UNITED STATES DEPARTMENT OF THE INTERIOR

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A POTENTIAL RESOURCE TARGET IDENTIFIED IN THE HOOVER WILDERNESS AND ADJOINING RARE II STUDY AREAS, CALIFORNIA

By

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This report is preliminary and
has not been reviewed for conformity
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editorial standards.

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E. W. Tooker[1], G. F. Brem[2], M. A. Chaffee[3], and Donald Plouff[1]

INTRODUCTION

In the course of evaluating the geologic evidence for potential mineral resource occurrence in the Hoover Wilderness, we have identified a potential resource target area located north of Mt. Emma, 23 km west of Bridgeport, Calif., near the eastern margin of the Sierra Nevada. Our conclusion is based on the convergence of data from geologic mapping, geochemical studies, and the geophysical investigations. The potential mineral target is not exposed at the surface, however, and will require additional detailed geologic studies and subsurface exploration to define its extent and mineral values, if any. The U. S. Bureau of Mines reports no mineral claims in the area.

The target is centered on an altered zone located along the northern border of the Hoover Wilderness (fig. 1) and lies mostly within the adjoining RARE II (4-664) study area. The altered zone (fig. 2) is an east-trending belt nearly 3.2 km long and 1.6 km wide, which crosses the unnamed north-trending ridge along the common edge of the Sonora Pass and Fales Hot Spring quadrangles. The zone was mapped in the Fales Hot spring quadrangle, but also extends an unknown distance into the Sonora Pass quadrangle. Geochemical results suggest that the target area may be somewhat larger than the alteration zone shown in figures 2 and 3.

The main previous mining activity in the Hoover Wilderness and adjacent region for gold, silver, base metals, and tungsten was in the Lundy Canyon area at the southern end of the Wilderness. The metals were recovered from late Paleozoic and (or) Mesozoic metamorphic wallrocks and Mesozoic plutonic rocks. Tungsten was also recovered from roof pendant skarn zones in the upper Cherry Creek drainage, in the westernmost study area. Uranium occurring in volcanic host rocks was mined in the Sonora Pass region (Rapp, 1981), west of the Mt. Emma area, and precious metals are known to occur in the Sweetwater Mountain and Bodie Hills, to the east and southeast of the target area.

The investigation of the Hoover Wilderness and adjoining study areas was made in compliance with provisions of the Wilderness Act (Public Law 88-577, Sept. 3, 1964). The objective was to make a resource evaluation of known deposits and prospects, mainly by the U.S. Bureau of Mines, and of geologically viable potential mineral resource occurrences, by the U.S. Geological Survey. A more detailed assessment report including a summary mineral evaluation of the Wilderness area is in preparation; the present statement is made in advance of that more comprehensive paper.

