

## SUBPART C - DAMS

## MO 520.21 Definitions and Classes

NRCS is required by policy and federal law to maintain the National Inventory of Dams. Timely reporting of dam construction is important in developing and managing the engineering workload and workforce in the State. NRCS is currently participating as an advisor to the State Dam Safety Council as they look at revising registration criteria. Accurate and complete data on which to base decisions is needed.

(f)(4) Inventory dams will be included in the NRCS inventory if they meet all of the following:

- (i) Dam was built with NRCS technical and/or financial assistance.
- (ii) The dam was built according to NRCS standards and specifications in effect at the time of construction.
- (iii) Alterations to the dam since the time of construction have been made in accordance with NRCS standards and specifications.

(f)(5) Inventory for new dams.

As new dams are constructed, the required data is to be added to the NRCS inventory on the basis of design and construction records. The individual approving the design shall, to the extent possible, complete Form MO-ENG-C94. The individual making the final construction check will check Form MO-ENG-C94 make any needed as-built corrections, and verify that all items are complete. One copy of Form MO-ENG-C94 is to be forwarded through the area office to the State Conservation Engineer and one copy retained in the case file.

State inventory information will be sent to the Missouri Department of Natural Resources at least annually, by the State Office.

Inventory data will be retrieved as needed by the State Office and copies of the inventory furnished to respective area and field offices.

Data on new dams and updated or corrected data on previously submitted dams can be submitted at any time. Data on all dams completed the past year from September 1 through August 31 must be forwarded through the area office to the State Conservation Engineer by September 30. This data will then be entered into the Automatic Data Processing system.

(f)(6) Responsibility.

- (i) The state conservation engineer provides overall coordination for the inventory of dams.
- (ii) Each Assistant State Conservationist (FO) insures the inventory policy is carried out by the field offices.

- (iii) Each area office will review the data for each dam received from the field, for completeness and accuracy, before transmitting to the state office.

## Instructions for completing Form NRCS-ENGC-94:

All instructions are on form or self explanatory except the Federal Agency I.D. (NRCS I.D.). Additional instructions are contained in Missouri Engineering Forms Handbook. The NRCS I.D. is a 10-character Missouri NRCS identification in accordance with the following:

- (i) **Watershed Dam** - This identification begins with the 2-letter (MO) state abbreviation, followed by a 4-digit project number for the watershed followed by 4-digit site number. Each dash (-) counts as one character.

Example: Troublesome Creek, Site A5  
MO 2025-A-5

- (ii) **CO-01 Dam** - This identification begins with a 2-letter (MO) state abbreviation, followed by a 2-digit program code (01), followed by a 3-digit county number followed by a 3-digit site number.

Example: Joe Doe in Atchison county and 14th site in county  
MO 01005-14

- (iii) **RC&D Dams** - This identification begins with the 2-letter (MO) state abbreviation, followed by a 4-digit project number followed by a 4-digit site number. The site number will be consecutive starting with ---1.

Example: Dam in Green Hills RC&D Project, 3rd dam in project  
MO 6003---3



NRCS NATIONAL INVENTORY OF DAMS (for Missouri use)

