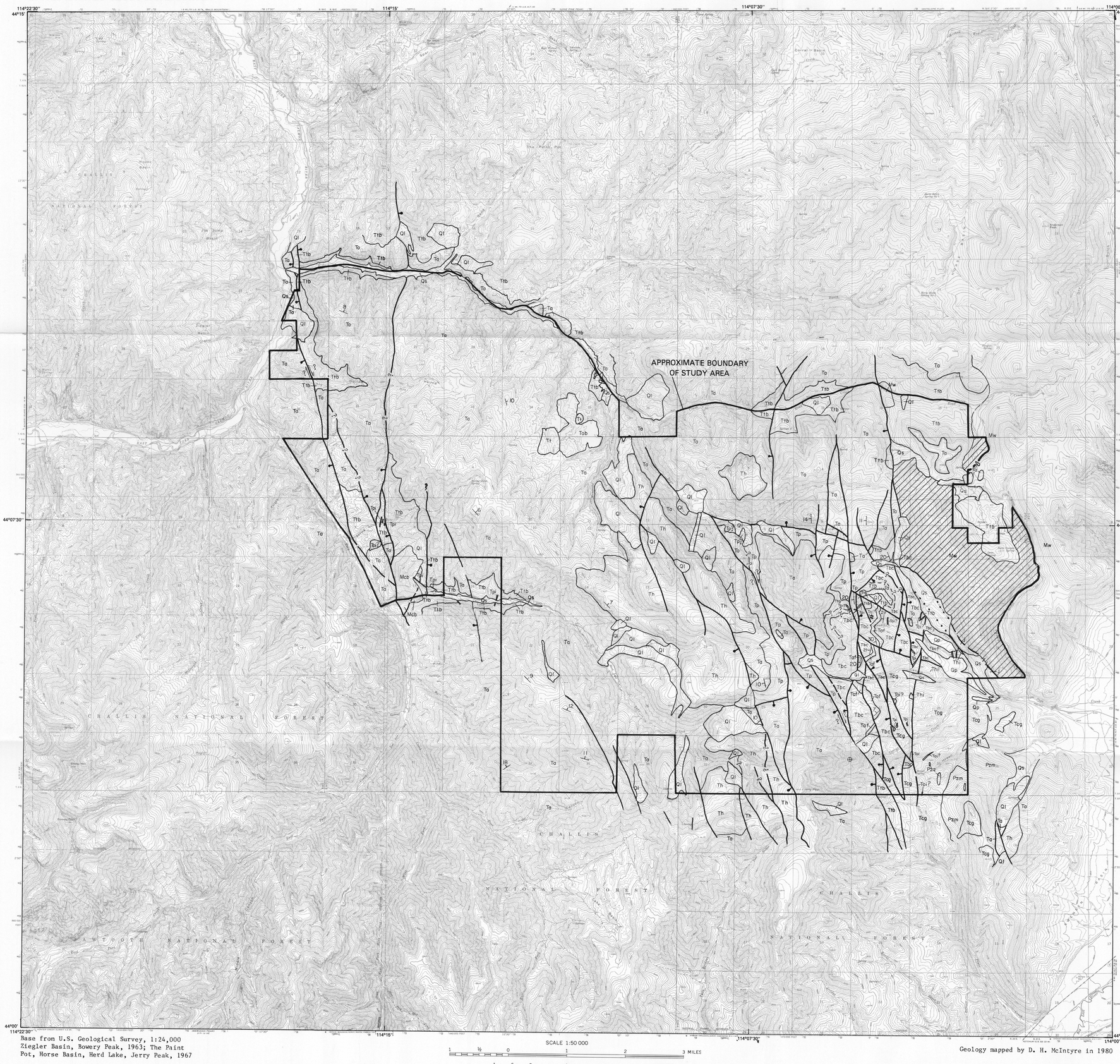


Base from U.S. Geological Survey, 1:24,000
Ziegler Basin, Bowery Peak, 1963; The Paint Pot, Horse Basin, Herd Lake, Jerry Peak, 1967

