

*American Mineralogist, Volume 90, pages 1434–1441, 2005*

## **Early diagenetic origin of Al phosphate-sulfate minerals (woodhouseite and crandallite series) in terrestrial sandstones, Nova Scotia, Canada**

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### **ABSTRACT**

Hydrated alumino-phosphate-sulfate (APS) minerals of the woodhouseite and crandallite series are found as microcrystalline aggregates replacing volcanic glass and apatite and filling pores in sandstones of the fluvial Lower Cretaceous Chaswood Formation, southeastern Canada. Mineral grains from heavy mineral separates and rock samples were analyzed with an electron microprobe. As the crandallite component of the grains increases, REE and F content increases. The APS minerals formed during early diagenesis as a result of the flux of meteoric water below the water table, beneath regional intraformational unconformities at which oxisols had developed. Sulfate was derived from the oxidation of very early diagenetic pyrite, and phosphate from dissolution of detrital apatite. The APS minerals are commonly associated with detrital dolomite, which may have played a role in increasing pH in the circulating meteoric water. Zoning of APS grains to lower S concentrations outward suggests that  $\text{SO}_4^{2-}$  concentration was a determining factor in APS mineralogy and mineral composition.