

## Mining District File Summary Sheet

DISTRICT	Churchill County General
DIST_NO	0020
COUNTY	Churchill
If different from written on document	
TITLE	Deposits of Magnesia Alum Near Fallon, Nevada
If not obvious	
AUTHOR	Hewett, D.
DATE OF DOC(S)	1924
MULTI_DIST Y / N?	
Additional Dist_Nos:	
QUAD_NAME	Lahontan Dam 7 1/2
P_M_C_NAME	
(mine, claim & company names)	
COMMODITY	Alum
If not obvious	
NOTES	Deposit report; geology; location map; U.S Geological Survey Bulletin 750, Part I p 79-84.  8p.

Keep docs at about 250 pages if no oversized maps attached  
(for every 1 oversized page (>11x17) with text reduce  
the amount of pages by ~25)

SS: DD 12/19/08  
Initials Date

DB: Initials Date

SCANNED: MT 1.07.10  
Initials Date

-1924, PART I.

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## DEPOSITS OF MAGNESIA ALUM NEAR FALLON, NEVADA.

By D. F. HEWETT.

### LOCATION.

During the summer of 1921 deposits of magnesia alum were discovered in the low hills along the south shore of Lahontan Reservoir, about 16 miles southwest of Fallon, Churchill County, Nev. Particular interest is attached to these deposits because it has been recently recognized that the application of alum to certain hard soils in arid regions makes them more pervious to water and therefore susceptible to cultivation. As certain tracts near Fallon that once produced crops but have recently been abandoned because they became impervious can probably be reclaimed by the use of alum, a ready market exists for any alum that can be produced.

The deposits lie near the quarter corner between secs. 16 and 17, T. 18 N., R. 26 E. (See fig. 23.) In this region Carson River, rising in the snow fields of the Sierra Nevada, flows generally northeastward through a mountainous region to a broad, flat basin surrounded by high ranges and clusters of low hills. The river disappears in Carson Sink, which occupies the center of the basin. The alum deposits lie on the edge of some low hills south of the river at the point where it leaves the mountainous area and enters the broad plain. The construction of the Lahontan dam confined the waters of Carson River, so that a part of the valley west of Fallon is now occupied by a reservoir about 3 miles in diameter. The surface of the reservoir fluctuates throughout the year, but at the time of the writer's examination, May 26-27, 1922, it stood at the highest level recorded, and water flowed over the spillway of the dam. Although the original river channel lay a mile north of the alum deposits, the level of the reservoir has risen so much that water 10 feet or more deep now lies within 500 feet of most of the deposits that have been found. As the reservoir is navigable for boats of shallow draft and as the tracks of the Southern Pacific Railroad lie close to the north shore, only modest improvements would be needed to permit the alum-bearing material to be mined and shipped to the Fallon district at a low cost.

The features of the region near the alum deposits are shown in Figure 23, which represents a part of the Wabuska quadrangle, and



in Figure 24, which was prepared by the writer at the time of the examination. The outstanding local feature is a terrace about a mile wide, which is limited on the south by a group of low hills that rise 500 feet higher and on the north by Lahontan Reservoir. This terrace was once cut by a deep ravine which drained northwest but

