

To: John Schilling.....
From: Keith G. Papke.....
Subject: Sulfur deposits in Nevada.....

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Memorandum
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Reno, Nevada

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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.

is not impossible that several million tons with grade in the order of 30 percent might be developed. Certainly this district has the best sulfur potential of any in Nevada.

2) Humboldt, Pershing County. This area is one mile southwest of Humboldt House and 500 feet west of the Southern Pacific tracks. It is on a hill about 800 by 500 feet rising about 30 feet above the surrounding plain. Exploratory work and evidence of sulfur is restricted to a central portion about 200 feet in diameter.

Much of the area is underlain by calcareous tufa; most of this is porous, friable, horizontally bonded material. Crystalline gypsum occurs as interlayers within the tufa and as a small, vertical mass at the center. The bright sulfur generally is associated with the gypsum. Probably the maximum grade of native sulfur is about 25 percent; the gypsum as a whole contains less than 10 percent native sulfur. This obviously is a hot spring deposit.

Exploration and mining was by a number of irregular pits and several shallow shafts. Production from the area was small. An inclined shaft about 30 feet deep was in tufa with little or no sulfur. A pipeline excavation along the east side of the hill penetrated barren tufa for 800 feet. There has been no activity at the property in recent years. I do not believe that this area is capable of producing any significant amount of sulfur.

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.