Oroville Dam Failure:

1. **Nature of Failure:** Erosion of Emergency Spillway Channel on Downstream Face of Dam, and toe area of dam.
2. **Occurrence of Failure:** Upon the first ever use of the Emergency Spillway following storms, with more storms in the forecast
3. **Details and Size of Reservoir and Dam:** http://www.water.ca.gov/damsafety/docs/Jurisdictional2016.pdf at Page 35 of 55.

Number	**1.048**
National ID No.	**CA00035**
Dam Name	**Oroville**
Owner Name	**California Department of Water Resources**
County	**Butte**
Stream	**Feather River**
Year Built	**1968**
Reservoir Capacity	**3,537,577.00**
Reservoir Area	**15,805.00**
Drainage Area	**3,607.00**
Crest Elev.	**922.00**
Dam Height	**742.00**
Crest Length	**6,920.00**
Dam Type	**ERTH**

4. **Design Criteria for Emergency Spillways, High Hazard Dams:**

The single most common cause of earthen dam failures is overtopping of the embankment. An undersized spillway will lead to overtopping, therefore spillway design is critical to reservoirs. Very often, the cost of a spillway of ample capacity will only be moderately higher than that of one that is woefully inadequate. The spillway must be located such that discharge will not erode or undermine the toe of the dam. If the banks of the spillway are made of erosive material, provision must be made for their protection. An emergency spillway must have sufficient capacity to allow for the conveyance of

peak flows during floods. Consideration must be given to the hazard to human life and potential property damage that may result from the failure of the dam or excessive flow rates through the spillway. Further consideration must be given to the likelihood of downstream development that may result in an elevation of the hazard classification.

The following flood criteria should be used when designing a spillway given the different dam hazard designations (NAC 535.240):

High Hazard: Probable Maximum Flood (PMF) on all dams.

Significant Hazard: PMF if no provision for a spillway is incorporated into the design or it is classified as a "large" dam. The greater of 1/2PMF or a "500-year" flood (0.2 percent chance of exceedence in any year) for "medium" and "small" dams.

Low Hazard: "100-year" flood (1 percent chance of exceedence in any year) on all dams.

Most effluent, process fluid and tailing impoundments are exempt from having a spillway, however, there must be diversion channels to route flood flows around the structure and/or sufficient freeboard designed into the structure to accommodate the required precipitation event.

A dam may also be designed to either impound the design flood or accommodate overtopping in which case no separate emergency spillway is necessary.

5. **Pictures and Videos of Failure:**
    a. **Dam and Reservoir (Google Earth):**

b. https://video.search.yahoo.com/search/video?fr=mcafee&p=oroville+dam+failure#id=6&vid=aae59ca663d12931be43dd31e9a69316&action=view

c. **2/12/17 Video Capture:** Note water flowing on downstream face of dam and through the Emergency Spillway.