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Grayhouse Area, Amador County, California

By George R. Heyl
1945

INTRODUCTION

Location

The Grayhouse area is located in southwestern Amador County, the southern boundary of the area being the Mokelumne River, which is the county line. It lies in secs. 28 and 33, T. 5 N., R. 10 E., Mount Diablo base and meridian.

The Grayhouse area lies to the north of the Penn Mine area, described in a previous report;[1/] it includes the northward extension of the belt containing the Penn mine mineralization.

1/ Heyl, G. R., Cox, M. W., and Eric, J. H., Copper-zinc deposits of the Penn mine, Calaveras County, California: Open-file report, U. S. Geological Survey.

The area is accessible by the surfaced county road which crosses its central portion, and connects Buena Vista on the north with Lancha Plana to the southwest.

Topography and drainage

The area is at the western edge of the Sierra Nevada foothills, where the metamorphic rocks of this range are overlapped by the Tertiary sediments of the San Joaquin Valley. Maximum relief within the area is approximately 360 feet. The Mokelumne River, a trunk stream of the western slope of the Sierra Nevada, forms a canyon along the

southern border of the area. The chief subsidiary streams are Barnett Gulch and East China Gulch, both tributaries of the river.

Ownership and development

The area mapped covers portions of the properties owned by L. W. Thayer of San Francisco, by H. G. Kreth of Amador County, and by Charles G. Patmon of Lockford, California.

The Grayhouse mine lies in the central portion of the area. Because the mine is now filled with water, the underground workings were inaccessible to the writer. The mine is reported by L. W. Thayer 2/ to have

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2/ Thayer, L. W., Personal communication.

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been last active in 1907, and to consist of a 250-foot shaft, with levels at 40, 200, and 240 feet. He also states that the 40-foot level consists of a drift extending 50 feet northward from the shaft; that the 200-foot level consists of a crosscut extending 210 feet eastward and 30 feet westward from the shaft; and that the 240-foot level consists of a crosscut and drift that extend about 700 feet northwestward.

In addition to the Grayhouse mine, there are prospect shafts, adits, pits, and trenches in other parts of the area; the locations of these are shown on the map.

In 1943 the U. S. Bureau of Mines drilled an 833-foot diamond-drill hole in the area; its location is indicated on the map. The hole was pointed S. 75° W., at an angle of -45°.

Field work and acknowledgments

The topography of the area was mapped by M. W. Cox, D. G. Wyant, and M. H. Staatz. Triangulation points were established by M. H. Staatz and M. W. Cox, by extending the Penn Mine system northward.

The writer is responsible for the geologic mapping of that portion of the area northward from the latitude of Grayhouse. M. H. Staatz is responsible for the geologic mapping southward from Grayhouse. Along the north shore of the Mokelumne River, M. H. Staatz and the writer have both contributed to the mapping.

The writer wishes to acknowledge the many courtesies and information received from Mr. L. W. Thayer. Mr. J. B. Hadley assisted the writer in logging drill-core.

STRATIGRAPHY

General features

Other than those of Quaternary age, the rocks exposed within the area fall within two major divisions, namely, the flat-lying beds of Tertiary age, and the steeply dipping low-grade metamorphic rocks of probable Jurassic age. The Tertiary strata lie unconformably on the older rocks, which are intensely weathered adjacent to this contact.

Tertiary rocks

The Tertiary rocks which cover much of the northern half of the area have been correlated by Turner,[3/] with the Ione formation. The

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3/ Turner, H. W., U. S. Geological Survey Atlas, Jackson folio (No. 11), 1894.

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rocks include ill-sorted conglomerate cemented with red clay; gravel with white quartz, felsite, fine-grained sandstone, and other pebbles; limonite-cemented sandstone; pale-gray, fine-grained sandstone and siltstone; white and buff mudstone; and limonite rock. To the south

these strata are replaced by white quartz gravels, generally auriferous, which Turner [4] considered to have been deposited by rivers flowing into

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4/ Turner, H. W., op. cit.

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the Ione sea.

Jurassic rocks

The older rocks are predominantly volcanics, which on the basis of their lithology are tentatively correlated with the Amador group [5] of

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5/ Taliaferro, N. L., Geologic history and correlation of the Jurassic of southwestern Oregon and California: Geol. Soc. America Bull., vol. 53, pp. 89-90, 1942.

