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MINERAL RESOURCES OF THE SIERRA ANCHA WILDERNESS AND SALOME STUDY AREA, GILA COUNTY, ARIZONA

SUMMARY REPORT

By

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STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, Sept. 3, 1964) and certain related Acts require the Geological Survey and the Bureau of Mines to survey certain areas on Federal lands to determine their mineral-resource potential. Results must be made available to the public and be submitted to the Administration and the Congress. These maps and reports present the results of a geologic and mineral survey of the Sierra Ancha Wilderness and Salome Study Area, Gila County, Arizona.

INTRODUCTION

During 1978 the U.S. Geological Survey and the U.S. Bureau of Mines conducted field investigations to evaluate the mineral-resource potential of the Sierra Ancha Wilderness and Salome Study Area. Field studies included geologic mapping, geochemical sampling, geophysical surveys, and a survey of known mines, prospects, and mineralized zones.

Within the Sierra Ancha Wilderness there is high to moderate potential for deposits of uranium and asbestos and moderate to low potential for deposits of fluorspar and iron. The Salome Study Area has very little or no mineral potential. Geochemical, gravity, and aeromagnetic data suggest some potential for tin, tungsten, molybdenum, and barite mineralization in areas adjacent to and partly within the Wilderness and Salome Study Area.

Location and geographic setting

The Sierra Ancha Wilderness and the Salome Study Area are located northeast of Theodore Roosevelt Lake in Gila County, central Arizona (fig. 1). The Sierra Ancha Wilderness encompasses 20,850 acres along the crest of the Sierra Ancha. The Salome Study Area includes an additional 18,900 acres west of the Wilderness along Salome Creek. These areas are located in mountainous terrain cut by streams that carved steep-walled canyons as deep as 3 000 ft. Lower elevations support diverse desert vegetation of the upper Sonoran zone including saguaro, palo verde, prickly pear, and cholla. The highest elevations, up to 7,733 ft, support forests of Douglas fir and Ponderosa pine.

When these investigations were begun in early 1978, the Salome Study Area and several areas adjacent to the Wilderness were being considered as additions to the Wilderness Preservation System and were therefore included in this mineral-resource study. During the course of field investigations, the Salome Study Area and all of the proposed wilderness additions were reclassified as "nonwilderness" (U.S. Forest Service, 1979, p. 20).

Geologic setting

The Sierra Ancha is located south of the Mogollon rim in the transition zone between the Colorado Plateau and the Basin and Range physiographic provinces of Arizona (Hayes, 1969, p. 37). This zone is characterized by moderately high, dissected uplands with occasional intervening block-faulted basins. Paleozoic and Mesozoic sedimentary rocks, present on the Colorado Plateau to the north, have been mostly eroded from the Wilderness Area. The Sierra Ancha lies east and north of a middle and (or) late Tertiary basin formed by movement on normal faults between the Sierra Ancha and mountains to the west and south.

Mining activity

The principal mineral commodities mined or prospected have been uranium, asbestos, fluorspar, and iron. Uranium was the object of intense exploration activity during the mid-1950's and again from the mid-1970's to the present. As of 1979, several companies were continuing exploration in and around the Wilderness with the intention of reopening several of the mines worked for uranium during the 1950's. Asbestos, the first major mineral commodity exploited in the area, was mined intermittently from about 1913 to the early 1960's. Fluorspar was being mined in 1979 at the Mack mine, 1.5 mi west of the Wilderness. Several iron deposits occur within the Sierra Ancha, and, although there has been no production in the area of this investigation, the deposits have been examined periodically to determine their potential.

GEOLOGY, GEOPHYSICS, AND GEOCHEMISTRY

The geology of the Sierra Ancha Wilderness, Salome Study Area, and vicinity was mapped by the U.S. Geological Survey (Bergquist and others, 1980). Detailed descriptions of rock units have also been published by Granger and Raup (1964, 1969a) and by Shride (1967).

The Sierra Ancha Wilderness and the Salome Study Area are underlain by igneous and sedimentary rocks of Proterozoic Y age, gravel and tuff of Tertiary age, and Quaternary talus, alluvium, and landslides.

The Ruin Granite of Proterozoic age, the oldest rock unit in the area, is overlain by the Proterozoic Y Apache Group consisting of the Pioneer Formation, Dripping Spring Quartzite, and the Mescal Limestone, which as mapped includes an unnamed basalt at its top.

