Idaho Department of Water Resources

Safety of Dams Program

https://idwr.idaho.gov/streams-dams-floods/

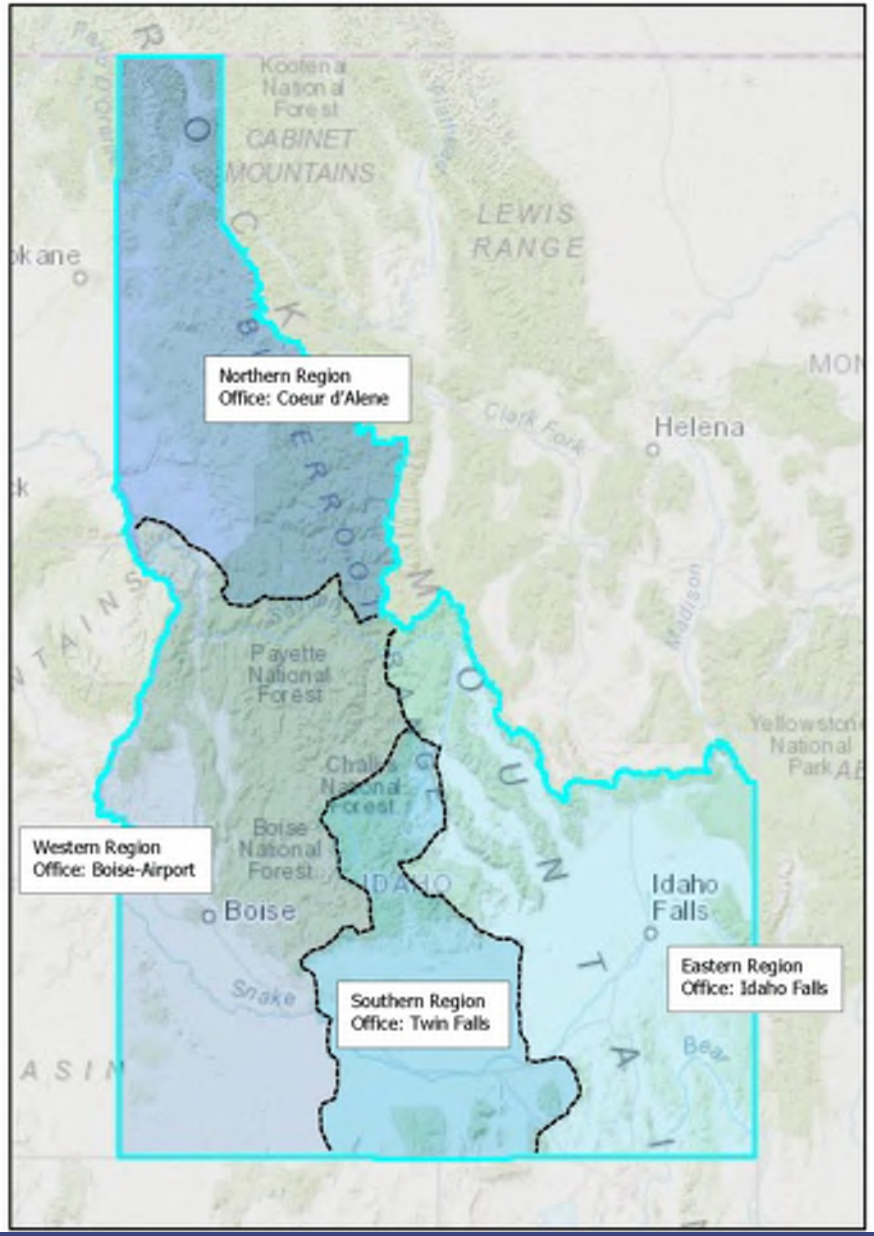
John Falk, P.E.
Dam Safety Program Manager
john.falk@idwr.Idaho.gov

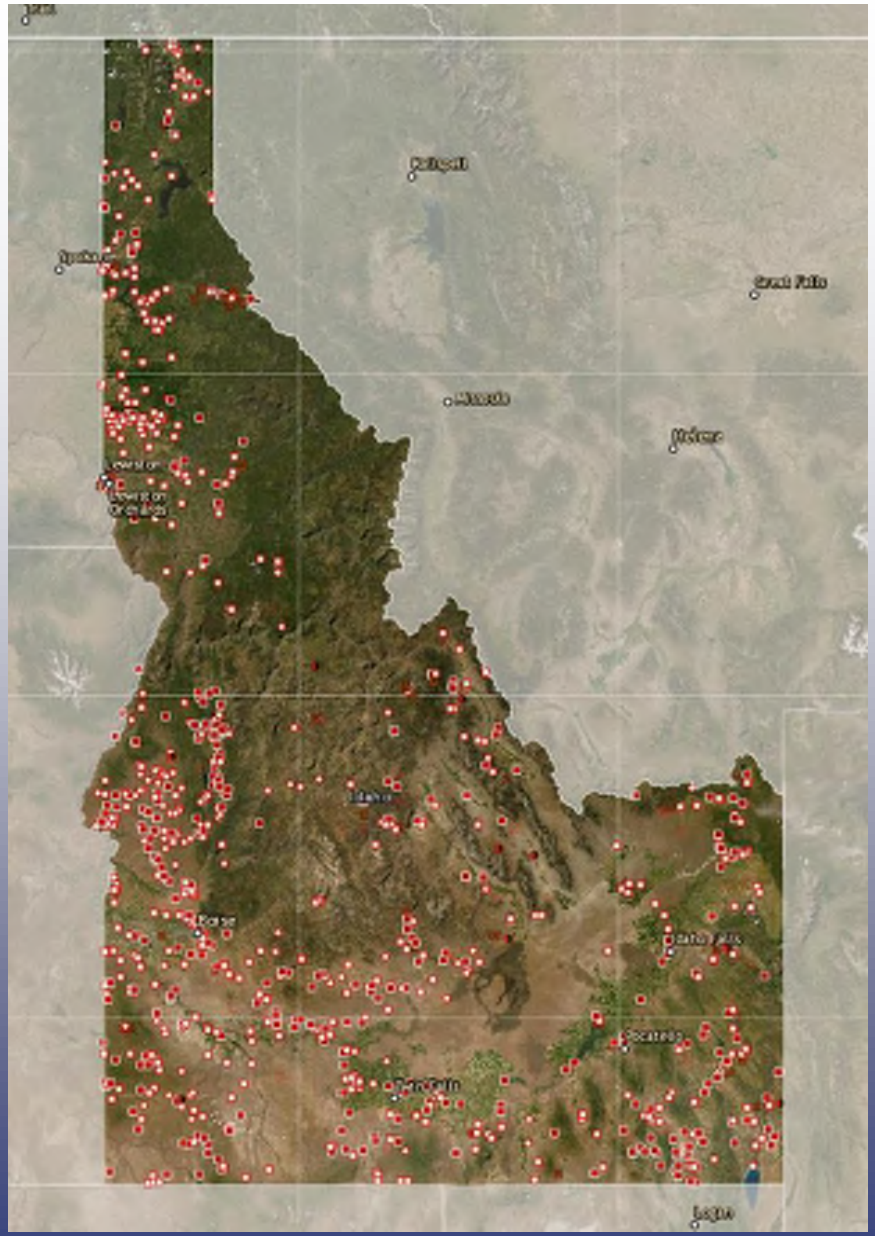
Idaho Society of Professional Engineers
2025 Annual Meeting – Coeur d'Alene
June 12th & 13th