Upper and possibly Middle Jurassic age. Within the area this group is a sequence of felsitic, dacitic, andesitic, and basaltic pyroclastics and flows, with the intermediate and felsic rocks predominating; these are metamorphosed to low-grade schists and greenstone. They form a portion of the stratigraphic section described in the Penn mine report.[6]

6/ Heyl, G. R., Cox, M. W., and Eric, J. H., op. cit.

Because of the relation of the volcanic rocks to the younger Mariposa slate lying to the westward, because of the lithologic similarities of these volcanics to those of the type section of Taliaferro's Amador, and because graded bedding observed in the Penn mine area indicates tops

to the west, it is believed that the local stratigraphic section is overturned, i.e., its top is to the west.

Since there is a dearth of good exposures in most parts of the Grayhouse area, no attempt has been made to differentiate stratigraphic units within the Amador group, except for a prominent metabasalt zone (Jab) cropping out in the eastern part of the area. This zone ranges in thickness from 400 to 500 feet. It is made up of medium to dark green chlorite and chlorite-epidote schists and greenstones, probably derived from basaltic lavas. These weather to shades of darker green or brown except under the Tertiary beds where they are weathered to pale green or brown, buff, or white. In many places abundant flecks of dark-green chlorite are present, which may represent former phenocrysts. Locally amygdules of quartz or calcite are abundant.

Much of this metabasalt zone (Jab) shows well-developed pillow structure, with interstitial cherty material, red jasper, or epidote-quartz rock. Gash jointing on the surfaces of the pillows is common. The pillows are generally flattened parallel to the schistosity, and in extreme cases the original structures may be almost entirely obliterated.

Zones of crystal tuff have been differentiated at several places. These are made up of light-colored, commonly feldspathic tuffs, containing subhedral quartz crystals and fragments of quartz. In places stratification is evident. These zones are generally quite local in their extent.

INTRUSIVE ROCKS

The intrusive rocks present within the area are quartz porphyry, and felsite, similar to those occurring in the adjoining Penn mine area.

For detailed descriptions of these rocks the reader is referred to the Penn mine report.7/

7/ Heyl, G. R., Cox, M. W., and Eric, J. H., op. cit.

These intrusive rocks have a schistosity, in many places strongly developed, that is in general parallel to the foliation of the enclosing volcanic rocks, which would indicate they antedate the regional orogeny. It is possible they are slightly later manifestations of Amador vulcanism, for the fine-grained character of the intrusive felsite suggests emplacement at shallow depth, before a thick section had accumulated.

ROCK ALTERATION AND QUARTZ VEINS

Hydrothermal alteration

Crossing the Grayhouse area in a direction approximately parallel to the strike is a belt characterized by discontinuous zones and lenticular areas of sericitization, silicification, and pyritization. The southernmost of these zones is the northern continuation of the Hecla alteration zone of the Penn mine area. The zones to the northward, in a general way, are offset en echelon to the eastward, similar to a certain degree to the pattern of the Jean alteration zone of the Penn mine area.

Sericitization is the most widespread of these types of alteration, and in most cases seems to be restricted to felsitic volcanic rocks or to quartz porphyry. Transition from unaltered to altered rock is gradual, and the more intensely altered rock generally has the more strongly developed schistosity. Locally silicification becomes

important, the introduced silica being whitish cryptocrystalline quartz developed as folia parallel to the schistosity.

At certain places within these alteration zones streaks of schist a fraction of an inch in thickness to bands several feet wide are impregnated with disseminated pyrite. On some of these gossans have developed, the locations of which are shown on the map.

At two localities, both indicated on the map, the weathered green schists contain abundant nodules and streaks of limonite. Because in both these cases the present surface lies only a short distance beneath the Jurassic-Tertiary unconformity developed during a period of intense weathering, it seems possible the limonite has resulted from the oxidation of pyrite which may have an origin distinct from that occurring within the alteration zones.

Quartz veins

Veins of milky quartz are common in the area, especially within or adjacent to the alteration zones. In general these strike approximately parallel to the schistosity of the enclosing rock, and have a steep dip either to the eastward or the westward. The veins range in thickness from a fraction of an inch to four feet, and the larger ones commonly show a pronounced transverse parting or jointing. In some cases small amounts of epidote and calcite are present in these veins.

