**Public Comment on Draft 37.03.05 – Safety of Dams and Mine Tailings Impoundment Structures Rules, Strawman Draft V1.0., Docket No. 37-0305-2201 (IDAPA 37.03.05 & IDAPA 37.03.06)**

By Tami Thatcher, July 28, 2022.

The first round of comments on the first Strawman were due June 17, 2022 and the comment period was closed. This second set of comments on the first Strawman currently will not be accepted by the IDWR, despite their continued work on the rule changes.

Comments would have been submitted by email to rulesinfo@idwr.idaho.gov, had IDWR specifically requested no more comments at this time.

**BACKGROUND**

The May 4, 2022 Idaho Administrative Bulletin identified rulemaking for the Idaho Department of Water Resources and announced a May 27 meeting. [1]

The current regulations, "Safety of Dams Rules" (IDAPA 37.03.06) and "Mine Tailings Impoundment Structures Rules" (IDAPA 37.03.05), are being modified and combined into one single new rule chapter, "Safety of Dams and Mine Tailings Impoundment Structures Rules" (draft IDAPA 37.03.05).

The draft rule can be found at https://idwr.idaho.gov/wp-content/uploads/sites/2/legal/rule-37-03-05/rule-37-03-05-and-rule-37-03-06-202205223-strawman-v1.0.pdf (or link ). The existing rules can be found at https://adminrules.idaho.gov/rules/current/37/ . The dam safety rulemaking webpage is located at this https://idwr.idaho.gov/legal-actions/rules/idwr-rulemaking-2022-2023/mine-tailings-impoundment-structure-safety-of-dams-rules/ .

A public (in person and virtual) meeting was held May 27, 2022. The IDWR briefly stated that the "Strawman" newly drafted rule combines the existing "Safety of Dams Rules" and the "Mine Tailings Impoundment Structures Rules." No specific rationale for changes made to individual requirements in the rule was provided (other than abandonment plans and bonding for Mine Tailings Impoundment Structures) and no discussion of the ramifications of the changes was provided.

A second public (in person and virtual) meeting was held July 7, 2022; however, there was no written response to comments received and no revised Strawman. It was signaled at the meeting that no explanation of the many changes made would be provided. It was also explained that 21 revisions of the initial Strawman draft had been made.

A third meeting has been planned for July 28, but has been postponed as IDWR works on the first set of comments.

[1] The May 4, 2022, Idaho Administrative Rules Bulletin, Volume 22-5, available in May 2022 at https://adminrules/idaho.gov/bulletin/2022/05.pdf

## COMMENT OVERVIEW

Two very important design criteria for dams and Mine Tailings Impoundment Structures (MTISs) are for water release capacity and seismic capacity. In my first set of comments, I addressed release capacity which is dependent upon estimated probable flooding inflows. Despite long known increasing risk of severe weather events due to climate change, the IDWR has proposed reducing the size of design probable flooding inflows to consider for selection of the design criteria for flooding inflows.

This is despite recent flooding in the neighboring state of Montana, which this June exceeded 1-in-500-year flood levels due to unexpected heavy snow followed by heavy rain this spring, despite a dry winter.

By 2017 it had been recognized by professionals that climate change increases the risk of severe weather and flooding and the risk of failure of MTISs. [2]

In these comments I focus on the hazard classification of dams and MTISs and on the selection of the design earthquake for assessing the seismic adequacy of dam and MTISs structures to withstand earthquakes.

Regulations for dams and MTISs need to set appropriate minimum design standards. In the proposed Strawman, the regulations allow waiving design requirements or allow unstated bottomless reductions in the minimum design requirements. This almost infinite flexibility can save mining companies money but it puts Idaho citizens and the environment at risk. Furthermore, it does not provide stakeholders with any reason to have confidence that IDWR will require and enforce reasonable minimum design standards.

In Idaho, large sums of money flow into political campaigns from the mining industry. In Idaho, lawmakers can influence agencies and can also remove any regulation, line-by-line, that a regulatory agency like the IDWR creates. Motives to "reduce regulation" are not necessarily in the best interest of Idaho and require scrutiny rather than unquestioned acceptance.

It needs to be understood that dams designed to hold water, *when properly designed and properly constructed* tend to be reliable structures. Not all dams in Idaho regulated by the IDWR necessarily meet these criteria. For example, the Mackay dam was not properly designed and construction quality was flawed. The spillway capacity for the Mackay dam was never adequate and despite the IDWR not wanting the Mackay dam capacity increased, legal action allowed its storage capacity to be increased.

Mine Tailings Impoundment Structures (MTISs), often simply called "tailings dams" continue to have a performance record of failure that has a far higher failure likelihood than water dams. The continuing failures of MTISs in the last twenty years continues to be alarmingly high and often with catastrophic consequences for the environment. And this is true of developed countries with

[2] Roche, C. Thygesen, K., Baker, E. (Eds.) *Mine Tailings Storage: Safety Is No Accident*. A UNEP Rapid Response Assessment. United Nations Environmental Programme and GRID-Arendall, Nairobi and Arendal, www.grida.no. 2017. ISBN: 978-82-7701-170-7

supposedly stringent regulatory oversight, like Canada. Sudden catastrophic failure of tailings dams continues to occur, in countries around the world. And importantly, tailings dams release toxic metals and materials into the environment in very large amounts. [3]

As other states like Alaska were reviewing their regulations for dams and MTIS back in 2017, [4] it seems that the IDWR is still lagging behind in ensuring adequate regulations. IDWR has emphasized that this rulemaking is about "zero-based regulations" and the overriding goal of reducing regulations. At the rulemaking meetings, ensuring stringent design criteria has not been mentioned nor has the IDWR's reductions in design criteria in the proposed draft Strawman been described or discussed in this rulemaking effort.

