To: John Schilling

From: Keith G. Papke

Subject: Sulfur deposits in Nevada

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 Frash 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.

(8) Cuprite, Esmeralda County. This property is in an unsurveyed area, in Section 5, T. 5 S., R. 43 E. This is 13 miles south of Goldfield and 1 mile east of Highway 95. The area is located by a lode and placer claim of Argentum Consolidated Mines, Inc.

The country rock is a light-colored, felsitic volcanic rock; at least part of this is the bleached equivalent of more highly colored rocks. There are a number of underground workings in an area powdery, oiliceous altered material. The most intense alteration is an area perhaps 100 feet across. While no sulfur was seen in place, several hundred pounds were piled on one of the adit dumps. This material might average 30 to 40 percent.

This prope[illegible] does not seem to be very promising for any tonnage of ore. The Cuprite - [illegible] Gulch area might be a favorable place, however, for regional exploration for 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 dependent upon railroad location; it might be better transported by truck.