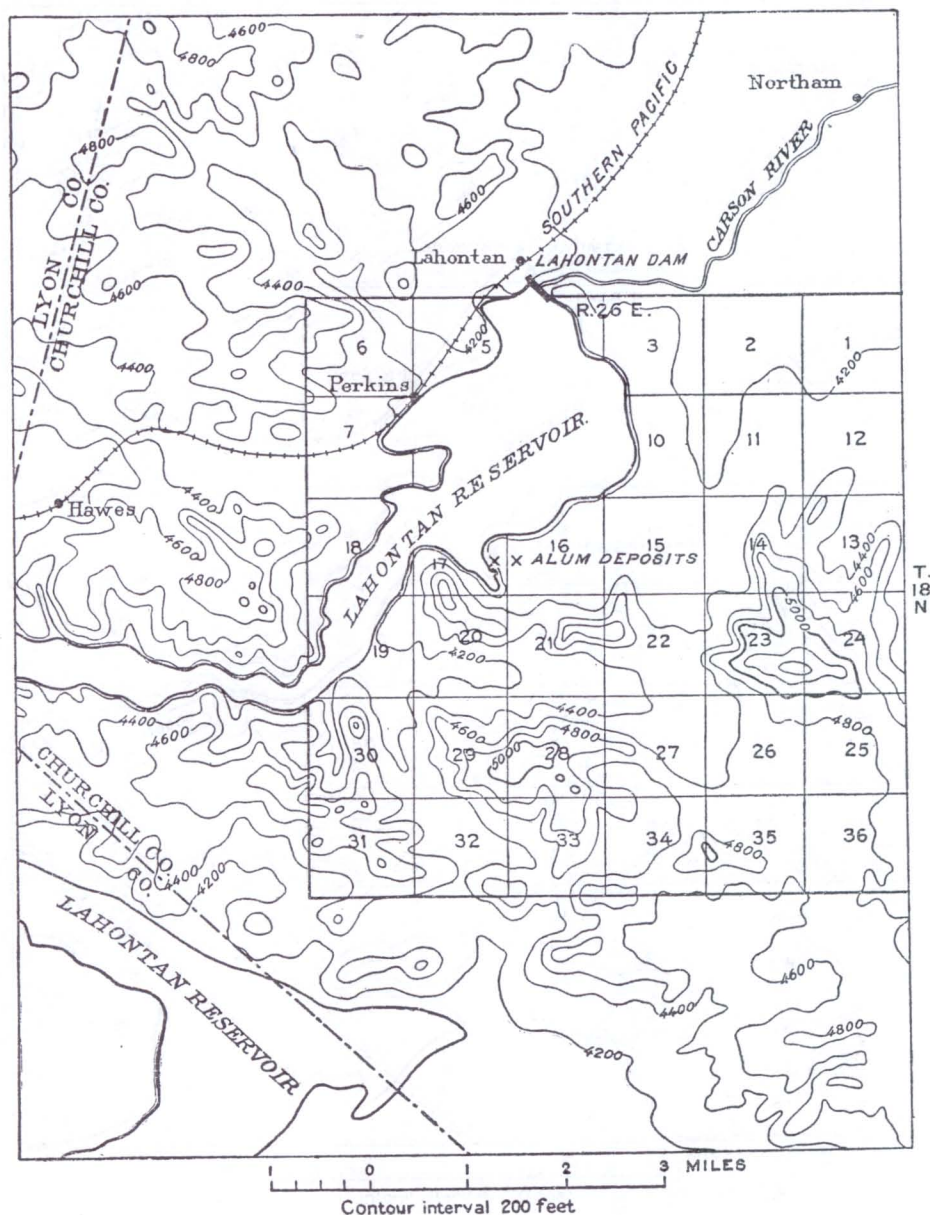


FIGURE 23.—Sketch map of western Churchill County, Nev., showing location of alum deposits near Fallon.

which, with the rise of the waters, is now occupied by an arm of the reservoir. The terrace is also dissected by other tributary ravines, and the deposits of alum crop out along their slopes. In May, 1922, the water stood about 125 feet below the average level of the terrace. A less conspicuous but well-defined terrace occurs along the hills south

of the alum deposits. This terrace probably once occupied

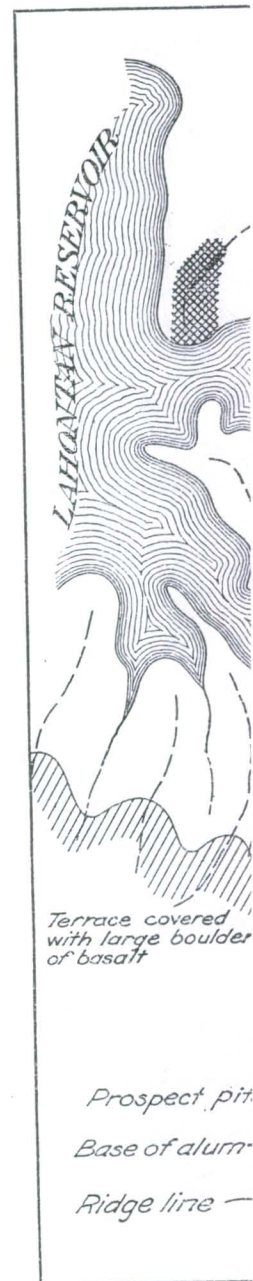


FIGURE 24.—Sketch

All the rocks near the terrace. Although flows of alum deposits, no other features are visible.