## SUMMARY OF KEY INADEQUACIES IN THE PROPOSED STRAWMAN

Brief summary of key inadequacies in the IDWR's proposed Strawman, based on version 1 of the Strawman include:

1. While it is good that the IDWR has added consideration of environmental damage to the hazard classification criteria in Rule 25, environmental damage needs its own heading in the hazard classification table in addition to estimated loss of life, economic losses, etc.
2. The "low hazard" category in Rule 25 fails to mention criteria for environmental damage and must state that no environmental damage is caused or characterize the limited amount of environmental damage allowed on the "low hazard" category.
3. For MTISs to be considered anything less than "high hazard" the environmental damage must be able to be remediated AND the IDWR must require the funding for its remediation following structural failure must be secured prior to operation of the structure. (Note that current bonding requirements only address routine closure of the MTIS and do not address remediation needs if the structure fails.) For MTISs, were the structure to fail, the MTIS would release toxic materials. The specific toxic materials depend on ores being mined and the processes at the mine. It would appear that all MTISs should be classified as "high hazard" and should be required to withstand the "maximum credible earthquake." If structural failure of the MTIS would cause the need for remediation beyond what is funded by the bonding rule, it should be deemed "high hazard."
4. The "significant hazard" category allows enormous adverse consequences, to environment and/or economically, should the structure fail. In fact, the criteria for "significant hazard" and for "high hazard" allow such extensive damage that it is unclear which category would be selected because of the lack of specific criteria. The Strawman proposed rules, however, have reduced the design requirements for "significant hazard" structures.

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[3] Roche, C. Thygesen, K., Baker, E. (Eds.) *Mine Tailings Storage: Safety Is No Accident*. A UNEP Rapid Response Assessment. United Nations Environmental Programme and GRID-Arendall, Nairobi and Arendal, www.grida.no. 2017. ISBN: 978-82-7701-170-7

[4] Charles F. Cobb, PE, *Alaska Business Monthly*, "Update on Mne Tailings Dam Regulation in Alaska and North America," January 2017. www.akbizmag.com

5. Strawman Rule 35, Rule 50 (new dams), Rule 55 (new MTISs) and Rule 60 (existing dams and MTISs) all include a variety of statements about the seismic analysis needs and sometimes address the selection of the minimum design earthquake. When these conflict, which rule overrides? The IDWR should also clarify the regulations with regard to modifications to existing structures. Would the regulations for new structures apply to modifications?
6. The clear statement of the minimum design earthquake is lacking in the Strawman. Rule 35 would require that large dams and high hazard structures use the "maximum credible earthquake" as the design earthquake. But Rule 35 allows the Director to waive the need for any seismic analysis. The basis for the Director's decision is not linked to the hazard classification or clear criteria or rationale.
7. Strawman Rule 35 would require that high hazard structures (including MTISs) use the "maximum credible earthquake" as the design earthquake, but only if the Director did not waive the requirement for a seismic analysis. Related to this is ambiguity in the criteria for hazard classification.
8. Strawman Rule 35 places no statement of the minimum design earthquake to be used for "significant hazard" structures, whereas the current analogous rule includes having "significant risk" structures (which aligns to "significant hazard" structures) use the "maximum credible earthquake." No explanation of this change has been given.
9. Strawman Rule 35 needs to require both "high hazard" and "significant hazard" dams and MTISs to be able to withstand the maximum credible earthquake, with no exception. There must not be an allowance for the Director to waive the need for a seismic analysis for high and significant hazard dams and MTISs for new structures. There must be a workable path for addressing seismic deficiencies for existing structures, not a blanket exception to appropriate design requirements.
10. There is currently no securing of any funds from the owner to remediate the environment and compensate people affected, prior to operation of the structure, in the event that the structure fails. The IDWR does not require securing of funds to address remediation or compensation should the structure fail. Note that existing bonding requirements do not address funding needed if the structure fails. Despite no such funding to address the losses if the structure fails, the Strawman allows the Director to waive the performing of seismic analyses and also allows the Director to accept any minimum design criteria, as the ability to choose any seismic return period is allowed in the proposed rules.
11. Strawman Rule 60 for existing dams and MTISs says to use the "maximum credible earthquake" or any lesser criteria accepted by the Director. There is not a clear statement of the minimum size earthquake that could be acceptable to the Director. The regulations need to provide a clear minimum standard that is to be met and Rule 60 fails to provide the minimum standard. Stating that the "maximum credible earthquake" or an earthquake of some other return period is not stating a minimum standard.
12. Strawman Rule 50 for new dams requires a seismic analysis for large dams regardless of their hazard classification. Unfortunately, intermediate and small dams, of high, significant or low hazard are left out and have no stated requirement in Rule 50 for a seismic analysis. Rule 50 does not state a minimum seismic design earthquake for any

structure. Rule 50 does require including (identifying) the peak ground accelerations for the 2 percent probability of exceedance in 50 years (the 2500-year return period earthquake), but Rule 50 does not state a minimum seismic design earthquake that the structure must withstand. Rule 35 does not state the minimum seismic design earthquake except for large or high hazard structures and even so, allows seismic analyses to be waived.

