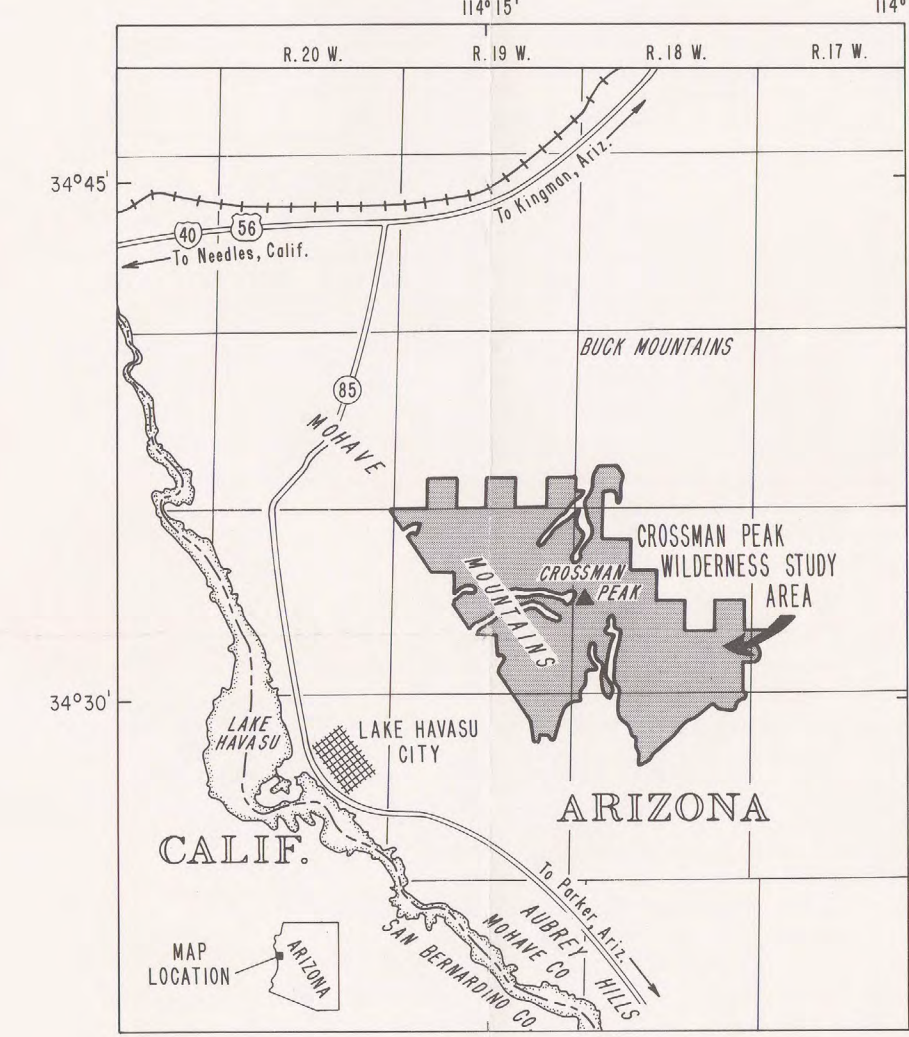


- EXPLANATION
- AREA WITH MINERAL RESOURCE POTENTIAL
- GS-1 High
 - GS-2 Moderate
 - GS-3 Moderate
- Placer gold-See table 4 in accompanying pamphlet
- High (P-1)
 - Moderate (P-2)
 - Moderate (P-3)
- Tungsten and base metals-See table 5 in accompanying pamphlet
- Tungsten-High
 - Base metals-Moderate to low
- MINERAL DEPOSIT-Numbers refer to table 1 in accompanying pamphlet
- BOUNDARY OF WILDERNESS STUDY AREA (APPROXIMATE)