Idaho Department of Water Resources
Safety of Dams Program

IDWR Region Office Locations and Dam Safety Program Staff

- **John Falk P.E. Program Manager, Amy Kussro - Office Specialist 2**
- **Northern Region (Coeur d'Alene) – Bill Cresse, Engineer Intern**
- **Southern Region (Twin Falls) – Tyler Wallace, Engineer Intern**
- **Eastern Region (Idaho Falls) – Brain Normandeau, P.E.**
- **Western Region (Boise Airport) – Manuel Rauhut, P.E.**


Kootenai National Forest
CABINET MOUNTAINS
LEWIS RANGE
Helena
Clark Fork
Madison
Payette National Forest
Boise National Forest
Boise
Idaho Falls
Snake
Yellowstone National Park
Northern Region
Office: Coeur d'Alene
Western Region
Office: Boise-Airport
Southern Region
Office: Twin Falls
Eastern Region
Office: Idaho Falls



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Safety of Dams Program

What is Idaho's definition for a regulated dam?

Rephrased, "what metrics are defined in statute that determine whether a dam in Idaho shall be regulated by IDWR for the benefit of public safety?"

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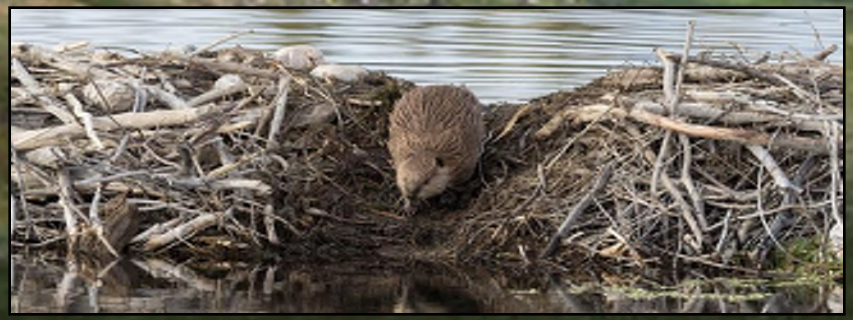
? ? ?



? ? ?

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→ HEIGHT (feet)

→ STORAGE CAPACITY (acre-feet)

→ plus the dam's *Hazard Classification*
(potential downstream failure consequences)

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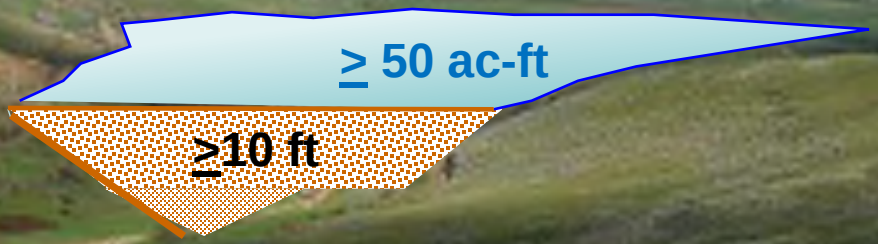
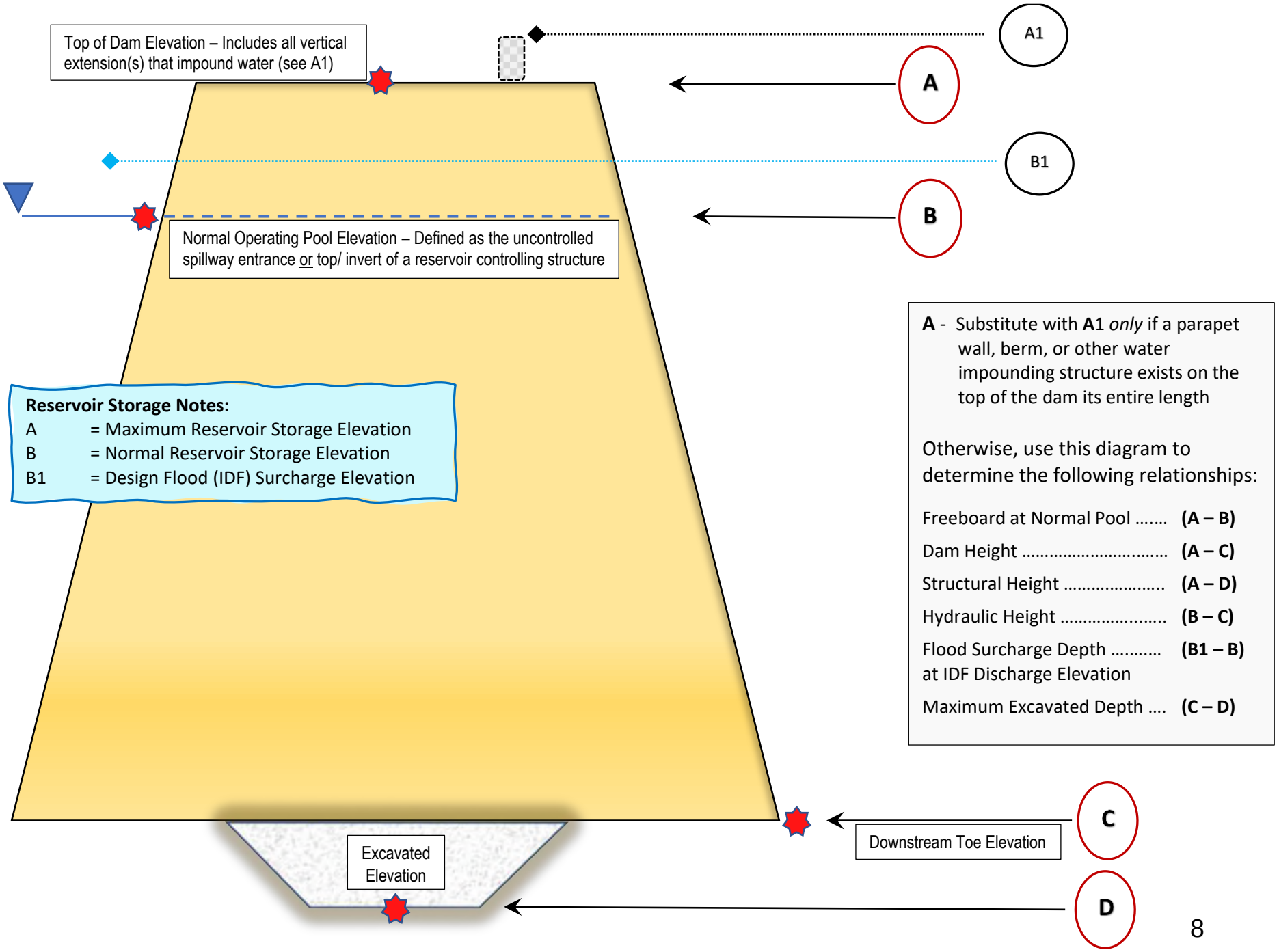
Dimensional Aspect