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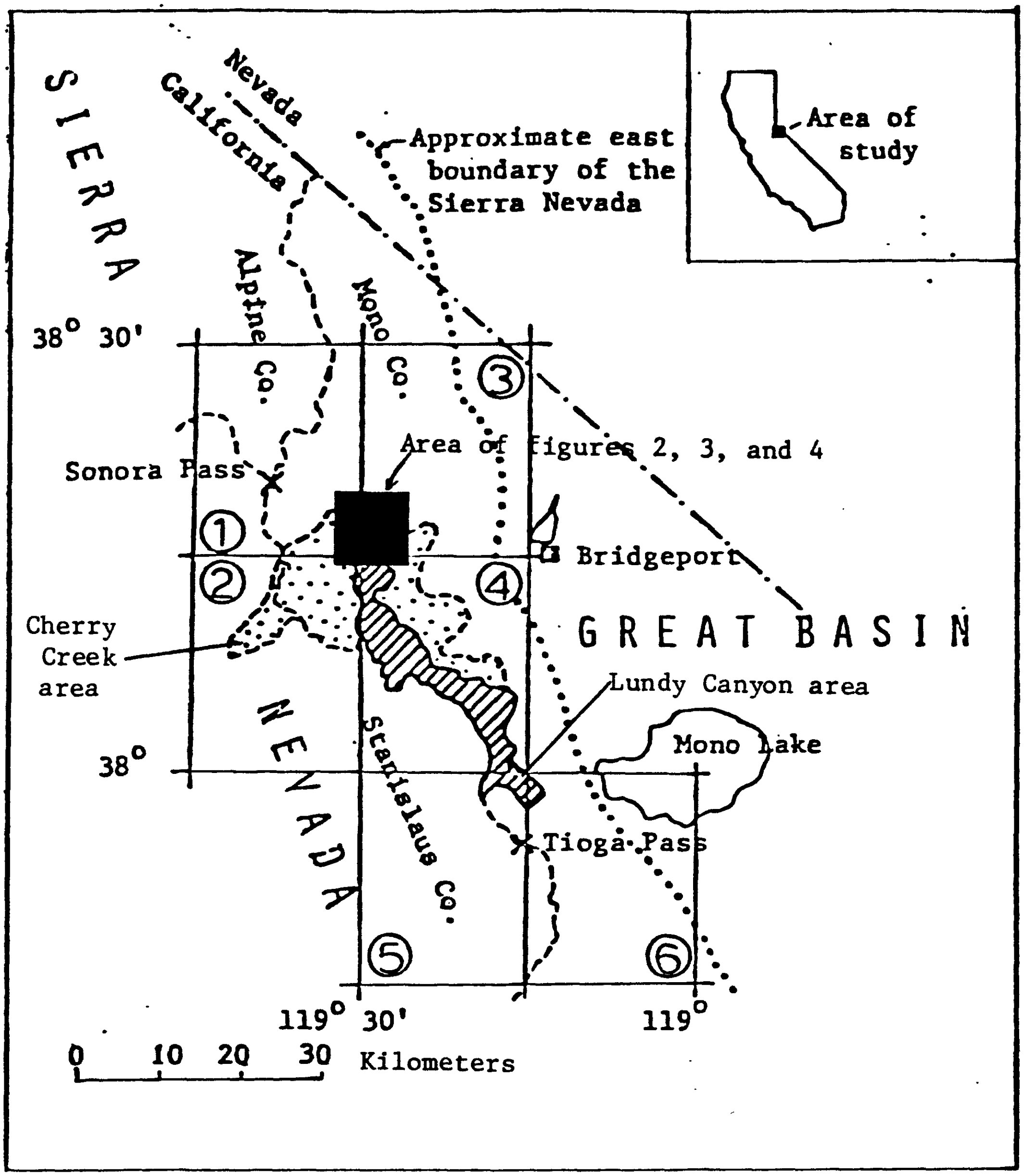

Figure 1.--Index map showing the locations of the Hoover Wilderness (lined), RARE II study areas (stippled), and the area of figures 2, 3, and 4. Numbers locate 15-minute quadrangle: 1. Sonora Pass, Calif., 2. Tower Peak, Calif., 3. Fales Hot Springs, Calif.-Nev., 4. Matterhorn Peak, Calif., and 6. Mono Craters, Calif.

