

US Army Corps of Engineers Dam Safety Issues in Kansas

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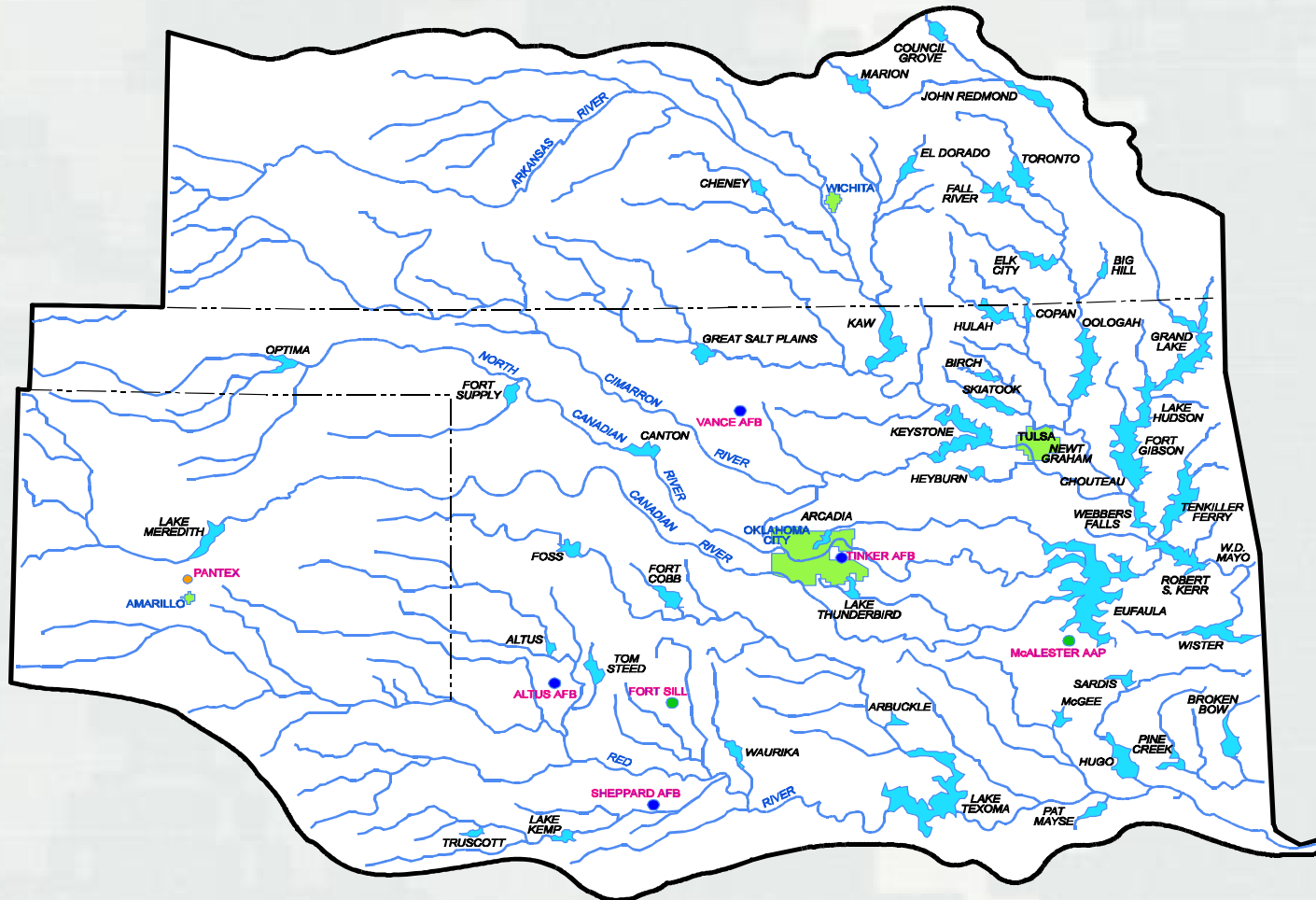
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US Army Corps of Engineers
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Tulsa District Civil Works Boundaries



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Tulsa District Dams/Levees in Kansas

- Dams

- ▶ John Redmond
- ▶ Marion
- ▶ Council Grove
- ▶ El Dorado
- ▶ Elk City
- ▶ Big Hill
- ▶ Fall River
- ▶ Toronto