13. Strawman Rule 55 for new MTISs does not state any minimum design earthquake. Apparently then, Rule 35 is the driver but it only addresses high hazard structures and even then allows seismic analysis to be waived.
14. Both Strawman Rule 50 and 55 for new structures, oddly, have less stringent seismic analyses and design criteria than Rule 60 for existing structures. Perhaps Rule 60, due to it allowing the Director to select any design earthquake, is not actually more stringent. It is difficult to tell. The "maximum credible earthquake" is larger than the 2500-year return period earthquake. A 100-year return period earthquake is smaller than the 2500-year return period earthquake. According the Rule 60, the Director can select one of these or any other earthquake with a different return period. Thus, no minimum on how small the earthquake the Director may accept has been stated in the regulations.

Below comment provides more detail on these problems and identifies some additional problems.

## THE STRAWMAN DOES NOT ASSURE APPROPRIATE SELECTION OF THE DESIGN EARTHQUAKE

The first Strawman draft in several sections states that certain dams and Mine Tailings Impoundment Structures (MTISs) are to use the seismic design criteria that is based on the "maximum credible earthquake." Yet, generally, the regulations water down this requirement in later sentences. Effectively, the design criteria are to be the "maximum credible earthquake" or a completely unstated far less severe earthquake. No rationale is given for selecting the less severe earthquake. Effectively, the proposed regulations are meaningless and do not even provide the rationale for accepting the less severe earthquake.

As background, in Table 1 below, I present the relationship of certain probabilities of exceedance to earthquake return interval or return period. Note that the seismic event is more severe and the loading of the structure more challenging for the 2 percent in 50-year probability of exceedance, than the 10 percent in 50-year probability of exceedance. And the "maximum credible earthquake" is the most severe earthquake considered, with the highest loading of the structure.

**Table 1.** United States Geological Survey Seismic Probabilistic Maps.

| Probability of Exceedance | Earthquake Return Period | Severity of Earthquake |
|---|---|---|
| 10 percent in 50 years | 500-year | Lower peak ground acceleration, lower on Modified Mercalli Intensity (MMI) Scale |
| 5 percent in 50 years | 1000-year | More severe earthquake than the 500-year earthquake |
| 2 percent in 50 years | 2500-year | More severe earthquake than the 1000-year earthquake |
| Maximum Credible Earthquake (no stated probability of exceedance) | (Sometimes considered 10,000-year return interval, although may not be estimated.) | Highest peak ground acceleration, highest on MMI Scale |

Table notes: Probability of exceedance relates to return interval. For example, 1/50 year * 0.1 = 1/500 years, where 0.1 is 10 percent divided by 100.

In the existing rules, there is a long history of evolving new information about the seismic hazard. In the past, seismic zones 2 and 3 have often used in the regulations for dams and MTISs. Seismic zone 3 was expected to experience more severe earthquakes than zone 2. However, the estimates of seismic hazard have continued to evolve and may no longer use zone 2 and 3. The boundaries of seismic zones 2 and 3 have also changed (and are no longer used). The seismic hazard maps from 1970 depicting seismic zone 3 show zone 3 to be east of the Nevada-Utah boundary. More current maps of seismic hazards show high seismic hazards throughout Custer County in the center of Idaho and extending further west than previous maps.

Zone 2 had corresponded to Modified Mercalli Intensity Scale MM VII, moderate damage, while Zone 3 had corresponded to MM VIII, major damage.

Importantly, more recent seismic hazard estimates of the seismic hazard at various locations have generally increased the estimated seismic hazards, meaning that more severe earthquakes are now expected than were expected in past estimates by the United States Geological Survey. This means structures that were thought to not need to follow stringent seismic design criteria are not necessarily adequately designed. Updates to USGS seismic hazard include updates in 2014. [5]

For dams and MTISs, there are two aspects of seismic evaluation that must be addressed:

(1) the site seismicity assessment at the location of the structure and
(2) the selection of the design earthquake. The most stringent design earthquake, with the highest loading on the structure, is the maximum credible earthquake.

[5] Allison M. Shumway et al., *Additional Period and Site Class Maps for the 2014 National Seismic Hazard Model for the Conterminous United States*, United States Geological Survey Open-File Report 2018-1111, 2018. https://doi.org/10.3133/ofr20181111

The past regulations for dams and MTISs have confusingly spread the seismic analysis criteria among the Rule for design reports, the Rule for new structures and the Rule for existing structures. In the Strawman, seismic analysis criteria are spread among Rule 35 (reports), Rule 50 (new dams and reservoirs), Rule 55 (new MTISs) and Rule 60 (Existing dams and existing MTISs).

In the proposed Rule 35, (035.12.d.i), the rule says to "use the maximum credible earthquake." But this is undermined by the following statement that "seismic analysis may be waived…" The subsequent qualifying statements for waiving the seismic analysis is said to be based on the "consequence of failure" yet there is no stated association to Rule 25, Hazard Classification, the identified hazard classification for the structure or to any specific criteria for evaluating the consequence of failure.

