Article 4

BERYLLIUM AND FLUORINE IN MINERALIZED TUFF, SPOR MOUNTAIN, JUAB COUNTY, UTAH

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Abstract.—The content of beryllium in a mineralized tuff bed varies directly with the fluorine content. Beryllium concentrations show a bimodal distribution with a large mode in the range 20 to 100 ppm and a smaller mode, representing the ore zone, in the range 1,000 to 10,000 ppm.

Beryllium minerals are associated with minor amounts of fluorite in nonpegmatitic deposits of many districts (Norton and others, 1959). However, no published study of the quantitative relationship between beryllium and fluorine in mineralized rocks has been made. The Spor Mountain, Utah, area was found suitable for such a study because the west side of Spor Mountain has zones of beryllium-rich rhyolitic tuff that also contain fluorite (Staatz and Griffitts, 1961). The Vitro Minerals Co. kindly supplied drill-hole samples to supplement this study; adequate representation of the lower parts of the tuff bed would not have been possible without the samples.

The distribution of beryllium and fluorine in the mineralized tuff bed at Spor Mountain is shown in figure 4.1. The upper part of the tuff bed contains the greatest concentrations not only of beryllium and fluorine but also of iron, manganese, zinc, lead, tin, and rare earths. However, the zones of greatest concentration of these other elements coincide only approximately with the beryllium-rich zones. The abundance of most of the above elements is greater in the lower part of hole 1 than in the lower part of hole 2, the reverse of the trend noted for the abundance of beryllium and fluorine. The rank-correlation coefficient (Dixon and Massey, 1951, p. 261) calculated for beryllium and fluorine in 30 samples from each drill hole gives values of 0.636 and 0.656, respectively. The critical value for significance at the 1-percent level for 30 samples is listed as 0.432. Thus the correlation between beryllium and fluorine is significant to a very high degree.

The plot of the beryllium concentration against the fluorine content of the samples (fig. 4.2) shows that the concentrations of the two elements vary directly. For convenience the concentrations are grouped into ranges with midpoints in the series 1, 1.5, 2, 3, 5, and 7, and these midpoints are plotted in the diagram. Figure 4.2 shows that most of the samples are grouped in 2 concentration ranges, namely, 1,000 ppm of Be or more, corresponding to the ore zone, and 100 ppm of Be or less, delineating a submarginal mineralization of widespread extent. The concentration range between 100 and 1,000 ppm of Be contains relatively few samples, indicating a sharp boundary of the ore zone. Similar sharp boundaries between ore and nonore rocks have been observed in other beryllium districts.

The concentrations of the two elements must reach a maximum before either approaches 100 percent. Study of selected specimens suggests that the maximum beryllium content might be between 7 and 10 percent, associated with a fluorine content of about 30 percent.

REFERENCES

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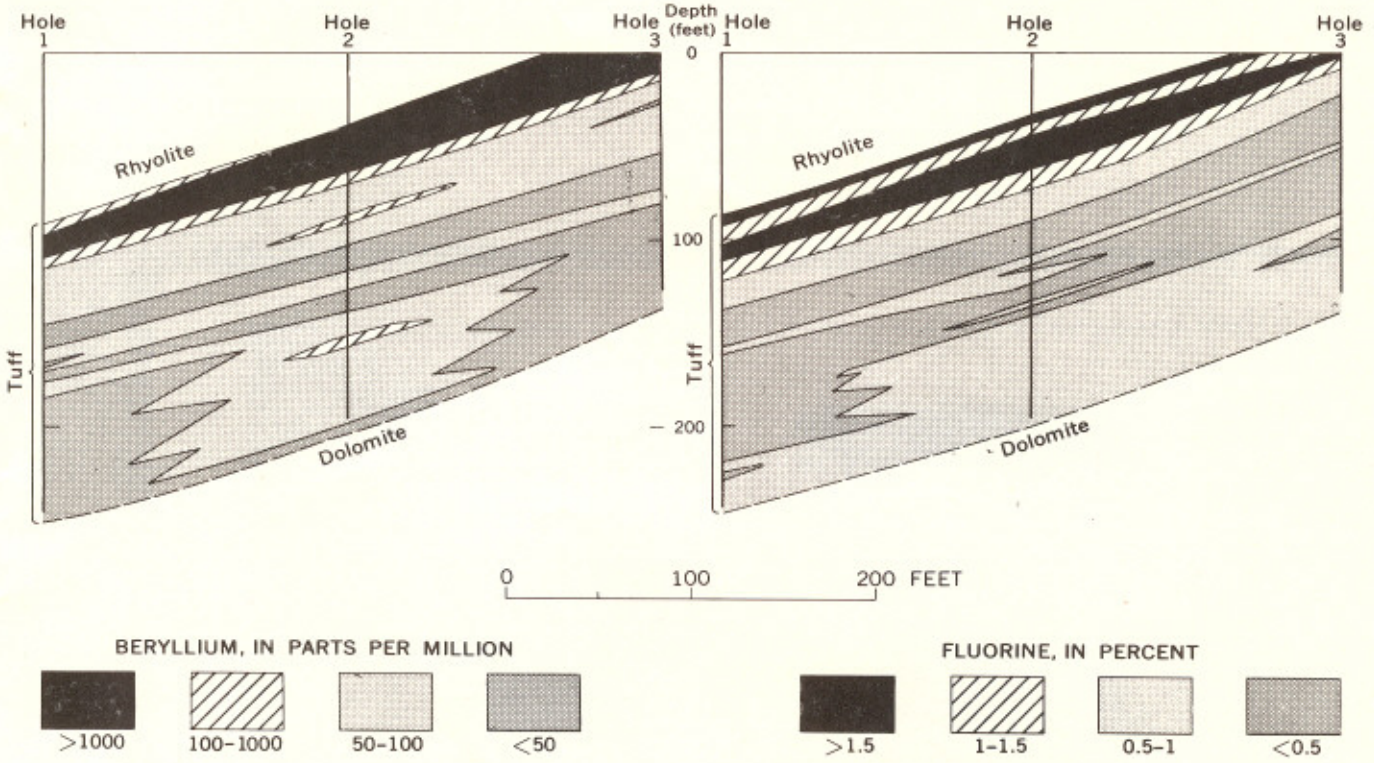

FIGURE 4.1.—Distribution of beryllium and fluorine in the mineralized tuff bed at Spor Mountain.

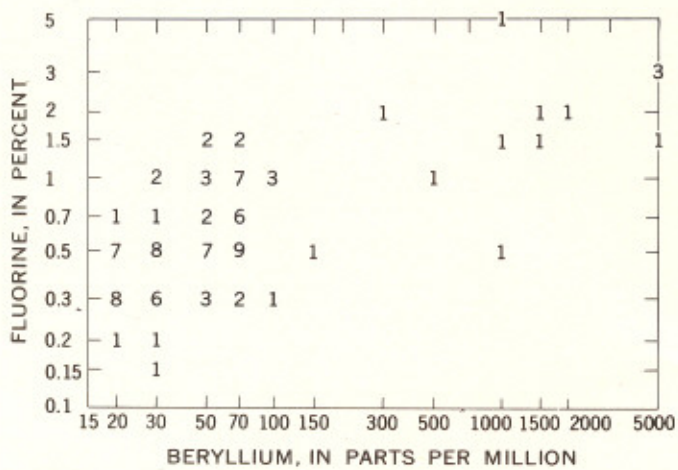

FIGURE 4.2.—Relation between beryllium and fluorine in mineralized tuff at Spor Mountain. Numbers indicate number of analyses falling at each coordinate intersection.