- Levees

- ▶ Hartford
- ▶ Caney
- ▶ Elk City



USACE Ratings

- Unsafe
 - ▶ 13 FDR Structures 8 Navigation Structures

- Unsafe or Potentially Unsafe
 - ▶ 73 FDR Structures 28 Navigation Structures

- Conditionally Unsafe
 - ▶ 150 FDR Structures 65 Navigation Structures

- Marginally Safe
 - ▶ 262 FDR Structures 72 Navigation Structures



SWT Ratings

- Unsafe or Potentially Unsafe
 - ▶ 3 dams, 1 lock and dam, 4 levees
- Conditionally Unsafe
 - ▶ 8 dams, 1 lock and dam, 3 levees
- Marginally Safe
 - ▶ 23 dams, 3 lock and dams, 1 re-Reg Dam, and 6 dikes (rated as one)



Kansas Structures Unsafe or Potentially Unsafe

- Hartford Levee (John Redmond)
 - ▶ Foundation Seepage and Piping
 - ▶ Overtopping due to Waves



Kansas Structures Conditionally Unsafe

- El Dorado
 - ▶ Abutment Seepage and Piping
 - ▶ Toe Drain Pipe Failure
- Elk City Levee
 - ▶ Conduit Structural Failure
 - ▶ Overtopping in extreme event
- Council Grove
 - ▶ Abutment Seepage and Piping



Kansas Structures Conditionally Unsafe

- Caney Levee (Copan in OK)
 - ▶ Wave Overtopping during an Extreme Event
 - ▶ Conduit Structural Failure leading to seepage and piping of embankment
 - ▶ Pump Station Failure or Inadequacy



Kansas Projects Marginally Safe

- Big Hill
- Elk City Dam
- John Redmond
- Marion
- Toronto
- Fall River



Interim Risk Reduction Measures

- IRRM are short-term measures taken to reduce the risk of catastrophic failure to the maximum extent reasonably practical until permanent repairs can be made or investigations determine that a potential failure mode is not probable.
- While the study, design, and construction of long-term solutions are pursued, IRRM are the most responsible way to manage the risk to public safety.



Non-Structural IRRM Examples

- Reservoir pool restrictions and/or operational changes
- Pre-position emergency contracts
- Stockpiling materials
- Improvement or increase inspection and monitoring
- Identify threshold pools for inspection frequency
- Updating EAP
- Emergency exercises and coordination with stakeholders (includes communication)
- Warning systems
- Preventative O&M



Structural IRRM Examples

- Improve seepage collection system, including toe drains, relief wells, etc.
- Construct a shallow cutoff trench to slow seepage.
- Grout voids around conduits
- Grout/Seal conduit joints
- Install a grout curtain to slow seepage.
- Construct downstream stability berm and/or inverted filter.

