

**U.S. Army Corps of Engineers
Risk Management Center, Lakewood, Colorado**

Hydrologic Hazards for Risk-Informed Dam and Levee Safety

John F. England, Jr., Ph.D., P.E., P.H., D.WRE, Lead Civil Engineer

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Abstract

The U.S. Army Corps of Engineers utilizes risk analysis to assess the safety of dams and potential modifications across a portfolio of over 700 dams. The dam safety risk analysis inputs are loadings (hydrologic, static, and seismic), failure probability estimates, and consequence estimates. Hydrologic hazards are the flood loading inputs to risk analysis, consisting of peak flows, volumes, and reservoir levels versus Annual Exceedance Probability (AEP). Full distributions and uncertainty are portrayed, with very low AEPs typically to 1×10^{-6} necessary for decision making. Uncertainties in these estimates can be quite large, and might span several orders of magnitude. Some advances in hydrologic hazard estimation techniques that have been made since that the late 1990s is summarized. In particular, advances in regional precipitation frequency analysis, storm data bases, site-specific and regional paleoflood information, and quantifying uncertainty of hydrologic hazards are discussed. Data needs and current challenges in estimating watershed-specific hydrologic hazards are outlined. There are numerous opportunities to advance the state-of-art in applications, including hydrometeorology of extremes, incorporating model uncertainty, and quantification of risk reduction benefits.