I.C. 42-1711(b)



Artificial barriers with a height greater than or equal to 10 feet *and* impounding a reservoir greater than or equal to 50 acre-feet.


Top of Dam Elevation – Includes all vertical extension(s) that impound water (see A1)
A1
A
B1
B
Normal Operating Pool Elevation – Defined as the uncontrolled spillway entrance or top/ invert of a reservoir controlling structure
Reservoir Storage Notes:
A = Maximum Reservoir Storage Elevation
B = Normal Reservoir Storage Elevation
B1 = Design Flood (IDF) Surcharge Elevation
A - Substitute with A1 only if a parapet wall, berm, or other water impounding structure exists on the top of the dam its entire length
Otherwise, use this diagram to determine the following relationships:
Freeboard at Normal Pool ..... (A – B)
Dam Height ..... (A – C)
Structural Height ..... (A – D)
Hydraulic Height ..... (B – C)
Flood Surcharge Depth ..... (B1 – B)
at IDF Discharge Elevation
Maximum Excavated Depth .... (C – D)
Excavated Elevation
Downstream Toe Elevation
C
D

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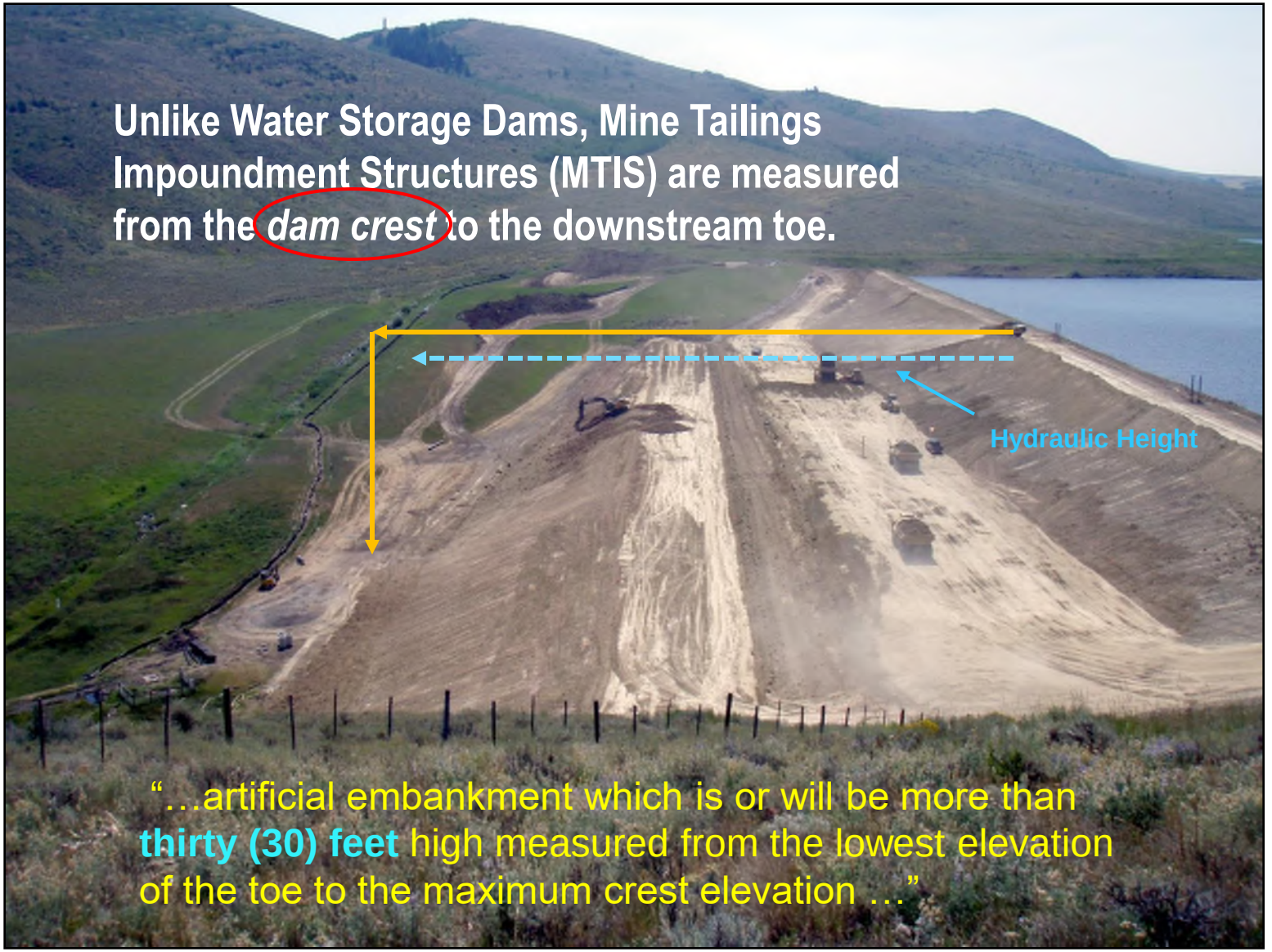
Let's not forget Mine Tailings Dams
I.C. 42-1711(l):