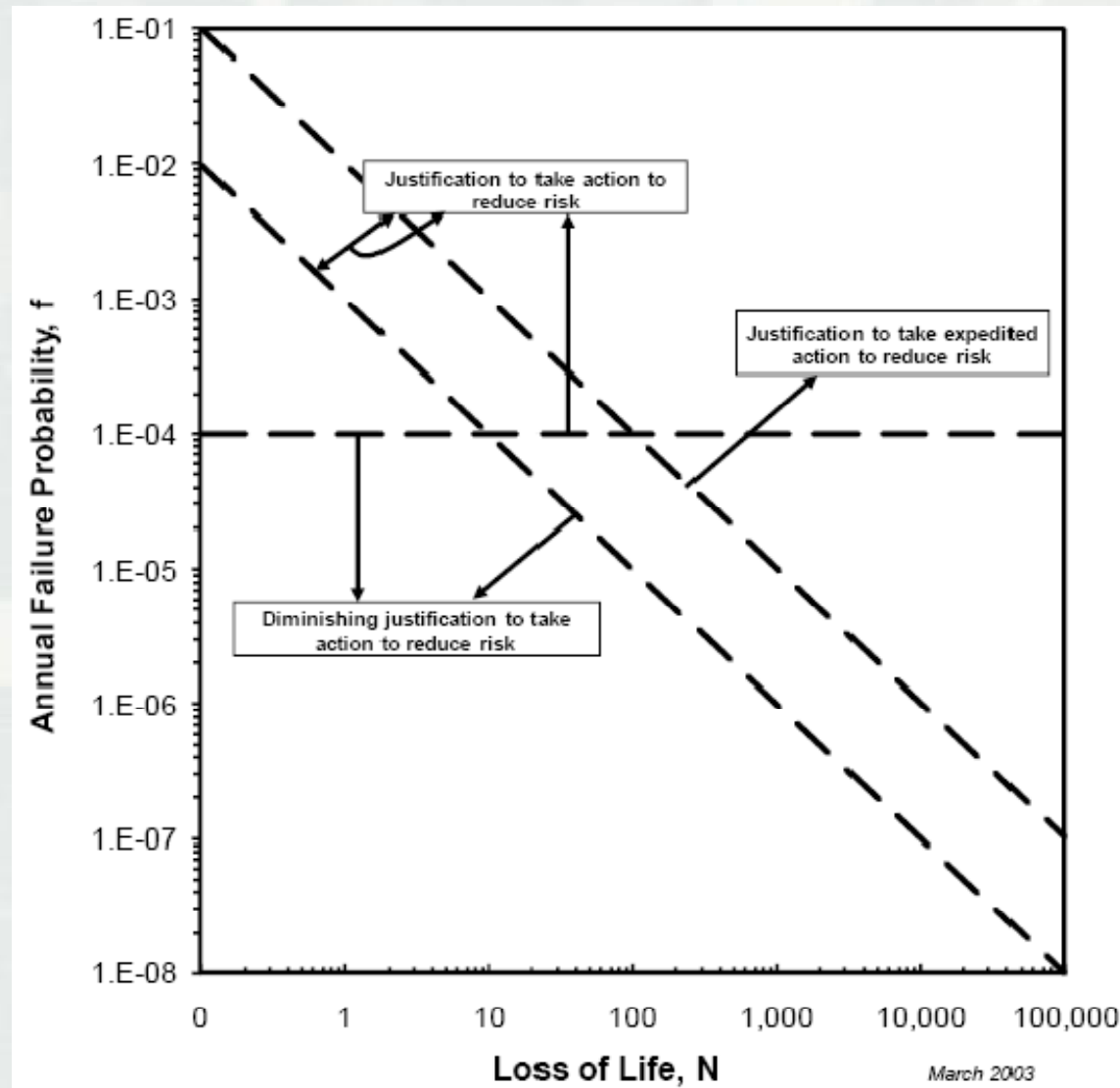


Issue Evaluation Studies

- Will be conducted on all structures rated as unsafe, potentially unsafe, or conditionally unsafe
- Scheduled and Funded by USACE Priority
- Conducted with the Risk Management Center
- Potential Failure Modes Analyses
- Risk Analyses
- Confirm or Revise Rating



Tolerable Risk



Dam Safety Modification

- Will be conducted on all dams rated as unsafe, potentially unsafe, or conditionally unsafe
- Schedule by USACE Priority
- Conducted with the Risk Management Center
- Additional Study and Investigations
- Potential Failure Modes Analysis
- Baseline Risk Analyses



Dam Safety Modification

- Formulate Risk Reduction Alternatives
- Develop Risk Reduction Alternatives
- Evaluate Risk Reduction Plans
- Select Risk Management Plan
- Includes an Independent External Peer Review