SCALE 1:50 000

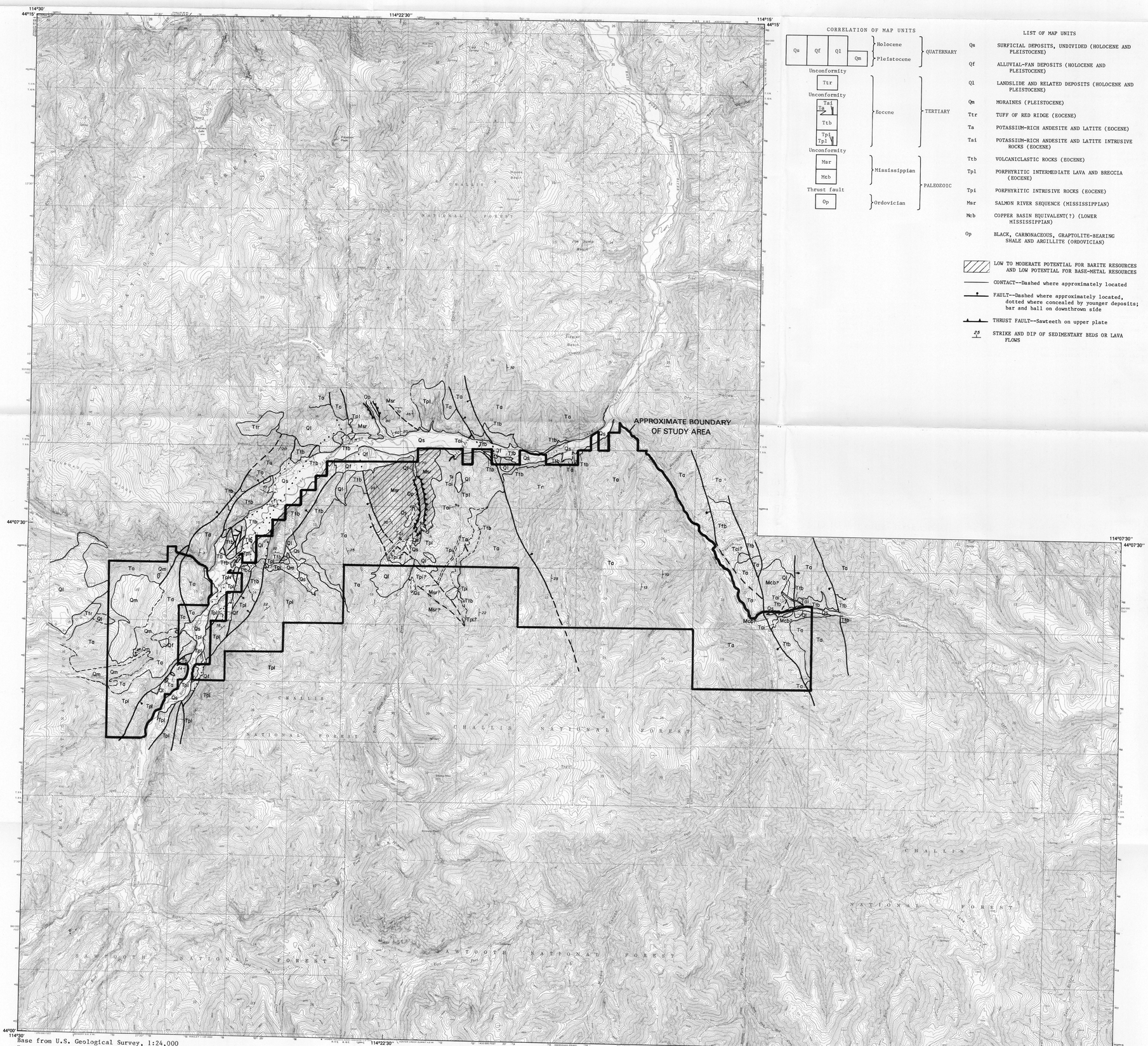
1 ½ 0 1 2 3 MILES

1 .5 0 1 2 3 KILOMETERS

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Geology mapped by D. H. McIntyre in 1980

