

## The Coursier Dam sinkholes: a case study of backward erosion as a consequence of filter incompatibility

R.J. Fannin

*University of British Columbia, Vancouver, Canada*

D. Roos

*Aurecon, Tshwane, South Africa*

Keywords: Coursier Dam, filter incompatibility, backward erosion, sinkhole.

Modern filter criteria are routinely used in engineering practice for the design of filters in embankment dams. Although somewhat well-developed, these criteria are based on results from a variety of non-standardised test devices and methods, and are rarely validated by means of field data or full-scale testing. Furthermore, very little work has been done towards understanding how filters built before the advent of modern filter design may be assessed.

To address this knowledge gap, the Continuing Erosion Filter (CEF) test and empirical criteria for the assessment of existing filters had been developed. Decommissioned in 2003, following a long history of sinkholes, piping and seepage-related incidents, Coursier Dam presents an excellent opportunity for study. CEF tests have been conducted on soils sampled at the dam site, to determine the material susceptibility to filter incompatibility.

It is concluded that the lower core from Coursier Dam is susceptible to filter incompatibility where it is in contact with a stratum of the foundation, and that this filter incompatibility may explain the occurrence of sinkholes. The finding is supported by the results of a parametric study on soil from another dam site. Furthermore, it is found that CEF testing, in conjunction with the empirical criteria for filter assessment, provides useful insights into the phenomenon of base-filter compatibility.