The Dripping Spring Quartzite comprises three members: the Barnes Conglomerate Member at the base, a middle member composed of fine- to medium-grained arkosic sandstone, and an upper member composed principally of feldspathic siltstone. The Dripping Spring Quartzite is exposed over much of the study area and underlies most of the Sierra Ancha Wilderness to depths of 2,000 ft. The upper member contains a dense, black, carbonaceous, pyritiferous, potassium-rich well-indurated siltstone or sandy siltstone that is the host rock for about 40 uranium deposits in the Sierra Ancha. Black siltstone is potentially uranium bearing and was observed only in the eastern part of the study area.

The Mescal Limestone is divided into three members in ascending order (Shride, 1967): (1) a thin- to thick-bedded cherty dolomitic member; (2) a dolomitic algal member; and (3) an argillitic member. The dolomitic members locally are hosts to asbestos and iron deposits. One uranium occurrence is known in the argillitic member. The Mescal underlies most of the Wilderness but has been eroded from the Salome Study Area.

The upper part of the Mescal Limestone includes a basalt flow that is generally less than 100 ft thick. Other basalt flows as much as 375 ft thick overlie the Mescal Limestone. Some copper occurrences are known in these basalts, but there are no prospect workings, and there has been no production.

The Troy Quartzite of Proterozoic Y age overlies the Apache Group and consists of white to red, fine- to coarse-grained sandstone and quartzite. The Troy Quartzite forms the crest of the Sierra Ancha and is more than 1,000 ft thick throughout much of the area. On Aztec Peak and in Armer Gulch small outcrops of Cambrian(?) sandstone occur. Neither the Troy Quartzite nor the Cambrian(?) sandstone is known to contain mineral deposits.

Diabase sills and dikes of Proterozoic Y age that have a minimum age of 1,075 m.y. (million years) and a probable age of 1,200 m.y. (Silver, 1960) intruded the Troy Quartzite and all older rocks, usually within specific stratigraphic horizons in the Apache Group. Some of the sills form massive sheets, in places more than 1,000 ft thick. Multiple sills with an aggregate thickness exceeding 1,500 ft occur in the Salome Study Area.

The Sierra Ancha is structurally similar to the Colorado Plateau. Sedimentary rocks are nearly flat lying except in monoclines, which are the principal structural features. The Cherry Creek monocline parallels the course of Cherry Creek along the east boundary of the Wilderness. The Sierra Ancha monocline follows the trend of McFadden and Rose Creeks between the Wilderness and the Salome Study Area. Fractures, faults, and folds related to these monoclines may have partly controlled uranium and asbestos mineralization.

Faults of Precambrian through Tertiary age occur in the Sierra Ancha Wilderness, the Salome Study Area, and adjacent areas. Many of these faults probably represent Tertiary reactivation of Precambrian faults. The McFadden fault strikes east and crosses the northern part of the Wilderness. It formed the faulted northern boundary of a large diabase sill and later was a zone of probable Tertiary movement along which fluorspar was deposited. Normal faults that strike northwest along the scarp at Red Bluff and extend into the Salome Study Area also are of Tertiary age and acted locally as conduits for hydrothermal fluids that formed known mineral deposits in the area.

Hydrothermal alteration and contact metasomatism associated with the intrusion of the diabase were instrumental in the formation of most of the known mineral deposits in the Sierra Ancha. The genetic relation of diabase and uranium deposits is suggested by (1) proximity of diabase to known uranium deposits, (2) similar ages of uraninite in veins (Granger and Raup, 1969a) and zircons in diabase (Silver, 1960), and (3) the high temperatures of formation for the deposits (Granger and Raup, 1969a). Uranium, probably derived from syngenetic uranium distributed in the black carbonaceous siltstone of the upper member of the Dripping Spring Quartzite, was mobilized and redeposited in faults and fractures by hydrothermal fluids that derived their heat from the diabase. Most of the uranium deposits occur as veins in a conjugate set of fractures that strike approximately N. 20° E. and N. 70° W. Uranium mineralization commonly extends laterally beyond the veins within favorable stratigraphic horizons. Deposits range from thin fractures with only minor amounts of uranium to extensive thick vein systems with contiguous large subhorizontal bodies of mineralized rock (Granger and Raup, 1969a). The small vein deposits apparently formed wherever uranium-enriched hydrothermal fluids heated by the diabase were driven through fractures in the carbon-aceous siltstone. The larger vein systems with large adjacent strata-bound zones are typified by two properties outside the Wilderness that either overlie massive sills of diabase (Workman Creek) or lie adjacent to major feeder dikes of diabase (Red Bluff). These deposits formed where great amounts of heat and hydrothermal fluids were available adjacent to large diabase bodies or feeder dikes. The host rocks locally are highly altered.