MAP A.-MINERAL RESOURCE POTENTIAL OF THE JERRY PEAK WILDERNESS STUDY AREA



Base from U.S. Geological Survey, 1:24,000
Potaman Peak, Bowery Creek, Ziegler Basin, Bowery Peak, 1963; Herd Lake, 1967

SCALE 1:50 000

1 ½ 0 1 2 3 MILES

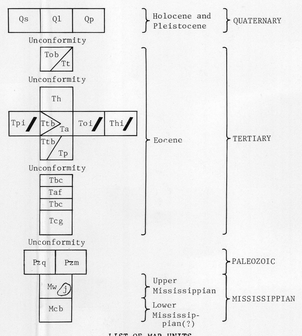
1 .5 0 1 2 3 KILOMETERS

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Quaternary and Tertiary geology mapped by D. H. McIntyre in 1981; pre-Tertiary geology mapped by S. W. Hobbs in 1980

MAP B.-MINERAL RESOURCE POTENTIAL OF THE JERRY PEAK WEST AND BOULDER CREEK WILDERNESS STUDY AREAS

CORRELATION OF MAP UNITS



LIST OF MAP UNITS

Qs	SURFICIAL DEPOSITS, UNDIVIDED (HOLOCENE AND PLEISTOCENE)
Ql	LANDSLIDES AND RELATED DEPOSITS (HOLOCENE AND PLEISTOCENE)
Qp	PEDIMENT GRAVELS (HOLOCENE AND PLEISTOCENE)
Tob	OLIVINE-BEARING MAFIC LAVA (EOCENE)
Tt	VOLCANIC MUDSTONE (EOCENE)
Th	TUFF OF HERD LAKE (EOCENE)
Ttb	VOLCANICLASTIC ROCKS (EOCENE)
Ta	POTASSIUM-RICH ANDESITE AND LATITE (EOCENE)
Tp	NEAR-VENT PYROCLASTIC ROCKS (EOCENE)
Tbc	ASH-FLOW TUFFS AND ASSOCIATED VOLCANOGENIC SEDIMENTARY ROCKS (EOCENE)
Taf	Dacitic ash-flow tuff
Tcg	CONGLOMERATE (EOCENE)
	INTRUSIVE ROCKS (EOCENE)
Tpi	Intrusions in which pyroxene, chiefly clinopyroxene, is the dominant mafic phenocryst mineral
Toi	Intrusions containing prominent olivine phenocrysts
Thi	Intrusions containing prominent hornblende phenocrysts
Pzq	QUARTZITE (PALEOZOIC)
Pzm	MUDSTONE (PALEOZOIC)
Mw	WHITE KNOB LIMESTONE (UPPER MISSISSIPPIAN)--Jasperoid (j) has developed on some areas of in White Knob Limestone
Mcb	COPPER BASIN EQUIVALENT(?) (LOWER MISSISSIPPIAN)

LOW TO MODERATE POTENTIAL FOR BARITE RESOURCES

CONTACT--Queried where uncertain

FAULT--Dashed where approximately located, queried where uncertain, dotted where concealed, bar and ball on downthrown side; queried half arrow show sense of inferred strike-slip motion

STRIKE AND DIP OF SEDIMENTARY BEDS AND LAVA FLOWS

25 Inclined

Horizontal

X PROSPECT

Studies Related to Wilderness

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of the Jerry Peak, Jerry Peak West, and Boulder Creek Wilderness Study Areas, Custer County, Idaho.