STRUCTURE

Schistosity and lineation

Schistosity may be discerned in almost all the types of rocks of the older or Jurassic strata. In general it has a northwest strike, and in most places a steep easterly dip. In the northernmost part of the area westerly dips are not uncommon. Bedding, which was observed only

in the southern part of the area, may dip less steeply or more steeply than the schistosity. Lineation developed on schistosity has a plunge close to the dip direction.

Folds

Folds in beds were observed in Barnett Gulch about 450 feet upstream from its mouth. These folds, illustrated in the accompanying sketch, are delineated by red jasper beds in green schist derived from pyroclastics. The folds, which are developed in steeply-dipping beds, have amplitudes ranging from 1 to 6 feet and plunge northward at angles ranging from 78° to 84°. Most of them are overturned, with their axial planes dipping eastward at high angles, approximately parallel to the plunge of the folds.

It seems likely that other folds of similar character are present elsewhere in the area, but have probably not been recognized because of lack of favorable exposures.

Faults

Three types of faults were observed within the area. These are (1) east-dipping, high-angle strike faults; (2) relatively low-angle reverse faults that strike between N. 50° W., and north, and dip east 25°—50°; and (3) high-angle faults that strike northeastward. These types are similar to those observed in the Penn mine area to the south, where the first two types have been significant in the control of ore deposition. The low-angle reverse faults, generally with small apparent displacements, are particularly numerous within the alteration zones; in most cases reverse drag on the schistosity is quite evident.

EXPLANATION

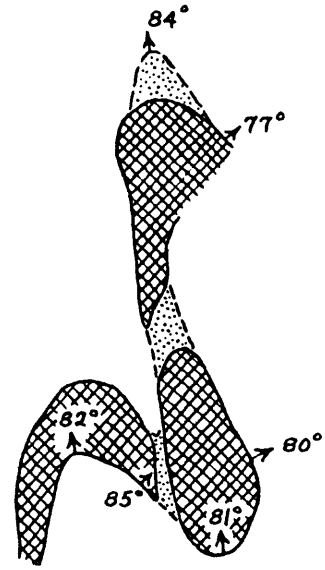
- Red Jasper
- Crushed Jasper in Green Schist
- Green Schist and Concealed Areas
- Attitude of Bed — 78°

Feet

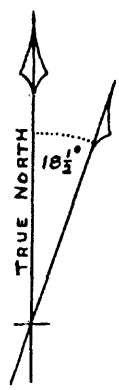
0 1 2 3 4 5 6

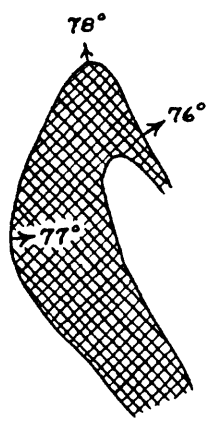
Scale Approximate

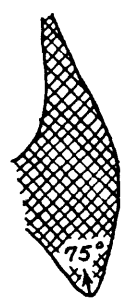
View is in Plan

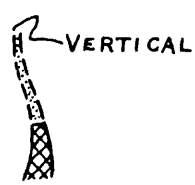


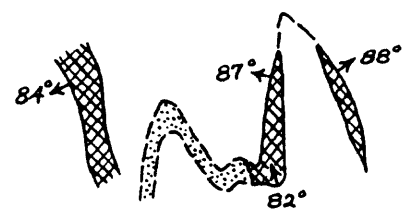
Lineation is Parallel to Plunge











FIELD SKETCH

FOLDS IN BARNETT GULCH

GRAYHOUSE AREA
AMADOR COUNTY
CALIFORNIA

U.S. GEOLOGICAL SURVEY

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MINERALIZATION

The gossans observed in the area in every case are located within the zones of alteration. Their position is indicated on the accompanying map. Two of the more prominent areas of gossan are those exposed in the inlier of schist from 600 to 700 feet westward of the collar of the Bureau of Mines diamond drill hole, and the one in Barnett Gulch about 350 feet upstream from its mouth.