Asbestos deposits in the Sierra Ancha normally occur where the carbonate members of the Mescal Limestone have been subjected to karst formation and silicification prior to deposition of the Troy Quartzite and intrusion of the diabase. Serpentine, containing veins of long-staple, low-iron chrysotile asbestos, developed generally parallel to bedding in the limestone where small-scale thrust and bedding-plane faults produced abundant fractures. Such faults are most prominent near small domes and monoclines, at discordant steps in a sill boundary, or in sedimentary strata that were shouldered aside adjacent to dikes. Few deposits are more than 25 ft stratigraphically above or below a diabase sill (Shride, 1967, p. 68).

Chrysotile asbestos developed as cross fibers in serpentine bodies 6 to 18 in. thick. Asbestos veins locally pinch, swell, and roll within the serpentine. Multiple veins commonly are present. The chrysotile fibers are normally less than 0.5 in. long, but may reach lengths of a few inches. An individual serpentine body may contain numerous visible chrysotile veins, constituting up to 40 percent of the body.

Typical asbestos deposits in the vicinity of the study area are generally flat lying, elliptical in plan, and elongated parallel to a single fold or linear belt of low-angle faults. Such deposits are small targets for exploration. Only a few yield as much as a few hundred tons of asbestos. Larger deposits occur where several folds related to diabase are closely spaced. Deposits of this type may yield a few hundred to several thousand tons of asbestos.

Iron deposits of two possible origins occur in the Mescal Limestone. Hematite concentrations that developed by laterization of the basalt that overlies the Mescal locally were partially or completely converted to magnetite during intrusion of the diabase. Additionally, thin beds and stockworks of magnetite were formed by contact pyrometasomatic replacement of carbonate rock. The iron deposits range from massive to disseminated and character-istically are irregular and discontinuous (Harrer, 1964, p. 18).

Airborne gamma-ray spectrometric values indicate that the surface distribution of equivalent uranium (eU), equivalent thorium (eTh), and potassium (K) varies considerably in the Wilderness and Salome Study Area (Duval and Pitkin, 1980, 1981). High values for eU and the ratios eU/Th and eU/K are generally associated with known uranium mineralization, outcrops of the upper member of the Dripping Spring Quartzite, and the argillite member of the Mescal Limestone. All other formations yield generally low to very low values. Potassium values suggest variations in the composition of the Ruin Granite and the diabase across the study area.

The aeromagnetic data (Duval and Pitkin, 1980, 1981) show partial control by diabase on the pattern of lows and highs. Wherever diabase has been thinned erosionally, low aeromagnetic values predominate. Wherever thick sections of diabase have been preserved, high values occur. Aeromagnetic lows occur along valleys where the diabase section has been thinned by erosion (for example, Workman Creek and Cherry Creek) and also on the upthrown side of normal faults where diabase has been eroded (for example, along the Armer Mountain fault). Despite the apparent control of the aeromagnetic signature by diabase, aeromagnetic values in the central Sierra Ancha seem unexpectedly low. The low area is roughly circular and is bounded by the McFadden fault to the north, Tertiary faults to the west and southwest, and the Cherry Creek monocline to the east. A high-level aeromagnetic survey (Sauck and Sumner, 1970) that also shows the aeromagnetic low suggests that the low is related to deep—seated features. Within the diabase and the Mescal in areas intruded by diabase, concentrations of magnetite appear to be marked by aeromagnetic highs superposed on the diabase—related aeromagnetic signature. Magnetic highs thus may be related to bodies of iron ore and to asbestos deposits, which commonly contain magnetite.

The gravity data (Wilson, 1981) suggest that the Sierra Ancha can be divided into three areas. The area west and southwest of the Armer Mountain fault is characterized by generally high gravity values. The central Sierra Ancha between the Armer Mountain fault and the Cherry Creek monocline is marked by moderate values. The trace of the Cherry Creek monocline is marked by low gravity values. In addition to the Armer Mountain fault and the Cherry Creek monocline, the McFadden fault and the Sierra Ancha monocline are marked by gradients or trends in the data. Gravity lows occur over thick basin-fill sediments south and west of the Sierra Ancha.

