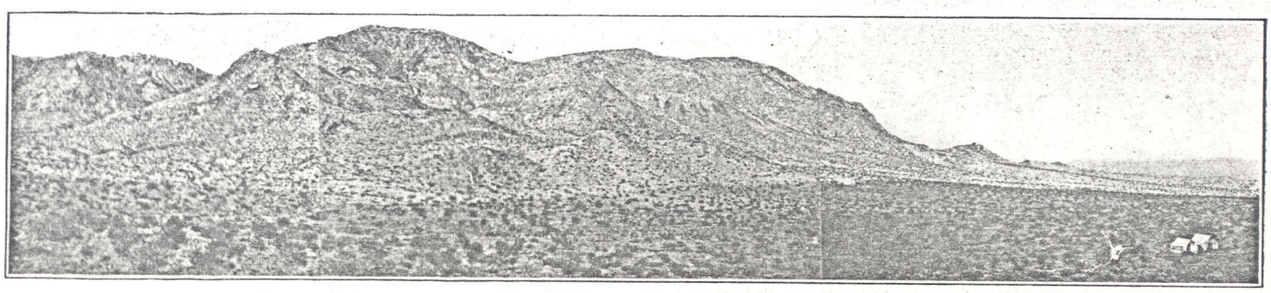
# Camp Alunite, a New Nevada Gold District

## A New Camp in Lincoln County Situated and Mineralized Like the Goldfield District and Having Similarly Altered Rocks

BY ROBERT T. HILL*

Camp Alunite is the name which we have given to a new alunite locality which we found as a result of our prospecting in ~~Lincoln county~~ Clark, Nev., 22 miles southeast of Las Vegas. The camp and its accompanying topography and geology do not appear upon any current map, although possibly indicated at the northwest corner of the old Mojave quadrangle of the U. S. Geological Survey. The mountains surrounding this camp, so far as known, have no names other than those here given them. The general geology and topography of the locality is entirely erroneous and misleading upon Wheeler's and other maps of the region.

The locality is situated in a low volcanic cross-range, running in a northeast-southwest direction, or contrary to the normal trend of the larger north-south ranges of stratified sedimentary rocks (mostly Paleozoic) known as Charleston (Spring mountain) and El Dorado ranges. There is a low gap or pass in this cross-range of mountains, known as Railroad pass, which is clearly visible to the southeast from Las Vegas. This pass is the site of the mining prospects here described.



CAMP ALUNITE, UNALTERED MOUNTAIN OF ANDESITE IN BACK-GROUND. WHITE HILL IN FOREGROUND AND DISTANT HILLS ON RIGHT, ALUNITIZED

### Topography

The range is a comparatively low, narrow ridge, probably less than 1000 ft. above the pass, rising to altitudes of 4000 to 5000 ft. above the sea. It is composed, so far as studied, exclusively of igneous rocks, which apparently differ in kind from one another in the mountains to the east and west of the pass and apparently within the pass itself.

The two portions of the range to the west and east of the pass differ somewhat in details of configuration and geologic material. The portion to the west is called Monzonite mountain, and consists of a long-crested and peaked ridge with salients leading toward the pass. This mountain is an eroded remnant of a once deep-seated lacolite or volcanic neck, which has been uncovered by erosion.

The mountain on the east may be termed Andesite mountain. It is a mass of eroded peaks, which terminate on the sides of the pass in sharply defined lines suggestive of fault scarps.

Railroad pass, the pass between the mountain in which Camp Alunite is located and which alone for our present purposes is considered as mineral ground, is a somewhat low, flat area connecting the desert areas which lie to the north and to the south of the range. Its surface drainage, mostly southwest, is largely desert "wash," through which here and there a few low ridges and hills of bedrock project.