In color the gossans range from shades of red brown to dark brown. This suggests, by analogy with the neighboring Penn mine gossans, together with the cubical character of many of the voids, that they were derived from predominantly pyritic material.

Judging from the composition of the mine dump, the Grayhouse shaft and connecting workings have apparently explored one of the more heavily mineralized portions of the alteration zones. The dump is made up mainly of sericite schist, some of it carrying disseminated pyrite, together with lesser amounts of strongly silicified schist that carries abundant disseminated pyrite. Also present in small amounts are pieces of heavy sulphides, consisting of an intimate mixture of pyrite, sphalerite, and chalcopyrite; a selected sample of this material, collected by L. W. Thayer and assayed by Abbot A. Hanks, Inc., of San Francisco, contained 7.83% copper, 14.04% zinc, 0.22 oz/ton gold, and 11.48 oz/ton silver.[8/] A few specimens of tetrahedrite in milky quartz may be found in the dump.

8/ Thayer, L. W., Personal communication.

L. W. Thayer [9] states that in driving the shafts, drifts, and

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9/ Thayer, L. W., Personal communication.

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crosscuts of the mine, an occasional nodule of heavy sulphide was encountered. According to Aubury,[10] in this mine "the ore is sulphide

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10/ Aubury, L. E., The copper resources of California: California Min. Bur. Bull., vol. 50, p. 225, 1908.

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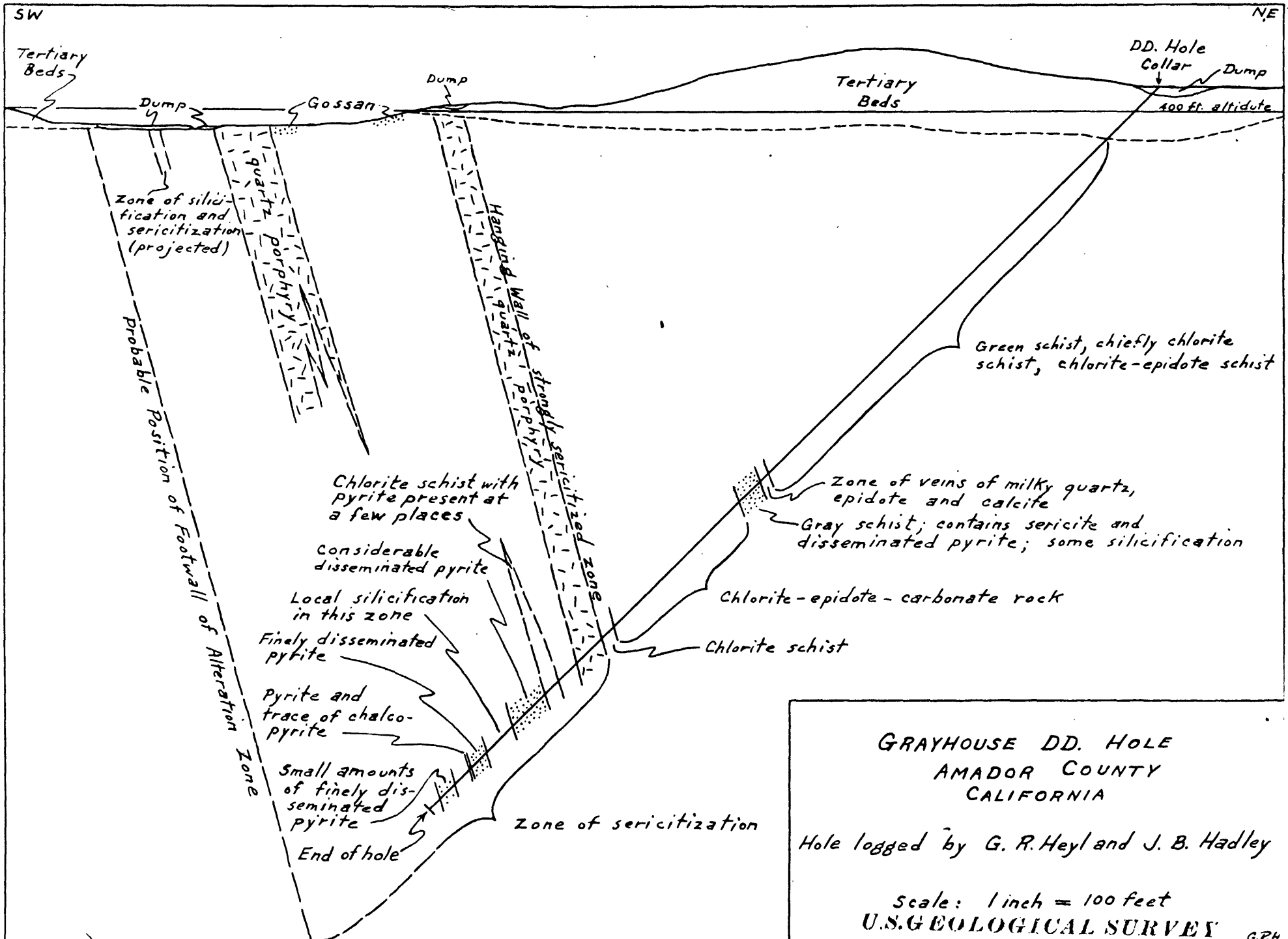
below and carbonate above."

