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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

# Preliminary geologic and geochemical maps of the Buckhorn mine area, Eureka County, Nevada

By John D. Wells and James E. Elliott

Open-file report

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# PRELIMINARY GEOLOGIC AND GEOCHEMICAL MAPS

# OF THE BUCKHORN MINE AREA,

# EUREKA COUNTY, NEVADA

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## INTRODUCTION

The geologic and geochemical maps of the Buckhorn mine area were prepared as part of the Heavy Metals Program of the U.S. Geological Survey. Field work was done in 1966 and 1967 with assistance from Robert D. Lupe and Robert P. Moragne. Chemical and spectrographic analyses were done by G. H. Van Sickle, T. G. Ging, Jr., E. L. Mosier, H. G. Neiman, V. D. James, H. D. King, A. J. Toevs, T. A. Roemer, S. K. McDonal, E. G. Martinez, S. I. Hoffmann, R. L. Marshall, and J. M. Matooka.

## GEOLOGY

The Buckhorn mine area is in unsurveyed sec. 31, T. 27 N., R. 49 E., Eureka County, Nev., in the northwest part of the Horse Creek quadrangle on the east flank of the southern Cortez Mountains (fig. 1). This area lies just east of the Cortez quadrangle, the geology of which was described by Gilluly and Masursky (1965). The description is pertinent to the Buckhorn area as well. A description of the mine has been compiled by Roberts, Montgomery, and Lehner (1967).

Rocks in the Buckhorn area consist of a series of Pliocene basaltic andesite flows that overlie Tertiary sedimentary rocks (fig. 2). The mineralized area is along three faults that trend N. 10° W. The Tertiary sedimentary rocks are exposed along a horst that is cut by a medial fault (figs. 3, 4, and 5). They consist, in descending order, of laminated bedded chert, tuffaceous sandstone (possibly interbedded with the chert), sandstone, and conglomerate. The sandstone and conglomerate are tightly cemented by silica. These rocks dip 10°-35° E., are locally deformed, and are intruded by vesicular basalt that is altered and silicified. Some of the basalt near the medial fault zone has been altered to pure white kaolin. The altered rock grades from kaolin through white swelling clay, brown swelling clay (montmorillonite), and partially altered basalt to fresh basalt.

Resistivity soundings by Charles Zablocki and associates of the U.S. Geological Survey indicate that the basaltic rocks are about 350 to 400 feet thick in the Buckhorn area. Eight flow units have been recognized by Gilluly and Masursky (1965) where the basalt and underlying gravels

