FEMA and Multi-Federal Agency Cooperation to Support Dam Safety and to Develop Tools for States and Local Communities to Create More Resilient Communities

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Agenda

- FEMA’s role promoting dam safety
- Dam safety and community resilience
- Federal agency collaboration to enhance dam safety resilience
- New FEMA dam safety products
FEMA’s Role Promoting Dam Safety

- Leadership role with dam safety responsible for coordinating the activities of the National Dam Safety Program
- Developing Risk MAP program role to promote proactive floodplain management for multi-hazards including potential dam breach's
FEMA’s Role Promoting Dam Safety

(strategies to reduce the risk from dam failures)

- Promote community and regional resilience
  - Increase awareness of dams by the downstream public
  - Increase the number and updates of EAPs
  - Assess the risk associated with dams
  - Increase inspections of dams
  - Increase the number of stakeholders dam safety trained
  - Expand the research program
  - Translate research products into training
  - Achieve the participation of all states in the program
The Need for Community Resiliency

- **Aging dam inventory**
  - Over 95% in the NID are either privately or locally owned and under the regulatory authority of the states.
  - The vast majority (over 88%) consist of an earthen embankment.
  - Over 93% of the regulated dams have a dam height ≤ 50 feet.
  - Over 50% of the regulated dams have a dam height ≤ 25 feet.
  - The inventory of regulated dams is aging:
    - 70 percent of the dams older than 43 years.
    - By 2029, 85% of the dam inventory will be older than 50 years.

- **Lack of dam breach hazard identification and pre disaster emergency planning**
The Need for Community Resiliency

- Lack of dam breach hazard identification and pre-disaster emergency planning
- Identification of the flood hazards of potential dam failures
- Determination of dam failure consequences
- Development of mitigation actions
- Preparation of pre-disaster Emergency Action Plans
Federal Collaboration to Enhance Dam Safety Resilience

NDSRB and FEMA collaboration

DSAT EAP module

FEMA Dam non-regulatory products

USBR Brown & Graham loss of life

NWS SMPDBK

NRCS EAP fillable template

A How-To Guide to Identify the Consequences of Dam Failure and Incidents
New FEMA Products to Enhance Dam Safety

- Support both dam safety and Risk MAP programs
  - Working with communities identify the flood hazard associated with potential dam failure incidents
  - Provide flood risk data for dam breach consequence studies and hazard mitigation
  - Provide tools for local governments to create risk communication products reducing “hazard creep”

Risk communication map showing the Special Flood Hazard Area superimposed on a dam breach flood inundation zone
Traditional products are regulatory and subject to statutory due-process requirements.

Risk MAP products are non-regulatory and are not subject to statutory due-process requirements.
New FEMA Products
(enhanced non-regulatory products for dams)

- Leverages existing studies
- Provides key datasets
  - Basic dam characteristics
  - Upstream inundation areas delineated
  - Downstream inundation areas delineated
  - Assorted depth and analysis grids (depth, velocity, arrival time)
  - Easements & critical facilities
  - Flood risk assessments
  - Additional Areas of Mitigation Interest categories

Emergency Spill-Crest Failure: Population at Risk = 450
Sunny Day Failure: Population at Risk = 266
100 Year Flood Event: Population at Risk = 167
New FEMA Products to Enhance Dam Safety

- Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures
  - Guidance for State Regulators

- Working with States to provide guidance for consistent dam breach mapping and EAP’s
- Presents a tiered dam breach study process that introduces simplified dam breach modeling methodology
- Provides standards for GIS-based dam breach model file naming and EAP map production so Risk MAP can leverage dam breach models and maps for the non-regulatory products
- Dam Breach Rapid EAP, Consequences and Hazards (GeoDam-BREACH) Toolset.
  - Developed in conjunction with the Dam Breach Guidelines
  - GIS-based simplified dam breach modeling and mapping based on the NWS SMPDBK program in use at River Forecast Centers
  - Capability to convert dam breach model results to standard Risk MAP non-regulatory datasets
  - Loss of life tool
  - Semi-automated EAP report and map generation linked to the dam breach model
New FEMA Products
(GeoDam-BREACH example non-regulatory maps)

Simplified dam breach modeling

Risk MAP flood depth grid datasets

Risk MAP flood arrival time dataset

The Residual Flood Risk Map is not currently a FEMA non-regulatory product. It includes the regulatory 100-year floodplain overlaid with the dam breach inundation zone.
New FEMA Products
(GeoDam-BREACH semi-automated EAP)

- **EAP mapping tools**
  - Tools for map paneling to standard sizes
  - Standard map collar
  - Automatically retrieves data from the dam breach model
  - Annotation tools

- **EAP report**
  - Semi automated
  - Provides simple data entry that populates a editable Microsoft Word document
Assessing the Consequences of Dam Failure

How-to guide for local communities for Identifying the Consequences of Dam Failure to provide community officials and interested stakeholders with a process for assessing the potential economic, environmental, and human impacts of dam failure.

- Gather information about dam
- Define scenario
- Identify inundation area
- Inventory assets:
  - Assets in the inundation area
  - CIKR associated with inundation area
- Identify consequences:
  - Potential loss of life
  - Potential damage
- Assess consequences:
  - Direct / indirect economic impacts
  - Social impacts
  - Environmental impacts
- Identify follow-up activities
Combination of new FEMA products support community resiliency

Risk MAP
Increasing Resilience Together

Supporting the goals of Risk MAP through non-regulatory products

National Dam Safety Review Board
Supporting 100% EAP coverage by reducing level of effort for study and EAP development

GeoDam-BREACH
SIMPLIFIED DAM BREAK ANALYSIS GIS TOOLBOX

Infusing draft guidance and encouraging consistency

Output data supporting draft document procedures
Multi-Federal Agency Cooperation to Support Dam Safety and to Develop Tools to Create More Resilient Communities

- FEMA collaboration with the NWS, NRCS, USBR, USACE, and DHS enhance local communities resilience from potential dam failures
- Guidance and new products assist local communities reduce risk and recover from disasters
  - “Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures Guidance for State Regulators”
  - GeoDam-BREACH (http://geodambreach-beta.ursdcmetro.com/)
  - “Assessing the Consequences of Dam Failure”
- New FEMA tools are available to States and are being piloted by FEMA Regions.
Questions?

National Dam Safety Awareness Day

Dam Safety is a Shared Responsibility