

To: John Schilling

From: Keith G. Papke

Subject: Sulfur deposits in Nevada

near 96-15
Memorandum

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Introduction

As you requested I have visited the principal areas where sulfur occurs in Nevada. The following description tells of the current status of these deposits, their geology, and their probable economic potential. I have included in the introductory portion some information on the reasons for the current interest in sulfur.

Interest in sulfur deposits in Nevada probably is at an all-time high. This is a reflection of the current free world supply and demand situation. For three years demand has exceeded production and excess orders have been filled from stockpiles (private stockpiles; sulfur is not a government stockpile commodity). Demand for sulfur continues to grow at a rate of 6 to 7 percent a year. In 1965 free world production of all forms was 22,800,000 long tons. Recent estimates are for a consumption in excess of 30,000,000 long tons in 1970.

The fertilizer industry is the largest consumer. In 1965 the domestic phosphate industry used 6,700,000 long tons in the acidulation of phosphate rock with sulfuric acid. The most promising substitution in this industry is by nitric acid but this gives a more expensive and less suitable product. Sulfuric acid will probably be used as long as supply and price permit.

Sulfur to meet this demand will have to come mostly from reactivated and new Frasch process installations along the Gulf of Mexico. The limitation of exports from Mexico to a percentage of newly-found reserves further complicates the situation. There will be increased yield from sour gas fields but the additional tonnage will be relatively small. Sulfur produced from deposits of the type found in Nevada and California will never be an important factor in supply. It is obvious that there will be abnormal interest in sulfur deposits until 1970 at least.

The shortage has caused a price increase but the amount is uncertain because quotations commonly give only nominal figures. Domestic bright sulfur has been quoted at \$27 since 1964. In September of 1966 the E. and M. J. Metal Market, while still retaining this quotation, also quoted \$39 f.o.b. Gulf ports for export and stated that the current spot market is about \$42 f.o.b. mine.

5) Alum, Esmeralda County. This area is located in the western part of the Weepah Hills, about eleven miles north-northwest of Silver Peak. The township is unsurveyed but the property probably is in Section 29, T. 1 N., R. 39 E. The property is covered by patented lode claims held by Nevada Potash and Chemical Company.

The district lies at the west edge of a group of hills made up of Tertiary rocks, principally pyroclastic, that dip eastward at moderate angles. To the west are scattered outcrops of Tertiary sandstones and bentonitic rocks.

The main mineralized area is the site of an open pit about 200 feet in diameter. The pit has a maximum depth of about 40 feet on its east side. Many of the geologic features are obscured by dumps and broken rock. Most of the pit seems to be in a white pulverulent material consisting mostly of alum minerals and quartz, with variable sulfur and some gypsum. Partly altered volcanic rocks are exposed on the northeast, east and southeast sides of the pit; these dip eastward at 30 degrees or steeper. The contact between the volcanic rocks and the completely altered material is not well exposed but it appears to be fairly sharp. Vertical and inclined shafts surrounding the pit area indicate that the alum-sulfur body is restricted to a surface diameter about the size of the pit. A pipe-like, steeply inclined body cutting across layering of the host rock might be postulated. The sulfur occurs as relatively thin coatings on fractures and impregnating the rock. There is no high-grade material; the ore might average 20 percent native sulfur with selective mining.

About 500 feet to the northeast there is a much smaller but somewhat similar body that contains only a little sulfur. There are several very small areas of altered rocks farther north.

There were a number of idle pieces of equipment at the property but very little work had been done. The one man I found on the property professed ignorance about who he was working for. A considerable amount of promotional activity that I observed in the Esmeralda County courthouse could be concerned with this area.

Conclusion

Examination of Nevada sulfur deposits as a group has led to some conclusions.

- 1) There is no present production of sulfur and the possibility of finding large tonnages amenable to production of pure sulfur are poor.
- 2) Directly mined, high-grade ore - say over 70 percent - could be available in only small tonnages.
- 3) There is a better possibility of producing limited tonnages of sulfur rock for agricultural use. In relation to percentage of total sulfur, it might be advantageous from a price standpoint to produce agricultural sulfur.
- 4) Based on the evidence now available, I rate the properties in the following order of potential economic significance: a) Sulphur; b) Alum; c) Deep Gulch; d) Hot Springs Point; e) San Emidio; f) Tognoni; g) Humboldt; and h) Cuprite.
- 5) By-product material might enhance the value of some ores. This is particularly true of mercury. Cinnabar is known to be present in significant quantities at the Sulphur and San Emidio properties.
- 6) Transportation must be considered in property evaluation. The Sulphur, Hot Springs Point and Humboldt areas are well situated near railroads, but the others are poorly situated at distances of 45 miles or more from railroads. Soil conditioner, mainly for a central California market, might not be dependant upon railroad location; it might be better transported by truck.