Nonmagnetic heavy-mineral concentrates from stream sediments locally show anomalous concentrations of copper, barium, lead, boron, tin, bismuth, molybdenum, silver, tungsten, and zinc (Tripp and others, 1980; Barton and others, 1980). Tin, boron, molybdenum, tungsten, and barium anomalies exhibit a roughly elliptical pattern that follows the trace of several faults in the eastern two-thirds of the area. Fluorite and scheelite were observed in most of the anomalous samples. Anomalous barium concentra-tions in the upper Cherry Creek area appear to be associated with outcrops of altered, asbestos-bearing Mescal Limestone. A cluster of copper and lead anomalies and visible chalcopyrite and minium (a lead oxide) were found in Parker Creek. Minium and associated high lead concentrations also occur in a linear zone that parallels the trend of the McFadden fault. In the western part of the Salome Study Area near Oak Spring, anomalous molybdenum, tungsten, and lead values are suggestive of mineralized faults or fractures.

Uranium and thorium concentrations in -80 mesh stream-sediment samples appear to be related to resistate minerals (Negri and others, 1980). Known uranium deposits were not detected by the samples taken. Uranium in stream waters was low throughout most of the higher Sierra Ancha (Negri and others, 1980). Water samples from low elevations in the western part of the study area generally contained more uranium. Radon concentrations follow a similar pattern, but a single sample containing an anomalously high amount of radon came from Cienega Spring, south of McFadden Horse Mountain. With the exception of Cienega Spring, the water sample anomalies did not coincide with patterns of known uranium mineralization.

The proximity of a subsurface alkaline or very silicic granitic intrusion is suggested by the association of tin, tungsten, molybdenum, fluorspar, boron, and lead in the western Salome Creek area, the vicinity of Armer Mountain, and elsewhere west of the Salome Study Area. The presence of a deeply buried pluton beneath the central Sierra Ancha is further suggested by (1) the circular pattern of geochemical anomalies, (2) the alkalic silicic affinity of the elements, and (3) the unexpectedly low, roughly circular aeromagnetic signature of the central Sierra Ancha.

MINING DISTRICTS AND MINERALIZED AREAS

The Sierra Ancha Wilderness is in the Fluorine (or Sierra Ancha) mining district, and the Salome Study Area is in the Salome (or Sally Mae) mining district. More than 3,000 mining claims have been located in and around the Sierra Ancha Wilderness and Salome Study Area. Prospecting and mining activity have occurred sporadically over the past 100 years. The first known claims date back to the early 1880's and were probably staked on minor copper showings.

Uranium was first discovered in the Sierra Ancha area in 1950. From 1953 to 1960, 14 uranium mines in and near the Sierra Ancha Wilderness produced a total of 21,851 tons of ore containing an average grade of 0.24 percent U_3O_8. An additional 1,197 tons averaging 0.07 percent U_3O_8 was classified as "no pay ore." More than 80 percent of the production came from the Workman Creek and Red Bluff properties. Three uranium mines, the Big Buck, Donna Lee, and Horseshoe, are within the Wilderness. They accounted for 291 tons of ore averaging 0.14 percent U_3O_8 and 14 tons of "no-pay ore" averaging 0.09 percent U_3O_8 (Schwartz, 1957, p. 56). Many other uranium occurrences are known in the Wilderness and its vicinity (Light, 1981a). No uranium production has been reported from the Salome Study Area.

Uranium mining in the Sierra Ancha was curtailed in mid-1957 when the U.S. Atomic Energy Commission closed the Cutter ore-buying station, which had been opened 8 mi east of Globe in 1955. With increasing uranium prices, exploration activity resumed in the Sierra Ancha in the mid—1970's. Since then, exploration on several properties within a few miles of the Wilderness indicates that several million pounds of U_3O_8 may be present in deposits with grades of 0.20 percent U_3O_8 or less. Extensions of these deposits, or similar deposits, seem likely within the Wilderness.

Asbestos was first discovered in Gila County in 1872 (Melhase, 1925, p. 805). Most of the major asbestos properties in the Sierra Ancha were located between 1913 and 1920 (Wilson, 1928, p. 24). Stewart (1955, 1956) described the history, geology, and mine workings of the major asbestos properties in the Sierra Ancha mining district.

