

## **GENESIS OF COMPOSITIONAL CHARACTERISTICS OF STILLWATER AN-I AND AN-II THICK ANORTHOSITE UNITS**

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### **ABSTRACT**

A single 10m x 10m outcrop of Stillwater anorthosite unit AN-II was mapped for pyroxene mode on a decimeter scale, and samples from each range of pyroxene proportion were analyzed for major and trace elements. Distinct one- to several square meter regions of different pyroxene mode were observed. Samples from regions with >10% pyroxene showed strong elemental correlations and anticorrelations with MgO concentrations that can be interpreted in terms of the following scheme for development of the Stillwater anorthosites: Aggregates containing ~50% to ~80% cumulus plagioclase (ave. 67%) formed stable frameworks in a crystal mush of complexly zoned plagioclase. The interstices among the plagioclase grains in these frameworks filled in part with pyroxene and plagioclase that were produced in equilibrium with the bulk melt and in part with pyroxene and plagioclase derived by crystallization of trapped intercumulus liquid. The proportions of these three types of materials were mutually constrained in a manner that gave rise to lines instead of fields on two-element variation diagrams. Samples richest in cumulus plagioclase are also richest in intercumulus plagioclase and pyroxene. Regions of the outcrop with <10% (original) pyroxene underwent substantial alteration by hydrous fluids that produced variations in Fe<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, LOI, and most incompatible trace elements.