MINERAL-RESOURCE POTENTIAL SUMMARY STATEMENT

The U.S. Geological Survey and the U.S. Bureau of Mines made a geological and mineral survey of the Jerry Peak, Jerry Peak West, and Boulder Creek Wilderness Study Areas, Custer County, Idaho, from 1980 through 1983.

The area is underlain chiefly by lavas and pyroclastic rocks of the Eocene Challis Volcanics. Paleozoic sedimentary rocks are exposed along the east border of the Jerry Peak Wilderness Study Area and in two small areas farther west in the Jerry Peak and Jerry Peak West Wilderness Study Areas. All the rocks locally are intricately faulted. No veins or pervasive hydrothermal alteration are associated with these faults.

A low to moderate mineral resource potential for barite resources associated with Paleozoic sedimentary rocks is assigned to the easternmost part of the Jerry Peak Wilderness Study Area and part of the Jerry Peak West Wilderness Study Area. A low potential for base-metal resources is assigned to the part of the Jerry Peak West Wilderness Study Area underlain by Paleozoic sedimentary rocks. Potential for oil and gas resources probably is precluded because of strong deformation and intricate faulting of Paleozoic sedimentary rocks and because these rocks probably were subjected to high temperatures during Tertiary volcanism. Construction materials similar to those available in the study areas are more readily accessible elsewhere.

INTRODUCTION

The Jerry Peak, Jerry Peak West, and Boulder Creek Wilderness Study Areas are located in Custer County, Idaho, about 25 miles south of the town of Challis, chiefly within the drainage basin of the East Fork Salmon River (fig. 1). The total area examined is 62,253 acres and is divided as follows: Jerry Peak, 46,150 acres; Jerry Peak West, 13,530 acres; and Boulder Creek, 2,573 acres. Well-maintained roads along the East Fork Salmon River, Road Creek, Herd Creek, and Sage Creek are the principal access routes. Several jeep trails within the Jerry Peak Wilderness Study Area permit ready access to most points within the study area. There are no roads within the Jerry Peak West and Boulder Creek Wilderness Study Areas.

The terrain within these study areas is moderately rugged; local relief approaches 2,000 ft. The highest point, Jerry Peak, is 10,010 ft in elevation while the East Fork Salmon River, about ten miles to the northwest, is at about 6,000 ft. Most of the terrain is covered with sparse grass and low shrubs; trees are restricted to sheltered slopes at the higher elevations and along streams.

Previous geologic studies in the area include geologic mapping at a scale of 1:125,000 by C. P. Ross and T. H. Hite, Jr. (Ross, 1937), and geologic mapping by Yokley (1974). Motzer (1978) mapped an area immediately west of the Boulder Creek Wilderness Study Area. Studies for the mineral resource evaluation include geologic mapping and stream-sediment geochemical surveys (McIntyre, 1982; Callahan and others, 1984; McIntyre and others, 1984), a minerals survey (Johnson and Neumann, 1984), and a geophysical survey (Hildenbrand and Mabey, 1983).

GEOLOGY

Stratigraphy

The oldest rocks exposed in the study areas are Paleozoic sedimentary rocks. The Jerry Peak West Wilderness Study Area contains the oldest of these rocks, a black, carbonaceous, graptolite-bearing shale and argillite tentatively correlated with the Ordovician Phi Kappa Formation (Dover and others, 1980; McIntyre and others, 1984). Overlying, but separated from these rocks by a thrust fault, is the Mississippian Salmon River sequence, which contains argillite, siltstone, and fine-grained sandstone. Exposures of these formations within the study areas are confined to the Jerry Peak West Wilderness Study Area. Farther east, at the confluence of Herd Creek and Lake Creek, is an isolated mass of siltstone, sandstone, and conglomerate that is tentatively correlated with the Lower Mississippian Copper Basin Formation. Still farther east, near the east border of the Jerry Peak Wilderness Study Area, are exposures of complexly deformed limestone of the Upper Mississippian White Knob Limestone, and a small area of fine-grained clastic rocks (Pzm) assigned to the Lower Mississippian McGowan Creek Formation (B. A. Skipp, written commun., 1983; Yokley, 1974). A small area of outcrops earlier identified as chert (Ross, 1937; McIntyre, 1982) has since been shown to be jasperoid (j) developed on the White Knob Limestone (B. A. Skipp, written communication, 1983). Thrust faults are known or inferred to separate these complexly deformed Paleozoic formations.