The only asbestos production within the Wilderness is from the Pueblo mine, sec. 22, T. 6 N., R. 14 E. No figures are available for the total production; however, the size of the workings indicates that at least a few hundred tons of fiber were produced. The Lucky Strike and Reynolds Falls mines lie outside the Wilderness north and southwest, respectively, of the Pueblo mine. Each of these two mines has produced several hundred tons of fiber. The American Ores mine, 1 mi west of the southwest corner of the Wilderness, produced several thousand tons of fiber.

Small deposits of iron ore are known in the Sierra Ancha Wilderness and adjacent areas. On the southern and eastern flanks of Zimmerman Point, magnetite crops out at an elevation of approximately 5,400 ft. The property was explored and evaluated by Cerro de Pasco Corporation from 1957 to 1960. The exploration work included geologic mapping, trenching, and drilling. Data from the Zimmerman Point deposit indicate approximately 15 million tons of ore with an average of 26.5 percent Fe (Cerro de Pasco Corp., written commun., 1979).

Magnetite also occurs in the steep eastern slope of Center Mountain at and above the Pueblo and Lucky Strike asbestos mines. The magnetite beds there are similar to those near Zimmerman Point; the deposits in both areas are locally irregular and discontinuous. Deposits at the Lucky Strike and Pueblo mines were reported to have been examined by Colorado Fuel and Iron, Inc. in the late 1950's and were estimated to contain approximately 6 million tons of ore averaging from 40 to 60 percent Fe (B. B. Kyle, oral commun., 1978).

Scattered occurrences of iron ore have been reported west of the Wilderness in the slopes of Baker, Carr, and Center Mountains (Harrer, 1964, p. 26). Hematite has been reported in small discontinuous bodies in the south-central part of the Sierra Ancha Wilderness between Coon Creek and Deep Creek Canyons (Harrer, 1964, p. 31-32).

Fluorspar was being mined in 1979 from the Mack mine located on the McFadden fault, about 1.5 mi west of the Wilderness and 1 mi north of the Salome Study Area. The mine began production in 1976, and produced approximately 30,000 tons of ore containing between 60 and 90 percent CaF_2 from 1976 to 1978 (V. Randolph, Western Fluorspar, Ltd., Phoenix, oral commun., 1979).

Several fluorspar prospects are located around the periphery of the Salome Study Area, but there has been no production. The fluorspar vein at the Oak Springs property averages 55 to 90 percent CaF_2; exploration and evaluation were still being conducted there in 1978.

Manganese occurs at the Sunset mine and the Rattlesnake prospect east of the Salome Study Area, in fault zones in brecciated Dripping Spring Quartzite. According to Farnham, Stewart, and DeLong (1961), the Sunset mine produced several tens of tons of manganese concentrates during World War II and 103.5 long tons of ore averaging 25.2 percent Mn during 1953 and 1954. The Rattlesnake prospect has had no production.

Minor occurrences of copper have been reported from upper Workman Creek (Woodie Nichols, oral commun., 1979) and have been observed at the Mack No. 8 claim, at the Gold Creek and Salome deposits, and at the Saguaro mine. Copper staining is also locally prevalent in the basalt that overlies the Mescal Limestone, especially in the area of Pueblo Canyon.

Anomalous concentrations of silver were obtained in samples from the Gold Creek deposit, Journigan mine, and Mack No. 8 claim. Lead minerals were observed at the Journigan mine, and barite at the Saguaro mine.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The mining history, results of recent mineral exploration, and the geologic, geochemical, and geophysical data acquired during this study suggest that the Sierra Ancha Wilderness has significant mineral potential. Within the Sierra Ancha Wilderness there is potential for deposits of uranium, asbestos, fluorspar, and iron. The Salome Study Area has very low potential for mineral deposits.

Uranium

The black facies of the upper member of the Dripping Spring Quartzite is the favored host for uranium deposits and underlies nearly all of the Sierra Ancha Wilderness. Diabase dikes and sills, which are related genetically to uranium mineralization, are close to the favored host rocks throughout the Wilderness. Therefore, most of the Sierra Ancha Wilderness is considered favorable for vein-type uranium deposits. Such deposits may occur at the surface or may be as deep as a few thousand feet where the host rock is deeply buried beneath the crest of the Sierra Ancha.