… any artificial embankment which is or will be more than thirty (30) feet in height … for the purpose of storing mine tailings slurry.
aka a Mine Tailings Impoundment Structure (MTIS)


Unlike Water Storage Dams, Mine Tailings Impoundment Structures (MTIS) are measured from the *dam crest* to the downstream toe.
Hydraulic Height
"…artificial embankment which is or will be more than **thirty (30) feet** high measured from the lowest elevation of the toe to the maximum crest elevation …"

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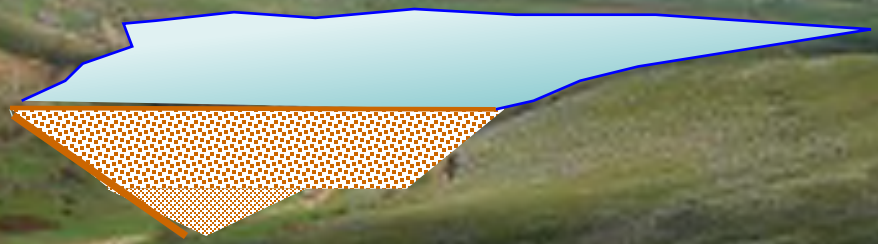
Safety of Dams Program

and last but not least is the structure's *Hazard Classification* (I.C. 42-1711q)



"…potential consequences to downstream life and property resulting from a dam failure and uncontrolled release of water exclusive of the size or the physical condition of the dam or mine tailings impoundment structure" (note: Hazard is not the same as **Risk**)

HAZARD CLASSIFICATION

Idaho Regulated Dams	DOWNSTREAM FAILURE CONSEQUENCES
HIGH HAZARD (92 Dams)	Loss of human life is a likely outcome. Typical of any dam that is located upstream from homes, industrial or commercial facilities, critical public utilities, heavily travelled roads or railroads, and other developed infrastructure. The accounting may include facilities that are heavily yet only seasonally visited, such as popular campgrounds or other recreational features.
SIGNIFICANT HAZARD (147 Dams)	Significant property damage and(or) environmental destruction, disruption of lifeline facilities or other infrastructure. The loss of human life is an unlikely result.
LOW HAZARD	Low economic and environmental damage; losses are limited to the dam and(or) the dam owner's property. No loss of human life.

