Findings from re-evaluating the IDFs for three dams in California during times of change

Carmen Bernedo P.E., D.WRE., Stantec

Vik Iso-Ahola, P.E., PMP, Stantec

Adam B. Mazurkiewicz, San Francisco Public Utilities Commission

Between 2017 and 2018, Probable Maximum Floods (PMFs) were developed for the San Francisco Public Utility Commission's (SFPUC's) Cherry Valley Dam on Cherry Creek and Eleanor Dam, utilizing the Probable Maximum Precipitation (PMP) and a complex set of other factors that affect runoff, such as snowpack, snowmelt and unit hydrographs to simulate the watershed hydrology and reservoir inflow hydrographs. A PMF estimation update was also performed for the SFPUC's Lower Moccasin Dam. The basin experienced an atmospheric river event in the spring of 2018 that resulted in an estimated peak inflow of about 14,000 to 15,300 cfs. This flow was comparable to the PMF peak inflow estimated in 1984 that was estimated at 15,776 cfs. Developing a level of accuracy in estimates of PMFs and Inflow Design Flows (IDFs), is essential to evaluate dam performance for reservoir management objectives and flood protection of downstream facilities. Rainfall-runoff models typically used for estimation of PMFs and IDFs have inherent uncertainty, since they are used to predict conditions which are far beyond those used in the calibration of the original models. Therefore, it is critical to assess such uncertainty/accuracy to support the decision-making process and evaluation of design alternatives. Limited streamflow and precipitation data were available to perform a thorough model calibration for Cherry Valley Dam. A more consistent and complete record from the adjacent Lake Eleanor basin was available and used to develop the rainfall-runoff model for both neighboring basins. The 2018 Moccasin observation was used to calibrate the HEC HMS model used to estimate the Moccasin Dam PMF. This paper provides a summary of the lessons learned when estimating new IDFs with limited data in snow and rain dominated basins. The challenges when upgrading the hydrologic design criteria of aging infrastructure will be discussed.