B-13

# Oconee Flood Issue
# Jocassee Dam Failure Frequency

## Division of Risk Assessment

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
*Protecting People and the Environment*

# 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

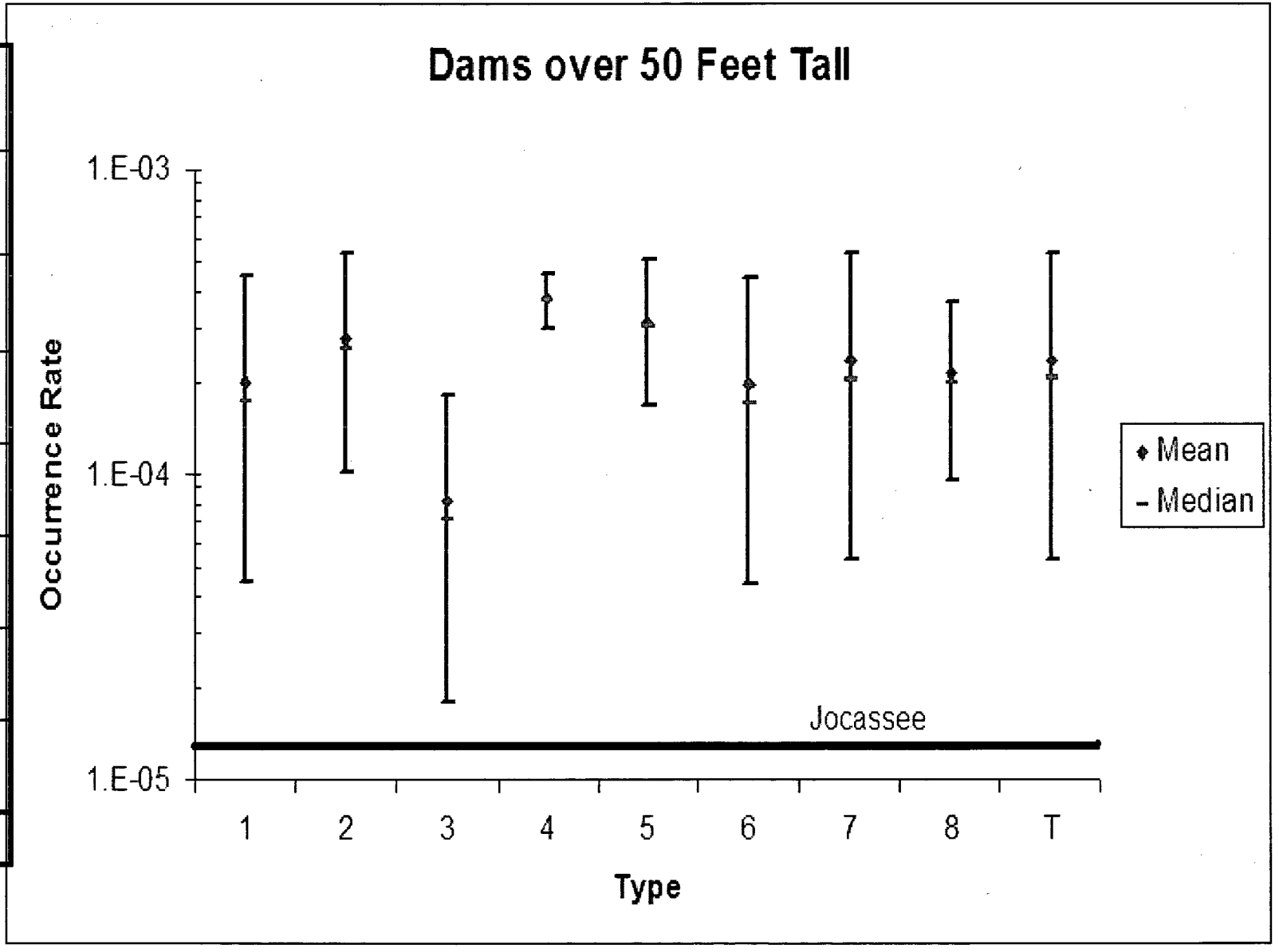
- Random ("sunny day") failure
  - Overtopping due to random failure
  - Piping or seepage
  - Foundation and structural defects
  - Other
- PMP (Probable Maximum Precipitation) – PMF (Probable Maximum Flood)
  - Results in overtopping
- Seismic
  - Results in a catastrophic foundation/structural failure
  - 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 ($50^{th}$ percentile) frequencies are in the $10^{-4}$ to $10^{-3}$ per year range.