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To: All State Directors

From: Director, National Applied Resource Sciences Center

Subject: Revised Criteria for Assigning Hazard Potential Ratings to BLM Dams

The Interagency Committee on Dam Safety (ICODS) recently approved several changes to the existing Hazard Rating Criteria. These changes will soon be issued by the Department of the Interior for implementation by Interior agencies.

The major changes include revising the term “Hazard Rating” to “Hazard Potential Rating” to better indicate that the rating is only an indication of a “Potential” problem and is independent of the physical condition of the dam. Another change is that any dam with the *probability* of loss of human life will be rated as a High Potential Hazard dam.

Dams whose failure would result in major economic, environmental, or cultural damage downstream (including disruption of main lifeline facilities) will be rated as a Significant Potential Hazard dam. Low Potential Hazard rating criteria will remain the same.

Attached are background information on the ICODS criteria and a draft document listing issues and considerations (with examples) for assigning ratings to BLM dams. This draft is to be used for the current process of updating the Facilities Inventory and Maintenance Management System (FIMMS) data on dams and for establishing scheduling priorities for field inspections.

If you have any questions, please contact Larry Hoovestol, RS-140, at 303-236-9510.

Signed by
Mike Kirby
Acting Director, National
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Authenticated by
Luron Porter
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2 Attachments
1 - ICODS Hazard Potential Classification System for Dams (4 pp)
2 - BLM Dam Safety Hazard Potential Rating Issues and Considerations (4 pp)

Distribution
WO-200, MIB, Rm 5650
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ICODS
HAZARD POTENTIAL CLASSIFICATION SYSTEM FOR DAMS

PURPOSE

Common practice among federal and state dam safety offices is to classify a dam according to the potential impact a dam failure (breach) or mis-operation (unscheduled release) would have on upstream and/or downstream areas or at locations remote from the dam. The existing classification systems are numerous and vary within and between both the federal and state sectors. Although differences in classification systems exist, they share a common thread: Each system attempts to classify dams according to the potential impacts from a dam failure or mis-operation, should it occur. The most significant problem with these various systems is the use of terms that lack clear definition. In addition, the various systems use different terminology to define similar concepts. This precludes consistency between the various federal and state agencies and understanding by the public.

This document sets forth a hazard potential classification system for dams that is simple, clear, concise, and adaptable to any agency's current system. The intent is to provide straightforward definitions that can be applied uniformly by all federal and state dam safety agencies and can be readily understood by the public. It does not establish how the system will be used, such as prescribing specific design criteria or prioritizing inspections. Those responsibilities belong to the responsible regulatory authority.

DEFINITIONS

For the purpose of this system, the following terms are defined:

> HAZARD POTENTIAL: The possible adverse incremental consequences that result from the release of water or stored contents due to failure of the dam or mis-operation of the dam or appurtenances.
>
> ADVERSE CONSEQUENCES: Negative impacts that may result from the failure of a dam (delete: may occur upstream, downstream, or at locations remote from the dam). The primary concerns are loss of human life, economic loss (including property damage), lifeline disruption, and environmental impact.
>
> INCREMENTAL: Under the same conditions (e.g., flood, earthquake, or other event), the difference in impacts that would occur due to failure or mis-operation of the dam over those that would have occurred without failure or mis-operation of the dam and appurtenances.

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Revised August 13, 1996

PROBABLE: Likely to occur; reasonably expected; realistic.

HAZARD POTENTIAL CLASSIFICATION: A system that categorizes dams according to the degree of adverse incremental consequences of a failure or mis-operation of a dam. The Hazard Potential Classification does not reflect in any way on the current condition of the dam (e.g., safety, structural integrity, flood routing capacity).

CLASSIFICATION SYSTEM

Three classification levels are adopted as follows: LOW, SIGNIFICANT, and HIGH, listed in order of increasing adverse incremental consequences. The classification levels build on each other; that is, the higher order classification levels add to the list of consequences for the lower classification levels, as noted in the subsequent table.

This hazard potential classification system should be utilized with the understanding that the failure of any dam or water-retaining structure, no matter how small, could represent a danger to downstream life and property. Whenever there is an uncontrolled release of stored water, there is the possibility of someone, regardless of how unexpected, being in its path.

[New para.] A primary purpose of any classification system is to select appropriate design criteria. In other words, design criteria will become more conservative as the potential for loss of life and/or property damage increases. However, postulating every conceivable circumstance that might remotely place a person in the inundation zone whenever a failure may occur, should not be the basis for determining the conservatism in dam design criteria.

