

## Module 209 Design Hydrology (Dams) Activity Questions

### Activity 1

1. Determine the hazard class of a dam with the following information.
  - a. Storage at maximum water surface during routing of the principal spillway hydrograph is 387 ac-ft at elevation 2314.8.
  - b. Storage at maximum water surface during routing of the Class "a" freeboard hydrograph is 541 ac-ft at elevation 2318.4.
  - c. Elevation of the low point in the original cross section on centerline of the dam is 2291.1.
  - d. Land use downstream of the dam is all agricultural with no buildings, roads, or major utilities to the backwaters of Hardaway Lake.
  - e. County Route 21 will be incorporated into the crest of the dam.
  - f. The conduit is four feet wide by five feet high.
  - g. Drainage area is 1290 acres.
  - h. Routing of the Class "a" freeboard hydrograph through the conduit reduces the peak flow through the conduit to 350 cfs.
2. Does this dam require an emergency spillway?
3. Can this dam be designed in accordance with Practice Standard 378?

*Solution (Refer to pages 30-31 in Module 209 for Activity 1 Solutions)*

## Activity 2

Develop the precipitation requirements for a Practice Standard 378 Pond near Cortez, Colorado. The following site information is available.

- a. Hazard class is "a".
- b. Drainage area is 117 acres.
- c. Storage at estimated emergency spillway crest of 6111.0 is 31.7 ac-ft
- d. Effective height of dam with crest elevation 6111.0 is 13.9 ft.
- e. Land owner chooses to install a trickle tube to pass base flow and frequent events. (For this example, we will size the conduit to pass the peak of the 2-yr 24-hr hydrograph through the conduit and provide at least 1.0 feet of elevation between the principal spillway crest and the emergency spillway crest. Check your own state requirements for minimum flow, minimum conduit size, and minimum elevation criteria between principal and emergency crests.)
- f. Provide a riser height adequate to allow drainage of the conservation pool for management purposes (9.0 feet).

*Solution (Refer to page 32 in Module 209 for Activity 2 Solutions)*

### Activity 3

Prepare the precipitation data and distributions for developing the principal spillway hydrograph, the emergency spillway, and freeboard hydrographs for a Class "c" dam north of Grand Junction Colorado.

- a. Drainage area = 10.5 square miles
- b. Principal spillway crest elevation is 5440.0
- c. Irrigation release elevation = 5403.5
- d. Time of Concentration = 4.3 hours
- e. Minimum conduit diameter = 30 inches (reinforced Concrete pressure Pipe)
- f. Average annual precipitation = 21 inches
- g. Average annual temperature = 54 degrees

*Solution (Refer to pages 33-58 in Module 209 for Activity 3 Solutions)*