The Paleozoic sedimentary rocks are overlain by a sequence of volcanic rocks that are part of the Eocene Challis Volcanics (Ross, 1937; McIntyre and others, 1982). The volcanic rocks, which blanket most of the area, are dominated by lavas and associated pyroclastic rocks (Ta and Tp), both of intermediate composition. Silicic pyroclastic rocks (Ttb, Thc, and Taf), underlain by conglomerate (Tcg), are exposed beneath the intermediate lavas (Tl) in the drainage basin of Sage Creek. Biotite from the pyroclastic rocks (Ttb) that lie immediately below the intermediate lavas in this area has a potassium-argon age of 49.0±1.8 m.y. (R.F. Marvin, written commun., 1982). In the south-central part of the Jerry Peak Wilderness Study Area, the intermediate lavas are overlain by a lava-like rhyolitic ash-flow tuff, the tuff of Herd Lake, which contains biotite having a potassium-argon age of 48.1±1.7 m.y. (R. F. Marvin, written commun., 1982). Farther west, west of the Boulder Creek Wilderness Study Area, the intermediate lavas are overlain by the tuff of Red Ridge. Several miles northeast of the study area the tuff of Red Ridge is intimately associated with the tuff of Challis Creek, which contains sanidine that gave a potassium-argon age of 45.0±1.3 m.y. (Armstrong, 1975; McIntyre and others, 1982).

Structure

The Paleozoic sedimentary rocks are complexly folded and cut by thrust faults. They also are cut by high-angle faults that offset the Eocene volcanic rocks. The high-angle faults are clustered in three groups: those in the eastern part of the Jerry Peak Wilderness Study Area, those along lower Herd Creek, and those along the upper reach of the East Fork Salmon River adjacent to the Boulder Creek Wilderness Study Area.

The high-angle faults in the eastern part of the Jerry Peak Wilderness Study Area offset the silicic pyroclastic rocks and conglomerate that underlie the intermediate lavas more than they offset the lavas (McIntyre, 1982). This shows that movement on these faults was concurrent with, as well as later than, the volcanic activity. The fault zone along lower Herd Creek locally shows some evidence for right-lateral strike-slip displacement in addition to the predominant dip-slip displacement. The fault zone along the upper reach of the East Fork Salmon River locally shows evidence of left-lateral strike-slip displacement in addition to the predominant dip-slip displacement. A microearthquake survey (Pennington and others, 1974) located a few epicenters near this fault zone. This suggests minor movement at depth along faults at the time the survey was made, and indicates the probability of some significant Holocene movement along this fault zone.

Alteration

Alteration, most conspicuous in the volcanic rocks, is confined chiefly to areas adjacent to the fault zones. The most common alteration products are zeolites and clays. Minor chlorite locally is present in volcanic rocks exposed adjacent to the East Fork Salmon River near the north boundary of the Jerry Peak West Wilderness Study Area. The bluish-green mineral celadonite and quartz commonly are found adjacent to faults in the Boulder Creek Wilderness Study Area and in the eastern part of the Jerry Peak Wilderness Study Area. This group of alteration minerals is not commonly associated with economic metallic mineral deposits.

The only alteration of Paleozoic rocks noted is silicification of limestone to produce jasperoid. This chert-like rock occurs adjacent to faults that separate the volcanic rocks from the Paleozoic sedimentary rocks in the eastern part of the Jerry Peak Wilderness Study Area (McIntyre, 1982).