- CORRELATION OF MAP UNITS
- | | | |
|-----|---------------|--------------------------|
| Qa | QUATERNARY | Tertiary and Proterozoic |
| Tvs | | |
| Kg | CRETACEOUS(?) | Tertiary and Proterozoic |
| Pg | | |
| Pag | PROTEROZOIC | Tertiary and Proterozoic |
| gnd | | |
- DESCRIPTION OF MAP UNITS
- Qa ALLUVIUM (QUATERNARY)-Includes talus deposits on Black Mountain
 - Tvs VOLCANIC AND SEDIMENTARY ROCKS (MIOCENE)-Flows, breccia, and tuff of silicic to basaltic composition; fanglomerate, conglomerate, sandstone, and claystone
 - Kg GRANITE AND DIORITE (CRETACEOUS?)
 - Pg GRANITOID ROCKS (PROTEROZOIC)-Porphyritic and equigranular granite and quartz monzonite
 - Pag AUGEN GNEISS (PROTEROZOIC)-Granite to granodiorite composition. Gradational to porphyritic granite of the granitoid rocks unit
 - gnd GNEISS AND DIKES (TERTIARY AND PROTEROZOIC)-Garnet granite gneiss, amphibolite, biotite granite gneiss, pegmatite, and rare pelitic gneiss and quartzite, of Proterozoic age, all intruded by a dense swarm of northwest-striking felsic and mafic dikes of Tertiary age
- CONTACT-Dashed where approximately located
- FAULT-Dashed where approximately located; dotted where concealed; hatchures on upper plate of detachment fault. Bar and ball on downthrown side



LOCATION OF CROSSMAN PEAK WILDERNESS STUDY AREA (5-7B), MOHAVE COUNTY, ARIZ.

STUDIES RELATED TO WILDERNESS

Bureau of Land Management Wilderness Study Areas

The Federal Land Policy and Management Act (Public Law 94-579, October 31, 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 Crossman Peak Wilderness Study Area (5-7B), Mohave County, Arizona.

SUMMARY

Mining history, results of recent mineral exploration, and geologic, geochemical, and geophysical data collected and evaluated as of 1982 indicate that the Crossman Peak Wilderness Study Area has potential for several mineral resources. The wilderness study area has high potential for small deposits of lode gold, silver, and tungsten, and for placer gold. Sixteen sites in or adjacent to the wilderness study area contain 100 to 8,000 tons of indicated or inferred gold or silver resources including grades of 0.05 to 0.82 oz gold per ton and 0.19 to 2.1 oz silver per ton. Favorable geologic terrane suggests that much of the wilderness study area has at least moderate potential for additional discoveries of lode gold and silver and placer gold. Positive geochemical anomalies and patterns of alteration in the central part of the wilderness study area provide evidence for speculating that there is moderate to low potential for additional deposits of base metals. There is high potential for resources of riprap and of sand and gravel, and moderate potential for small deposits of perlite, opal, and manganese in the wilderness study area. The potential for uranium, oil and gas, and geothermal resources is low.

INTRODUCTION

The Crossman Peak Wilderness Study Area is in western Arizona 3 mi east of Lake Havasu City, Ariz., and 45 mi southwest of Kingman, Ariz. The wilderness study area covers approximately 35,000 acres in the topographically rugged center and flanking foothills of the Mohave Mountains, sometimes included as part of the Chemehuevi Mountains. The Chemehuevi Mountains are in California adjacent to the northwest Mohave Mountains but across the Colorado River. The Mohave Mountains form a northwest-trending range adjacent to Lake Havasu (elevation 445 ft) on the Colorado River. Both the Mohave Mountains and the wilderness study area are dominated by Crossman Peak, which has an elevation of 5,148 ft. The area is accessible from the north and west by numerous jeep trails that intersect either Interstate 40, State Highway 89, or some residential streets of Lake Havasu City. From the south, southeast, and northeast access to the area is by jeep trails that intersect the unimproved Dutch Flat Road, which skirts the south flank of the mountains. Several small areas of mines and roads excluded from the wilderness study area proper are within the approximate boundary shown here for the study area.