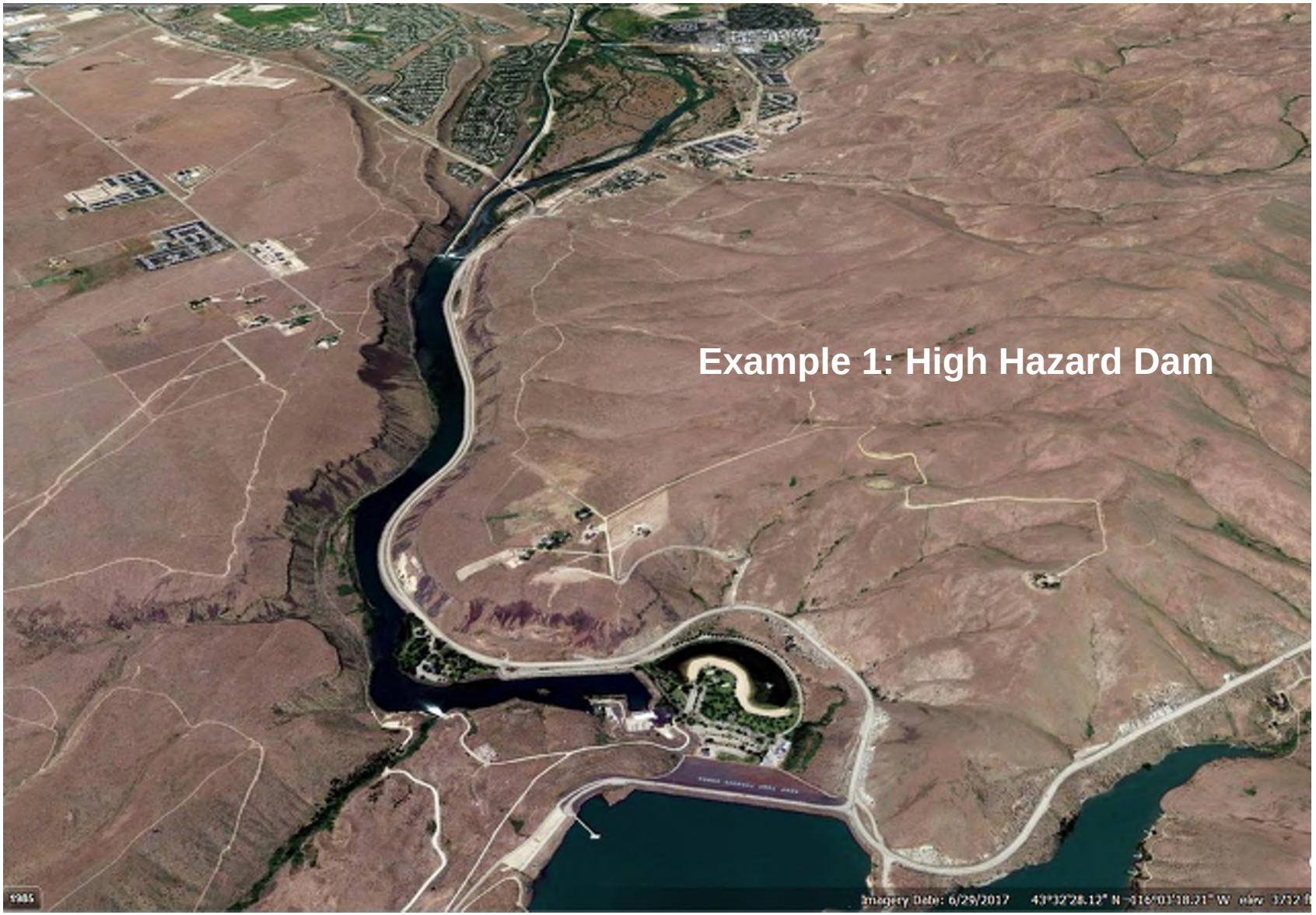
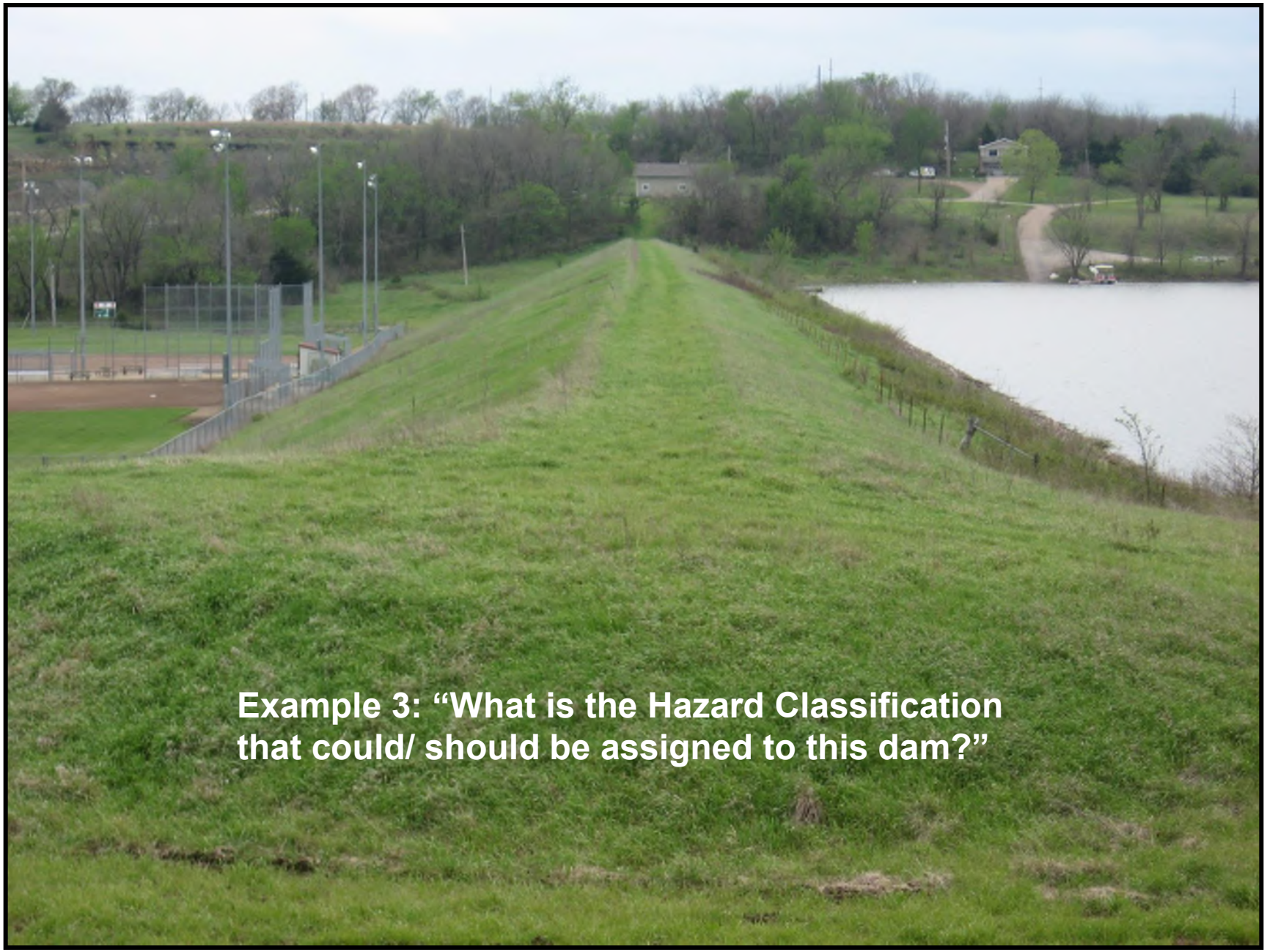

Example 1: High Hazard Dam


Photo courtesy USACE
Example 2: High Hazard Dam


Example 3: “What is the Hazard Classification
that could/ should be assigned to this dam?”


10 10'00

Although design requirements for dams have existed in Idaho since the beginning of the State Engineer's Office, a focus on the *Safety of Dams* didn't become standardized nationally until one unfortunate day in June……

….when a brand new, large-sized dam, designed and constructed by two of the world's premier dam-building entities catastrophically failed resulting in 11 deaths and several hundred million dollars in damage.

THE IDAHO LEGISLATURE

Idaho Code (aka Statutes) – Title 42

(Department of Water Resources)

Chapter 1709 – 1721

Administrative Rule 37 (IDAPA) – Title 03

Chapter 05: Mine Tailings Impoundments
Chapter 06: Safety of Dams

Canals and Ditches ? ?
Levees and River Dikes ? ?
Excavated Ponds ? ?

Idaho Code exempts the following hydraulic structures from dam safety regulations:

- Levees and Dikes
- Canals of any capacity
- Excavated Ponds
- Dams less than 20’ tall under the jurisdiction of IDEQ or Idaho Department of Agriculture…. designed for retention or treatment of municipal or livestock waste or sediment and wastes from produce washing or food processing

In Idaho, which of following group of individuals is authorized to design a dam that is regulated by IDWR for the benefit of public safety?

Politicians ?

ATTORNEYS

??