In the proposed Rule 60 for existing dams, the Strawman rule says "use the maximum credible earthquake." But this is undermined by then saying that any other unstated "specified return period" may be accepted. Effectively, this allows an unstated bottomless minimum on the selection of the seismic loading that may be chosen. This provides citizens of Idaho with no assurance of reasonable regulatory decisions by IDWR.

In the proposed Rule 50, (050.01.d.iv), "The engineer shall include in the stability analysis peak ground accelerations obtained from Seismic Hazard Maps published by the United States Geologic Survey (USGS) using a minimum return interval of 2 percent (2%) probability of exceedance in 50 years, or as determined by the Director." Requiring that something be <u>included</u> is fine but as written creates ambiguity about the size of the selected and enforced design earthquake.

Citizen stakeholders concerned by the stringency of design standards are given no assurance as to what design criteria the IDWR is even aiming for, even for new structures or for modifications to structures.

In the proposed Strawman, for both <u>new</u> dams and <u>new</u> MTISs, (Rules 50 and 55), the seismic design criteria appear to be lower than for <u>existing</u> dams and MTISs (Rule 60). For MTISs, this reduction in the standards may lower costs to mining companies, but it in doing so, may allow unacceptably high seismic risk of failure of the structure.

With increasingly higher seismic hazard being discovered by the U.S. Geological Survey, there is understandably a lot of pain involved in considering existing structures. But it is quite odd for <u>new</u> structures to be granted lower seismic design criteria than <u>existing</u> structures. The IDWR needs to explain why they lowered the design criteria for new dams and MTISs.

For new dams, the proposed Strawman (Rule 50), regardless of hazard classification, only <u>large</u> dams shall be required to include a geologic and seismic report. This is inconsistent with previous regulations and regulatory guidance. In the past, whether large, intermediate or small in size, it was the Hazard classification that determined the level of analysis required. (Small dams fed in somewhat indirectly from the Safety of Dams Rule 60.) But the proposed Strawman is

written to say that for dams, hazard classification doesn't matter, only the size of the dam being large.

In the current regulation of dams, large dams that are significant or high "risk" (basically corresponding to significant hazard or high hazard) shall use the maximum credible earthquake. The Strawman in Rule 35 would limit use of the maximum credible earthquake to high hazard but not significant hazard dams and it would allow the seismic analysis to be waived without clear criteria or linkage to the hazard classification.

The wording in the existing and Strawman regulations regarding the selection of seismic criteria and when seismic analyses are required, are difficult to follow. The IDWR should be providing an explanation and justification of the increased or decreased requirements in the Strawman compared to existing regulations.

For new MTISs, the proposed Strawman in now relying on Rule 35 and only high hazard MTISs would use the "maximum credible earthquake." In the past, it is unclear what design earthquake was used for structural analysis of MTISs. But all MTISs in seismic zone 3 required seismic analysis and this could sometimes apply to zone 2.

The current and proposed rules are difficult to compare. But one thing is clear - the hazard classification of the MTIS matters a great deal with regard to selection of appropriate seismic hazard.

**THE HAZARD CLASSIFICATION REMAINS TOO AMBIGUOUS**

This leads us to the proposed Strawman Rule 25, "Hazard Classification." First of all, the criteria in Rule 25 may be inconsistent with the wording in Rule 10, Definitions. The wording in definitions could be construed such that only life and property matter, with the word property left up to interpretation. With the prolonged environmental contamination from mine tailing's releases, the table in Rule 25 properly considers "prolonged environmental loss" in addition to loss of life, damage to developed property, or damage to commercial or industrial facilities, or agriculture, etc.

The definition for hazard classification should be clear that the criteria for determining hazard classification will be based on criteria in Rule 25.

An adequate hazard classification should be utilized in the regulations rather than independent statements not linked to the hazard classification as in proposed Rule 35 "if the consequences of failure is demonstrated to be sufficiently low…"

Also, in the way that the criteria for "low hazard" are stated, there needs to be more clarity so that low hazard means "no prolonged environmental loss' due to failure of the structure. In fact, due the toxic material they could release and the streams, rivers, groundwater, and land that would be affected, all MTISs should be deemed high hazard structures, even if there is little or no developed property downstream. In addition to their hazard classification, MTISs can be higher risk due to their more vulnerable design and higher likelihood of failure based on the

continuing high rate of failures world-wide. MTISs should have more stringent, not less stringent design requirements for seismic capability (and other design requirements).

The "significant hazard" category allows so much damage to the environment and economic losses that any structure could be designated "significant hazard" when it actually is high hazard. The "significant hazard" category does not require stringent design criteria, particularly lacking in seismic design criteria. In fact, the existing rule for dams has more stringent criteria for "significant hazard" dams than the proposed new Strawman. This is a serious flaw.