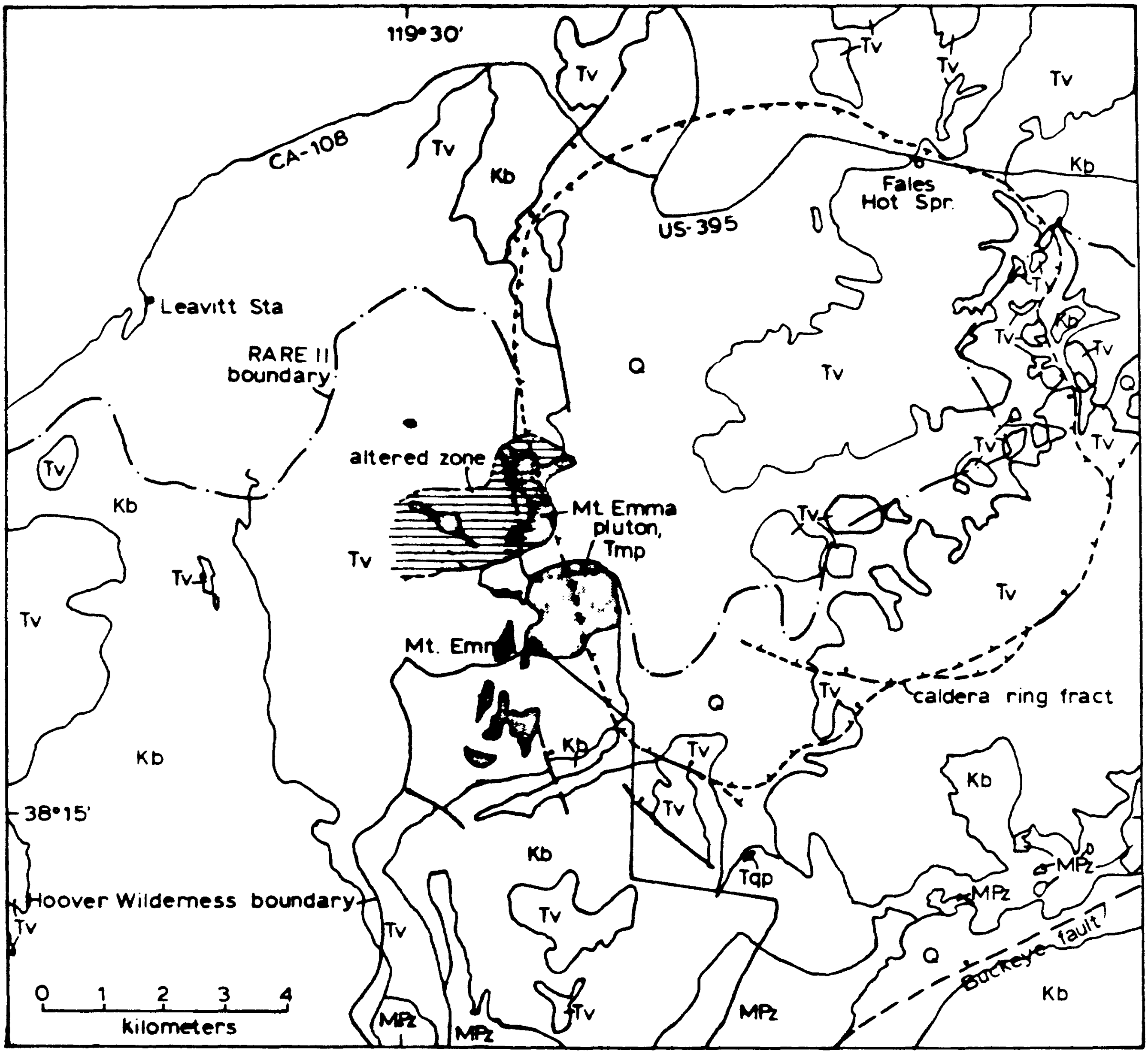

Figure 2.--Generalized geologic map of the Mt. Emma area showing major formational units and structures, abstracted from G. F. Brem (written commun., 1981) and Keith and Seitz, 1981). Q, Quaternary unconsolidated glacial and alluvial deposits; Tv, Tertiary volcanic rocks, undivided; Tmp, Tertiary hypabyssal granodioritic (Mt. Emma) pluton (stipple); hydrothermally altered plutonic and volcanic rocks (lined); Tqp, Tertiary pluglike quartz body; Kb, Cretaceous batholithic rocks, undivided; and MPz, Mesozoic-Paleozoic metamorphosed roof pendant rocks, undivided.