- 1) DAM NAME: \_\_\_\_\_
  - 2) Other Dam Names: \_\_\_\_\_ 3) Dam Former Names: \_\_\_\_\_
  - 4) Federal Agency ID (NRCS ID): \_\_\_\_\_ 5) National ID: (Provided by MO Dam Safety)
  - 6) Longitude: (Decimal Degrees) \_\_\_\_\_ 7) Latitude: (Decimal Degrees) \_\_\_\_\_
  - 8) Location: S\_\_\_ T\_\_\_ R\_\_\_ 9) County: \_\_\_\_\_ 10) River/Stream: \_\_\_\_\_
  - 11) Nearest City/Town:<sup>1/</sup> \_\_\_\_\_ 12) Distance to Nearest City/Town: \_\_\_\_\_ Miles
  - 13) Owner Name: \_\_\_\_\_ 14) Owner Type:<sup>1/</sup> \_\_\_\_\_ 15) Dam Designer: \_\_\_\_\_
  - 16) Non-Fed Dam on Fed Prop: Yes No 17) Dam Type:<sup>1/</sup> \_\_\_\_\_
  - 18) Dam Core: Position: \_\_\_ Type: \_\_\_ Certainty:\_\_\_ 19) Foundation: Material: \_\_\_ Certainty: \_\_\_
  - 20) Purpose:<sup>1/</sup> \_\_\_\_\_ 21) Year Completed: \_\_\_\_\_ 22) Year Modified: \_\_\_\_\_
  - 23) Dam Length, Ft.: \_\_\_\_\_ 24) Dam Ht., Ft.:<sup>1/</sup> \_\_\_\_\_ 25) Structural Ht., Ft.:<sup>1/</sup> \_\_\_\_\_ 26) Hydraulic Ht., Ft.:<sup>1/</sup> \_\_\_\_\_
  - 27) Maximum Discharge, cfs: \_\_\_\_\_ 30) Surface Area, AC: \_\_\_\_\_ 31) Drainage Area, Sq. Mi.: \_\_\_\_\_
  - 32) Down Stream Hazard:  L  S  H 33) Emergency Action Plan: Yes No Not required
  - 34) Last Inspection Date: \_\_\_\_\_ 35) Inspection Freq.: (Yrs) \_\_\_ 36) State Regulated Dam: Yes No
  - 37) State Regulatory Agency: \_\_\_\_\_ 38) Spillway Type: Uncontrolled Controlled None
  - 39) Spillway Width, Ft.: \_\_\_\_\_ 40) Outlet Gates:<sup>1/</sup> \_\_\_\_\_ 41) Volume of Dam, CY: \_\_\_\_\_
  - 42) Number of Locks: \_\_\_\_\_ 43) Length of Locks: \_\_\_\_\_ 44) Lock Width: \_\_\_\_\_
- Federal Agency (USDA NRCS) Involvement
- 45) Involvement w/Funding: Yes No 46) Involvement w/Design: Yes No
  - 47) Involvement w/Construct: Yes No 48) Involvement w/Regulatory: Yes No
  - 49) Involvement w/Inspection: Yes No 50) Involvement w/Operation: Yes No
  - 51) Involvement as Owner: Yes No 52) Involvement w/Others: Yes No
  - 53) Authorization: CO-01 PL-566 RC&D WP-03 PILOT OTHER
  - 54) PL566 Watershed #: \_\_\_\_\_ 55) PL566 Watershed Name: \_\_\_\_\_
  - 56) Planned Service Life (Yrs): \_\_\_ 57) O&M Inspection Responsibility<sup>1/</sup>: \_\_\_\_\_ 58) O&M Current Yes No
  - 59) O&M Completed: Yes No 60) Population at Risk<sup>1/</sup>: \_\_\_\_\_ 61) Population at Risk Accuracy<sup>1/</sup>: \_\_\_\_\_
  - 62) Hazard Classification as Designed or Modified:  L  S  H 63) Hazard Classification Year: \_\_\_\_\_
  - 64) Sediment Storage, AC.FT.:<sup>1/</sup> \_\_\_\_\_ 65) Flood Storage, AC.FT.:<sup>1/</sup> \_\_\_\_\_
  - 66) Surcharge Storage, AC.FT.:<sup>1/</sup> \_\_\_\_\_ 67) Other Storage, AC.FT.:<sup>1/</sup> \_\_\_\_\_
  - 68) Principal Spillway Type: Concrete Pipe Concrete Box Open Concrete  
Corrugated Metal Pipe Other None
  - 69) Auxiliary Spwy #1 Type: Vegetated Earth Hard Rock Soft Rock Other None
  - 70) Auxiliary Spwy #2 Type: Vegetated Earth Hard Rock Soft Rock Other None
  - 71) Auxiliary Spwy #3 Type: Vegetated Earth Hard Rock Soft Rock Other None
  - 72) Conduit Height/Dia: \_\_\_\_\_ Ft. 73) Conduit Width: \_\_\_\_\_ Ft. 74) Number of Conduits: \_\_\_\_\_
  - 75) Cool Water Release: Yes No

<sup>1/</sup>SEE BACK FOR CODE DEFINITIONS

Permit No. To Construct: \_\_\_\_\_ Permit No. To Operate: \_\_\_\_\_

Remarks: \_\_\_\_\_

**<sup>1/</sup> DAM INVENTORY CODE & DEFINITIONS**

**Owner Type (14)**

F – Federal  
S – State  
L – Local Government (PL-566)  
U – Public Utility  
P – Private Owner