Designating MTISs as high hazard structures (or including a framework for hazard levels higher than "high" as Canada has, would appear to be appropriate and would alleviate some of the regulatory uncertainty stakeholders have. Other schemes have hazard classification categories above high hazard: very high hazard and extreme hazard. [6] With the unlimited size of MTISs, such distinctions can be relevant and provide a rational basis for selecting a more stringent seismic design earthquake. In the Canada example, high hazard dams would require using as the design earthquake at least the 1-in-2500-year earthquake. Extreme hazard structures would use the 1-in-10,000-year earthquake or maximum credible earthquake. In the IDWR Strawman, there is way too much ambiguity about the selection of the design earthquake. This means that stakeholders concerned about the protection of environment or property have no way to predict how stringent the design requirements will be, even for new structures.

Environmental damage to streams, lakes, aquatic life, and land that cannot be remediated should be considered extreme hazard. And yet, the IDWR Strawman allows the Director to waive or reduce the size of the design earthquake in undefined, undescribed ways.

Also, the regulations should explicitly address the potential cascade of dam or MTIS failures should the failure of one structure cause the failure of another. The consequences then of the cascade of failures need to be considered in the hazard classification.

No stakeholder should accept the IDWR's ultra flexible approach that allows the Director to greatly reduce the design earthquake selected based on no stated criteria or to waive the requirement for seismic analysis altogether.

Including in the proposed Rule 25, criteria for "prolonged environmental loss" is crucial and is a step in the right direction. But ambiguity remains because of the way low hazard criteria are stated and the possible restricted way that the definition of hazard classification could be narrowly interpreted in Rule 10, Definitions.

Here is the definition of "Hazard" in the Strawman:

Hazard: "The 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. Hazard Classification shall be assigned to new and

[6] Marc E. Orman, P.E., G.E., et al., Amec Foster Wheeler, Tailings Dam Classification and Breach Analyses, Perspectives from the Canadian Dam Association, Presentation, 2017.

existing dams or mine tailings impoundment structures based on the severity of failure consequences to life and property."

Notice how this definition is first limited to dams and uncontrolled release of water, not mine tailings slurry. Also notice the way consequences are narrowly limited to "life and property."

In contrast, a better definition that has been used in Canada is as follows:

Dam Classification as defined by the Association of Dam Safety Officials:

"The hazard potential classification for a dam is intended to rank dams in terms of potential losses to downstream interests if the dam should fail for any reason. The classification is based on the incremental adverse consequences (after vs. before) of failure or mis-operation of the dam, and has no relationship to the current structural integrity, operational status, flood routing capability, or safety condition of the dam or its appurtenances. The hazard potential classification is based on potential adverse impacts/losses in four categories: environmental, life line, economic, and/or human life."

An example of dam classification from Canada is shown in Table 2 from a presentation and may not be complete or current. [7] It is not a perfect example as it is lacks specifics about how the level of loss, such as "Major loss" versus "Significant loss" of environment, would be determined. And it lacks information about whether, when restoration is considered probable, where the money for restoration would come from.

**Table 2.** Dam classification example from Canada Dam Association.

| Consequence Category | Population at Risk | Loss of Life | Environmental and Cultural Values | Infrastructure and Economics |
|---|---|---|---|---|
| Extreme | Permanent | More than 100 | Major loss…Restoration impossible… | Extreme losses… |
| Very High | Permanent | 100 or fewer | Significant loss… Restoration impractical… | Very high economic losses… |
| High | Permanent | 10 or fewer | Significant loss…Restoration probable… | High economic losses… |
| Significant | Temporary Only | Unspecified | No significant loss… | Loss to recreational facilities… |
| Low | None | 0 | No long term loss... | Low economic loss… |

[7] Marc E. Orman, P.E., G.E., et al., Amec Foster Wheeler, Tailings Dam Classification and Breach Analyses, Perspectives from the Canadian Dam Association, Presentation, 2017.

The relationship of the hazard category to selection of the seismic design criteria is shown, for the Canada example, is shown in Table 3.

**Table 3.** Example of design earthquake selection based on hazard classification (Canada example).

| Dam Classification (Canada example) | Return Interval for Earthquakes |
|---|---|
| Low | 100-year |
| Significant | 100-year to 1000-year |
| High | 2,500-year (2 percent in 50 years) |
| Very High | Between 2,500-year to 10,000-year or maximum credible earthquake |
| Extreme | 10,000-year or maximum credible earthquake |

Table notes: Canada Dam Association uses 2,475-year rather than 2,500-year.

In the selection of design earthquakes in the Canada example, for high hazard dams or above, in no case is the design earthquake less severe than the 2 percent in 50 years which corresponds to roughly the 2,500-year return period earthquake.

In contrast, the IDWR Strawman could allow waiving the seismic design requirement or allow selecting a very small earthquake return interval with very small seismic loading.

In the Canada example, for "Extreme" hazard level, the maximum credible earthquake would be the required earthquake for the structure to be designed to withstand. In contrast, the IDWR Strawman could allow waiving the seismic design requirement or allow selecting a very small earthquake return interval.

The proposed Rule 25, Hazard Classification, is shown below in Table 4. Notice how the three categories listed do not specifically include environmental damage. Environmental damage is tossed in for the significant and high hazard categories under the heading of economic losses but it needs to have its own heading.

Notice how for the low hazard category, under economic losses, environmental loss is not included. And notice the odd wording for economic losses in the low hazard category: "Low probability for economic loss or damage to or disruption of essential infrastructure." Why is "low probability" being used? The wording for criteria for low hazard should require "No or low economic loss and no or very low damage to the environment."