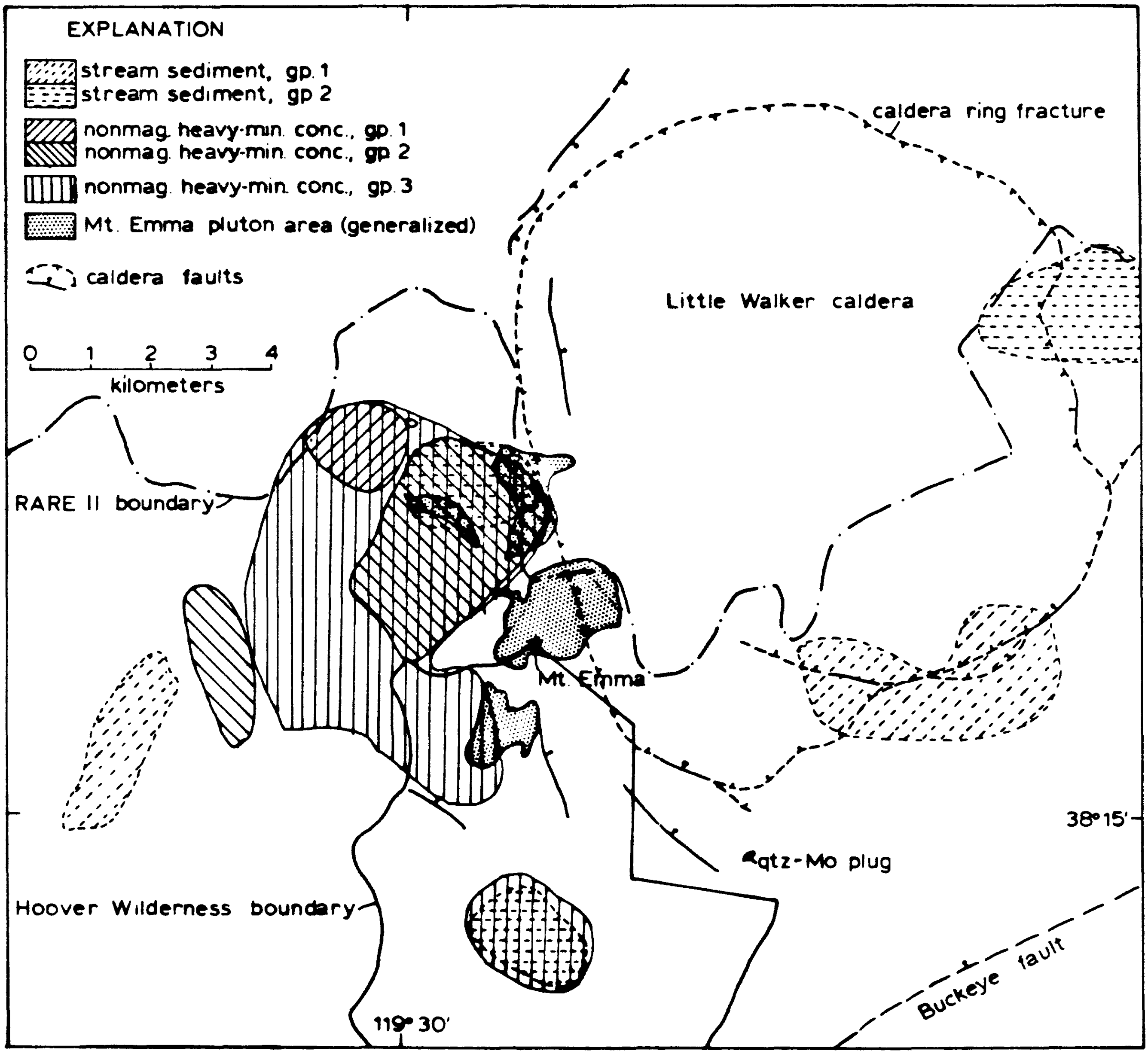

Figure 3.--Geochemical anomaly map of the Mt. Emma area showing the main types of stream basin anomaly areas in the vicinity of the Mt. Emma pluton, abstracted from M. A. Chaffee (written commun., 1981). Stream sediments: Group 1 (probably mineralization related) elements include Ag, Cu, Pb, Zn, Cd, As; Group 2 (possibly mineralization related) elements include Sb, Bi, B, Mo, W, Ba. Nonmagmatic heavy-mineral concentrates: Group 1 elements include Ag, Au, Cu, Pb, As, W; Group elements include B, Mo, Sn; Group 3 (hydrothermal alteration related) elements include Ba, Fe.

