What I’ve Learned About Dam Safety…Good, Bad and Ugly

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What is a Dam?
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- Minimum of 25 feet in height measured from the downstream toe to the top of the dam - or -

- Impounds 50 acre-feet of water, measured at the top of dam - or -

- Small but poses a hazard to life or property.
Kentucky Dam Safety Law and Regulation

- KRS 151.100, Definitions
- KRS 151.125, Authority and Powers of Secretary
- KRS 151.250, Permits
- KRS 151.280, KRS 151.310, Violations
- KRS 151.292, State-owned Dams
- KRS 151.293, Certificate of Inspection

- KAR 401 (4:030), Design Criteria
- KAR 401 (4:060), Stream Construction Criteria
Kentucky Dam Safety Guidance

- The following are guidance documents and may be found at: www.water.ky.gov.
- Engineering Memorandum No. 5 - summarizes design criteria
- Rainfall Frequency Values - required values for hydraulic evaluation
- Geotechnical Guidelines for Earthen Dams
- General Discussion of Dam Breach Analysis
Hazard Classification

- Classifications are Low, Moderate and High.

- Based on the potential consequences of failure.

- Independent of condition and quality of the dam.

- Hazard Classification can change as the consequences of failure change. (Downstream land use changes)
Low Hazard Dam

Potential damage limited to:

- Loss of dam
- Loss of livestock, farm out-buildings, Ag land
- Little used roads
- Loss of life unlikely
- 629 of these in Kentucky
Moderate Hazard Dam

Potential damage limited to:

- Industry or commercial buildings
- Moderately traveled roads or railroads
- Interruption to utilities or public water supplies
- Loss of life unlikely
- 153 of these in Kentucky
High Hazard Dam

- Failure may cause a threat to, or loss of, human life.
- Failure may result in serious damage to:
  - Residential, industrial or commercial areas
  - Public utilities or buildings; major transportation facilities
- 181 of these in Kentucky
Hazard Classification Change

- When downstream conditions change, hazard classification can change.
- DOW cannot control downstream development.
- Dam breach flood often exceeds the 100-year flood.
- Local ordinances can prevent some development.
Hazard Class Change Due to Development
Hazard Classification Change

- Dam Safety may require upgrades or removal if the dam does not meet requirements for the current hazard classification.

- Upgrades may include lowering the normal pool elevation, raising the dam, or enlarging the spillway.

- Dam removal may be the cheapest alternative and must be done in a controlled manner.
Emergency Action Plans

Emergency Action Plans can save lives if the unthinkable happens to a dam.

2:00 AM in the middle of a raging thunderstorm isn’t the time to discover that you don’t know what to do or who to call.
Emergency Action Plans

- Identify failure modes.
- Include inundation maps, warnings and evacuation plans.
- List critical personnel and phone numbers.
- Requires training and exercise to be successful.
Emergency Action Plans

- Get the location of high and moderate hazard dams in your area.
- Become familiar with the structures and their history of problems.
- Check the area below the dam for low-lying buildings and roads.
- Be prepared to act quickly. If something doesn’t look right, it probably isn’t.
Permits for new dams

Required when:

- Height of dam > 25 feet from downstream toe to top of dam
- Top of dam storage > 50 acre-feet
- Dam will pose a potential for loss of human life
- Dam is built across stream as defined by KRS 151
Permits for existing dams

Required when:

- Modification or alteration is beyond the scope of routine maintenance.
- Change in operating procedures.
- Change in spillway height or dimensions.
- Conditions of permit may require meeting all current criteria for existing dams.
Dam Inspections

Dam Safety Inspects:

- High Hazard and Moderate Hazard dams every 2 years.
- Low Hazard Dams every 5 years.
- Summary report, letter sent to owner, filed.
Dam Inspections

- Generally take from 45 minutes to an hour.
- Inspectors look for:
  - Embankment items: stability, vegetation, rodent burrows, erosion, seepage.
  - Principle spillway: debris, seepage, corrosion, cracking.
  - Emergency spillway: vegetation, erosion, debris.
  - Ability to operate drains.
  - Downstream development.
Action for Unsafe Dams

- Dam Safety may issue a Notice of Violation requiring the owner to repair, upgrade, or remove the dam.

- The EEPPC Secretary may issue an Emergency Order to drain the lake and breach the impoundment at the owner’s expense.

- These are not popular or common actions.
Inspection Modernization

- Migrating to a geo-referenced database.

- Streamlines data entry through the use of tablets.

- Increases data consistency by using dropdown menus.

- Automated upload of data improves data integrity.
Coal Combustion Residuals

- New rule was published in the Federal Register.

- We are writing a regulation to implement in conjunction with the Solid Waste Branch.

- Won’t require many changes to dams, but many of these surface impoundments will have to close or retrofit.
The “L” Word

- Levee
- No federal program
- No state program
- Many were designed for one purpose, but now being used for another
Exhaustive List of Levee Law and Regulation in Kentucky

- KRS 151.250, Permits
Questions?