**Foundation (19)**

Material: R – Rock  
RS – Rock & Soil  
S – Soil  
U – Unlisted/Unknown  
Certainty: K – Known  
Z – Estimated

**Type of Dam (17)**

RE – Earth  
ER – Rockfill  
PG – Gravity  
CB – Buttress  
VA – Arch  
MV – Multiarch  
CN – Concrete  
MS – Masonry  
RC – Roller Compacted Concrete  
ST – Stone  
TC – Timber Crib  
OT – Other

**Core (18)**

Position: F – Upstream Facing  
H – Homogenous Dam  
I – Core  
X – Unlisted/Unknown  
Type: A – Bituminous Concrete  
C – Concrete  
E – Earth  
M – Metal  
P – Plastic  
X – Unlisted/Unknown  
Certainty: K – Known  
Z – Estimated

**Purposes (20)**

I – Irrigation  
R – Recreation  
T – Tailings  
D – Debris Control  
C – Flood Control  
P – Fire Protection  
S – Water Supply  
F – Fish & Wildlife  
O – Other

**Year Modified (22)**

S – Structural  
F – Foundation  
E – Seismic  
H – Hydraulic  
M – Mechanical  
O – Other

**Outlet Gates (40)**

X – None  
L – Vertical Lift  
S – Slide  
U – Uncontrolled  
F – Flap  
V – Valve  
O – Other Controlled

**O&M Inspection Respon. (57)**

OWNER (if same as field 13)  
JOINT (for Owner & NRCS)  
NRCS  
OTHER  
NONE (No O&M Agreement)

**Population At Risk Accuracy (61)**

E – Estimated  
A – Analyzed Breach Map

**Downstream Hazard (32)**

L – Low  
S – Significant  
H – High

(11) Nearest City or Town - NEAREST DOWNSTREAM COMMUNITY AFFECTED IF BREACH WERE TO OCCUR

(12) Distance To Nearest City/Town - STREAM MILES TO AFFECTED TOWN

(24) Dam Height - TOP OF DAM TO DOWNSTREAM TOE (NEAREST FT.)

(25) Structural HT. - TOP OF DAM TO LOWEST POINT OF EXCAVATED FOUNDATION

(26) Hydraulic HT. - MAXIMUM DESIGN WATER LEVEL TO DOWNSTREAM TOE

(60) Population At Risk – ALL PERSONS EXPOSED TO BREACH FLOOD WATERS IF NO EVACUATION

(64) Sediment Storage - CONSIDERED AS THE VOLUME BELOW THE PRINCIPAL SPILLWAY ELEVATION

(65) Flood Storage - VOLUME BETWEEN PRINCIPAL AND AUXILIARY SPILLWAYS

(66) Surcharge Storage - VOLUME BETWEEN AUXILIARY SPILLWAY AND TOP OF DAM

SUBPART C – DAMS

MO520.23(b)(1)

§MO520.23 Classification

- (b)(1) It is important that reasons for assigning a classification be documented. Documentation of the classification is to be one of the following:
- (i) For non-inventory size Class “a” dams in rural areas with low potential for development, complete Form MO-ENG-46, MO-ENG-C46, or Form MO-ENG-C82.
  - (ii) For non-inventory size Class “a” dams in developing areas use Form MO-ENG-C82. All dams in the following counties with high potential for development shall use Form MO-ENG-C82:  

Boone, Buchanan, Camden, Cape Girardeau, Cass, Clay, Cole, Franklin, Greene, Jackson, Jasper, Jefferson, Platte, St. Charles, St. Louis, and Taney.
  - (iii) For all job Class IV dams, all Class “a” inventory size dams and all Class “b” and “c” dams, complete Form MO-ENG-C82. A USGS map or equivalent shall be included to show site location and downstream hazards.
  - (iv) Written notes addressing all items to be included in the classification documentation may be used for all dams in lieu of the forms.
- (2) Attached is a copy of form MO-ENG-C46 and MO-ENG-C82.

