

~~Official Use Only - Security Related Information~~

B-13

Oconee Flood Issue Jocassee Dam Failure Frequency

Division of Risk Assessment



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Derivation of the Random Jocassee Frequency

- Two Catastrophic Failures Derived from NPDP – National Performance of Dams Program
 - Frenchman (Montana)
 - Failure in 1952
 - 63-ft height (some literature shows it as 44-ft)
 - Low hazard class
 - Skagway (Colorado)
 - Failure in 1965
 - 79-ft height
 - Significant hazard class

Failure Modes That Constitute The Jocassee Dam Catastrophic Failure Frequency

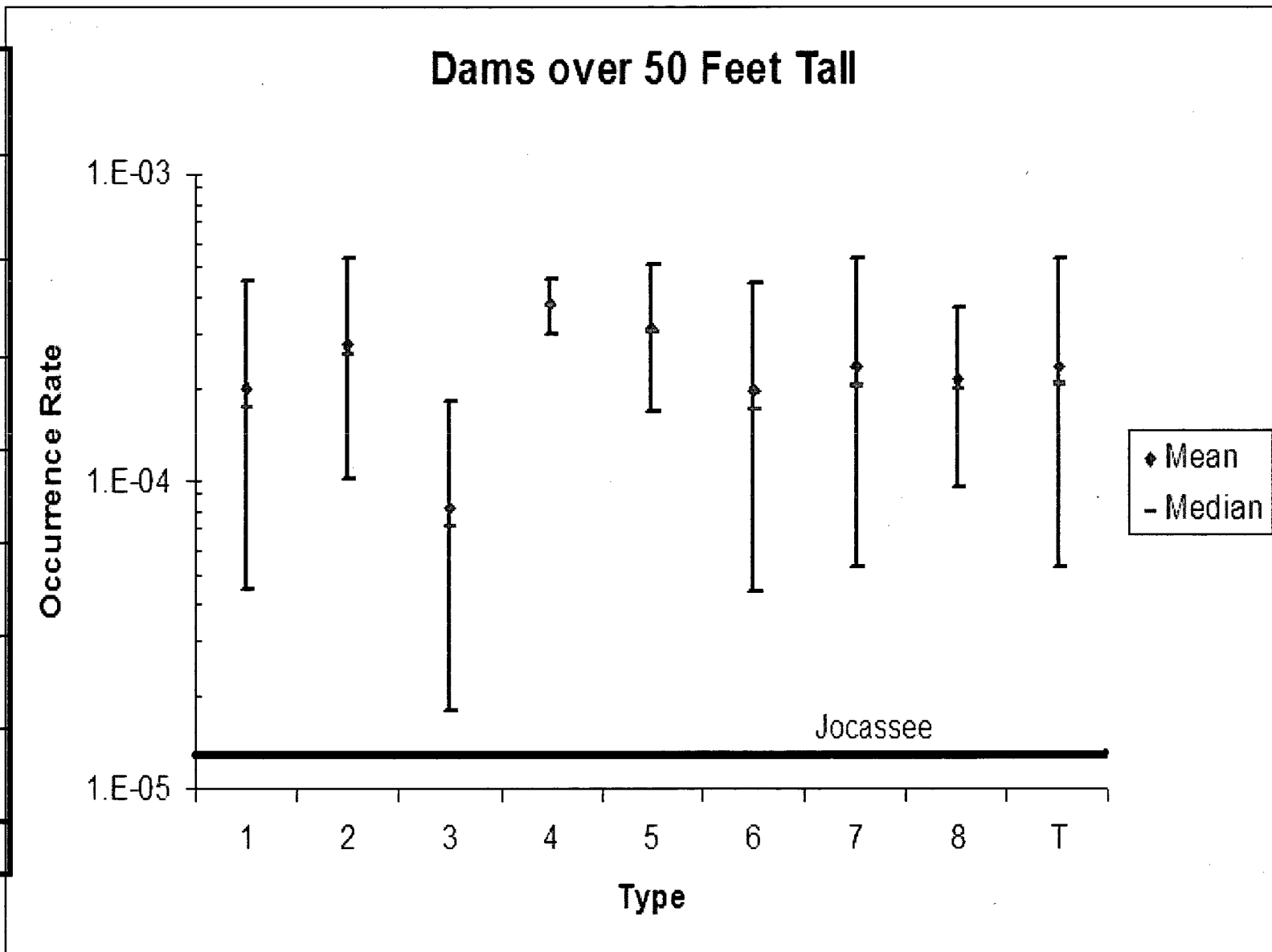
- Random (“sunny day”) failure
 - Overtopping due to random failure
 - Piping or seepage
 - Foundation and structural defects
 - Other
- PMP (Probable Maximum Precipitation) – PMF (Probable Maximum Flood)
 - Results in overtopping
- Seismic
 - Results in a catastrophic foundation/structural failure
 - Overtopping potential due to wave.
 - Evaluation done for Duke in 2007 calculates Jocassee HCLPF at 0.22g for slide initiation.

Parsing The Frequency Of Random (“Sunny Day”) Failure Modes

- Pros
 - Get higher resolution of failure modes contributing to the catastrophic failure frequency.
 - Concentrate on specific engineering/operational improvements to reduce overall frequency.
- Cons
 - Cannot statistically justify if the overall catastrophic failure data is sparse.
 - Method is not well developed relying on the assumption that each failure mode is statistically independent without consideration of common cause.
 - Uncertainty needs to be addressed for each failure mode which might yield distributions that are too wide to be confidently used.

Comparison of Random Dam Failures by Type

1	Buttress Dams Over 50 Feet High
2	Arch Dams Over 50 Feet High
3	Concrete Dams Over 50 Feet High
4	Earth Dams Over 50 Feet High
5	Gravity Dams Over 50 Feet High
6	Masonry Dams Over 50 Feet High
7	Multi-Arch Dams Over 50 Feet High
8	Rockfill Dams Over 50 feet high
T	Total



Evaluation

- Uncertainty bands are narrowest for rockfill (similar to Jocassee) and earthen dam types.
- Mean and median (50th percentile) frequencies are in the 10^{-4} to 10^{-3} per year range.