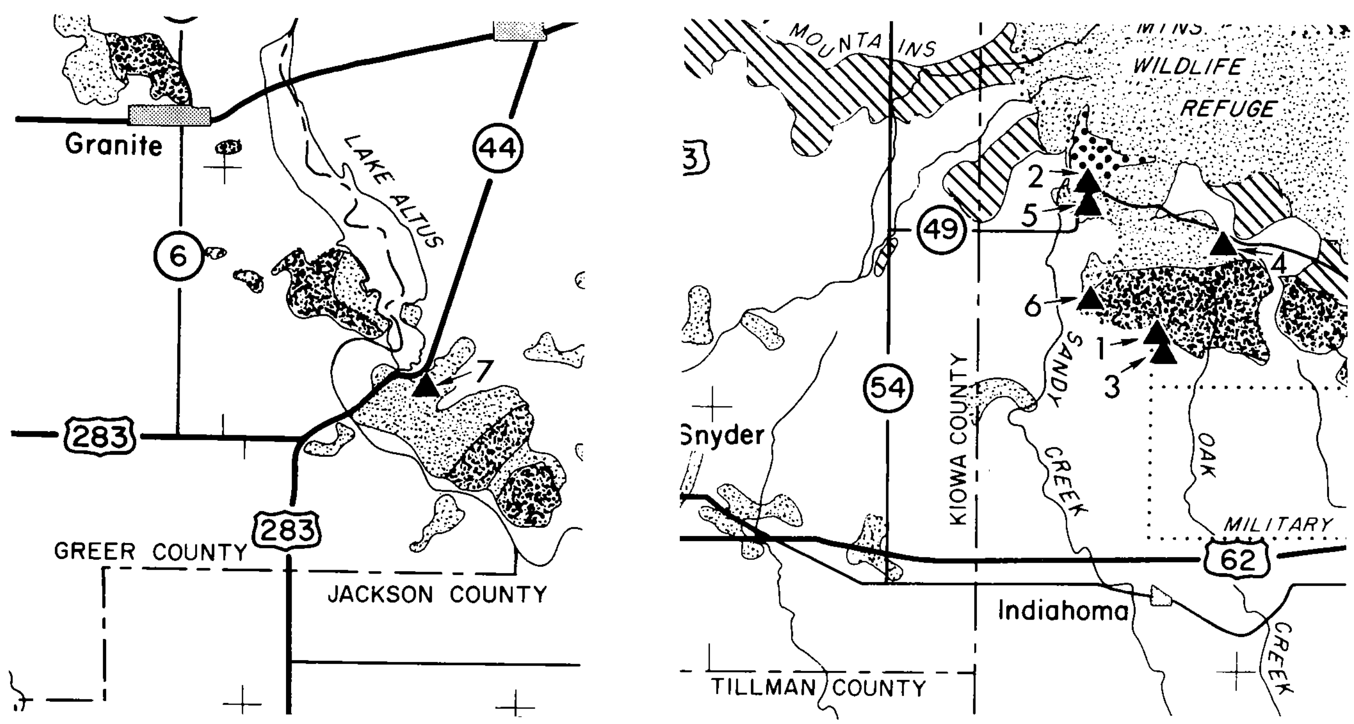

Western Wichitas

Eastern Wichitas

Figure 39. Index map for sample areas from figure 2.

$Fe^{+2}_{4.9}\,Fe^{+3}_{0.7}\,Si_{7.7}\,Fe^{+3}_{0.3}\,O_{22}(OH)_2$, under hydrothermal conditions, depending on temperature, oxygen fugacity, and fluid pressure. Under relatively oxidizing conditions, with oxygen fugacity defined by the hematite–magnetite buffer, fine-grained, blue riebeckite is stable up to about 500°C, depending on fluid pressure. When the oxygen fugacity is defined by the magnetite–fayalite–quartz buffer, high-temperature stability is elevated, and the experimental amphibole crystals were coarser grained and greenish. This reflects solid solution toward the more ferrous arfvedsonite, with formation of about 5 percent quartz. With still greater reducing conditions, as defined by the wustite–iron buffer, the maximum thermal stability extends to nearly 700°C at 1,000 bars fluid pressure. The amphibole is green, has the approximate composition of $Na_{2.4}\,Fe^{+2}_{4.9}Fe^{+3}_{0.7}Si_{7.7}Fe^{+3}_{0.3}O_{22}(OH)_2$, and coexists with 10 to 15 percent quartz. However, the high-temperature thermal stability is presumably elevated considerably when fluorine replaces hydroxyl (Ernst, 1962).

Thus, in the sample from the western Wichitas, the lower fluorine content of the arfvedsonitic amphiboles, and the presence of fine, blue riebeckite (fig. 44) surrounding titanomagnetite, suggest reaction of the titanomagnetite and quartz with the residual fluid as the temperature dropped under relatively oxidizing conditions. Samples from the eastern locations 1, 2, 3, and 5, with their higher fluorine contents and more arfvedsonitic compositions, suggest relatively greater reducing conditions and perhaps

Figure 40. Photograph of Hale Spring outcrop, dike 1—sample WM5 (Stop 3).