

Chemical and Mineralogical Transformations of Coal Fly Ash after Landfilling

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ABSTRACT

Most coal fly ash applications, such as additive to cement, structural fill, and waste stabilization, use fresh fly ash received directly from coal fired power generation plants. However, if the current trend continues, the demand for fresh coal fly ash for various applications will increase and utilization of coal fly ash disposed in landfills should be considered. This study investigates the chemical, mineralogical and geochemical properties of coal fly ash after landfilling for various durations and at various depths. The coal fly ash studied was from the Atikokan generation station in Northern Ontario, Canada. The effects of weathering/ageing on the landfilled coal fly ash are studied in comparison with the fresh fly ash from the same site. The physical, mineralogical and micro-structural characterization results showed the alteration in mineralogy and microstructure of the fly ash, and revealed the formation of secondary minerals mainly due to hydration, carbonation and pozzolanic reactions that occurred after landfilling. The formation of secondary minerals during weathering of disposed fly ash samples has significant effect on acid neutralization capacity, heavy metal sorption capacity from aqueous solutions and leaching behavior of their components.

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