Professional Engineers ?

GEOLOGISTS ??

RANCHERS

???

In Idaho, which of following group is authorized to design a dam that is regulated by IDWR for the benefit of public safety?

- And the correct answer is:

Correct Answer:
Professional Engineers

Idaho Code 42-1712

Plans, drawings and specifications which are submitted to the department shall be prepared by or under the direction of a licensed professional engineer who is registered pursuant to Idaho law and authenticated by him as provided in section 54-1215, Idaho Code, or by such other person as provided in section 54-1223, Idaho Code.

54-1212: General Requirements for Examination and License

54-1223: Saving Clause – Exemptions

54-1223: Saving Clause – Exemptions (cont.)

(5) A professional engineer licensed in Idaho may review the work of a professional engineer who is licensed in another jurisdiction of the U.S. or a foreign country on a project that is a site adaptation of a standard design plan to determine that the standard design plan meets the standard of care and is applicable to the intended circumstance, with or without modification.

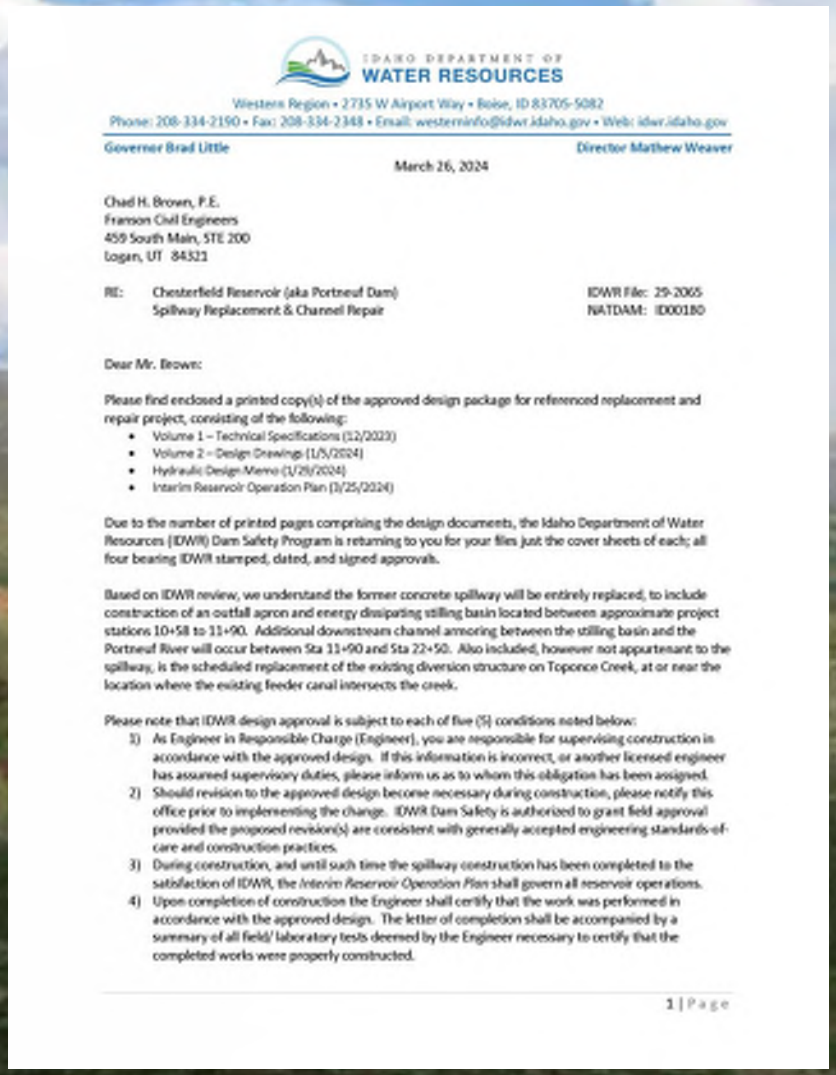
The Idaho professional engineer shall demonstrate responsible charge by performing professional serves related to his assignment including developing or obtaining a complete design record with design criteria and calculations, performing necessary code research and developing any necessary and appropriate changes to the standard design plan as necessary to properly apply the standard design to the intended circumstance.

The Idaho professional engineer shall have control of and responsibility for the entire work product, shall seal, sign and date it as required in this chapter, and shall be in possession of all original documents or certified copies of documents related to the professional engineer's work for the project.

54-1223: Saving Clause – Exemptions (cont.)

(6) In the event a licensee in responsible charge of a project leaves employment, is transferred, is promoted, becomes incapacitated, dies or is otherwise not available to seal, sign and date final documents, the duty of responsible charge of the project shall be accomplished by the successor licensee by becoming familiar with and reviewing, in detail, and retaining the project documents to date. Subsequent work on the project must clearly and accurately reflect the successor licensee's responsible charge.

IDWR Typical Design Approval Letter



IDAHO DEPARTMENT OF
WATER RESOURCES

Western Region • 2735 W Airport Way • Boise, ID 83705-5082
Phone: 208-334-2190 • Fax: 208-334-2348 • Email: westerninfo@idwr.idaho.gov • Web: idwr.idaho.gov

Governor Brad Little **Director Mathew Weaver**

March 26, 2024

Chad H. Brown, P.E.
Franson Civil Engineers
459 South Main, STE 200
Logan, UT 84321

RE: Chesterfield Reservoir (aka Portneuf Dam) IDWR File: 29-2065
Spillway Replacement & Channel Repair NATDAM: ID00180

Dear Mr. Brown:

Please find enclosed a printed copy(s) of the approved design package for referenced replacement and repair project, consisting of the following:

- Volume 1 – Technical Specifications (12/2023)
- Volume 2 – Design Drawings (1/5/2024)
- Hydraulic Design Memo (1/25/2024)
- Interim Reservoir Operation Plan (3/25/2024)

Due to the number of printed pages comprising the design documents, the Idaho Department of Water Resources (IDWR) Dam Safety Program is returning to you for your files just the cover sheets of each; all four bearing IDWR stamped, dated, and signed approvals.