**Table 4.** Strawman Rule 25 hazard category table.

| Hazard Category | Downstream Development | Estimated Loss of Life | Economic Losses |
|---|---|---|---|
| Low | Undeveloped property, no permanent or permanently occupied structures for human habitation. | No loss of life | Low probability for economic loss or damage to or disruption of essential infrastructure. |
| Significant | No concentrated urban development. 1 or more permanent structures for human habitation within the flood zone that are potentially inundated with flood water at a depth of 2 ft. or less. | Loss of life is unlikely to occur | Significant damage to agricultural, commercial or industrial facilities; damage to or the disruption of transportation, utilities or other public facilities or values including environmental loss. |
| High | Urban development, or any permanent structure for permanent or temporary human habitation which are potentially inundated with flood water at a depth of more than 2 ft. | High probability for loss of life | Major damage to agricultural, commercial or industrial facilities; damage to or the disruption of transportation, utilities, or other public facilities or values including prolonged environmental loss. |

For the low hazard category, the criteria under the heading economic loss, is worded to allow estimation of the probability for economic loss rather than simply stating "No economic loss." It also leaves out any criteria for damage to the environment. As worded, it creates ambiguity. It should say "No economic and environmental loss." And again, it highlights the need for a heading specifically for environmental loss. Cultural loss could also be added as in the Canada example.

Also, for the low hazard category, given the speed at which dams or MTISs can fail and fail unpredictably, why does it matter if a dwelling is not permanently occupied? It would seem that the flood water depth criteria of 2 ft. or less should be described and that it should not be asked whether or not dwellings are permanently occupied. And flood water depth does not address thick toxic tailings slurry depth. IDWR now requires the hazard classification of mine tailings impoundment structures but it seems that adding MTISs has not been fully thought out and included in the Strawman's Rule 25 Hazard Classification table.

Notice that the Strawman's "Significant hazard" category allows significant damage to agriculture, industrial facilities and to the environment. In contrast, in the Canada example, the significant hazard category allows no significant environmental loss and only loss to recreational facilities. There are no clear criteria between significant hazard and high hazard in the IDWR's Rule 25, so one could expect the designation of "significant hazard" to what should be deemed a high hazard structure (or extreme hazard structure). When designated anything less than high hazard, the IDWR now has no seismic design criteria required, even though it did for dams in the existing rule (Rule 40).

Importantly, MTISs in the current rule required a seismic evaluation if in seismic zone 3. In the proposed Strawman, MTISs would not require a seismic evaluation unless deemed High hazard. There is no way to predict how IDWR will classify an MTIS. Even if an MTIS is classified as high hazard, the Strawman appears to allow unspecified criteria not related to the hazard classification to be used to waive seismic design requirements.

## PROVISIONS FOR BONDING ARE INADEQUATE

In proposed Rule 40, the "Bond provisions shall provide that the surety may be held liable for a period of up to five (5) years following notice of default of the bond." Why only up to five years? As written, the bond provisions may be allowed to end far earlier than after five years. It is an example of mining industry favorable regulations, to the expense of property owners who may never be compensated or tax payers who pay for the abandonment.

Also, the Rule 40 "current costs for abandonment" uses the present condition which seems designed to reduce the estimated costs for abandonment.

The bonding requirements do not pay for the cost of remediation should a mine tailings impoundment structure fail. Even if criminal charges are successful against mining engineers for faulty designs or quality, bankruptcy of the mining companies tends to mean that the mining companies don't pay for their mistakes if a structure fails.

According to a 2017 report, *Mine Tailings Storage: Safety Is No Accident*, [8] chronic problems at closed MTISs may require long-term or perpetual management, with the costs often borne by local communities and authorities. The true costs of managing mine tailings waste, even when no catastrophic tailings dam failure occurs, are often not revealed.

## REGULATORY PRESSURES TO REDUCE REQUIREMENTS

The IDWR must balance regulatory enforcement burden on the owner of the dam or MTIS with the need to protect citizens, property and the environment. It is not an easy job.

The challenges of regulating an industry that generally seeks to reduce it costs are large. Every project tends to seek special dispensation to reduce design requirements and reduce costs.

[8] Roche, C. Thygesen, K., Baker, E. (Eds.) *Mine Tailings Storage: Safety Is No Accident*. A UNEP Rapid Response Assessment. United Nations Environmental Programme and GRID-Arendall, Nairobi and Arendal, www.grida.no. 2017. ISBN: 978-82-7701-170-7

While world-wide concern over the continuing catastrophic failure of MTISs has been growing, the IDWR has been lagging, not leading in creating appropriate regulations to protect Idaho citizens and the environment.

## PAST OR CONTINUING REGULATORY FAILURES NOT ADDRESSED

The IDWR has the problem of structures constructed without appropriate documentation or quality inspections. The IDWR has the problem of having appropriately denied dam capacity increases, having the denial overturned in court. This means the enlarged capacity of a dam that was not safe to enlarge.

What the IDWR seems to do in this proposed Strawman is to create so much flexibility that its job is simplified by allowing the Director to simply waive any requirement.

This is unacceptable and does not protect Idaho citizens or the environment.