The majority of such deposits are likely to be small veins that would not contribute significantly to the overall uranium resources of the area. There are, however, several areas where large vein systems with associated stratabound mineralization are likely to be found in the Wilderness and adjacent areas. Such deposits are expected to range in grade from 0.01 to 0.30 percent U_3O_8 and in size from 100,000 pounds to 2.0 million pounds U_3O_8. The likely areas include extensions of favorable ground now being explored or developed and other areas where geologically favorable factors are present.

The potential for uranium resources is high in the Workman Creek area, including areas underlying Baker and Carr Mountains. The black facies underlying McFadden Horse Mountain also has high potential. Moderate potential exists for the following areas: (1) west of Cherry Creek along the Cherry Creek monocline; (2) in the upper Cherry Creek area adjacent to the northern part of the Wilderness; and (3) from Grantham Peak west to Asbestos Point.

Areas of low potential for uranium resources are: (1) the Pendleton Mesa area; (2) the central Sierra Ancha Wilderness from Center Mountain to Coon Creek Butte; (3) the Juniper Flat area; and (4) the Greenback Peak area.

The resource potential for uranium is low in the Salome Study Area. Although there are extensive areas of diabase in the Proterozoic Y section in that area, the black facies is not known there, and the only uranium occurrences in the Salome Study Area are near Greenback Peak.

Asbestos

There is significant potential for several asbestos deposits in the Wilderness. The projection of the discordant diabase-Mescal Limestone contact from the area of the Pueblo and Lucky Strike mines to the Reynolds Falls mine outlines a potentially favorable structural environment for large quantities of asbestos under Center Mountain. Potential for large asbestos deposits also exists in Mescal Limestone in the area of Asbestos Point and Zimmerman Point in the southwest corner of the Wilderness. Favorable areas underlying Center Mountain and near Zimmerman Point have a potential for a few deposits each containing 1,000 to 10,000 tons of asbestos.

Additional areas within or bordering the Wilderness are geologically favorable for smaller asbestos deposits. These include outcrops of Mescal Limestone (1) along Coon Creek 1 mi north of Coon Creek Butte, (2) northeast of Center Mountain, and (3) partly in the Wilderness east of Juniper Flat. In areas adjoining the Wilderness, much of upper Cherry Creek is favorable for asbestos mineralization, and there may be several small deposits of as much as 500 tons each.

Because no exposures of the Mescal Limestone are known in the Salome Study Area, that area has no potential for deposits of asbestos.

Iron

Moderate to low potential exists for iron resources in the Wilderness adjacent to the Zimmerman Point and the Lucky Strike-Pueblo deposits and under Baker Mountain. Other very small iron deposits may occur locally throughout the Wilderness and vicinity, wherever Mescal Limestone has been intruded by diabase. These are not likely to contribute significantly to the iron resources of the area.

The Salome Study Area has no potential for iron deposits, because the Mescal Limestone is missing.

Fluorspar

There is moderate potential for fluorspar deposits at depth along the McFadden fault where it extends into the Wilderness. Drilling along the McFadden fault, east of the Mack mine and within 1 mi of the Wilderness, has established reserves of over 300,000 tons (Victor Randolph, Western Fluorspar, Ltd., oral commun., 1979).

Fluorspar resources may be present near Oak Spring, in the western part of the Salome Study Area.

Manganese

The potential for manganese in the area is very low. Probably the greatest potential is at the Sunset mine, which, according to Dorr (1969), has manganese resources of less than 1,000 long tons at a grade of less than 10 percent Mn.

Other resources

Stream-sediment data indicate that no major deposits of metals or commodities, other than those discussed above, are exposed at the surface (Barton and others, 1980; Tripp and others, 1980). However, the geology and the geochemical, aeromagnetic, and gravity data suggest that there is potential for tin-tungsten-molybdenum mineralization that may be related to one or more alkalic granitic plutons.

Concentrations of copper, silver, and lead occur, either individually or together, at the Mack No. 8 claim, at the Gold Creek and Salome deposits, and at the Saguaro and Journigan mines. All these occurrences are irregular and discontinuous. Possible production of metals from these properties is not expected to contribute significantly to the mineral resource potential of the Sierra Ancha Wilderness or Salome Study Area.

Some potential exists for barite west of the Salome Study Area. Barite occurs as hydrothermal concentrations in Tertiary faults at the Saguaro mine 3 mi west of the Salome Study Area, and a select sample of the dump material contained 51.1 percent barium.

