

Assessing the vulnerability of a typical British embankment dam to internal erosion

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SYNOPSIS The vulnerability to internal erosion of a 100-year old typical British embankment dam without filters has been examined using seven methods. Four assessed the potential of the shoulder fill, a low permeability till, to act as a filter and prevent erosion through the core. These were the Sherard grading criteria, the Vaughan permeability criteria, the Delgado permeability criteria, and the Foster & Fell probability-based criterion. Two methods, particularly Fry's, assessed whether sufficient tractive forces would be available to initiate and continue erosion. The seventh was the Interim Guide to Quantitative Risk Assessment for UK Reservoirs, which by comparing the characteristics and performance of the subject dam to that of similar embankment dams makes it possible to assess the probability of failure and whether this is acceptably low. The filter and probability criteria gave only moderately re-assuring results, probably because they are derived from stringent tests to develop conservative design criteria for filters. Methods, such as Fry's, that analyse the mechanics of erosion in the dam seem to best reflect the actual performance of the dam, which has been demonstrated by the QRA to be good when compared to the behavior of many similar dams.