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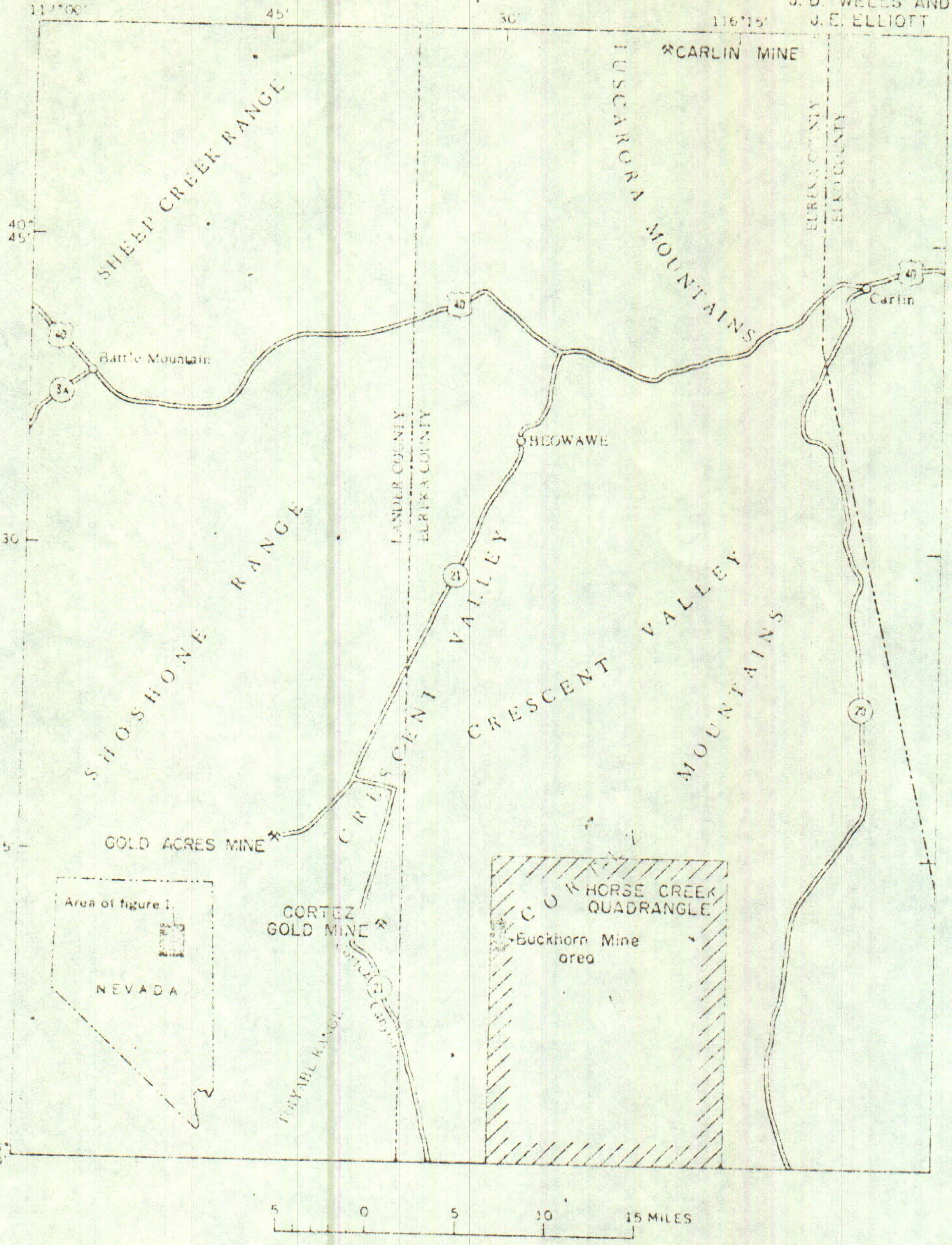


Figure 1.--Index map showing location of the Buckhorn mine area in the Horse Creek quadrangle and Carlin, Gold Acres, and Cortez gold mines. Base from U. S. Geological Survey, Winnemucca quadrangle, 1:250,000, 1962.



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are exposed to the west in the Cortez quadrangle. Some of the flow units have vesicular zones.

The underlying Tertiary sedimentary rocks are possibly 750 feet thick, judged from the thickness exposed along the axis of the sedimentary basin to the northwest in the Cortez quadrangle (Gilluly and Masursky, 1965). At those exposures no bedded chert is present and the gravels are not cemented.

The bedrock underlying the Tertiary units is probably mostly the Fourmile Canyon Formation, a Silurian unit that is primarily chert, in the upper plate of the Roberts Mountains thrust. Rhyolite, similar to that exposed to the southwest in the Cortez quadrangle and slightly younger than the basaltic andesite, may be present beneath the Buckhorn area. Extensions from the Mill Canyon stock, a Jurassic quartz monzonite, may be present at depth as well. Conceivably, carbonate rocks in the lower plate of the Roberts Mountains thrust occur beneath the Tertiary deposits.

## MINERALIZATION

During primary mineralization pyrite, marcasite, and gray chalcedony filled breccia zones and voids in vesicular basalt. The mineralogy has not been fully investigated and the minerals which carry gold and silver are not known. Good gold and silver values are widely distributed in iron-stained kaolin in the oxidized zone as well as in the primary ore.