### Rocks of Camp Alunite

Our studies at Camp Alunite have not progressed to the point where we can fully discuss or describe all of the rock species, but according to microscopic determination the chief rocks are biotite monzonite, latites and andesites. The monzonite occurs in the mass of Monzonite mountain to the west of the pass, in Big Butte, and in one or two isolated localities. For the present we are considering the area of the main Monzonite mountain as nonmineralized ground, although gold occurs in it, and it has been extensively located and prospected in times past. The unaltered andesites and latite are found in Andesite mountain to the east of the pass, which, like Monzonite mountain, for the present, is not included in the area of expected value.

The area of the pass between Monzonite and Andesite mountains (Alunite and Homestake ground) is underlaid by peculiar-looking white and gray, or red colored rocks, which at first glance would appear to be entirely distinct species from the monzonites and andesites of adjacent mountains. To the eye these whitish and grayish rocks of the pass at the localities mentioned might be easily mistaken for rhyolite and some other light-colored volcanic rock, and are usually called rhyolite on first observation. When thinly sliced and studied under the microscope, however, it is seen that these rocks are mostly the same species as the dark-colored andesites and monzonites of Andesite and Monzonite mountains and that their entirely different color is due to the intense and peculiar alteration which their original feldspar minerals have undergone, being converted into kaolinite and alunite minerals. The nature of this alteration, produced by hot, ascending, acidic, volcanic, mineralized vapors, especially the occurrence of alunite, is the key and guide to the mineral occurrence, as will be described later on.

These altered rocks, in the area of the pass, are those wherein valuable mineral is expected to be found and which are the present objects of interest. These rocks are exposed here and there in gullies, ridges and low conical hills in the pass and on the edge of the plain to the southward. They also outcrop in many places along the base of Andesite mountain, in direct contact and contrast with the black andesite of the mountain.

Near the northern end of the pass is a low, white, three-pointed hill (Alunite hill). The two southern cusps or points are of intensely silicified rock, which is a fine-grained quartz, resembling very much the honestone of commerce. It is surrounded by and passes into a white, intensely altered and decomposed material, resembling the talc and kaolin of the miners. Occasionally there is a little iron stain, but this is comparatively feeble.

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At the foot of the south end of Andesite mountain, extending in an east-west direction for 2500 ft., and in line with and allied to Alunite hill, there is a row of five peculiar tepe-shaped white hills composed of the whitish material above described. Between these hills and the main mass of Alunite mountain is a great "footwall," an east-west fault zone, running along the east side of the pass. These hills are alined with Alunite hill and probably collectively constitute a belt or zone of similar conditions.

There are also many little areas of bedrock exposed in the pass where the wash has eroded down to bedrock, showing that a broad belt extending through the whole pass is underlain by these altered rocks.

In the southern half of the pass and the plain southward there are several elongated ridges of the grayish-white rock which appear as low erosion divides between arroyos. These are from 20 to 50 ft. high, and have a north-south axial direction. When closely examined the ridges are seen to be intensely indurated, and the apexes or combs are found to be north-south fracture lines which have been hardened by silicification along the fractures, removed the softer altered material alongside these ridges, leaving them a little higher than the adjacent ground.

These little ridges, the Silverspoon, Long Ridge, Homestake and others, have a north-south strike directly toward the belt of white hills, above described.

