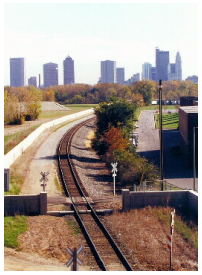
Levee Safety Program Vision



West Columbus, Ohio

- The Federal Flood Damage Reduction Systems Will Be:
  - Safe and Reliable
  - Managed in a Partnership of Shared Responsibilities
  - Assessed in a Comprehensive and Continuing Program
  - Effectively Communicated to All Stakeholders, Decision Makers, and Communities

Why Risk Based?

- It Answers the Question of "So What?"
- It's the State of the Practice
- Improved Decision Making
  - Equitable Treatment
  - Clear Justifications for Action
  - More Credible and Defensible Decisions
  - Smarter Investments
- Expectations of the Public, Stakeholders, and Government

Safer Levees, Faster

Transitions…

- Move from Periodic Inspections to Periodic Assessments: PI + RA = PA
  - Consistency Via National Cadres
  - From Visual only to Visual & Analytical
  - From O&M Orientation to Comprehensive, Robust, and Continuing Approach
  - From Traditional to Risk Informed
- From Local/Regional Priorities to National

Risk

- What's wrong?
- How likely is it to occur?
- What are the consequences?

Definitions

- Risk = Probability X Consequence

Loading Event Probability

Potential Failure Mode

Probability of Failure

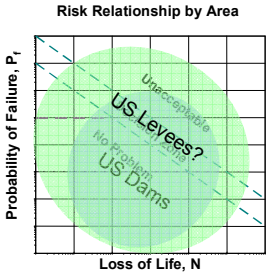
Release Severity Probability

Loss of Life

Economic Damage

Other Consequences

Conventional Wisdom: Infrastructure Risks



Explicit Risk

- The quantitative risk calculated with this system is a function of the methodology and the simplifying assumptions made to allow this to be a practical tool.
- Consistency is maintained by evaluating all levees using the same procedures.
- Permits Comparison to Tolerable Risk Guidelines

Methodology

- Determine Probable Failure Modes
- Determine Loading Curve
- Use Modules To Develop System Response Curves For Each Probable Failure Mode
- Perform Breach Analysis And Develop Consequences For Primary Failure Modes

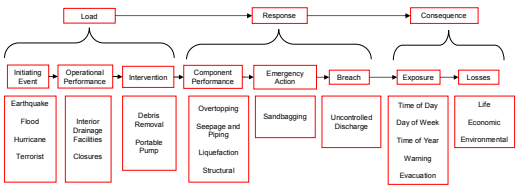
Components of Risk Model

- Main Engine
- Loading Modules
- System Response Modules
- Consequence Module
- Database

Main Engine

- General Purpose: “Bolt on Capability”
- Simple Event Tree For Standard Failure Modes
- Continuous Loading
- Uncertainty
- Provisions For “Other” Failure Modes

Generic Event Tree



Time Considerations

- All features will be evaluated based on the current conditions. Estimates of degradation rates will not be made to estimate probabilities of failure into the future. This effort is beyond that appropriate for portfolio assessment.
- It is however, very simple to look into the future using the current estimated annual probability of failure. The cumulative probability for different exposure periods can be determined.

Length (Spatial) Considerations

- We are still working this issue. This will be very important when we assess levees.

Uncertainty

To fully understand the risk of a project it is important to consider and quantify uncertainty in all aspects of the analysis. The loading curve, system response curves, and consequence curves shall all include uncertainty bands. Monte Carlo simulation will be used to incorporate uncertainty into the calculation of risk.

Multiple Projects

Upstream projects – The influence of upstream project failure will not be considered at the PRA level at this time.

Downstream projects – Damage to projects downstream of the project being evaluated will be included in the consequences.

Adjacent structures –All structures that have separate consequences shall be grouped and combined by common consequence.

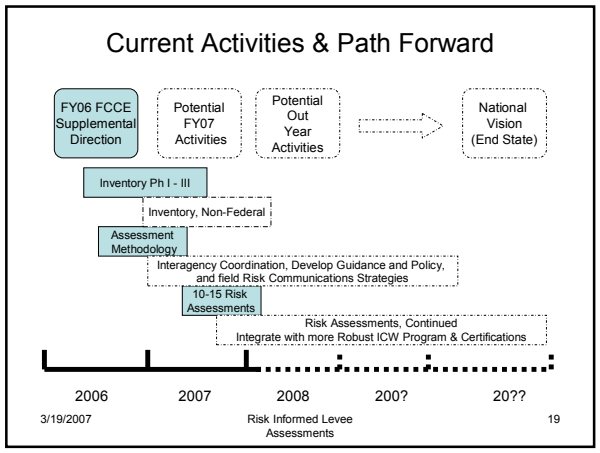
Intervention

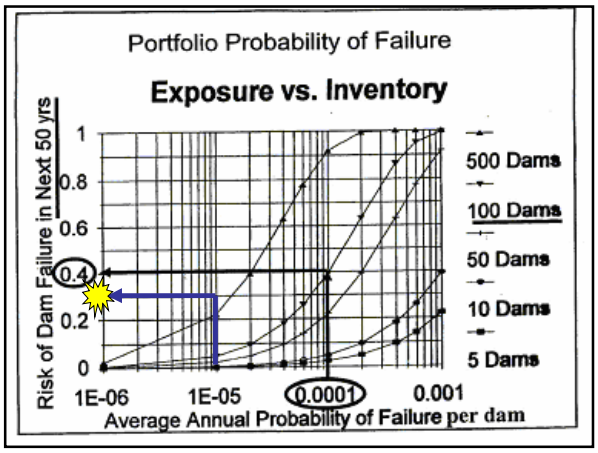
Intervention shall not be used to permanently address a deficiency or as a risk reduction solution **in lieu** of structural measures as it can mask the true problem.

Human Intervention will be considered in the effectiveness of closure structures, the potential for temporary raisings to increase risks, and the probability of satisfactory performance of mechanical/electrical components.

Alternative Evaluation

Assessment Should Include a Rough Alternative Evaluation to Address Project Deficiencies and Evaluate Risk Reduction.


Current Activities & Path Forward
FY06 FCCE Supplemental Direction
Potential FY07 Activities
Potential Out Year Activities
National Vision (End State)
Inventory Ph I - III
Inventory, Non-Federal
Assessment Methodology
Interagency Coordination, Develop Guidance and Policy, and field Risk Communications Strategies
10-15 Risk Assessments
Risk Assessments, Continued
Integrate with more Robust ICW Program & Certifications
2006
2007
2008
200?
20??
3/19/2007
Risk Informed Levee Assessments
19


Portfolio Probability of Failure
Exposure vs. Inventory
Risk of Dam Failure in Next 50 yrs
1
0.8
0.6
0.4
0.2
0
500 Dams
100 Dams
50 Dams
10 Dams
5 Dams
1E-06
1E-05
0.0001
0.001
Average Annual Probability of Failure per dam