GEOLOGY

Rocks in the wilderness study area are dominantly Proterozoic metamorphic and igneous rocks intruded by Proterozoic and Tertiary igneous dikes. Potassium-argon ages suggest that mineralized veins within the Proterozoic gneisses may be related to Cretaceous(?) intrusions such as occur adjacent to the study area. Tertiary volcanic and sedimentary rocks overlie Proterozoic rocks at the south and southwest margins of the study area. Several faults of Tertiary age cut these rocks. Quaternary alluvial deposits occur around the flanks and in drainages within the range.

GEOCHEMISTRY AND REMOTE SENSING

Rock, stream-sediment, and panned-concentrate samples from the Crossman Peak Wilderness Study Area characteristically contain anomalously high concentrations of silver, copper, lead, zinc, molybdenum, tungsten, barium, and lanthanum. In rock and panned-concentrate samples, gold and blamuth commonly accompany this assemblage. Numerous panned-concentrate samples contain anomalously high tin, cadmium, and arsenic values relative to the backgrounds defined in these studies. The gold-silver-tungsten-copper-lead-zinc metal assemblage is distributed throughout the wilderness study area and is considered to represent mineralization derived from a large hydrothermal system, probably of Cretaceous age.

Mineralite materials were identified in Landsat images using a color-ratio-composite method. Field examination of several mineralite areas associated with mineral deposits revealed that patches of argillite alteration, characterized by an assemblage that contains kaolinite-white mica-hematite-chlorite, occur in the central and eastern parts of the wilderness study area. An area of about 1/4 mi² at the Jupiter East mine (no. 33) has intensely altered feldspars and represents a more advanced stage of argillite alteration. The area of argillite alteration is bounded on the north and west by a porphyritic alteration assemblage including chlorite, epidote, albite, and quartz at the Pittsburgh (no. 41) and J & J (no. 15), Scotts Well (no. 18), and Ararat Well (no. 8) areas. Abundant sericitic alteration was observed at the Sunrise mine (no. 20). The mapped mineralite areas and observed alteration suggest a crudely zoned pattern of hydrothermal alteration from intermediate argillite at the Dutch Flat mines outward to sericitic alteration at the Sunrise mine and then to porphyritic alteration along the western and northern parts of the wilderness study area.

The distribution of base and precious metals forms a crudely zoned, overlapping pattern that roughly correlates with the zones of alteration. The area of the Dutch Flat mines (nos. 30-33) is the most intensely altered and mineralized, with anomalously high concentrations of tungsten, copper, and gold. Outward from this area to the west and northwest, tungsten and copper values diminish and gold is associated with lead, zinc, silver, and arsenic forms the dominant metal association in a zone that includes the Sunrise (no. 20) and Dutch Flat (nos. 30 and 31) mines and the south-center of sec. 24, T. 14 N., R. 19 W. (no. 26). Peripheral to this zone the metal assemblage is dominated by silver and is accompanied by lead, zinc, gold, and barium in a zone containing the Pittsburgh (no. 41) and J & J (no. 15) mines. At the Wing mine (no. 11), a gold, silver, lead, zinc assemblage is associated with arsenic, barium, and secondary copper and molybdenum.

GEOPHYSICS

A broad area of relatively high Bouguer gravity values overlies the northern and central parts of the wilderness study area that has exposures of Proterozoic gneisses. Slightly lower gravity values occur in the southeastern part of the wilderness study area, partly over Proterozoic gneisses and partly over Tertiary volcanic and sedimentary deposits south of the Crossman Peak fault. The portion of the gravity low over the gneisses could be caused by the alteration of the gneisses in this area or by lithologic changes. A steep gravity gradient along the east and north flanks of the Mohave Mountains is probably caused both by the Dutch Flat valley of low-density Cenozoic sedimentary deposits and by density changes across a structural boundary within the crust.