This brief information report, by the Geological Survey, is based on analysis of the geologic possibilities for this potential resource target. The data presented in figures 2, 3, and 4, have been abstracted from manuscript maps and reports now being prepared for publication. G. F. Brem's detailed map of the Fales Hot Springs quadrangle (G. F. Brem, written commun., 1981) is the source of information about the Little Walker caldera, the Mt. Emma pluton, and its associated alteration. The regional geologic setting for the target area is shown on the map of Keith and Seitz (1981). The geochemical anomalies are from maps prepared by M. A. Chaffee (M. A. Chaffee, written commun., 1981) and based on analyses of rock, stream-sediment, and nonmagnetic heavy-mineral concentrate samples. The analytical data are available in an open-file report by Chaffee and others (1980). The geophysical data are from maps of magnetic intensity and gravity anomalies by Donald Plouff (Donald Plouff, written commun., 1981) based on his current field studies as well as reports by Robbins and Oliver (1976), Oliver (1977), and U.S. Geological Survey (1979).

GEOLOGIC SETTING OF THE TARGET AREA

The Mt. Emma area lies on or near the inferred boundary between the Sierra Nevada and adjoining Basin and Range geologic provinces. This is a region of complex plutonic and volcanic activity that has been described by Bateman and Wahrhaftig (1966) and Slemmons (1966). Numerous late Mesozoic dominantly granitic plutons forming the Sierra Nevada composite batholith intruded folded, faulted, and sheared late Paleozoic to middle Mesozoic metavolcanic and metasedimentary rocks.

Following unroofing of the batholith, extensive middle to late Tertiary volcanic eruptions formed the late Miocene Little Walker center (Noble and others, 1974). Caldera collapse and infilling was followed by several periods of volcanism from vents along the ring fracture zone. A series of dikes and subvolcanic intrusions were also emplaced beneath a now eroded stratovolcano that was constructed above ring fracture zone vents at the present site of Mt. Emma and the ridge to the north and south.

Hydrothermal alteration preceded and followed intrusion of the Mt. Emma pluton. The entire ridge has undergone pervasive propylitic alteration. Intense argillic alteration and pyritization of porous pyroclastic rocks, subsequently oxidized, has resulted in bleaching the rocks to an orange-yellow hue primarily in the area shown in figure 2. Brem has mapped the zone in the Fales Hot Spring quadangle, but the extent of the zone in the Sonora Pass quadrangle is not known.

DEFINITION OF THE RESOURCE TARGET

Two areas within the Hoover Wilderness associated with superimposed geochemical and geophysical anomalies and favorable geologic characteristics. One is the well-known Lundy Canyon area, the second is the area immediately west of Mt. Emma, an area of no known mineral occurrence. The geologic evidence on which evaluation of the Mt. Emma area is based is summarized in figures 2, 3, and 4; it includes the following data: (1) A prominent argillic-pyritic altered zone in pyroclastic rocks that locally overlie propylitized Mt. Emma hypabyssal granodioritic pluton. Sparse amounts of molybdenite occur locally along Molybdenite Creek, southeast of Mt. Emma.

