

Hydraulic Conductivity of Compacted Cement-Stabilized Fly Ash

Michael E. Kalinski¹ and Praveen K. Yerra¹

¹University of Kentucky, Department of Civil Engineering, 161 Raymond Bldg., Lexington, Kentucky 40506-0281

KEYWORDS: fly ash, portland cement, compaction, hydraulic conductivity

ABSTRACT

When combined with portland cement and compacted, fly ash is a high-strength, versatile material with many uses. In some instances, it may be desirable to quantify and control the hydraulic conductivity of compacted cement-stabilized fly ash. Previous research has demonstrated that the hydraulic conductivity of cement-stabilized compacted fly ash is on the order of 10^{-5} - 10^{-6} cm/s, depending on water content, cement content, and curing time. However, the effects of compaction effort have not been investigated. Therefore, a study was performed to assess the effects of water content, cement content, curing time, and compaction effort on the hydraulic conductivity of compacted cement-stabilized fly ash. Specimens were prepared, cured, and tested using a flexible-wall permeameter. Results indicate that there is a slight decrease in hydraulic conductivity with increasing cement content, water content, and curing time, and that hydraulic conductivity on the order of 10^{-5} - 10^{-6} cm/s can be expected, which is consistent with previous studies. However, it was also observed that hydraulic conductivity decreases by roughly half an order of magnitude when increasing compaction effort from standard to modified proctor. This demonstrates that additional measures should be taken when using compacted cement-stabilized fly ash as a permeability barrier to achieve hydraulic conductivity less than 10^{-7} cm/s. On the other hand, compacted cement-stabilized fly ash may be an attractive alternative for other applications, such as use for an evapotranspirative landfill final cover.

Submitted for consideration in the 2005 World of Coal Ash, April 11-15, 2005, Lexington, Kentucky, USA.