The Nearly Perfect Nineteenth Century Embankment Dam

P J RIGBY, United Utilities PLC
A N THOMPSON, United Utilities PLC
D E JONES, United Utilities PLC

SYNOPSIS United Utilities (UU) is owner of over 170 embankment dams; most constructed during the late nineteenth century and include homogeneous and Pennine type dams. In support of its Portfolio Risk Assessment (PRA) approach prioritisation of dam work, UU has undertaken a number of seepage “Toolbox” workshops to quantitatively identify the main risks to its dams from internal erosion.

The paper provides a timeline of the development of embankment dam design and notable incidents and these are related to the construction of dams included within the Toolbox study.

The Toolbox studies include both homogenous and clay core dams and the paper discusses common mechanisms of potential failure identified the embankment, associated with conduits and through the foundation. In addition some potential shortfalls in design, common defects and inconsistency in the construction practice are discussed. Following review of the homogenous and clay core dams, an idealised “C19th embankment dam” design is promoted that would address the majority of the potential failure mechanisms and associated risks for internal erosion.