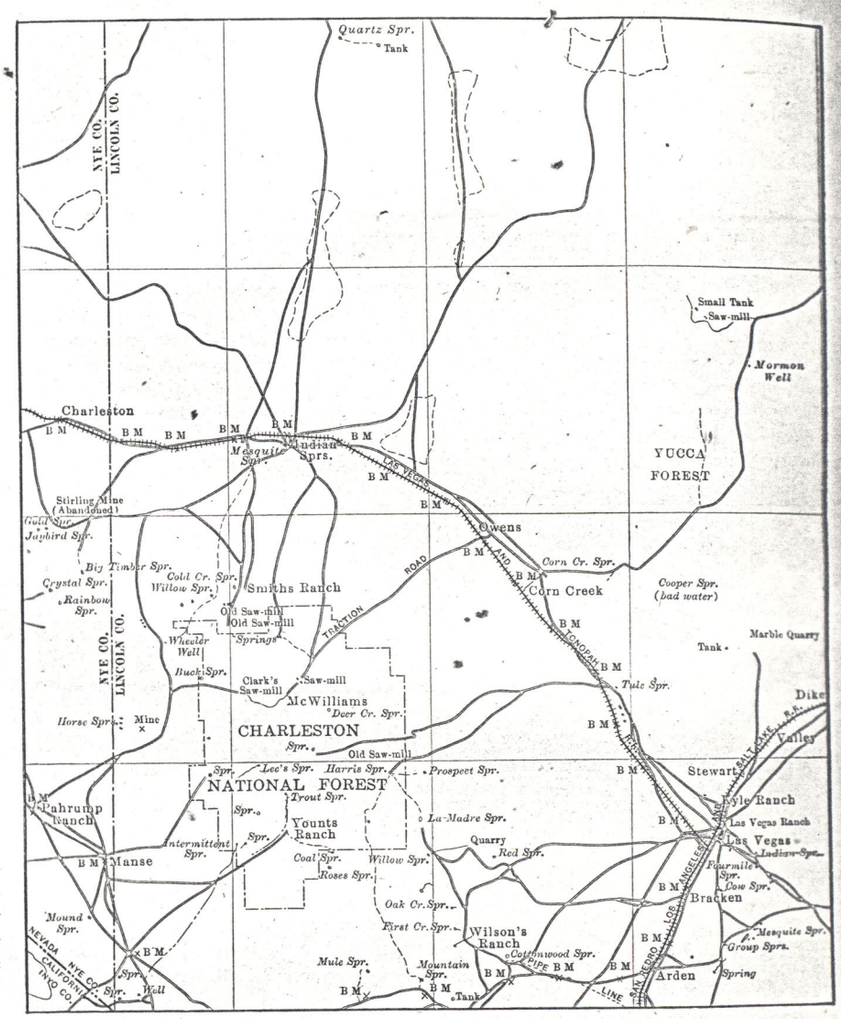
## Structure

The configuration of Alunite pass, the rock alternation and mineralization and the former extrusion of volcanic vapors at this site, is largely due to the intense fracturing, faulting and cross-faulting, of which this locality seems to have been a focus of intersections and which permitted the ascent of the mineralizing volcanic vapors.

The main west of north—east of south direction of the pass conforms in general to a great fault zone along which the andesite mountain has suffered great downthrow against the monzonite area to the west. Still another strong set of fracturing in a north-south direction is seen in the fractures along the combs of the silicified ridges and in the adjacent Andesite and Monzonite mountains. This is a zone of intense fracturing, and its effects are seen in many details. A strong east-west fault zone is also present, as seen at the south end of Andesite mountain, and cuts directly through the pass. There are also complimental northeast-southwest fracture lines.

This intense faulting and fracturing is actually seen and mapped in many places within the pass, even though in some areas the fractures are lost in the soft altered ground, or veneered by wash. An accompaniment of this faulting is the occurrence of many strong minor intersection points, which, as mining men know, are most favorable localities for the finding of orebodies.

In general, the pass is an area of intersection of the three major Nevada fault systems accompanied by many minor intersections; and it was this condition of structure which permitted the ascension of the volcanic vapors (fumarolic or solfataric) which altered the dark andesite into the white rocks described, and introduced the mineralization, as will be further explained.




MAP OF LAS VEGAS, NEVADA, AND VICINITY

## Mineralization

The surface at Camp Alunite shows gold values upon many of the claims located. In fact, no portion of the surface seems void of traces of gold. The assays ran from 40c. to $26 per ton. These assays are very similar in value to those originally found at the surface at Goldfield, where rich ore did not occur at the surface, but in the unleached zone below; the preliminary assays are as high as anticipated or desired in the type of mineralization here described.