GEOPHYSICS

A detailed analysis of gravity and aeromagnetic surveys of the Jerry Peak Wilderness Study Area has been carried out by Hildenbrand and Mabey (1983). The analysis provides thickness estimates for the principal geologic units and defines the principal major basement structures, most of which trend northwest. The geophysical data give no indication of any large, buried intrusions beneath the study area. Similar studies were not carried out in the other two study areas.

GEOCHEMICAL AND MINERALS SURVEYS

Stream-sediment samples were collected from about 90 locations in the Jerry Peak Wilderness Study Area, 20 locations in the Jerry Peak West Wilderness Study Area, and 8 locations in the Boulder Creek Wilderness Study Area. At many of these locations panned concentrates were collected, from which nonmagnetic heavy-mineral fractions were prepared. These materials were subjected to semiquantitative spectrographic analysis for Ag, As, Au, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, La, Mg, Mn, Mo, Nb, Ni, Pb, Sb, Sc, Sn, Sr, Ti, Th, V, W, Y, Zn, and Zr (Callahan and others, 1984; McIntyre and others, 1984).

High values for any of these elements were mostly confined to the nonmagnetic heavy-mineral fractions from a few localities in the Jerry Peak and Jerry Peak West Wilderness Study Areas. No high values were found in the Boulder Creek Wilderness Study Area. No mineralized areas were found in the drainage basins of streams from which samples yielding relatively high values were collected.

Several samples from streams draining areas underlain by Paleozoic sedimentary rocks contained barium in amounts in excess of 5,000 parts per million in the nonmagnetic heavy-mineral fractions. The most prominent occurrences are in the area underlain by limestone near the eastern boundary of the Jerry Peak Wilderness Study Area (Callahan and others, 1984); the nonmagnetic heavy-mineral fractions from samples collected there contain visible barite crystals. The crystalline barite may have been derived from small veins in the limestone. A large, undiscovered deposit of barite in this area is possible, but unlikely. A careful search for barite veins or bedded barite in this area during geologic mapping was unsuccessful (B. A. Skipp, oral commun., 1983). The other occurrence of high barium in the stream-sediment samples is associated with the Paleozoic sedimentary rocks exposed in the Jerry Peak West Wilderness Study Area. Bedded barite is known to occur within the Salmon River sequence elsewhere in the region (W. E. Hall, oral commun., 1981) so it is possible that a deposit of this kind could be present within the exposures of this unit in the Jerry Peak West Wilderness Study Area.

Bureau of Mines field personnel collected 19 samples (Johnson and Neumann, 1984). All samples were checked for radioactivity and fluorescent minerals. Those thought to contain metallic minerals were fire-assayed for gold and silver. Selected samples were analyzed by emission spectroscopy, atomic absorption, colorimetric, and X-ray fluorescence methods.

Thirteen samples of volcaniclastic rocks collected from the Jerry Peak and Jerry Peak West Wilderness Study Areas were analyzed for zeolites (Johnson and Neumann, 1984). Zeolites are minerals that have a number of industrial uses, especially as catalysts and in fluid purification. One sample contained 20 percent of the zeolite mineral clinoptilolite; a second contained 3 percent clinoptilolite and 5 percent analcime; a third contained 20 to 40 percent mordenite. Ten of the samples contained no zeolites (Johnson and Neumann, 1984, p. 10).

MINING ACTIVITY AND MINERALIZATION

There is no record of mineral production or development for any of the study areas. Only a few claims, probably less than ten, have been located in the study areas. Brecciated, limonitic jasperoid in the eastern part of the Jerry Peak Wilderness Study Area has been explored by means of one 20-ft-long adit and one prospect pit. No significant concentration of metallic minerals was noted. Workings on several mining claims 1/2 mi north of the Jerry Peak West Wilderness Study Area expose quartz lenses and pods in Paleozoic sedimentary rocks. The quartz is malachite-stained and contains chalcopyrite. The lenses and pods are clustered near a high-angle fault that trends N. 50° W. The fault does not continue into the wilderness study area. No copper-bearing quartz lenses were found in Paleozoic sedimentary rocks exposed in the wilderness study area. No significant metal content was detected in samples of the Paleozoic sedimentary rocks collected along Pine Creek, in the wilderness study area (Johnson and Neumann, 1984); nor was a significant metal content found in sediment samples from streams draining the outcrop area of the Paleozoic sedimentary rocks (McIntyre and others, 1984).