<sup>1</sup> Russell, I. C., Geologic

1924, PART I.

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of the alum deposits, about 300 feet above the level of the lake. This terrace probably represents the position of Lake Lahontan, which once occupied a large area in western central Nevada.<sup>1</sup>

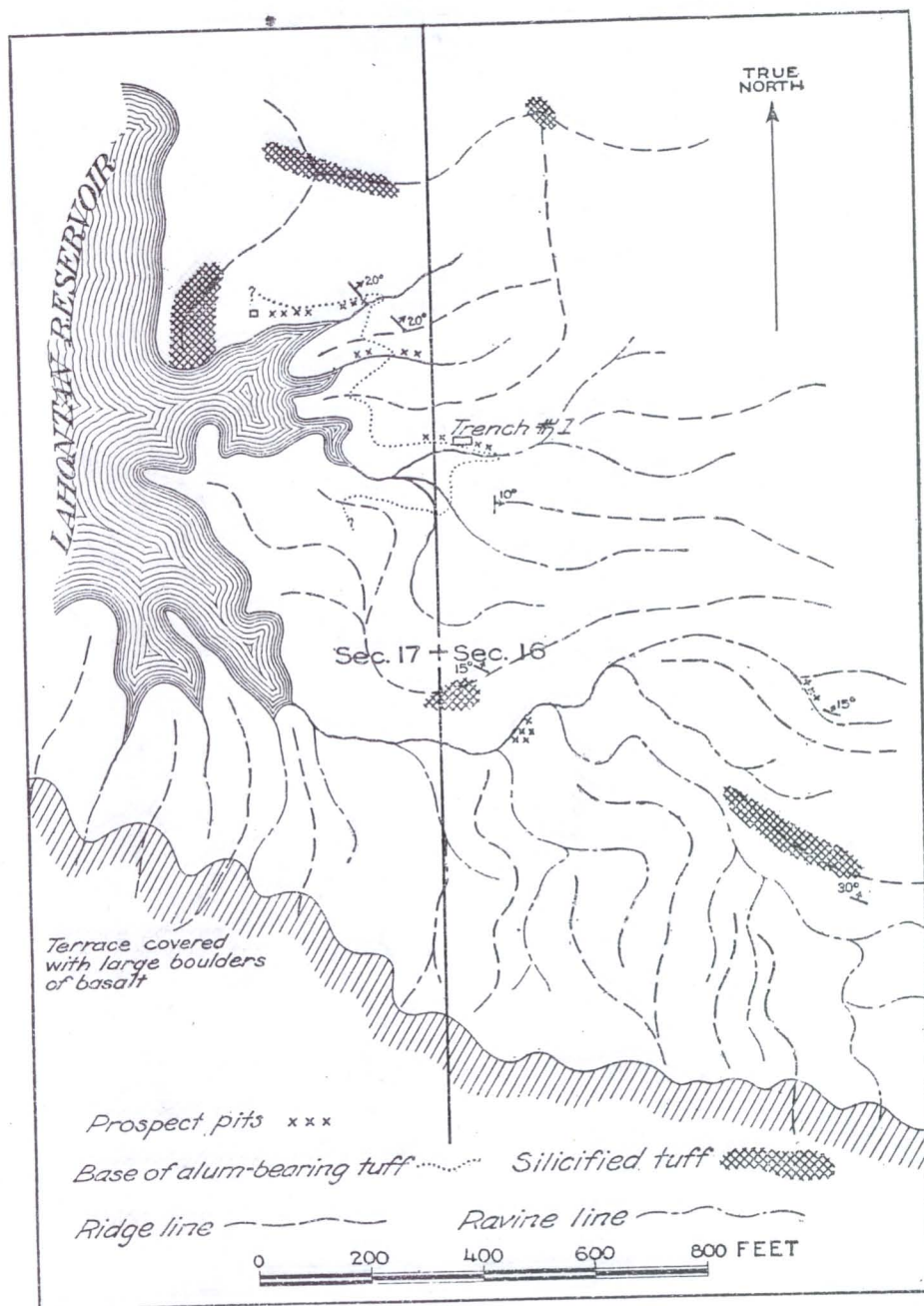


FIGURE 24.—Sketch map showing local relations of alum deposits near Fallon, Nev.

