United States Department of Agriculture

USDA-NRCS Uses of Extreme Storm Event Data

Advisory Committee on Water Information (ACWI) -
Subcommittee on Hydrology (SOH) -
Extreme Storm Events Work Group (ESEWG) Workshop
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Claudia C. Hoeft, P.E.
National Hydraulic Engineer
USDA -NRCS

Natural Resources
Conservation Service

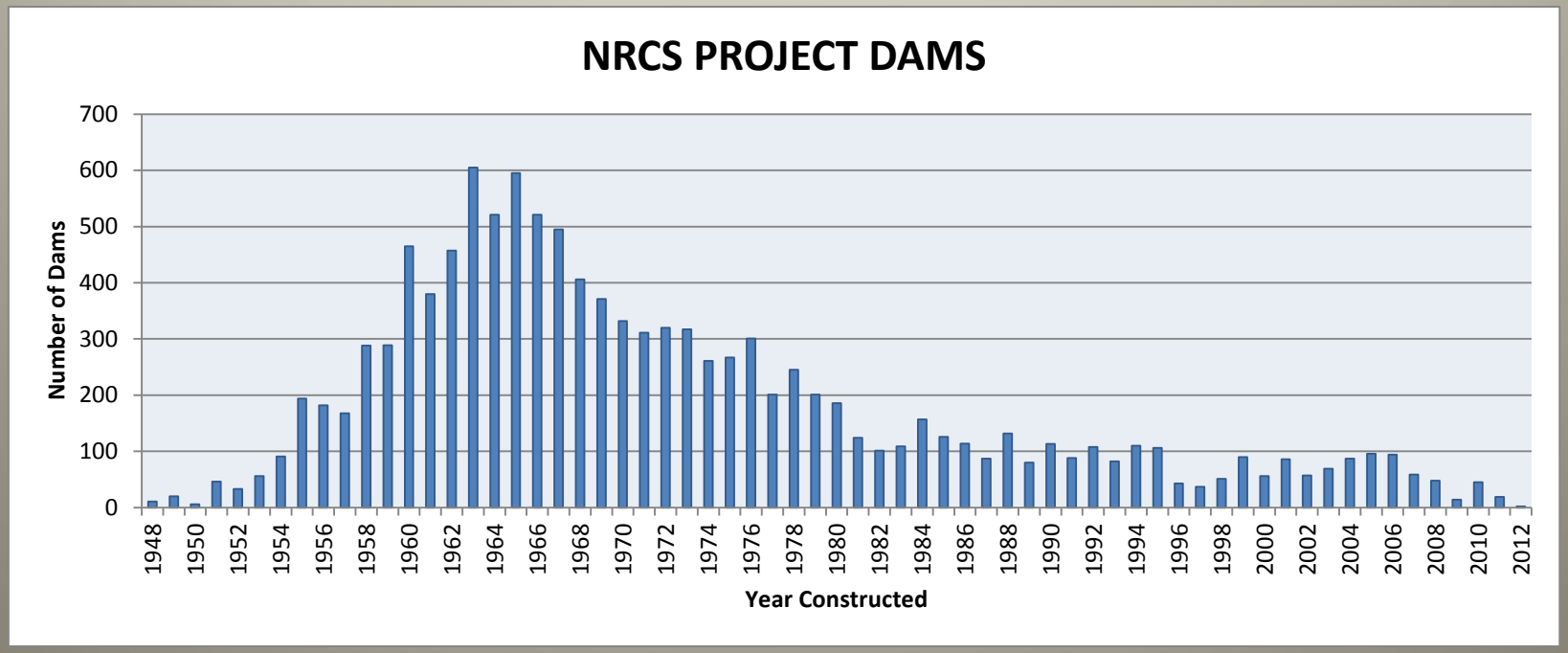
Natural Resources Conservation Service

Natural Resources Conservation Service

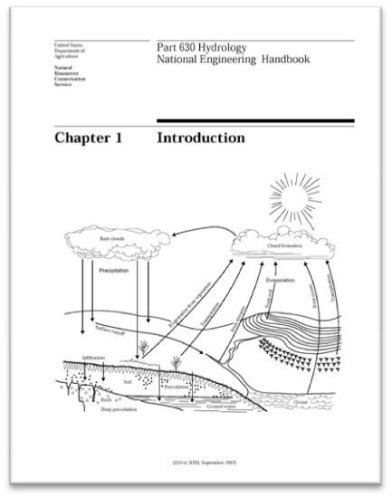
Aging Infrastructure

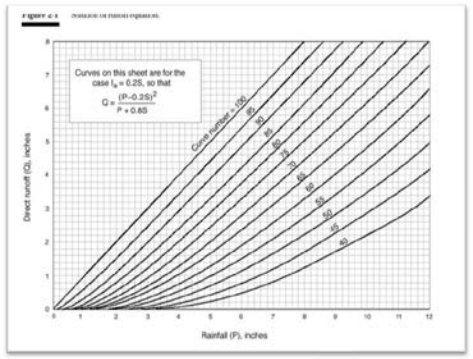
The peak of dam construction was 1963

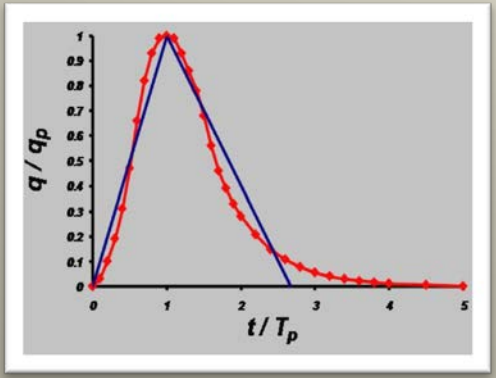
605 dams reached their 50 year life in 2013



NRCS Hydrologic Procedures







- NEH Part 630, Hydrology
- WinTR-55, Small Watershed Hydrology computer program
- WinTR-20, Computer Program – Project Formulation – Hydrology