The accompanying or accessory minerals thus far noted at the surface at Alunite are: a small proportion of silver (detected in the assays), small patches of copper resembling bornite, pyrite (oxidized) and magnetite. Bismuthinite and sylvanite have also been reported, but not yet confirmed. These accessory minerals in kind, association and mode of occurrence are similar to those at Goldfield.

The studies and deductions by Dr. F. L. Ransome, of the United States Geological Survey at Goldfield,[1] have shown the close relationship in genesis and occurrences of the mineral alunite to the gold ores of that camp. Concerning the occurrence of this mineral he says: "The recognition of alunite as a characteristic constituent of the Goldfield ores, and the demonstration of its genetic relation to them establishes a new type, that of alunitic and kaolinitic gold quartz veins. It is not believed that the Goldfield district is unique in the possession of this type. Other examples are likely to be found

[1] "The Association of Alunite with Gold in the Goldfield District, Nevada," by Frederick Leslie Ransome, U. S. Geological Survey. Economic Geology, Vol. II, No. 7, October-November, 1907.

among the great number of ore deposits associated with Tertiary volcanism."

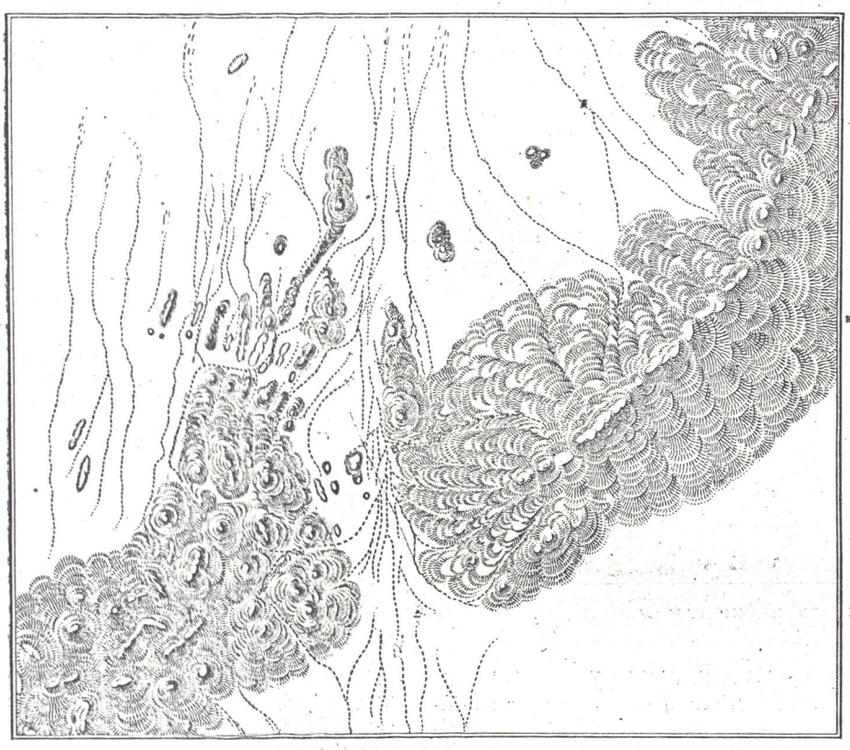
### Significance of Alunite

In view of the general resemblance of the altered rocks of Camp Alunite, we collected and had studied microscopically and chemically specimens of all the altered and gold assaying rocks of the camp. These studies were made by the firm of Washington & Lewis. They discovered that in all of the altered rocks from the mineralized zone of the pass at Camp Alunite, alunite was either present, abundant, or apparent. Concerning the rocks of Homestake hill "much alunite" was reported; others in the center of the field "mostly alunite" (57 per cent.). These determinations were from the two ends and center of the altered ground of the pass and indicate that the whole belt, which is of similar rock, is alunitized. The proportions of alunite varied from 1 to 57 per cent. of the mass of the material studied. In the monzonite areas the percentage was small, but large in the areas of the altered andesites.