### LOCAL GEOLOGY.

All the rocks near the alum deposits are igneous and fragmental. Although flows of basalt form the ridge half a mile south of the deposits, no other flows were found near by. The rocks range from

<sup>1</sup> Russell, I. C., Geological history of Lake Lahontan: U. S. Geol. Survey Mon. 11, 1885.

ation of alum deposits near

l by an arm of the  
tributary ravines,  
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light-gray and brown laminated tuff resembling common clay shale to bedded breccia in which the coarsest fragments are about an inch in diameter. A line drawn northwest approximately following the principal ravine south of the alum deposits would roughly separate the fine bedded tuff on the northeast from the coarser material on the southwest. Only traces of alum have so far been found south of the ravine, and these were found in a local area of fine-grained material.

Knowledge concerning the unaltered tuff is largely obtained from several explorations for alum, as it is uniformly overlain by a layer of weathered material that ranges from 6 inches to a foot or more in thickness. In the prospect known as trench No. 1, where a vertical section 10 feet high is exposed, the lowest 4 feet is light chocolate-brown in color, is well stratified, and resembles a common variety of shale. The intermediate zone, 3 feet thick, is lighter, and the uppermost zone, also 3 feet thick, is light gray. Fragments from the upper zone, although outwardly gray, are distinctly light brown on the inside. Traces of carbonized plant material are rather common throughout the exposed zone. Some material showing plant remains collected from the same zone 150 feet farther north was submitted to F. H. Knowlton, of the United States Geological Survey, for identification. Although grasses could be recognized, they and the other remains were too fragmentary to serve to establish definitely the age of the rocks in which they were found. It was considered that the inclosing rocks are probably Tertiary. It seems highly probable that the brownish color of the unweathered tuff is due to finely divided organic matter. The even stratification shows that the tuff was laid down in water.

Close examination of the unweathered and unaltered tuff fails to show the presence of fragments of glass and other minerals characteristic of tuff. Abundant evidence that the material is tuff, however, is obtained here and there near the alum deposits where the tuff is silicified. Figure 24 shows five areas where the tuff is almost completely replaced by a chalcedonic silica and therefore weathers as conspicuous ledges. Although these areas are irregular in outline, the longest dimensions of most of them tend to follow the bedding. In these areas the texture and mineralogy of the original tuff may be discerned. Interbedded with the finer material are layers of coarser material that contain many angular grains of orthoclase in various stages of silicification. Although quartz was not identified, the coarser layers appear to be rhyolitic tuff. The silicified tuff uniformly contains a small proportion of minute grains of pyrite. As the rock weathers it becomes coated with thin films of limonite (hydrous ferric oxide) and jarosite (hydrous sulphate of iron and potash). Here and there, especially near the alum-bearing deposits, the unsilicified tuff also contains aggregates of small grains of pyrite.

The breccia that altered and decomposed breccia is a terrace probably weathered.

A general idea of the outcrops that show the west in the northwest and northeast in the and east. Small faults. No intrusive rocks were

*Minerals present.*—The deposits is pickeringite has been recognized as well as by chemical the size and shape of form clusters rather than of the tuff. In places and joints the alum which cement the fragments from pure white to gray that show neither of taste and probably of

Gypsum (hydrous) It generally forms a surface zone of weathered by erosion they form the alum deposits, where there is commonly Such crusts do not makes them coherer

Pyrite (or marcasite) unaltered brown tuff it forms sporadically noted only where all of the areas indicate pyrite, which forms distributed throughout near by, however.

Sulphur forms cl trench No. 1. It is

Jarosite (hydrous) on the surface near brown masses reser



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The breccia that underlies the southern part of the area is also altered and decomposed by weathering. The southern limit of the breccia is a terrace strewn with large boulders of basalt that have probably weathered from the flows that crop out farther south.

A general idea of the local structure may be obtained from the few outcrops that show the bedding of the tuff. The beds strike northwest in the northwestern part of the area, north in the central part, and northeast in the southeastern part. They dip gently northeast and east. Small faults may be present, but they are not conspicuous. No intrusive rocks were observed near the alum deposits.