- NEH Part 650, Engineering Field Manual (specifically Chapter 2)
- EFH2 Computer Program
- Curve Number Archives (misc. reports related to runoff curve numbers)
- SITES (Earthen/Vegetated Auxiliary Spillway Erosion Prediction for Dams)
- WinDAM – Windows Dam Analysis Modules
- Technical Release No. 60, Earth Dams and Reservoirs (policy document defining NRCS specific requirements for design and construction of earthen dams)

NRCS Conservation Practice Standards Hydrologic Criteria

NRCS Conservation Practice Standards:

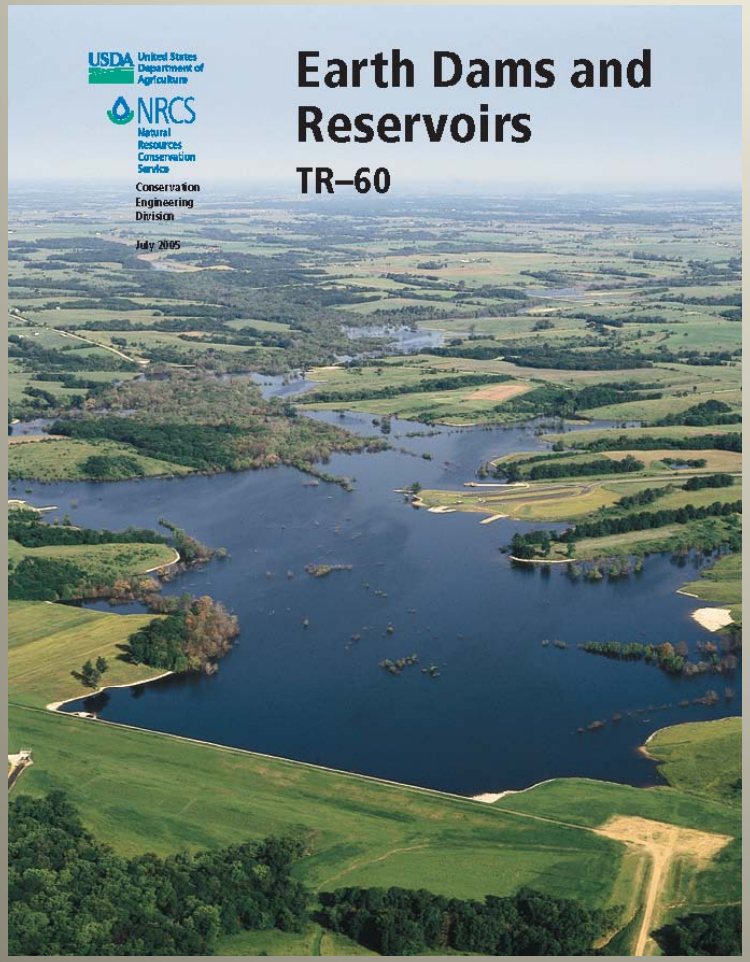
- Approximately 255 NRCS conservation practice standards (*http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/cp/ncps/*)
- Purpose:
  - Provide information on and where practices are applied
  - Set forth the minimum quality criteria (INCLUDING HYDROLOGIC CRITERIA, IF APPLICABLE) to be met during application of the practice for it to achieve its intended purpose