This hazard potential classification system categorizes dams based on the probable loss of human life and the impacts on economic, environmental, and lifeline interests. Improbable loss of life exists where persons are only temporarily in the potential inundation area. For instance, this hazard potential classification system does not contemplate the improbable loss of life of the occasional recreational user of the river and downstream lands, passer-by, or non-overnight outdoor user of downstream lands. It should be understood that in any classification system, all possibilities cannot be defined. High usage areas of any type should be considered appropriately. Judgment and common sense must ultimately be a part of any decision on classification. Further, no allowances for evacuation or other emergency actions by the population should be considered because emergency procedures should not be a substitute for appropriate design, construction, and maintenance of dam structures.

1. LOW HAZARD POTENTIAL

Dams assigned the low hazard potential classification are those where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

2. SIGNIFICANT HAZARD POTENTIAL

Dams assigned the significant hazard potential classification are those dams where failure or mis-operation results in no probable loss of human life but can cause [delete: major] economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas, but could be located in areas with population and significant infrastructure.

3. HIGH HAZARD POTENTIAL

Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life.

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Probable. One or more expected	Yes (but not necessary for this classification)

DISCUSSION

This Hazard Potential Classification System for Dams is based on the probable loss of human life and the potential for economic losses, environmental damage, and/or disruption to lifelines caused by failure of mis-operation of a dam or its appurtenances. This Hazard Potential Classification System for Dams recognizes that the failure or mis-operation of any dam or water-retaining structure, no matter how small, represents a potential danger to downstream life and property. Whenever there is an uncontrolled release of stored water, there is always the possibility, regardless of how unexpected, of someone being in the path of the discharge. However, postulating every conceivable circumstance that might remotely place a person in the potential inundation zone should not be the basis for determining the appropriate classification level. This system considers improbable loss of life to exist where persons are only temporarily in the potential inundation area.

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The difference between the significant and high hazard potential classification levels is that a high hazard potential dam includes the probable loss of human life. The failure of a dam that is classified as a high hazard potential structure may or may not include adverse incremental consequences that would otherwise justify a significant hazard potential classification.

The hazard potential classification assigned to a dam is based on consideration of the effects of a failure or mis-operation during both normal and flood flow conditions. The classification assigned should be based on the worst-case probable scenario of failure or mis-operation of the dam. That is, the assigned classification should be based on failure consequences that will result in the assignment of the highest hazard potential classification of all probable failure and mis-operation scenarios. Each element of a project must be evaluated to determine the proper hazard potential classification for the project. However, there is only one hazard potential classification assigned to the entire project. Individual elements are not assigned separate classifications.

The probable scenarios considered should be reasonable, justifiable, and consistent with the "Federal Guidelines for Selecting and Accommodating Inflow Design Floods for Dams" (FEMA). For example, assuming reasonable breach parameters and a failure during normal operating conditions ("sunny day" failure) may result in the released water being confined to the river channel and no probable loss of human life, indicating a low hazard potential classification. However, if the dam were assumed to fail in a similar manner during a flood condition, and the result would be probable loss of human life (excluding the occasional passer-by or recreationist) but minor economic losses, a high hazard potential classification would be appropriate. Once a project is placed in the high hazard potential classification, additional probable failure or mis-operation scenarios need only be considered if there is a need to determine if they would likely induce higher adverse incremental impacts.

In most situations, the investigation of the impact of failure or mis-operation of a dam on downstream human life, property damage, lifeline disruption, and environmental concerns is sufficient to determine the appropriate hazard potential classification. However, if failure or mis-operation of a dam contributes to failure of a downstream dam(s), the hazard potential classification of the dam should be at least as high as the classification of the downstream dam(s) and consider the adverse incremental consequences of the domino failures.

BLM - DAM SAFETY
HAZARD POTENTIAL RATING
ISSUES AND CONSIDERATIONS

All BLM-owned dams should be re-evaluated to assign a current, correct "Hazard Potential Rating." These ratings may change based on the new criteria or from a change upstream or a change in downstream use/development.