The problem of deteriorating dams is not even addressed by IDWR's rulemaking. [9]

## COMPENSATION FOR DAM OR MTIS FAILURES

According to a 2017 report, *Mine Tailings Storage: Safety Is No Accident*, [10] there is no financial assurance requirement for catastrophic failure.

The 2017 report states: "If a catastrophic failure occurs, either the operator must be able to provide financial compensation, and/or that responsibility falls to government. If neither is able to provide compensation, then the environmental and social costs fall on those who live near the mine."

The lack of financial assurance requirement for catastrophic failure of dams or MTISs continues to be true in Idaho. Importantly, IDWR regulates dams with inadequate designs and inadequate construction quality. And IDWR regulates MTISs, which continue to fail catastrophically at a high rate of failure, around the world.

## EXCERPTS OF STRAWMAN FOR SEISMIC EVALUATIONS

Because various statements regarding seismic requirements are spread across the "Safety of Dams Rules" (IDAPA 37.03.06) and "Mine Tailings Impoundment Structures Rules" (IDAPA 37.03.05), and the proposed single new rule chapter, "Safety of Dams and Mine Tailings Impoundment Structures Rules" (draft IDAPA 37.03.05), I include Tables below containing excerpts from the current rules and the proposed combined rule.

The current and proposed rule are difficult to compare. The rules may give the impression of setting a clear minimum standard for selecting the design earthquake. However, as written the

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[9] Maya Wei-Haas, National Geographic, "The problem America has neglected for too long: deteriorating dams," May 27, 2020. https://www.nationalgeographic.com/science/article/problem-america-neglected-too-long-deteriorating-dams

[10] Roche, C. Thygesen, K., Baker, E. (Eds.) *Mine Tailings Storage: Safety Is No Accident*. A UNEP Rapid Response Assessment. United Nations Environmental Programme and GRID-Arendall, Nairobi and Arendal, www.grida.no. 2017. ISBN: 978-82-7701-170-7

proposed rule allows waiving seismic analyses and although it may not have been intentional, allows any infinitely small earthquake to be selected as the design earthquake.

**Table 5.** Excerpted text from the existing rule versus proposed Strawman for dams.

| Existing Rule for Dams | Proposed Rule for Dams |
|---|---|
| Existing Rule 40, "Construction Plans, Drawings and Specifications, specifically 040.14.d.i "Seismic design loads shall be evaluated and applied at all large dams to be located in significant or high risk areas, in Seismic Zone 3, which for purposes of these rules is the area in Idaho east of Range 22 East, Boise Meridian. The evaluation required of large dams, that are classified significant or high risk, shall use the maximum ground motion/acceleration generated by the maximum credible earthquake, which could affect the dam site." And 040.14.d.ii, "Seismic analysis may be required as determined by the Director for large dams located above high risk areas in Seismic Zone 2, which for purposed of these rules is the area in Idaho west of Range 22 East, Boise Meridian."<br><br>Note that "high risk areas" would appear to pertain to the seismicity of that particular location and not the hazard level posed by potential failure of a dam. Note that this is different than "high risk dams" which are now understood to be more properly referred to as "high hazard dams" based solely on the consequences of a failure of a dam. | For dams, Proposed Rule 35, Design Reports, Drawings and Specifications, specifically 035.12.d.i. "An evaluation of seismic design loads may be included in the stability analysis for all dams or mine tailings impoundment structures as deemed necessary by the Director for benefit of public safety. The evaluation required for large dams or high hazard structures shall use the maximum ground acceleration generated by the maximum credible earthquake which could affect the dam site." However, 035.12.d.ii also states: "Seismic analyses may be waived by the Director for new or existing dams or mine tailings impoundment structures if the consequence of failure is demonstrated to be sufficiently low or the critical features of design are demonstrated to be sufficiently conservative to allow minor deformation(s) without releasing the contents of the impounding structure."<br><br>[The proposed rule is allowing the Director to decide the consequence of failure is sufficiently low, all without providing any criteria and without linking the criteria considered to the hazard category for the dam. And the Director may waive the seismic analyses based on apparently undocumented seismic loads and undocumented acceptability of critical features of the design pertaining to seismic performance.] |
| Existing Rule 50, New Intermediate or Large Dams, 050.01.f, "The design analyses for new dams located in high risk areas (in Seismic Zone 2 or 3) shall include geologic and seismic reports, location of faults and history of seismicity." And 050.01.h, "The design analyses for new large dams located in high risk areas (in Seismic Zone 3) shall include an evaluation of potential landslides in the vicinity of the dam or immediate area of the reservoir, which could cause damage to the dam or appurtenant | Proposed Rule 50, New Dams and Reservoirs, specifically 050.01.a. "Dams shall be designed, constructed, and maintained to assure stability under static loads and prevent instability due to seepage or uplift forces, rapid drawdown conditions and applied seismic loads." And 050.01.c, "The minimum factor of safety for a steady state loading condition shall be 1.5. The minimum factor of safety for rapid drawdown loading shall be 1.2. The minimum factor of safety for seismic loading shall be |