Based on IDWR review, we understand the former concrete spillway will be entirely replaced, to include construction of an outfall apron and energy dissipating stilling basin located between approximate project stations 10+58 to 11+90. Additional downstream channel armoring between the stilling basin and the Portneuf River will occur between Sta 11+90 and Sta 22+50. Also included, however not appurtenant to the spillway, is the scheduled replacement of the existing diversion structure on Toponce Creek, at or near the location where the existing feeder canal intersects the creek.

Please note that IDWR design approval is subject to each of five (5) conditions noted below:

1) As Engineer in Responsible Charge (Engineer), you are responsible for supervising construction in accordance with the approved design. If this information is incorrect, or another licensed engineer has assumed supervisory duties, please inform us as to whom this obligation has been assigned.
2) Should revision to the approved design become necessary during construction, please notify this office prior to implementing the change. IDWR Dam Safety is authorized to grant field approval provided the proposed revision(s) are consistent with generally accepted engineering standards-of-care and construction practices.
3) During construction, and until such time the spillway construction has been completed to the satisfaction of IDWR, the *Interim Reservoir Operation Plan* shall govern all reservoir operations.
4) Upon completion of construction the Engineer shall certify that the work was performed in accordance with the approved design. The letter of completion shall be accompanied by a summary of all field/ laboratory tests deemed by the Engineer necessary to certify that the completed works were properly constructed.

5) Two sets of as-constructed drawings signed by the Engineer shall be provided within 60 days of completion; one set printed and the other in digital format. If no changes to the approved design occurred during construction, please make certain this fact is included in the letter of completion.

Note that IDWR Dam Safety cannot accept the constructed works as final until all the above-listed conditions have been satisfied. Should you have any questions, please don't hesitate to call me (208) 287-4927, or you may contact Brian Normandeau in Idaho Falls at (208) 525-7161.

Sincerely,

John Falk, P.E.
Dam Safety Program Manager

Cc: John Hyde – Portland Marsh Valley Canal Company
Eric Hobson – Caribou Country Emergency Services
Bruce Sandoval – NRCS State Conservationist
Brian Normandeau – IDWR Eastern Region Office

Enc: Approved Cover Sheets
- Volume 1 – Technical Specifications (12/2023)
- Volume 2 – Design Drawings (1/5/2024)
- Hydraulic Design Memo (1/25/2024)
- Interim Reservoir Operation Plan (3/25/2024)

Another frequently asked question:

“Do I need a permit to build a dam in Idaho?”

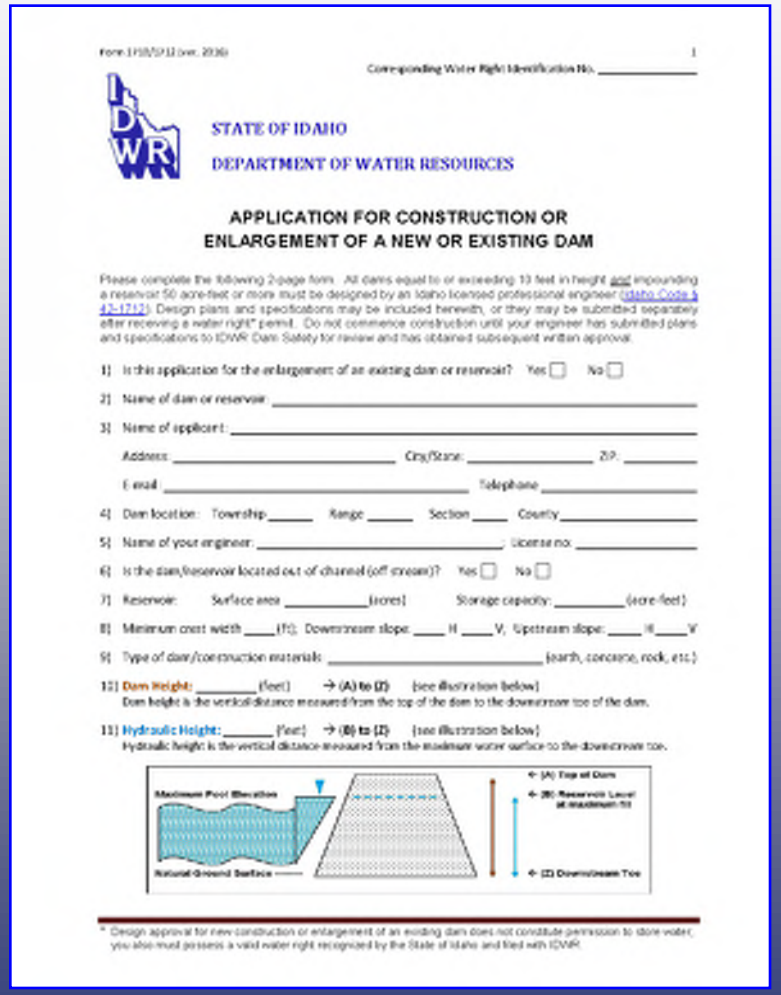
Idaho Department of Water Resources
Safety of Dams Program

The short answer is: "No"
One does not need a permit to build a dam.

However…
an *Application for Construction or Enlargement of a New or Existing Dam* and associated fee, plus an engineered design approved by IDWR is required prior to construction.

Dam Application Form

idwr.idaho.gov/forms/dams-forms/



Form 1710/1712 (ver. 2016) 1

Corresponding Water Right Identification No. _____

STATE OF IDAHO

DEPARTMENT OF WATER RESOURCES

APPLICATION FOR CONSTRUCTION OR ENLARGEMENT OF A NEW OR EXISTING DAM

Please complete the following 2-page form. All dams equal to or exceeding 10 feet in height and impounding a reservoir 50 acre-feet or more must be designed by an Idaho licensed professional engineer (Idaho Code § 42-1712). Design plans and specifications may be included herewith, or they may be submitted separately after receiving a water right* permit. Do not commence construction until your engineer has submitted plans and specifications to IDWR Dam Safety for review and has obtained subsequent written approval.

