits.

Jasper, chalcedony, common opal, and thunder eggs from the intermittently active White Point Prospect in the southwestern corner of the study area has been used for lapidary and/or mineral specimen purposes; other locales in the area may have occurrences. These materials can be mined only on a recreational basis by hobbyists.

Regionally, zeolite occurs in altered rhyolites; none of significance was found in the study area.

Minor placer gold (less than 2 cents per cubic yard), typical of the Owyhee River canyonlands was found in 12 of the 19 placer samples from

---

4/ Jasper and chalcedony are hard and durable cryptocrystalline quartz minerals which may be stained by iron, manganese, etc. in pleasing colors and patterns. Good quality material is commonly sold to rockshops or to lapidary supply companies, generally for use as settings in belt buckles, bolo-ties, as bookends, carvings, etc., as mineral specimens, or most commonly, for resale to lapidary hobbyists. The value of the material is based on the ease of cutting and polishing; the amount of discarded material; the brightness, intensity, transcluscency, and uniqueness of the colors and their patterns; the form, size, and finish of the completed jewelry or mineral specimens; and fashion and demand. Common opal is a hydrous and amorphous form of quartz; it is relatively soft and brittle. In the WSA, it forms bands and fillings in vugs and fractures in conjunction with the jasper and chalcedony, and if of good color, is of value as an intrinsic part of these minerals.

5/ Thunder eggs are hollow, spherical aggregations of chalcedony that have weathered out of bedrock, usually as fist-size pieces, and are prized as lapidary and mineral specimens if they display attractive patterns when cut and polished.

sand and gravel deposits in the study area (fig. 2). No other significant heavy minerals were found in the samples.

Volcanic rocks that may be used as dimension stone occur in the study area, but do not have unique properties that would make them preferable to other more accessible deposits closer to major markets. Sand and gravel deposits are scattered and limited in volume, but might have minor local construction uses.

Oil and gas leases or applications cover the northeast portion of the study area and part of the area south of the Owyhee River. There may have been geophysical prospecting activity associated with the leasing.

REFERENCES

Bendix Field Engineering Corp., 1982, National Uranium Resource Evaluation (NURE), Jordan Valley Quadrangle, Idaho and Oregon (contract DE-AC07-76GJ01664): U.S. Geological Survey Open-File Report No. PGJ/F-132(82), 33 p.

Bonnichsen, Bill, and Breckenridge, R. M., eds., 1982, Cenozoic geology of Idaho: Idaho Bureau of Mines and Geology Bulletin 26, 725 p.

Buenler, A. R., and Capstick, D. O., 1985, Mineral resources of the Little Owyhee River Wilderness Study Area, Owyhee County, Idaho: U.S. Bureau of Mines Open File Report, in preparation.

Derby, Gloria, 1981, Owyhee Resource Area (Garat and '45'): unpublished Bureau of Land Management wilderness management situation supplemental, Boise District Office, Boise, ID., 7 p.

Eimon, P. I., and Anctil, R. J., 1981, Epithermal precious metals deposits: presentation given at Northwest Mining Association, 87th Annual Convention, Spokane, WA, 17 p. and 7 maps.

Ekren, E. B., McIntyre, D. H., Bennett, E. H., and Malde, H. E., 1981, Geologic map of Owyhee County, Idaho, west of longitude 116 degrees W: U.S. Geological Survey Miscellaneous Investigations Map I-1256, scale 1:125,000, 2 sheets.

Ekren, E. B., McIntyre, D. H., and Bennett, E. H., 1984, High-temperature, large-volume, lavalike ash-flow tuffs without calderas in southwestern Idaho: U.S. Geological Survey Professional Paper 1272, 76 p.

Elevatorski, E. A., 1975, Idaho Industrial Minerals: MINOBRAS, 55 p.

Gabby, P. N., and Mayerle, R. T., 1985, Mineral resources of the Owyhee River Canyon Wilderness Study Area, Owyhee County, Idaho: U.S. Bureau of Mines Open File Report, in preparation.

Geodata International, Inc., 1980, Aerial radiometric and magnetic survey, National Topographic Map, Jordan Valley, Oregon and Idaho (subcontract 79-7336-S): U.S. Geological Survey Open-File Report No. GJBX-95(80), 192 p.

Glanzman, R. K., and Rytuba, J. J., 1979, Zeolite-clay mineral zonation of volcanoclastic sediments within the McDermitt Caldera complex of Nevada and Oregon: U.S. Geological Survey Open-File Report 79-1668, 25p.

Hope, R. A., and Coats, R. R., 1976, Preliminary geologic map of Elko County, Nevada: U.S. Geological Survey Open-File Report 76-779, scale 1:100,000, 6 sheets.

Leszcykowski, A. M., 1985, Mineral resources of the Yatahoney Creek Wilderness Study Area, Owyhee County, Idaho: U.S. Bureau of Mines Open File Report, in preparation.

Mathews, G. W., and Blackburn, W. H., 1983, Assessment of geology, energy, and mineral (GEM) resources, Owyhee River GEM Resource Area (GRA ID-010-11), Owyhee County, Idaho: Prepared under U.S. Bureau of Land Management contract YA-553-CT2-1042 by TERRADATA, Lakewood, Colorado, 37 p.

Powers, H. A., 1947, Diatomite deposits of southwestern Idaho: Idaho Bureau of Mines and Geology Report 4, 27 p.

_____, 1955(?), Diatomaceous deposits of Idaho and the Pacific Northwest: Publication source unknown; copy on file at U.S. Bureau of Mines, Western Field Operations Center, Spokane, WA.

Rytuba, J. J., and Glanzman, R. K., 1979, Relation of mercury, uranium, and lithium deposits to the McDermitt Caldera Complex, Nevada-Oregon: Nevada Bureau of Mines and Geology, Report 33, p. 109-117.

Silberman, M. L., 1981(?), Hot-spring type, large tonnage, low-grade gold deposits: Publication source unknown; copy on file at U.S. Bureau of Mines, Western Field Operations Center, Spokane, WA.

Staley, W. W., 1964, Diatomite in Mineral and water resources of Idaho: Idaho Bureau of Mines and Geology Special Report 1, p. 74-79.

Union Carbide Corp., 1982, Hydrogeochemical and stream sediment reconnaissance basic data for Adel, Jordan Valley, and Twin Falls, Oregon and Idaho (contract W-7405 eng 26): U.S. Geological Survey Open-File Report No. GJBX-170(82), 70 p.

U.S. Geological Survey and Society of Economic Geologists, 1980, various articles in Field trip guide to epithermal precious metal deposits of northern Nevada, p. 52-135.

Winters, R. A., 1985, Mineral resources of the Battle Creek Wilderness Study Area, Owyhee County, Idaho: U.S. Bureau of Mines Open File Report, in preparation.