Minimum auxiliary spillway capacity for POND (Conservation Practice Standard Number 378)

Drainage area (ac)	Effective height of dam[1] (ft)	Storage (ac-ft)	Minimum design storm[2]	
			Frequency (Years)	Minimum duration (hours)
20 or less	20 or less	< 50	10	24
20 or less	> 20	< 50	25	24
> 20		< 50	25	24
All others			50	24

1. As defined under "Conditions where Practice Applies.
2. Select rain distribution based on climatological region.

NRCS TR-60



- NRCS policy on design of dams

  "… describes design procedures and provides minimum requirements for planning and designing earth dams and associated spillways… to ensure consistent performance…"

- Specifies PMP event to generate freeboard hydrograph (FBH) for High Hazard Dams

  To analyze integrity, or erosion resistance, of earthen materials in auxiliary spillway and to set top of dam elevation

TR-60 Minimum Auxiliary Spillway Hydrologic Criteria

Class of Dam	Product of storage x effective height	Existing or planned upstream dams	Precipitation data for [1]	
			Auxiliary spillway hydrograph	Freeboard hydrograph
Low[2]	less than 30,000	none	P_{100}	$P_{100} + 0.12(PMP - P_{100})$
	greater than 30,000		$P_{100} + 0.06(PMP - P_{100})$	$P_{100} + 0.26(PMP - P_{100})$
	all	any[3]	$P_{100} + 0.12(PMP - P_{100})$	$P_{100} + 0.40(PMP - P_{100})$
Significant	all	none or any	$P_{100} + 0.12(PMP - P_{100})$	$P_{100} + 0.40(PMP - P_{100})$
High	all	none or any	$P_{100} + 0.26(PMP - P_{100})$	PMP

[1] P_{100} = Precipitation for 100-year return Period. PMP = Probable maximum precipitation
[2] Dams involving industrial or municipal water are to use minimum criteria equivalent to that of Significant Hazard Class.
[3] Applies when the upstream dam is located so that its failure could endanger the lower dam

NRCS Engineering Policy

http://directives.sc.egov.usda.gov/RollupViewer.aspx?hid=27418

- NEM Part 530, Hydrology provides guidance on hydrometeorological data sources:

A. When available, existing hydrometeorological data must be used for planning, design, and operation of water-related structures and systems. Hydrometeorological data are available through numerous sources, including—

(1) NRCS National Water and Climate Center (NWCC).
(2) U.S. Geological Survey (USGS).
(3) National Oceanic and Atmospheric Administration (NOAA).
(i) National Weather Service (NWS).
(ii) National Climatic Data Center (NCDC).
(4) Regional climate centers (RCCs).
(5) State climatologists.
(6) USDA sister agencies.
(i) Agricultural Research Service
(ii) Forest Service
(7) Other Federal, State, and local agencies having planning responsibilities for water-related projects, operational responsibilities, or both.

B. Hydrometeorological data may also be found in various watershed and floodplain reports, which can be found in the libraries of Federal agencies involved in study and report preparation.

Need for updated/current PMP (and other) rainfall data

- Flood hazard and other studies that rely upon hydrologic analyses
- Project design
- Need to use the most current and available information
  - Climate change considerations
  - Questions from project sponsors and others about why we may not be using the must currently available data
  - Questions about using Special Studies developed outside the Federal realm

NRCS Issues and Concerns

- NRCS is a technical Agency providing assistance to landowners.
- We are a consumer of rainfall data, including PMP studies.
- Very few personnel within NRCS who have knowledge or ability to develop or evaluate PMP studies.

NRCS Primary Needs

- Updated PMP estimates
- Access to studies and accompanying background information (such as historical extreme storms databases)
- Access to and support in using tools developed by other Federal Agencies (HEC-MetVue?)
- Clear guidance on development of regional and site-specific studies to ensure consistency of studies developed outside of the Federal realm

Questions?

Claudia C. Hoeft, P.E., National Hydraulic Engineer, USDA - Natural Resources Conservation Service, Conservation Engineering Division, 1400 Independence Avenue, SW, Room 6136-S, Washington, D.C. 20250.
Phone: 202-720-0772. e-mail: claudia.hoeft@wdc.usda.gov.