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To: John Schilling

From: Keith G. Papke

Subject: Sulfur deposits in Nevada

Eureka Co., - general
Memorandum
UNIVERSITY OF NEVADA
Reno, Nevada Item #

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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.

(3) Hot Springs Point, Eureka County. This area is at the extreme western end of Dry Hills, in Sections 11 and 12, T. 29 N., R. 48 E. This is about 13 miles by road south of the railroad at Beowawe. The property is covered by unpatented mining claims. These are controlled and are being explored by the Southwestern Exploration Company, which is stated to be a joint venture of Hunt Oil Company, Nationwide Oil Company and the Hathaway family. The work is being directed by Mr. Ralph Edwards of Reno.

The end of the mountain is bounded by two intersecting faults that separate the steep mountain slopes from a nearly flat, alluvium-covered valley. A north-northeasterly trending fault bounds the northwestern side of the range for some distance while a northwesterly trending fault bounds the southwestern side.

Sulfur is now exposed in a face up to 50 feet high for a distance of 300 feet. The sulfur appears to be restricted to the northwest-trending fault zone; this zone is about 50 feet wide and has a nearly vertical dip. Shales and quartzites, regarded as Ordovician in age, are present on the northwest side; these rocks are strongly silicified adjacent to the structure. A trench on the valley side of the fault zone is in unconsolidated gravel.

The rocks within the zone are strongly altered to a clayey material; native sulfur is irregularly distributed through this material. A small tonnage of fairly high-grade material has been sorted out; mining of the entire zone, as now exposed, would yield a very low grade material. Small amounts of cinnabar and antimony are reported to be present in the material.

The north-northwest fault has been explored by trenches over a length of about one-fourth mile. There has been some bleaching and alteration along this structure but sulfur was not found. There are a number of almost inactive hot springs near the Point.

My examination suggested that development of additional sulfur must be to the southeast along the mineralized fault zone. Mr. Edwards is of the opinion that the sulfur-bearing material extends for some distance back into the mountain. He had a crew of three men ineffectually drilling short holes into the silicified rocks on the northeast side. He planned to start core drilling in the same area.

It seems extremely unlikely to me that an adequate tonnage can be developed to support a mill to upgrade this material. Even if a considerable strike length of ore can be developed, mining below a shallow depth would have to be by underground methods. It is more reasonable to expect that any production from this area will be sulfur for agricultural use in limited tonnages.

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.