Geological Society Engineering Group: Engineering Geology of Dams, preceded by the Engineering Group AGM

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The Design and Construction of Embankment Dams on the Mercia Mudstone

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The Mercia Mudstone underlies large areas of the Midlands and North West England, and outcrops in locations as diverse as Devon, South Wales and Carlisle. Unsurprisingly, a number of reservoirs have been constructed on this stratum, mostly impounded by earth-filled embankment dams, although gravity dams also exist.

The use of Mercia Mudstone as an embankment construction material poses a number of challenges. These included the very variable strength and permeability of the stratum, together with the presence of Skerry beds and evaporite bands.

During preparatory works for a new reservoir in Lincolnshire, some surprising and contradictory ground investigation information was obtained, and this data prompted a review of previous examples of reservoir construction with and on this material.

This presentation deals with the geotechnical aspects of reservoir construction using Mercia Mudstone. It highlights some of the essential features of this formation using examples from the Lincolnshire reservoir which is currently under development, but also from some other reservoirs for which information is available.

The author will explore the findings of some desk study research as well as data from ground investigations undertaken for reservoir design purposes, and will illustrate his findings with images, tables and graphs as appropriate.

Surface Fault Rupture Hazard Analysis for Earth Embankment Dams

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In addition to the hazard from strong ground motions, dams in active tectonic regimes are often exposed to displacement from active faults. Fault traces are almost ubiquitous within the foundation footprints of many dams. The perceived potential for fault displacement usually results in dam design defaulting to a zoned earth embankment. However, even for these relatively forgiving structures, successful design requires quantification of the style and magnitude of slip-per-event in order to ensure adequate clay core design and, if necessary, to incorporate appropriate design measures to mitigate the effects of seiche erosion/overtop potential.

This presentation will discuss fault rupture evaluation methods to provide input for both deterministic and probabilistic rupture hazard analyses. Recommended mitigation measures will be presented from worldwide case histories.