Most of the production from the Buckhorn mine, which totaled $1,109,838 (Roberts, Montgomery, and Lehner, 1967), probably was from the oxidized zone, inasmuch as the oxidized zone is about 100 feet thick and mining extended to a depth of only about 120 feet.

## DESCRIPTION OF MAPPED UNITS

The geologic map (fig. 2) was prepared by planetable methods at a scale of 1 inch to 400 feet, using an altimeter sensitive to 2 feet for elevation control.

The units that were mapped (fig. 2)--all Tertiary--consist of conglomerate, sandstone, bedded chert, tuffaceous sandstone, and basaltic andesite. Fresh basaltic andesite and four types of altered basaltic andesite resulting from action of hydrothermal solutions were distinguished. Chalcedony overlies the basalt in the northeast part of the area.

Sections A-A', B-B', and C-C' show interpretations of the possible subsurface stratigraphy and structure.

Conglomerate

Poorly sorted, angular to rounded, black to light-gray, light-tan, and light-green chert with minor igneous-rock pebbles varying in size from less than 1/8 inch to slightly more than 2 feet across; tightly cemented with silica; about 15-foot thickness exposed.

Sandstone

Coarse, mostly angular grains made up of black to light-gray, light-tan, and light-green chert with minor igneous material; tightly cemented with silica; about 25 feet thick.

Bedded chert

Laminated dark-gray chert that weathers to light-gray plates; commonly folded and brecciated.

Tuffaceous sandstone

Coarse poorly sorted sand with irregular bedding; contains variable amounts of clay; weathers to a subdued topography; the clayey parts weather to a "popcorn" surface.

Fresh basaltic andesite

Generally black, massive to vesicular; weathers to a rough reddish-brown surface.

Partially altered basaltic andesite

Basalt boulders in a brown clay matrix resulting from partial alteration.

Brown altered basaltic andesite

Predominantly brown with minor white clay, containing only a few basaltic fragments; clay on ground surface dries with wide cracks and swells upon wetting. The dominant clay mineral is montmorillonite.

White altered basaltic andesite

Predominantly white to yellow clay, minor brown clay; much of the clay is montmorillonite, but kaolinite is present along the fault in the Buckhorn mine.

Siliceous white altered basaltic andesite

White to yellow kaolinitic siliceous vesicular basalt; commonly intimately associated with deformed and fragmented bedded chert.

White chalcedony

White chalcedony; probably deposited in a spring. Fossil snails and plant remains are present.

## GEOCHEMICAL MAPS

Approximately 220 samples have been collected from an area of about 1 square mile; geochemical maps (figs. 6-9) show the distribution of gold, silver, mercury, and arsenic as determined from these samples. The samples were collected from outcrops, mine dumps, open pits, and float. The material was selected primarily because it appeared potentially mineralized; that is, it showed clay alteration effects, iron oxides in fractures, breccia, silicification effects, or other possible evidence of hydrothermal activity. Identifiable sulfides were present in some of the samples. At some localities a variety of compositional types was sampled in order to establish a range of values, but only the highest value obtained from each locality is shown on the distribution maps.

## REFERENCES CITED

Gilluly, James, and Masursky, Harold, 1965, Geology of the Cortez quadrangle, Nevada, with a section on Gravity and aeromagnetic surveys by D. R. Mabey: U.S. Geol. Survey Bull. 1175, 117 p.

Roberts, R. J., Montgomery, K. M., and Lehner, R. E., 1967, Geology and mineral resources of Eureka County, Nevada: Nevada Bur. Mines Bull. 64, 152 p.