DOCUMENTATION FOR HAZARD CLASSIFICATION OF DAMS

(PL-566, Job Class IV and Inventory Dams) <sup>1/4/5/</sup>

Name or Number of Site \_\_\_\_\_

Program (Check One):  Watershed;  RC&D;  CO-01

Location: (See attached map or photo)

County \_\_\_\_\_ Section No. \_\_\_\_\_ T \_\_\_\_\_ R \_\_\_\_\_

Dam in Series:  Yes  No Explain: \_\_\_\_\_

Preliminary Structure Data

\_\_\_\_\_ Assumed Hazard Class <sup>2/</sup>

Drainage Area: \_\_\_\_\_ Acres

A. Ditch Bottom Elevation at Centerline \_\_\_\_\_

F. Total Storage to A.S. Crest \_\_\_\_\_ Ac-Ft.

B. Ditch Bottom Elevation at Downstream Toe \_\_\_\_\_

G. Effective Height:  $E_1 - A_1 =$  \_\_\_\_\_

C. Floodplain Elevation at Centerline \_\_\_\_\_

H. Overall Height:  $D_1 - B_1 =$  \_\_\_\_\_ <sup>3/</sup>

D. Settled Top of Dam Elevation \_\_\_\_\_

H x S:  $G_1 \times F_1 =$  \_\_\_\_\_

E. Auxiliary Spillway Crest Elevation \_\_\_\_\_

Conduit Diameter: \_\_\_\_\_ inches

Job Class \_\_\_\_\_ (See Form MO-ENG-C12 or C12A)

Downstream Conditions

1. Valley Conditions Downstream from Structure:  Convergent  Divergent  Parallel

Floodplain Elevation \_\_\_\_\_ Valley Slope in Downstream Direction \_\_\_\_\_

2. Stream Channel Size: Depth \_\_\_\_\_ Width \_\_\_\_\_ Valley: Width \_\_\_\_\_ Shape \_\_\_\_\_

3. Valley Roughness or Retardance: "n" \_\_\_\_\_

4. First Downstream Hazard (See Page 2 of 2) \_\_\_\_\_ Distance \_\_\_\_\_

5. Distance Downstream to Junction of Significantly Larger Tributary \_\_\_\_\_

Rationale for Determining Hazard Class \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Actual Hazard Class \_\_\_\_\_ Analyzed by \_\_\_\_\_ Date \_\_\_\_\_

Approved by \_\_\_\_\_ Date \_\_\_\_\_

ATTACHED: Breach Routings  Yes  No  
Map(s)  
Other pertinent supporting documents

Describe Type of Utilities, Distance Downstream and Distance Above Floodplain Elevation	Approximate Distance Downstream From Dam	Approximate Distance Above Floodplain Elevation	Location in Potential Impact Area (Yes or No)
Building and Utilities:			
Roads and Railroads:			
Bridges:			

Describe Potential Downstream Development: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Potential impact area due to sudden failure of dam:

Determined by breach routing. (See attached maps and/or other descriptions)

Taken from Tech. Note 9:

$H_{BR}$  = Auxiliary Spillway Elevation – Floodplain elevation  
 = \_\_\_\_\_ - \_\_\_\_\_ = \_\_\_\_\_ ft.

A = Area of dam above floodplain elevation = \_\_\_\_\_ sq. ft.

$V_s = F =$  \_\_\_\_\_ ac. ft.

$BR = \frac{V_s H_{BR}}{A} = \frac{\text{___} \times \text{___}}{\text{___}} = \text{_____} \text{ ac.}$

$Q_{max} = 1100 BR^{1.35} = \text{_____} \text{ cfs.}$  Use \_\_\_\_\_ cfs

Distance Downstream (ft)	0	500	1,000	1,500	2,000	2,500	3,000	5,000	7,500	10,000	15,000
Water Depth (ft)	$H_{BR}$										
Q (cfs)	$Q_{max}$										

The hazard classification and design should be re-evaluated if there is development or changes in the impact area or upstream watershed.

NOTE:

<sup>1/</sup> Inventory dams are described in NATIONAL INVENTORY AND MONITORING MANUAL, Part 505, MO505.05 and NATIONAL ENGINEERING MANUAL 520.21(f).

(All class b and c dams.

All class a dams with 6 feet overall height and storage of 50 or more acre-feet.

