
Clay Mineralogy, Alteration History, and Economic Geology of the Whitemud Formation, Southern Saskatchewan, Canada

Robert J. Pruett¹ and Haydn H. Murray

Department of Geosciences, Indiana University, Bloomington, Indiana 47405

¹Present address: ECCI (Americas), Technology Center, P.O. Box 471, Sandersville, Georgia 31082.

Abstract: The Upper Cretaceous (Maastrichtian) Whitemud Formation is a potentially commercial kaolin deposit located in southern Saskatchewan and southeastern Alberta. The Whitemud Formation contains a lower kaolinitic sandstone, a middle lignite and carbonaceous shale, and an upper interbedded siltstone and claystone. The sediments that comprise the rocks of the Whitemud Formation were deposited on alluvial or upper deltaic plains located along the northwest flank of the Williston Basin.

Mineralogy and textures were determined by X-ray powder diffraction, scanning electron microscopy, and optical microscopy. Kaolinite abundance increases upward from the underlying rocks of the Eastend Formation through the Whitemud Formation, and the abundance of smectite, micas, and feldspars decreases from the Eastend Formation into the Whitemud Formation. Vermiform kaolinite crystals are in close spatial association with feldspar and mica grains. Near the top of the Whitemud Formation, etched quartz and feldspar grains, and gibbsite suggest the presence of a strong chemical leaching environment.

Mineral distributions, presence of root remains, pedologic mottles, grain coatings composed of clay, and soil horizons indicate the Whitemud Formation sediments were modified by intense weathering in a paleosol environment.

Kaolin concentrated from selected kaolinitic sandstone deposits, and beneficiated by oxidation, leaching, and high-intensity wet-magnetic separation has a product brightness up to filler quality. Recovery of low-abrasion kaolin is low and viscosity of a fine-particle kaolin fraction is high. Economics of producing a wet-processed filler-grade kaolin is marginal.

Key Words: Abrasion • Brightness • Eastend Formation • Frenchman Formation • Kaolin • Kaolinite • Paleosol • Whitemud Formation

Clays and Clay Minerals; December 1991 v. 39; no. 6; p. 586-596; DOI: [10.1346/CCMN.1991.0390604](https://doi.org/10.1346/CCMN.1991.0390604)

© 1991, The Clay Minerals Society

Clay Minerals Society (www.clays.org)