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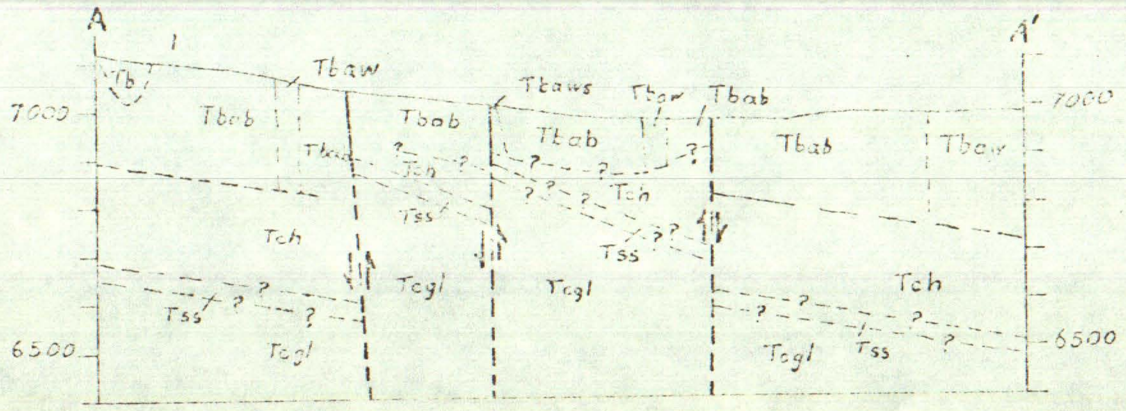


Figure 3.--Cross section A-A' of the Buckhorn mine area, Eureka County, Nevada

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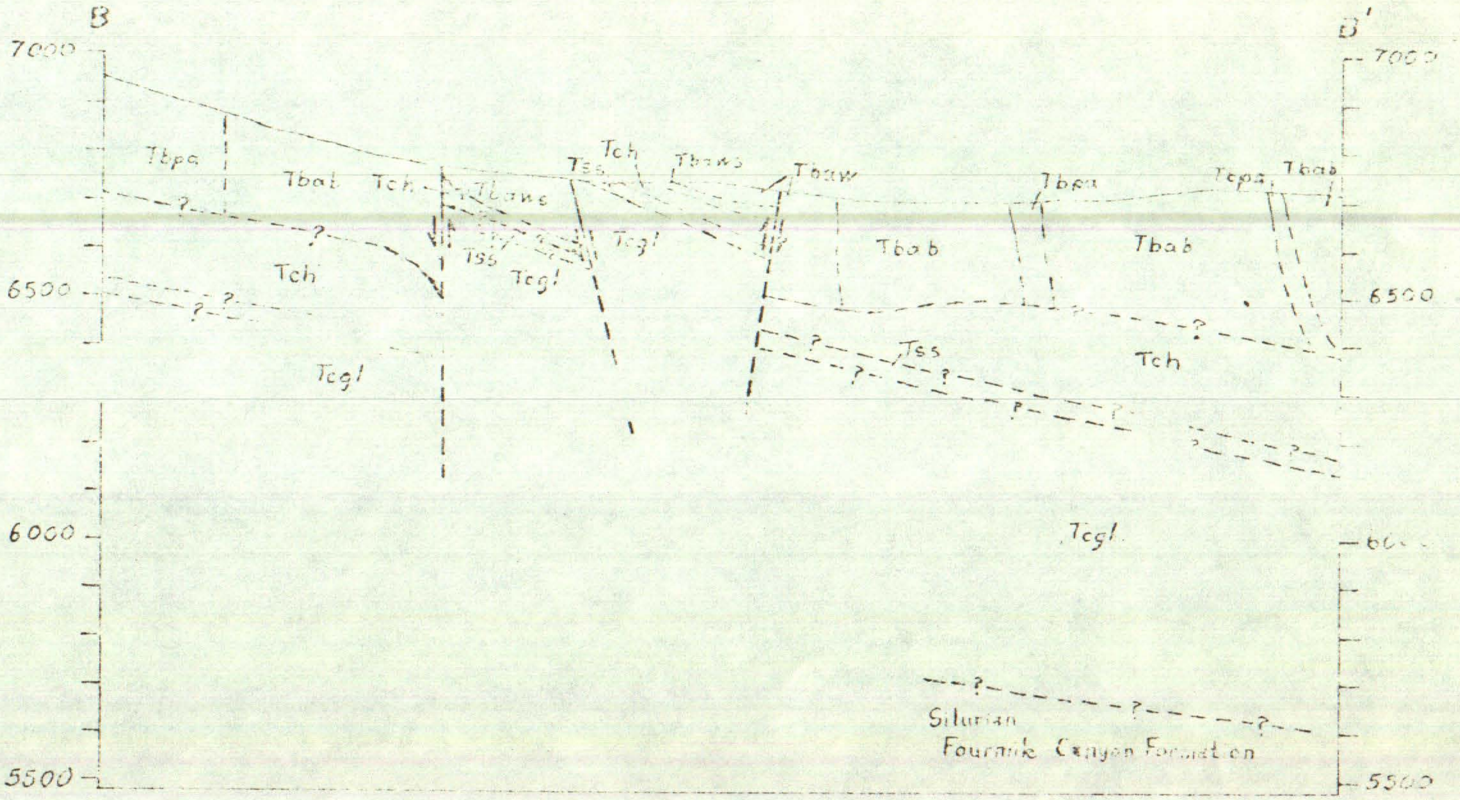


