

Unit 04: Hands on Exercises Using the New System Features

WEB-BASED FLOOD INUNDATION MODELING WITH DSS-WISE WEB: A
SHORT COURSE ON RECENT UPDATES WITH HANDS-ON TRAINING

For
FEDERAL EMERGENCY
MANAGEMENT AGENCY



FEMA



Technical Workshop

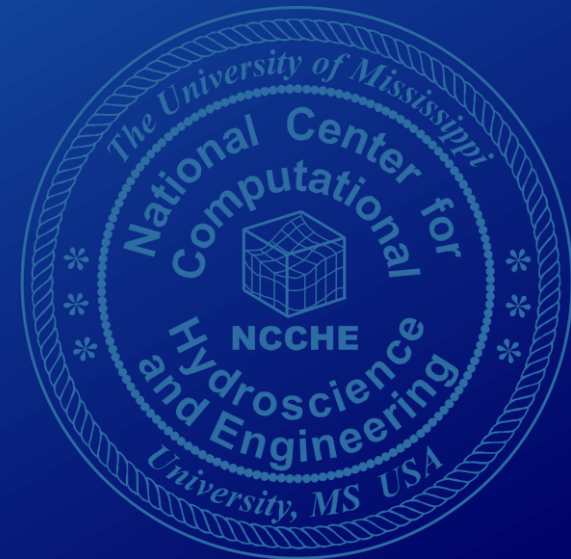
September 26th, 2024

Colorado Convention Center, Meeting Room 403

700 14th St, Denver, CO 80202

Developed by

NATIONAL CENTER FOR COMPUTATIONAL HYDROSCIENCE AND ENGINEERING
THE UNIVERSITY OF MISSISSIPPI



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On the group application page, apply to **SHORT COURSE ASDSO**

<https://dsswiseweb.ncche.olemiss.edu/>



Assignment:
Perform a Reservoir-Type Simulation for
Mountain Run Dam #50 (VA047003)

4.1

All the workshop course materials are now available online here:

**[https://dsswiseweb.ncche.olemiss.edu/documentation/
ASDSO_Denver_2024/index.php](https://dsswiseweb.ncche.olemiss.edu/documentation/ASDSO_Denver_2024/index.php)**

Mountain Run Dam No. 50 (or Mountain Run Watershed Dam No. 50), known locally as the Lake Pelham Dam, in Virginia was constructed in 1972 by the Culpeper Soil and Water Conservation District and the Town of Culpeper with assistance from the USDA Natural Resources Conservation Service Watershed Program.

The dam was constructed for flood control and water supply for the Town of Culpeper, Virginia. The dam creates a 220-acre reservoir that is also used for recreation. The dam is one of five dams constructed in the Mountain Run Watershed project between 1959 and 1973.

The Town of Culpeper is downstream of the dam. The dam is classified as a high hazard because a failure of the dam could cause loss of life and property downstream. Minimal information is available on the dam.

Note:

Recently the dam was rehabilitated because the earthen auxiliary spillway did not have the capacity to pass the water volume required by current Virginia dam safety regulations.

A concrete labyrinth weir was constructed over the embankment to serve as auxiliary spillway.

For this Capstone exercise, we will disregard the rehabilitation of the dam. The analysis will be performed for the old embankment dam with earthen auxiliary spillway.



There is an emergency situation at the Mountain Run Dam #50.

Your assignment is to perform a reservoir-type dam-break flood simulation for the Mountain Run Dam #50 with the water surface elevation at the top of the dam at the time of the failure. Only minimal information about the dam is available.

Your work should produce the following results to help with the preparation of emergency response plan:

1. Search for the information needed for a DSS-WISE Lite simulation
2. Estimate the breach parameters for the dam
3. Set up and launch a reservoir-type simulation with the water surface elevation at the top of the dam
4. Create a map of maximum flood extent and maximum flood depth map
5. Create a map of maximum velocity
6. Create a map of maximum DV (depth times velocity, i.e. specific discharge)
7. Estimate nighttime and daytime PAR (Population at Risk) numbers by considering the danger level and the time available for escape.
8. Determine where nighttime and daytime PAR numbers are located. Analyze the results to determine evacuation and shelter needs.
9. Create danger maps for humans caught indoors and outdoors
10. Discuss your findings with the other participants

Bonus: Estimate a simulation a scenario with a hydrograph-type breach

Parameters Chosen for this Capstone Exercise

Parameter	Adopted Value	Remarks
Maximum Storage Elevation (ft. NAVD 88)	402.2	This is the volume at the dam crest elevation. However, we decided to use it as maximum storage elevation. Adjustments will be made in the hydraulic height.
Maximum Storage Volume (ac-ft)	9,873	In reality, this is the volume at the crest elevation
Normal Storage Elevation (ft. NAVD 88)	384.2	Elevation of the crest of the primary spillway
Normal Storage Volume (ac-ft)	1942	Volume at the crest elevation of the primary spillway
Dam Type	Embankment	Renovated dam has a concrete section with a labyrinth weir. We consider the dam before renovation.
Hydraulic Height (ft.)	41	Since crest elevation is used as max. storage elev, we use dam height as hyd. height
Crest Elevation (ft. NAVD 88)	402.2	Crest elevation
Reservoir Storage Elev. at Failure (ft. NAVD 88)	402.2	Same as crest elevation
Reservoir Storage Volume at Failure (ac-ft)	9,873	Same as volume at crest elevation
Breach Type	Partial Breach of Structure	
Breach Invert Elevation (ft. NAVD 88)	365	This was decided based on the downstream elevation in the DEM. It will be demonstrated during the simulation set up.
Breach Width (ft.)	200	Based on the average of the values calculated using several empirical equations
Formation Time (hrs)	0.5	Slightly shorter than given by empirical equations to create unfavorable conditions