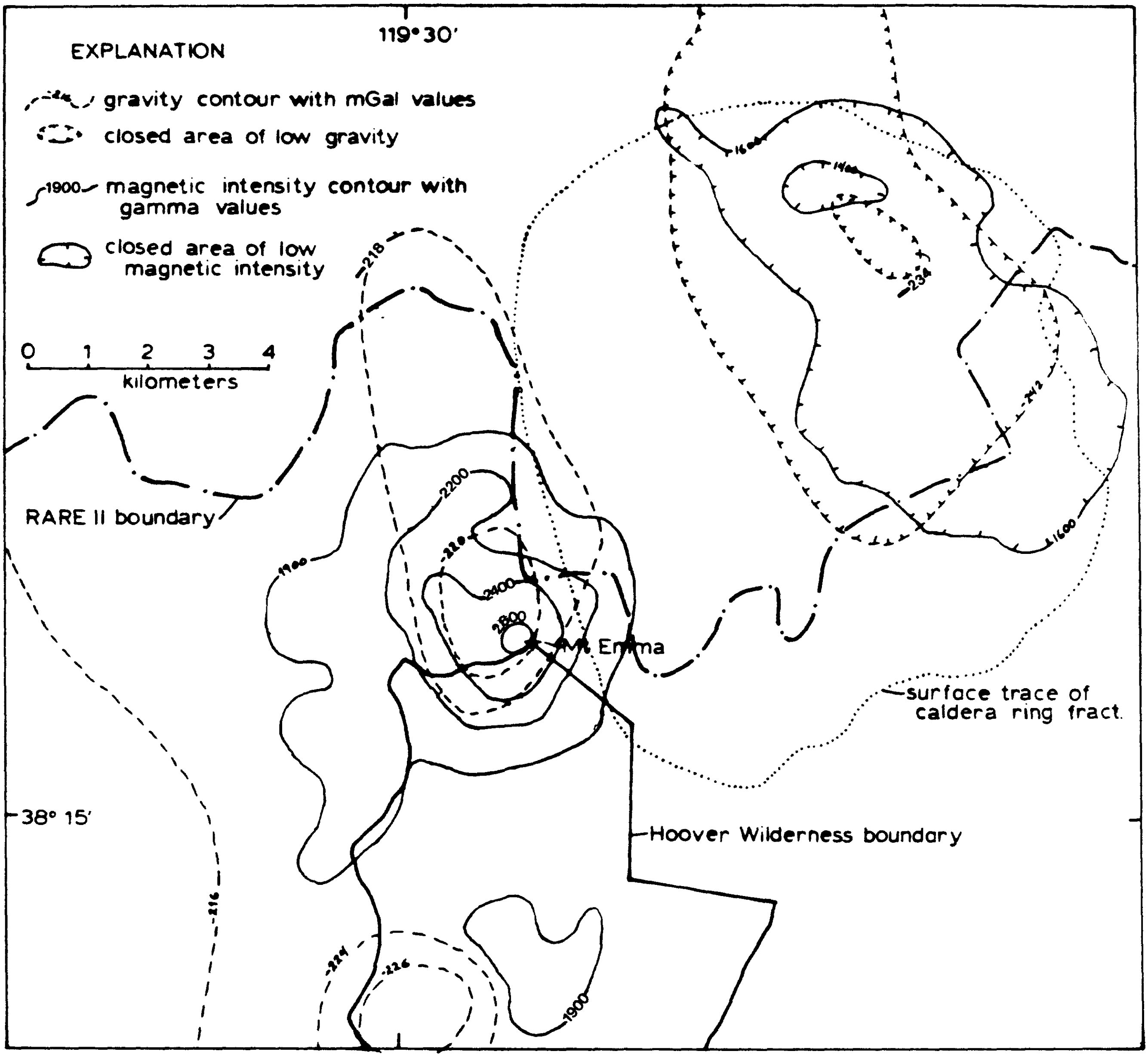

Figure 4.--Generalized geophysical map of the Mt. Emma area showing gravity and magnetic intensity anomalies. The selected gravity and magnetic intensity contours shown with values exposed in milligals (mGal) and gammas, respectively, were abstracted from Donald Plouff (written commun., 1981).

(2) Moderately anomalous concentrations of copper, lead, silver, boron, tungsten, molybdenum, and other metals that are commonly associated with disseminations in fractured subvolcanic plutons occur in both the stream-sediment and nonmagnetic heavy-mineral-concentrate samples from stream drainage basins in the altered zone. (3) A strong positive aeromagnetic intensity anomaly and a weak positive gravity anomaly overlie the Mt. Emma pluton, and strong negative magnetic and gravity anomalies occur over the Little Walker caldera structure. These data confirm the geologic caldera setting and help define the subsurface extent of the target.

Whether the Mt. Emma target represents the altered cap of a buried porphyry- or vein-type copper or molybdenum system remains to be determined from more detailed geologic studies and subsurface exploration. The coincidence of geologic indicators and the fact that this type of deposit would not be unique to the area, prompted our making this information now. The Yerington, Nev., copper deposit is about 72 air kilometers north-northeast of Mt. Emma. Also, known mineralized regions in the Sweetwater Mountains and Bodie Hills lie immediately northeast of the Little Walker caldera. Most known porphyry systems in the region are of Mesozoic age. If substantiated, this occurrence would represent the first of Tertiary age, and be a potentially significant extension of the occurrence model for such deposits.

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