The Sierra Ancha Wilderness and Salome Study Area contain large quantities of sand and gravel, stone suitable for crushed rock, and limestone for making lime and possibly cement. However, similar and larger deposits outside the Wilderness and Salome Study Area are closer to major population centers and more readily available.

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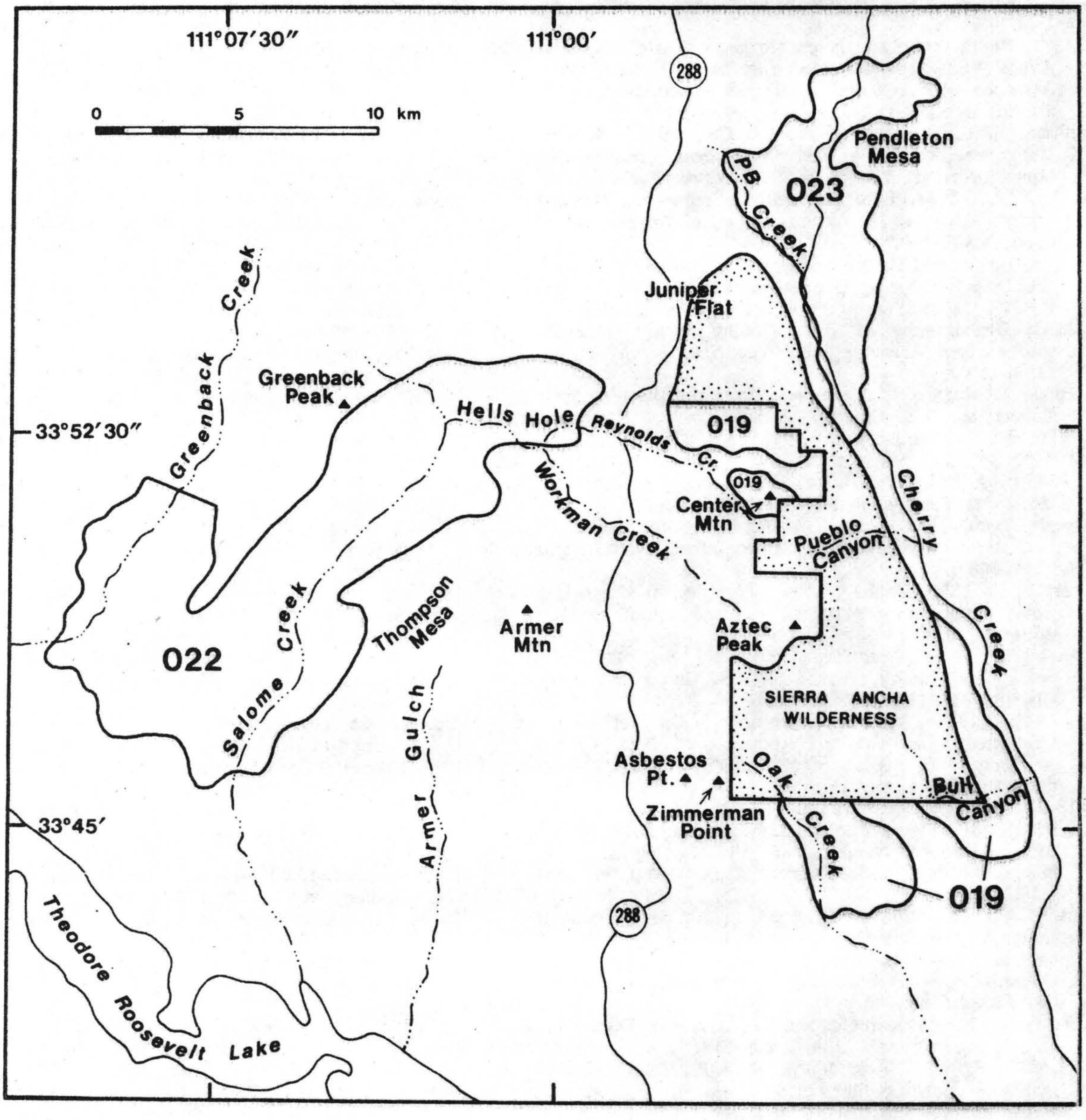

Figure 1.--Map showing location of Sierra Ancha Wilderness, Salome Study Area (022), Sierra Ancha Contiguous Areas (019), and Cherry[2] Creek Area (023), Gila County, Ariz.