In 1943 the U. S. Bureau of Mines drilled an 833-foot hole at an inclination of 45° under one of the more prominent gossans in the northern part of the area; a section drawn through this hole accompanies this report.

This diamond-drill hole intersected the hanging wall of the alteration zone at 635 feet, and did not extend to the footwall of the zone. It penetrated several intervals of schist carrying disseminated pyrite, and a one-foot thickness (at 787-788 feet) of non-schistose, siliceous rock containing disseminated pyrite and traces of chalcopyrite. No commercial ore was intersected by the hole.



GRAYHOUSE DD. HOLE
AMADOR COUNTY
CALIFORNIA

Hole logged by G. R. Heyl and J. B. Hadley

Scale: 1 inch = 100 feet

U.S. GEOLOGICAL SURVEY

G.R.H

UNITED STATES DEPARTMENT OF THE INTERIOR
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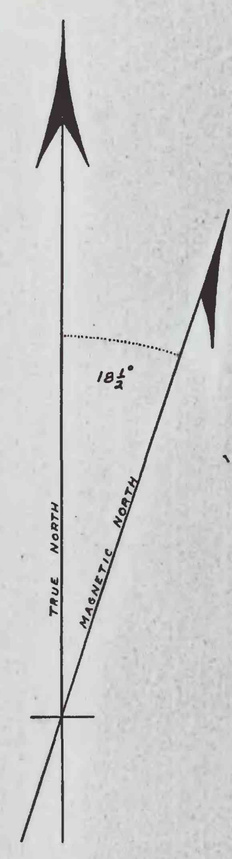
STRATEGIC MINERALS INVESTIGATIONS
PRELIMINARY MAP



SCALE IN FEET

200 100 0 200 400 600 800

1 inch = 200 feet

Contour interval is 10 feet

Datum is sea level

Coordinates refer to Penn mine area triangulation system

EXPLANATION

Sedimentary and Volcanic Rocks

Quaternary

- Qal — Alluvium
- Qt — Terrace gravel, sand, and volcanic ash

Tertiary

- Tg — Gravel, sandstone, mudstone, and limonite rock

Unconformity

Jurassic

- Ja — Amador group, low-grade metamorphosed volcanics
- Quartz crystal tuff
- Jab — Meta-basalt, including pillow lava

Intrusive Rocks

- Felsite
- Quartz porphyry breccia
- qp — Quartz porphyry

Altered Rocks

- sil — Silicified rock
- Sericitized, silicified rock
- ser — Sericitized rock

Miscellaneous Rocks

- go — Gossan
- q — Quartz veins

Special Symbols

- Geologic contact, observed, inferred, concealed
- Fault, with dip, observed, inferred
- Attitude of bed
- Attitude of schistosity, plunge of lineation
- Vertical schistosity
- Dip of quartz vein
- Shaft
- Adit
- Pit and dump
- Trench
- Building
- Triangulation point

GRAYHOUSE AREA
AMADOR COUNTY
CALIFORNIA

Geology by G.R. Heyl and M.H. Staatz

Topography by M.W. Cox, D.G. Wyant, and M.H. Staatz

Triangulation by M.H. Staatz and M.W. Cox