An elongate northwest-trending belt of magnetic highs extends through the west-central part of the wilderness study area. The highest values in the belt occur over outcrops of Proterozoic augen gneiss. A region of low aeromagnetic values lies over the northeastern and southeastern parts of the wilderness study area, overlapping areas that are altered. These magnetic lows may be produced by the destruction of magnetic minerals during alteration, or may simply be located over gneisses that are not very magnetic even if unaltered.

MINING DISTRICTS AND MINERALIZED AREAS

The Crossman Peak Wilderness Study Area contains numerous occurrences of gold, silver, tungsten, lead and zinc, which have been prospected intermittently during the past 120 years. Several thousand mining claims are located in and around the study area. During this investigation, the U.S. Bureau of Mines mapped and sampled all the known mines and prospects where accessible. The Crossman Peak Wilderness Study Area and immediate environs contain 43 separate mineralized areas that have been mined or prospected. Sixteen of these areas are reported to have produced some ore and several other areas probably produced some high-grade ore.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Mapped areas of mineral resource potential

Criteria used to define mapped areas of mineral resource potential are listed in tables 3-5 of the accompanying pamphlet.

Lode gold and silver-All of the ground underlain by pre-Tertiary rocks in the Crossman Peak Wilderness Study Area has high to moderate potential for small lode deposits of gold and silver. Area GS-1 is considered to have high potential; areas GS-2 and GS-3 are considered to have moderate potential.

Placer gold-Area P-1 has high potential for deposits of placer gold, and areas P-2 and P-3 have moderate potential for additional deposits of placer gold.

Lode tungsten-Area T contains veins from which tungsten has been mined in the past and has high potential for further small deposits.

Base metals-A crude zonation of metal assemblages and alteration, and supporting chemical and petrographic evidence, indicates area C may be underlain by a low-fluorine porphyry molybdenum system. Geologic evidence suggests that the area is also underlain by a low-angle fault, which detached the Crossman plate (which includes this area) and transported it away from a substratum that now may lie 10 to 20 mi to the southwest. If the unexposed root of the mineralized system lies buried in the Crossman plate, area C has moderate potential for base and precious metals at depth. If the mineralizing system was detached by faulting, the potential of area C is low. Definition of the potential therefore depends on the (unknown) depth to the fault that defines the base of the Crossman plate.

Miscellaneous resources

Uranium-Aeroradiometric data and field studies indicate a low potential for uranium resources in the Crossman Peak Wilderness Study Area.

Manganese-Manganese mineralization is not known within the Crossman Peak Wilderness Study Area. However, Tertiary volcanic and sedimentary rocks contain three small deposits of very limited tonnage nearby to the west, southwest, and northwest of the wilderness study area. Where Tertiary rocks occur within the west and south boundaries of the wilderness study area, there is moderate potential for similar deposits.

Sand, gravel, and rocks-Sand and gravel are present in the study area in washes, and potentially are resources for local construction. Large quantities of these materials occur outside the wilderness study area all around its margin. Hard dike rocks, potentially useful for riprap for dam and other local water projects, are abundant north of the Crossman Peak fault; similar dike rocks are available in smaller quantities immediately northwest of the wilderness study area.

Opal-Opal of non-gem quality occurs locally in Tertiary volcanic rocks within the southern and southwestern parts of the wilderness study area and grades may occur in Tertiary volcanic rocks within the study area.

Fertilite-Perlite of untested quality occurs in Tertiary volcanic rocks 1-4 mi northwest and west of the wilderness study area, and in very small amounts within the southwestern and southern boundaries of the wilderness study area.

Oil and gas-The Crossman Peak Wilderness Study Area is considered unfavorable for resources of oil and gas.

Geothermal resources-No geothermal resources are known or suspected in the Crossman Peak Wilderness Study Area.

Explanatory pamphlet accompanies map

MINERAL RESOURCE POTENTIAL MAP OF THE CROSSMAN PEAK WILDERNESS STUDY AREA (5-7B), MOHAVE COUNTY, ARIZONA

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