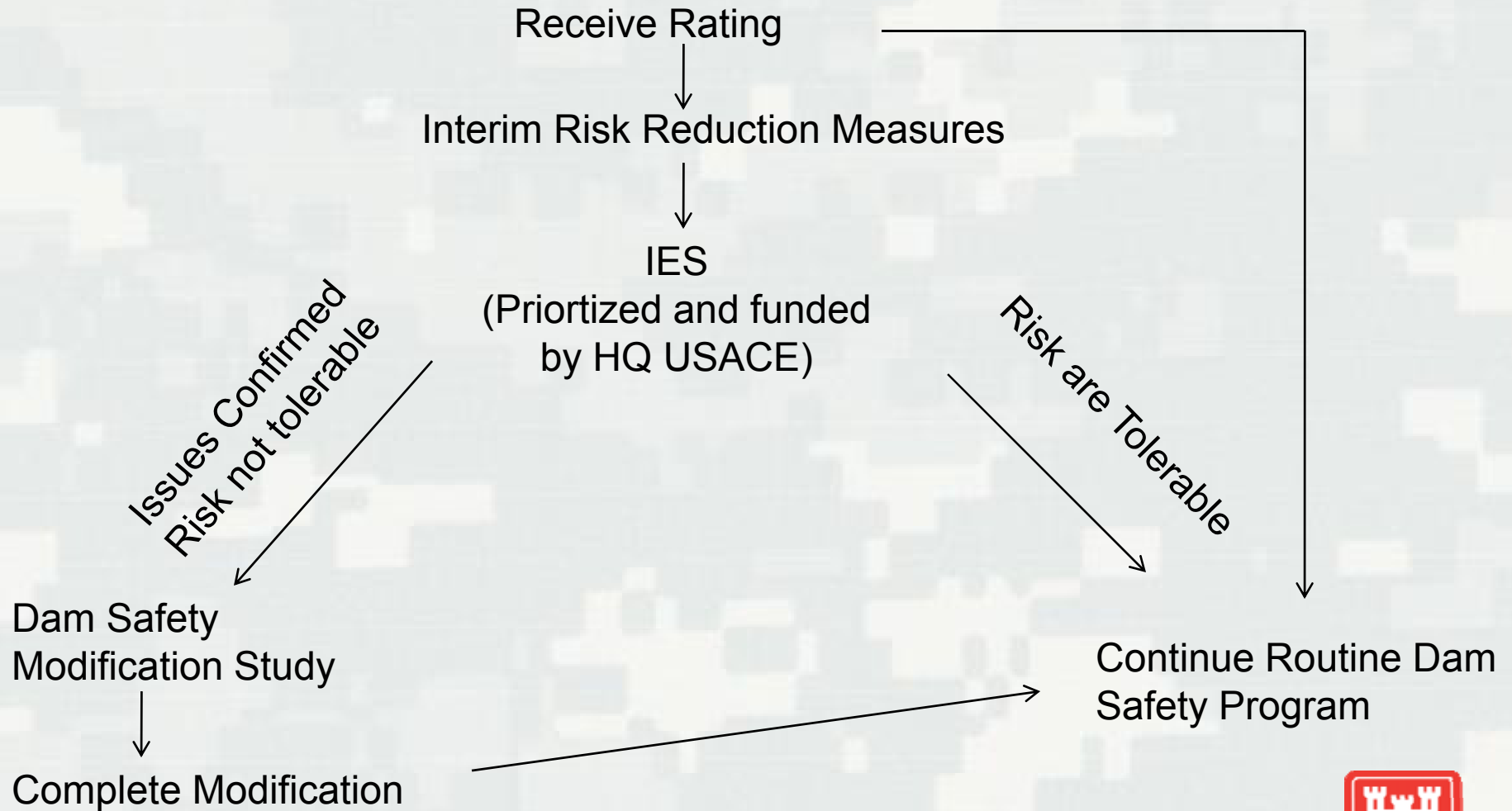


Periodic Assessments

- Conducted every 10 years
- Start in 2012
- Potential Failure Modes Analysis
- Update Consequences
- If issue identified, go to Issue Evaluation Study



Dam Safety Process



EC 1165-2-210

- **Unsafe, Potentially Unsafe, or Conditionally Unsafe.**

A reallocation that would require raising the conservation pool is not permitted while a project is classified Unsafe, Potentially Unsafe, or Conditionally Unsafe.

Impacts John Redmond due to Hartford Levee, Elk City due to Elk City Levee, El Dorado, and Council Grove



Reallocation Policy

- **Marginally Safe.**

Recommendations for reallocations that would require raising the conservation pool will be considered by Headquarters USACE on a case-by-case basis. Reallocation reports that recommend pool raises must include a review of the Potential Failure Mode Analysis (PFMA) for the dam and an analysis of the effect of a higher pool elevation on the probable failure due to seismic or hydrologic conditions.

Impacts Big Hill, Marion, Toronto, and Fall River.

Could Impact John Redmond and Elk City once the Hartford Levee and Elk City Levee are addressed.



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John Redmond/Hartford Levee

- Project receives overall rating based on worst rating of all structures
- IRRMs at Hartford Levee
 - ▶ Instrumentation to further monitor and study seepage – installed in May
 - ▶ Emergency Exercise with County/City – May 25, 2010
 - ▶ Stockpile Materials to respond to Emergency – August 2010
 - ▶ Inverted Filter to Control Seepage – August 2010



John Redmond/Hartford Levee

- Issue Evaluation Study (IES) is the next Step
- IES is currently not one of USACE top priorities due to several other urgent/high priority Dam Safety projects
- Once IES is prioritized and funded, the process requires 3-5 years to complete study, recommend modifications, and complete modifications.



Questions?



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