is very useful in seeking heavy minerals, such as gold, wolframite, or cassiterite, because they are concentrated in the alluvium. Unfortunately, however, the common beryllium minerals are too light to be concentrated readily and are difficult to recognize: their presence, therefore, must be inferred from the relatively high beryllium content of alluvium that contains them. The concentration of beryllium in most alluvium is less than 5 ppm (5 parts per million or 0.0005 percent), so that a few fragments of a beryllium mineral will increase the tenor of a sample by an amount readily detectable by rapid spectrographic or fluorimetric analyses.

We have made fairly thorough studies of alluvium in the beryllium districts near Lake George, Colo., at Iron Mountain, N. Mex., and in the Sheeprock Range, Utah; less thorough studies in other places confirm the conclusions reached in those three districts. V. Venkatesh and Y. G. K. Murty of the Geological Survey of India worked with us in the Lake George and Iron Mountain areas respectively.

Most of the beryl- and bertrandite-bearing veins in the Lake George area are in a broad intermontane valley underlain by schist and gneiss that are deeply covered with soils. The mountains at the eastern edge of the valley are underlain by granite of the Pikes Peak batholith. The soils and alluvium derived from the metamorphic rocks contain 2 to 3 ppm of Be; those derived from the granite may contain as much as 10 ppm. Near the beryllium-rich parts of veins, which weather readily, alluvium may contain as much as 20 ppm of Be. Figure 44.1 shows the increase in beryllium content of alluvial samples from a wash that flows eastward past the veins in and near the Boomer mine.

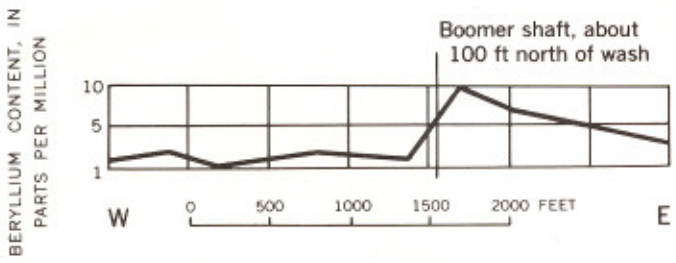

FIGURE 44.1.—Beryllium content of alluvium in wash south of Boomer mine.

In the Iron Mountain district, New Mexico, tactite has replaced limestone of the Magdalena group near intrusive masses of fine-grained monzonite, granite, and porphyritic rhyolite. Helvite occurs near the north end of the largest mass of tactite, but most of the known localities are in smaller masses west of the ridge crest. Samples of alluvium taken from washes and near the mountain front contain no more than 2 ppm of Be south of the area of figure 44.2. Nearer the mineralized rocks the beryllium content of similar alluvium samples is higher, reaching a maximum in the washes that drain the known helvite-bearing rocks in the NW quarter of section 2 (see figure 44.2). The low beryllium content of most alluvial samples taken east of the crest reflects the absence of known helvite occurrences in most of the large tactite mass. The two washes east of the ridge crest that yield the richest samples—with 30 and 100 ppm—drain the only known helvite-bearing rocks east of the divide. The two soil samples taken at the north end of the mountain indicate that the layer of tactite exposed there can account for the 30 ppm of Be found in the alluvium to the west. Samples of residual soil taken along several traverses in section 2 show anomalous beryllium content immediately above and downhill from metallized tactite layers.

The northwesterly-trending Sheeprock Range, near Eureka, Utah, is flanked by desert basins that contain Quaternary and older alluvium and volcanic rocks. The range consists mainly of Precambrian and Paleozoic sedimentary rocks, but a stock of granite extends about six miles along the range. Soils are poorly developed over this granite. Near the center of the stock clusters of blue beryl crystals are embedded in apparently unaltered granite. Beryl-free granite between the clusters of beryl crystals in this central area contains 10 to 15 ppm of Be, whereas granite from other parts of the stock generally contains less than 10 ppm. The coarser (over 200-mesh) fractions of alluvium contain more beryllium over the beryllium-rich granite than elsewhere, but the finer fraction contains a rather uniform 2 to 5 ppm in most places sampled over the stock.