All class a dams with 25 feet overall height and storage of 15 or more acre-feet.)

<sup>2/</sup> Definition of hazard classification in NATIONAL ENGINEERING MANUAL 520.21.

<sup>3/</sup> See Rules and Regulations of the Missouri Dam and Reservoir Safety Council if overall dam height is greater than 35 feet.

<sup>4/</sup> See NATIONAL ENGINEERING MANUAL Supplement MO 520.23 and MO 520.28.

<sup>5/</sup> This form may also be used for non-inventory size dams.





## SUBPART C – DAMS

MO520.25(b)(2)(iii)

### §MO520.25 Clearing Reservoirs

(b)(2)(iii) Inflow channels shall not be cleared upstream beyond the point where the contour representing the crest of the lowest ungated principal spillway inlet remains within the channel banks.

(iv) For land treatment structures (grade stabilization), RC&D-CAT structures, and small floodwater structures (less than 3,000 height x storage) the minimum area to be cleared shall be as stated in 520.25(b)(2)(ii). The 400 feet shown in 520.25(b)(2)(ii) shall be from principal spillway inlet.

## SUBPART C – DAMS

MO520.28(b)(3)

MO520.28 Potential impact area—class (a) dams of inventory size and all class (b) dams.

(b) Requirements.

(3) Use Form MO-ENG-C82 to document the impact area and a letter similar to Exhibit in MO520.28 to inform the landowner. Other forms or maps are acceptable if they show the same information.

(4) Use breach routing procedures for all class (b) dams.

(5) The following procedures will be used in class (a) inventory size dams.

(i) The person who approves the design drawings will determine that the proper method was used to define the impact area. Breach routing or a conservative approximation may be used.

(ii) A conservative approximation normally used would be the area defined using data from the charts in Appendix B of Missouri Engineering Technical Note 9 for those sites meeting the applicable conditions.

(6) Advise owners that the hazard classification and design should be re-evaluated if there is development or changes in the impact area.

PART 520 – SOIL AND WATER RESOURCES DEVELOPMENT

§MO520.28(c)(3)

MO520.28(c)(3)

(c) Distribution.

- (3) The description and/or maps of the potential impact area shall be submitted to the landowner or sponsor. It is the responsibility of the landowner or sponsor to transmit the description of potential impact area to:
  - (i) All landowners involved.
  - (ii) The local Soil and Water Conservation District.
  - (iii) The Missouri Dam and Reservoir Safety Program if the overall height is 35 feet or greater.
  - (iv) Any local government agency having zoning authority on the potential impact area.
- (4) If requested by the owner or sponsor, or if the owner or sponsor fails to act, NRCS shall distribute this information. The responsibility for distributing this information is delegated to the district conservationist by the state conservationist.



<Name of Office>  
 <Address of NRCS office>  
 <City, State Zip of NRCS office>  
 <NRCS Office phone number>

<Date>

<Name>

<Address>

<City>, <State> <Zip code>

<Salutation>:

The Natural Resources Conservation Service (NRCS) has designed a dam on your property. The location, size, and other significant features regarding the dam are shown on the attached form.

The form shows information used to evaluate the area that would be flooded or impacted should there be a sudden failure of the dam. The hazard class and design were based on this information. The hazard classification and design should be re-evaluated if changes are made in the impact area downstream from the dam or in the watershed upstream of the dam.

Dam failures are rare and most failures are not of the sudden, catastrophic type. The NRCS believes your dam will serve you for many years. However, this information on the potential hazard in case of sudden failure is being furnished so everyone affected by the construction of this dam can be properly informed.

A copy of this letter and form are being sent to your local Soil and Water Conservation District and any local government agency having zoning authority on the potential impact area for their information. If the dam is 35 feet or greater in overall height, the Missouri Dam and Reservoir Safety Program will be sent a copy for their information.

Please contact me if you have questions or desire further information.

Sincerely,

<NRCS Employee Name>

District Conservationist

Attachments: Form MO-ENG-C82, MO-ENG-C46 or MO-ENG-46

Cc: \_\_\_\_\_ Soil and Water Conservation District  
 Local agency having zoning authority on potential impact area  
 Missouri Dam and Reservoir Safety Program (Only if dam is 35 feet or greater in height.)