PETROLOGY OF THE PROTEROZOIC MT. ROSA INTRUSIVE COMPLEX, PIKES PEAK BATHOLITH, COLORADO.

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The Mount Ross intrusive complex is one of seven alkalic plutons within the anorogenic 1080 ma Pikes Peak batholith. It includes faylite-bearing granitoids, "riebeckite" granite, and a variety of dikes including lamprophyres, diabase, syenite, quartz diorite, and granite.

The fayalite-bearing rocks range from syenite to granite. They have variable mineralogies of quartz, microcline/perthite, and oligoclase. Annite is the most common mafic mineral with accessory magmatic epidote, fluorite, amphibole, and fayalite. They are chemically homogeneous with SiO2 ranging from 67 to 74 wt. %, Na2O (4%), K2O (5.5%), high REE and LREE-enriched contents with a negative Eu anomaly. They all plot as A-type granite on various discriminants. The zircon suggests near-liquidus temperatures in the range from 865°C to 966°C. The magmatic epidote suggests pressures of at least 8Kb, much greater than previously believed. Variations among the granitoids can be explained through fractionation of anorthite, with orthopyroxene, amphibole, and biotite. The Mt. Rosa granite contains quartz, microcline/perthite, and oligoclase with annite and arfvedsonite (not riebeckite) (Giambalvo, 1993). Accessory muscovite, astrophyllite, zircon, aegerine and opaques also occur. SiO2 contents range from 73 to 78 wt. % SiO2, 2-5% Na2O and 4-6% K2O. They are strongly enriched in LREE with a negative Eu anomaly. They are within-plate, A-type granite. Field evidence supports the occurrence of mafic dikes contemporaneous with the Mt. Rosa granitoids. These include augite-bearing camptonite and tholeiitic hornblende diabase. Nd-isotopes indicate an undepleted or enriched mantle source for the diabase, though low Mg- numbers (average of 37) suggest they are evolved and contaminated. Discriminant diagrams place both sets of dikes as within-plate.

Isotopic data (Douglass, 1993) require a mantle component in the Mt. Rosa granitoids and indicates the fayalite and arfvedsonite granites are related, though computer modeling suggests simple crystal fractionation is insufficient to derive the arfvedsonite granite from the fayalite-bearing rocks. The diabase may be evolved from the required mantle source that produced the Mt. Ross intrusives.