### THE ALUM DEPOSITS.

*Minerals present.*—The only alum that has been recognized in the deposits is pickeringite (hydrous magnesium-aluminum sulphate). It has been recognized by its optical properties under the microscope as well as by chemical tests. It forms small hard gray masses about the size and shape of half a small pea, and numbers of such masses form clusters rather firmly attached to the partings and open fractures of the tuff. In places where the tuff is much broken by fractures and joints the alum forms fibrous veins as much as 2 inches thick, which cement the fragments firmly. The color of such veins ranges from pure white to gray, locally tinted reddish. Many blocks of tuff that show neither of these forms of alum have a strong astringent taste and probably contain minute disseminated particles of alum.

Gypsum (hydrous sulphate of lime) is common near the deposits. It generally forms veinlets as much as half an inch thick in the surface zone of weathered tuff. Where these veinlets are laid bare by erosion they form transparent plates 2 to 6 inches long. Near the alum deposits, where the tuff is disintegrated to a light powder, there is commonly a hard surface crust as much as an inch thick. Such crusts do not have an astringent taste, and the cement that makes them coherent is probably gypsum.

Pyrite (or marcasite?) (sulphide of iron) is present in both the unaltered brown tuff and the gray silicified variety. In the brown tuff it forms sporadic aggregates of small round grains. These were noted only where alum has been found. The silicified tuff from each of the areas indicated on Figure 24 contains a small percentage of pyrite, which forms minute grains that are in general uniformly distributed through large masses of the rock. No alum was noted near by, however.

Sulphur forms clear yellow crystals on fractures in the tuff near trench No. 1. It is uniformly near the pyritic nodules in the tuff.

Jarosite (hydrous sulphate of iron and potash) is rather widespread on the surface near the alum deposits. It generally forms yellowish-brown masses resembling small cauliflowers, which appear to have



It is surprising to find a deposit of magnesia alum in rocks that appear to be deficient in magnesia. So far as the tuffs have been studied they appear to be rhyolitic and when fresh should have contained more soda and potash than magnesia. Under the circumstances one would expect to find soda and potash alums rather than magnesia alum. Possibly the tuff was uncommonly rich in magnesia, or perhaps under the local conditions magnesia alum is relatively less soluble than other alums.

In order to estimate the probable quantity of alum-bearing rock in this area, the following assumptions are made:

1. The alum has been formed by the action upon the tuff of sulphuric acid produced by oxidation of pyrite.
2. The oxidation has been effective to a depth of 25 feet below the surface.
3. The average thickness of alum-bearing tuff is 10 feet.
4. The central part of the area, which lies between the ravine adjacent to trench No. 1 and the next trench on the north, is probably underlain by alum-bearing tuff.
5. The tracts adjacent to the central part of the area on the north and south, which lie between the second ravine south of trench No. 1 and the second ravine north of it, may also contain some alum, but from the surface exposures it is estimated that the rock here would contain a lower percentage than that in the central area.

On these assumptions it is estimated that within the central area there is 17,000 tons of rock that probably contains 15 per cent of soluble magnesia alum. There is a fair possibility that the outlying areas contain an additional 13,000 tons of rock carrying 10 per cent of alum.

## MOLYBDENITE

This paper describes an ore mineral of the iron steel. It is based on a report of 1923. Hospitality at M. E. Rinebold and mineralogical determination by Schaller and L. M. I.

The presence of iron has been known for many years but has hitherto appeared

The deposits are in the Trinity Mountain belt of central Idaho along the Snake River, a large stream of the Snake River about 70 miles from the Oregon border on the Oregon border line west of Rocky Mountain. The two nearest post offices are trail several miles from the river and Featherville have over good roads from winter. Rocky Mountain which dates from the interest, such as the the country, however the molybdenite area bold cabin, about a of Roaring River, an upstream. (See figure a trail from Feather country accessible for which it is admir

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MINING ENGINEER · GEOLOGIST

DEPARTMENT OF THE INTERIOR  
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY  
George Otis Smith, Director

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CONTRIBUTIONS TO ECONOMIC GEOLOGY  
(SHORT PAPERS AND PRELIMINARY REPORTS)

1923-1924

PART I.—METALS AND NONMETALS EXCEPT FUELS

F. L. RANSOME, G. F. LOUGHLIN, G. R. MANSFIELD, AND  
E. F. BURCHARD  
GEOLOGISTS IN CHARGE



WASHINGTON  
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1925