These microscopic determinations in connection with the actual occurrence of gold in these rocks demonstrated beyond all doubt that we had found a new alunite gold locality in Nevada, and the only one thus far discovered except Goldfield. It is apparent, from Ransome's careful studies of Goldfield and the significant association of gold with alunite in that camp, that the discovery of a second alunite gold locality in Nevada is of great scientific interest and possibly much economic significance.

From this resemblance and the actual occurrence of gold we have strong reason for believing that Camp Alunite, when developed, will show in depth ores similar in origin to those of Goldfield. Whether they will be similar in value development alone can tell, and Camp Alunite may now be defined as a Nevada mineralized locality of the Goldfield-Alunite type.

The igneous rocks at Alunite do not present the same succession as at Goldfield, nor can the andesites be correlated with the earlier or later andesites elsewhere separated, nor is the matter material, inasmuch as the andesite is alunitized and mineralized and that is the chief point of economic interest.



RAILROAD PASS, NEVADA, SHOWING FAULT ZONES INTERSECTING IN PASS

It is the feldspar in both the andesite and dacite rocks which alters into alunite and affords the matrix for the gold introduction, inasmuch as these feldspars are the same in both plain andesite and dacite-andesite the absence of dacite at Camp Alunite is not necessarily of significance. The andesite of the pass is altered, mineralized and alunitized exactly like the dacite and andesite at Goldfield, and that fact is the all-important point.

### Goldfield and Camp Alunite

The details at the various localities of mineralization in Nevada differ very much at different camps as at Tonopah, Goldfield, Rhyolite and Searchlight, but the conditions of the geology, topography and mineralization of Camp Alunite more strongly resemble those of Goldfield than any other locality; in fact, it is the only known spot in Nevada approximating it, although others may be found. The two localities in essential conditions present many strong points of resemblance.

In order to more fully appreciate the significance of the prospects at Camp Alunite, one should be thoroughly acquainted with the conditions and occurrences at Goldfield, as published in scattered and somewhat inaccessible literature, especially the researches of Dr. Ransome, which I have summarized in earlier articles.

In general, Camp Alunite presents the following points of resemblance to Goldfield, which justify our expenditures in development of the camp in the expectation of finding similar returns of gold:

(1) *Similar Topographic Aspects Due to Similar Geologic Causes*—The Goldfield pay ground is located in a low pass or plain between two adjacent mountains, as at Camp Alunite. These passes are at both places developed in areas of shattered and altered rock due to extensive faulting and rock softening by solfataric metamorphism. At Goldfield the ore was found at the surface as an enriched portion of one or two low ridges of quartzose rock in the valley plain. Some of the ridges of the southern part of the Alunite field resemble those of Goldfield, as seen in the accompanying figures.

(2) *Similarity of Geological Aspects*—Both areas consist of andesite lava flows, which have been intensely changed and altered by ascending solfataric volcanic vapors. Both areas are fractured and faulted by intersecting faults.

(3) *Similarity of Alteration Products*—The rocks of both areas are altered into similar rocks by similar action of the ascending hot volcanic vapors, resulting in the production of similar alteration products, kaolinized, gypsumized and alunitized rocks, especially alunite, which is known in Nevada in only these two localities; also the similar alteration of quartz into the same kind of semi-flinty stone.

(4) *Similar Character of Introduced Mineralization*—Under this classification may be included the same character and occurrence of gold at the surface; the similar feeble ferrugination of the outcrops; the similar accessory minerals in similar proportions, silver and copper, and probably bismuthnite, and tellurium.

### Development Work at Camp Alunite

The foregoing account of Camp Alunite describes the conditions which we have selected for the purposes of making a scientific attempt to locate oreshoots. Since the acquirement of the properties on Sept. 1 the sites for five shafts have been determined by the structure, pannings and assays of the outcrops. Each of the shafts at the present writing has progressed to a depth of 50 ft., and all the conditions en-