Hazard Potential Classifications:

(This classification criteria is in the process of being updated according to Departmental direction.) As proposed:

HAZARD POTENTIAL	LOSS OF HUMAN LIFE	ECONOMIC, LIFELINE, & ENVIRONMENTAL LOSSES
Low	None expected	Low & limited to owner
Significant	None expected	Yes, significant impact
High	Probable, 1 or more	Yes, but not necessary for "High"

Field office engineering personnel must evaluate each dam and the potential for downstream damage in the event of a failure of the dam and make a preliminary hazard potential rating. Any dams which are not obviously a Low Potential Hazard, for which more information is needed or are too complex, should be referred to the State Engineer for review.

Those dams which the State Engineer determines to be probable High or Significant Potential Hazard dams will receive a second level review, and the approved dams listed will be scheduled for formal inspections by a consultant.

Management must be informed of any dams which are listed as High or Significant, the potential liabilities, and any required maintenance needs and related costs. A decision must then be made by the Field Office Manager, in consultation with the State Engineer, to either keep and maintain the dam or to decommission/remove the dam.

The Formal Inspection report will review all technical aspects of the dam and will verify the assigned hazard rating. The report will also contain a downstream inundation map which will be used in developing the Emergency Action Plan.

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The following information is adapted from a draft paper from the Association of State Dam Safety Officials (ASDSO) - Subcommittee on National Dam Safety Coordination.
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General Issues:

Any dam, regardless of size, which has the potential for probable loss of human life in the event of a failure will be classified as a "High Potential Hazard" dam.

The probability of loss of human life, the significance of environmental damage and/or the extent of economic loss will be determined on the basis of the incremental flooding caused by failure or mis-operation of the dam.

Issues to Consider When Evaluating Dams:

Purpose, use, current value, and condition of the dam vs. liability and maintenance

Potential dollar loss impact on rating (e.g., cost of dam modifications exceeding costs of potential damage)

Coordination with State Dam Safety Officials and with other agencies

EPA and FWS considerations of potential damage to environmental resources

Cascade dam failure scenario (may be multiple owners)

Proper use of dam break studies to define downstream impact limits (notification time, depth/velocity criteria, etc.)

Consider proposed definition of no significant incremental impact (less than 2 feet of incremental flooding at low velocity at downstream area of concern)

Impacts on downstream lifelines (e.g., highways, hospitals, prisons, water supplies, etc.)

Value of reliable Emergency Action Plan with adequate warning time

Examples of Factors to be Considered for Assigning a Hazard Potential Rating:

Note: Only the potential downstream damage is considered in assigning a Hazard Potential Rating for a dam. The condition of the structure, cost of the dam structure, and loss of resource use from a dam failure are not considered in assigning a Hazard Potential Rating for a dam.

The following lists contain examples of factors to be considered in the decision process for assigning a hazard potential rating to a dam. THIS IS NOT AN ALL-INCLUSIVE OR COMPREHENSIVE LIST. The user of these lists must consider all site-specific issues before making a classification decision.

High Potential Hazard Dams

Probability for loss of human life from:

Occupied housing within inundation boundaries downstream

High use recreation sites downstream

Overnight use recreation sites downstream

Developed day-use areas downstream

Developed camping facilities downstream

Paved highways (State or County) or only access road to a community & related bridges downstream

Main railroads (more than one train/day) & related bridges downstream

Airports downstream

Nursing homes, hospitals, prisons, and emergency response stations downstream

Motels, gas stations, grocery stores, etc., downstream

Churches, etc., downstream

Schools, fire stations, offices, etc., downstream

Significant Potential Hazard Dams

Human life risk limited to unscheduled transient activities downstream (hiking, hunting, fishing, etc.)

Severe contamination downstream from reservoir sediment

Scouring of downstream valley by flood wave

Hazardous material, waste, or landfill sites downstream

Non-BLM economic losses (other than minimal agricultural losses)

Threatened/Endangered Species habitat downstream (or in reservoir area)

Minor industrial facility downstream

Water supply / wastewater treatment plant downstream

Septic treatment facility downstream

National / State Park / Fish Hatchery downstream

Unpaved Township or County roads & related bridges downstream

Minor Railroad line (one train / day or less) & related bridges downstream

Utility transmission systems downstream (e.g., gas, electric, water)

Fuel tanks downstream

Extensive agricultural activities downstream

Mining / mine waste piles or ponds downstream

Archeological site / Historic site / Native American cultural area downstream

Low Potential Hazard Dams

Human life risk limited to unscheduled transient activities downstream (hiking, hunting, fishing, etc)

Limited economic losses on BLM lands (downstream damage, etc.)

Environmental damage that can be repaired and/or habitat that can be restored