Analysis of alluvium is an effective way to find districts in which beryllium-rich rocks crop out, and it is relatively economical, because taking and analyzing samples in a district of ordinary size requires about two man-weeks. In general, any district should be considered favorable if it yields samples containing 10 ppm or more of Be, but even values between 5 ppm and 10 ppm may be promising in samples taken from geologically favorable places. Analyses of residual soils can be used to find individual bodies of beryllium-rich rock, in the same way that float has long been used in finding veins.

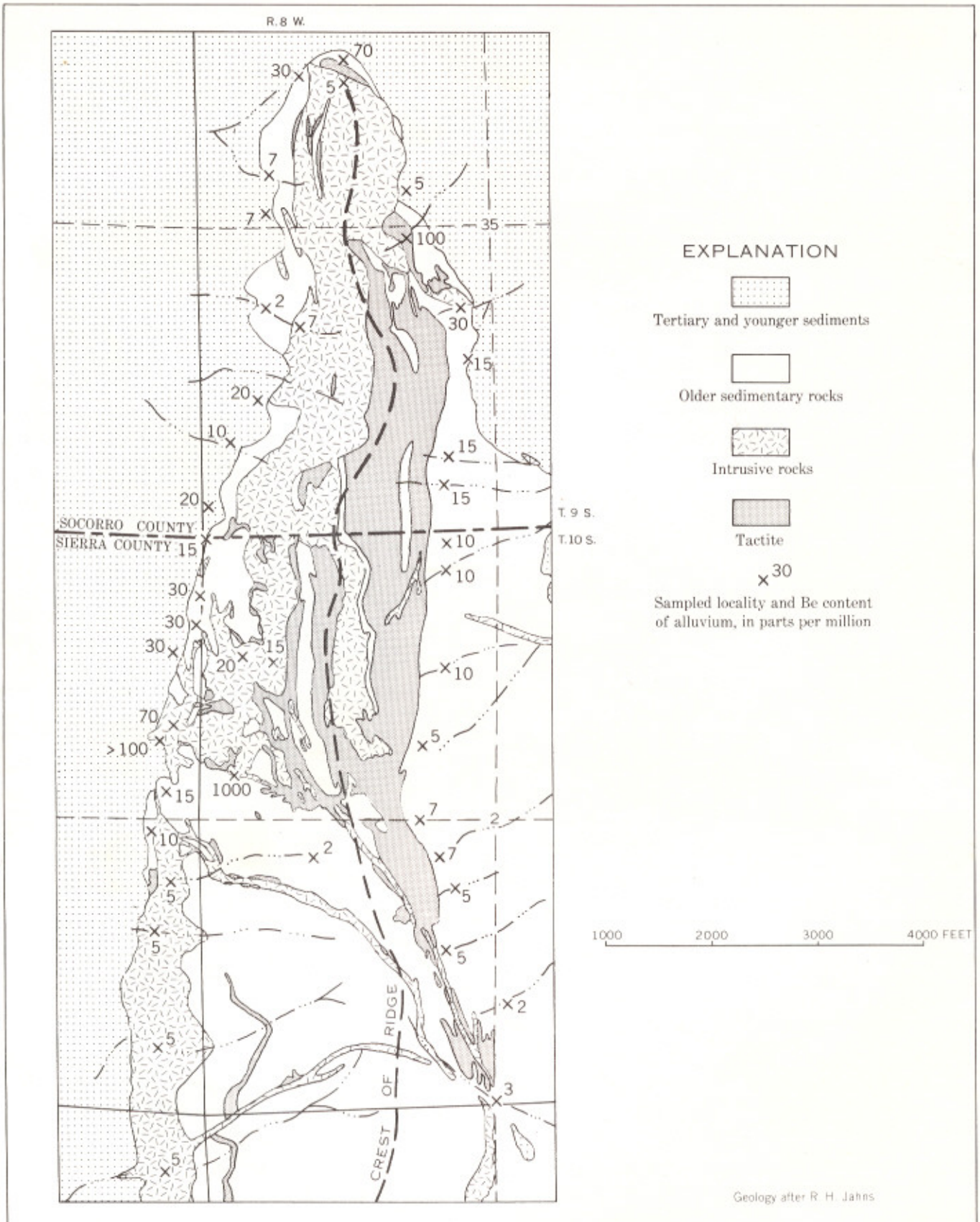

FIGURE 44.2.—Simplified geologic map of the Iron Mountain area, N. Mex., showing beryllium content of alluvium.