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

A low to moderate resource potential for barite is assigned to the area underlain by Paleozoic sedimentary rocks near the eastern boundary of the Jerry Peak Wilderness Study Area and the area of Paleozoic sedimentary rocks in the Jerry Peak West Wilderness Study Area where rocks of the Salmon River sequence crop out. Several nonmagnetic heavy-mineral concentrates from panned stream-sediment samples from these areas contain greater than 5,000 parts per million barium. However, no outcrops of barite-enriched rocks were noted.

Evidence of metallic mineralization is lacking in all three wilderness study areas. Minor occurrences of chalcopyrite in quartz lenses and pods along a fault are exposed in prospects in Paleozoic sedimentary rocks 1/2 mile north of the Jerry Peak West Wilderness Study Area. No similar occurrences were found within the wilderness study area, nor does the mineral-bearing structure extend into the study area. Analytical results of stream-sediment and rock geochemistry do not indicate the presence of any metal anomalies associated with the Paleozoic sedimentary rocks in the study area. Nevertheless, a small possibility exists that similar, concealed metal deposits could be present. Therefore, a low resource potential for base metals is assigned to the part of the Jerry Peak West Wilderness Study Area that is underlain by Paleozoic sedimentary rocks.

The alteration mineral assemblages noted are not typically associated with deposits of metallic minerals, and local occurrences of high metal values in nonmagnetic heavy-mineral fractions of the stream-sediment samples did not lead to discovery of mineralized areas in the drainage basins of those streams. Significant concealed deposits are unlikely because such deposits probably would be spatially associated with an intrusive mass. The geophysical study detected no such masses beneath the Jerry Peak Wilderness Study Area. They are equally unlikely to be found beneath the other two study areas.

Most of the Jerry Peak Wilderness Study Area and some of the Jerry Peak West Wilderness Study Area have been leased for oil and gas exploration; however significant oil and gas occurrences are unlikely. The Paleozoic sedimentary rocks, the most likely targets for oil and gas exploration, are complexly folded and faulted. In addition, heating of these rocks during the Eocene volcanism, accompanied and followed by high-angle faulting, probably drove off or destroyed such oil and gas that may have accumulated.

Construction materials of suitable quality and quantity may be found in the area, but transportation costs to major markets far exceed the value of these materials. Equally suitable materials are more readily accessible elsewhere.

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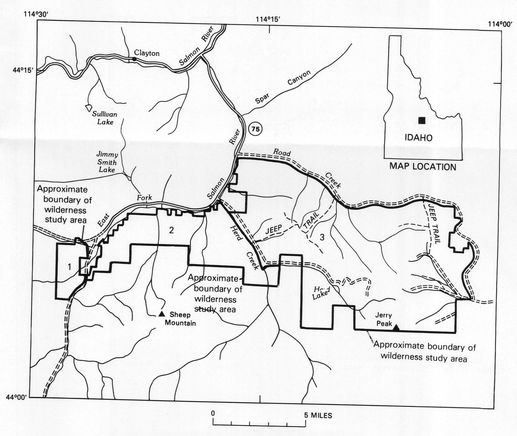

Figure 1.--Map showing locations of the Boulder Creek (1), Jerry Peak West (2), and Jerry Peak (3) Wilderness Study Areas, Custer County, Idaho

MINERAL RESOURCE POTENTIAL MAPS OF THE JERRY PEAK, JERRY PEAK WEST, AND BOULDER CREEK WILDERNESS STUDY AREAS, CUSTER COUNTY, IDAHO

By
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1984

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