Figure 4.--Cross section B-B' of the Buckhorn mine area, Eureka County, Nevada

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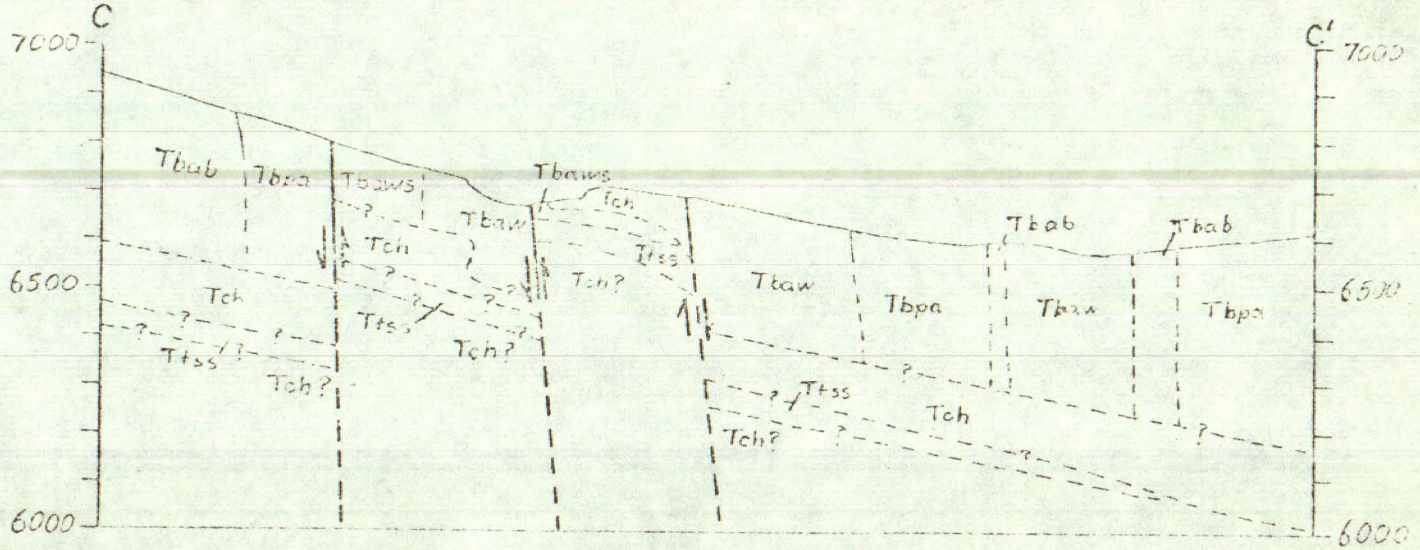


Figure 5.--Cross section C-C' of the Buckhorn mine area, Eureka County, Nevada

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