

CHAPTER D-2 SPILLWAY EROSION

D-2.1 Key Concepts

This chapter is under development. The Spillway Erosion presentation contains current guidance on this failure mode. Refer to Chapters D-1 Erosion of Rock and Soil and D-3 Flood Overtopping Failure of Dams and Levees for background information, concepts, and related case histories.

Erosion of spillways is a component event of many potential failure modes resulting from large floods and spillway discharges. There are several important case histories of spillway erosion and/or slab failures leading to progressive failure of the spillway chute, such as at: Ricobayo Dam (Spain); Saylorville Dam (Iowa); Tuttle Creek Dam (Kansas); Cottonwood Creek Dam (North Dakota); Clearwater Dam (Missouri); and Guajataca Dam (Puerto Rico). Initiation of erosion in spillways does not necessarily lead to complete breach of the spillway and uncontrolled release of the reservoir.

Key concepts of the spillway erosion potential failure mode (PFM) include the following.

- Recognize that the failure progression is duration dependent (judgment required in evaluating rate of erosion, duration of loading, etc.).
- Understand the difference between erosion of a uniform material and that of a varied geology.
- There are multiple methods available for estimating erosion/scour potential.
- Scour is complicated and cross-disciplinary.
- This failure mechanism can be linked to the likelihood of other failure modes (e.g. control section stability, spillway chutes, tunnels and stilling basins).

An Issue Evaluation study focusing on a spillway erosion PFM was completed in 2018 by USACE for Pipestem Dam (North Dakota). The data, methods, and analyses in that study can be considered as a representative example for evaluating the potential for spillway erosion.