1) Is this application for the enlargement of an existing dam or reservoir? Yes ☐ No ☐

2) Name of dam or reservoir: _____

3) Name of applicant: _____

Address: _____ City/State: _____ ZIP: _____

E-mail _____ Telephone _____

4) Dam location: Township _____ Range _____ Section _____ County _____

5) Name of your engineer: _____ License no. _____

6) Is the dam/reservoir located out of channel (off stream)? Yes ☐ No ☐

7) Reservoir: Surface area _____ (acres) Storage capacity: _____ (acre-feet)

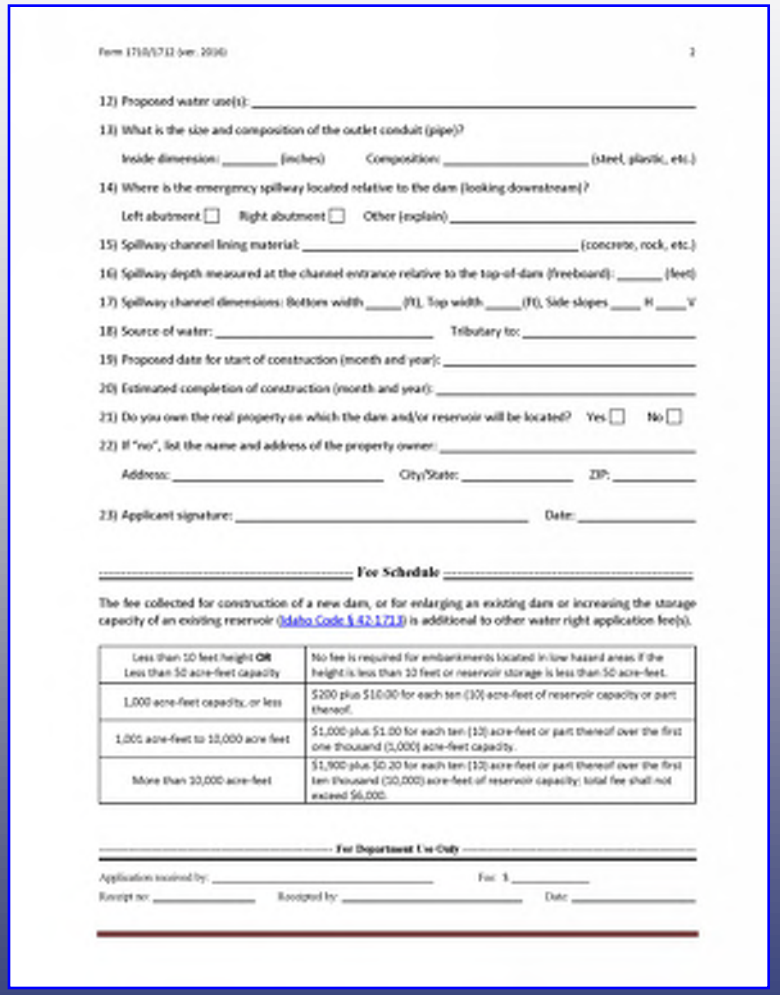
8) Minimum crest width ____ (Ft); Downstream slope: ____ H ____ V; Upstream slope: ____ H ____ V

9) Type of dam/construction materials: _____ (earth, concrete, rock, etc.)

10) **Dam Height:** _____ (feet) → **(A) to (Z)** (see illustration below)
Dam height is the vertical distance measured from the top of the dam to the downstream toe of the dam.

11) **Hydraulic Height:** _____ (feet) → **(B) to (Z)** (see illustration below)
Hydraulic height is the vertical distance measured from the maximum water surface to the downstream toe.

* Design approval for new construction or enlargement of an existing dam does not constitute permission to store water; you also must possess a valid water right recognized by the State of Idaho and filed with IDWR.



Form 1710/1712 (ver. 2016) 2

12) Proposed water use(s): _____

13) What is the size and composition of the outlet conduit (pipe)?

Inside dimension: _____ (inches) Composition: _____ (steel, plastic, etc.)

14) Where is the emergency spillway located relative to the dam (looking downstream)?

Left abutment ☐ Right abutment ☐ Other (explain) _____

15) Spillway channel lining material: _____ (concrete, rock, etc.)

16) Spillway depth measured at the channel entrance relative to the top-of-dam (freeboard): _____ (feet)

17) Spillway channel dimensions: Bottom width _____ (Ft), Top width _____ (Ft), Side slopes ____ H ____ V

18) Source of water: _____ Tributary to: _____

19) Proposed date for start of construction (month and year): _____

20) Estimated completion of construction (month and year): _____

21) Do you own the real property on which the dam and/or reservoir will be located? Yes ☐ No ☐

22) If "no", list the name and address of the property owner: _____

Address: _____ City/State: _____ ZIP: _____

23) Applicant signature: _____ Date: _____

Fee Schedule

The fee collected for construction of a new dam, or for enlarging an existing dam or increasing the storage capacity of an existing reservoir (Idaho Code § 42-1713) is additional to other water right application fee(s).

Less than 10 feet height **OR** Less than 50 acre-feet capacity	No fee is required for embankments located in low hazard areas if the height is less than 10 feet or reservoir storage is less than 50 acre-feet.
1,000 acre-feet capacity, or less	$200 plus $10.00 for each ten (10) acre-feet of reservoir capacity or part thereof.
1,001 acre-feet to 10,000 acre feet	$1,000 plus $1.00 for each ten (10) acre-feet or part thereof over the first one thousand (1,000) acre-feet capacity.
More than 10,000 acre-feet	$1,900 plus $0.20 for each ten (10) acre-feet or part thereof over the first ten thousand (10,000) acre-feet of reservoir capacity; total fee shall not exceed $6,000.

For Department Use Only

Application received by: _____ Fee: $ _____

Receipt no: _____ Receipted by: _____ Date: _____

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Safety of Dams Program

However (*and this is important*) ← ! ! ! !
In most instances a Water Right[1] issued by IDWR is *required* if you expect to legally divert, impound or otherwise store any water behind your dam.

[1] the application for a Water Right Permit is a unique procedure governed by statute and rule that includes a separate application form, separate fees, and an associated public comment period.

It's also important to be aware that the length of time needed to obtain a water right and(or) other state or federal permits and thus begin to legally store water in a reservoir can take several months or perhaps several years.

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And, in the end, issuance of a Water Right Permit may be denied for a variety of reasons.
So, a responsible engineer will not forget that …

IT ALWAYS PAYS TO PLAN AHEAD


QUESTIONS?