| Existing Rule for Dams | Proposed Rule for Dams |
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| structures, obstruct the spillway or suddenly displace water in the reservoir causing the dam to overtop. If potential landslides pose such a threat, they shall be stabilized against sliding, with a minimum factor of safety of 1.5.<br><br>See also existing Rule 60 for small dams. | 1.0." And 050.01.d.i, "The stability of an embankment subjected to earthquake ground motion may be analyzed by the engineer using either a dynamic response or pseudo-static analyses. Pseudo-static analyses are acceptable for embankment dams and foundations composed of non-liquifiable soils that preclude the generation of excess pore water pressures due to shaking. Otherwise, the stability analysis shall employ a dynamic response method."<br><br>And 050.01.d.iii, "The design analysis for large dams shall include a geologic and seismic report. The seismic report shall identify the location of faults, evaluate landslide potential, and include a history of seismicity." And 050.01.d.iv., "The engineer shall include in the stability analysis peak ground accelerations obtained from Seismic Hazard Maps published by the United States Geological Survey (USGS) using a minimum return internal of 2 percent (2%) probability of exceedance in 50 years, or as determined by the Director."<br><br>Note that having the engineer include the 2 percent probability of exceedance in 50 years peak ground accelerations does not specify what the required minimum seismic design criteria actually is. |
| Existing Rule 55, Existing Intermediate or Large Dams, specifically 055.01.e, "For large, high risk dams, the seismic design loads shall be evaluated and applied to dams located east of Range 22E. B. M. The Evaluation shall use the maximum ground motion/acceleration generated by the maximum credible earthquake. And 055.01.g addressed the compliance period for assuring safety under earthquake loads. | Proposed Rule 60, Existing Dams and Existing Mine Tailings Impoundment Structures, 060.01.d, "Seismic loads shall be evaluated and applied to dams and mine tailings impoundment structures. The evaluation shall use the maximum ground motion/acceleration generated by the maximum credible earthquake. The Director may accept maximum ground motion/acceleration corresponding to a specified return interval using a probabilistic evaluation of earthquake history in |

| Existing Rule for Dams | Proposed Rule for Dams |
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| | accordance with USGS hazard maps." Also, 060.01.g discusses compliance periods for addressing seismic stability or safety concerns.<br><br>[As written, the seismic loads may be far reduced below the maximum credible earthquake. Any "specified return period" may be selected and this is unnecessarily vague. The seismic loading from a maximum credible earthquake would be far larger than the seismic loading from a 50-year return period earthquake. The smaller the specified return period, the smaller the seismic design loading.] |

**Table 6.** Excerpted text from the existing rule versus proposed Strawman for MTISs.

| Existing Rule for MTISs | Proposed Rule for MTISs |
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| Rule 35, Plans Drawings and Specifications, 035.16.e, "Geologic description of reservoir area, including landslide potential" and 035.16.g, "Earthquake design loads must be evaluated at all sites located east of Range 22E., Boise Meridian. This area corresponds to Seismic Zone 3 as designated by the Recommended Guidelines of the National Dam Safety Program. Earthquake analysis may be required at other impoundment structure sites if deemed necessary by the Director: …" | Proposed Rule 35, Design Reports, Drawings and Specifications, specifically 035.12.d.i., states "An evaluation of seismic design loads may be included in the stability analysis for all dams or mine tailings impoundment structures as deemed necessary by the Director for benefit of public safety. The evaluation required for **large dams or high hazard structures** shall use the maximum ground acceleration generated by the maximum credible earthquake which could affect the dam site." However, 035.12.d.ii also states: "Seismic analyses may be waived by the Director for new or existing dams or mine tailings impoundment structures if the consequence of failure is demonstrated to be sufficiently low or the critical features of design are demonstrated to be sufficiently conservative to allow minor deformation(s) without releasing the contents of the impounding structure."<br>It is interesting that in 035.12.d.ii, no criteria are provided for determining the consequence of failure and it has not been linked to the rule for assigning a hazard category to a dam or MTIS. It is also interesting that the Director may waive the seismic analyses based on apparently undocumented seismic loads and undocumented acceptability of critical features of the design pertaining to seismic performance. |
| Rule 45, Mine Tailings Impoundment Structures Design Criteria, 045,01.b, "Construction by the upstream method shall not be used in the area of the state east of Range 22E., Boise Meridian, unless the engineer can provide evidence that the construction and operation of the tailings impoundment will achieve a relative density of sixty percent (60%) or greater in the embankment and tailings to prevent liquefaction during earthquake loading." And 045.01.c, "Safety factors for the embankment shall be at least | Proposed Rule 55, New Mine Tailings and Impoundment Structures, 055.01.c., "Safety factors for the stability of the embankment and underlying foundation materials shall be at least one and five-tenths (1.5) for static loads and a minimum of one (1.0) for the static plus the appropriate earthquake (i.e., dynamic load) and shall include deformations that may result in loss of freeboard due to liquefaction." |

| Existing Rule for MTISs | Proposed Rule for MTISs |
|---|---|
| one and five-tenths (1.5) for static loads and a minimum of one (1) for static plus the appropriate earthquake load." | Proposed Rule 60, Existing Dams and Existing Mine Tailings Impoundment Structures, 060.01.d, "Seismic loads shall be evaluated and applied to dams and mine tailings impoundment structures. The evaluation shall use the maximum ground motion/acceleration generated by the maximum credible earthquake. The Director may accept maximum ground motion/acceleration corresponding to a specified return interval using a probabilistic evaluation of earthquake history in accordance with USGS hazard maps." Also, 060.01.g discusses compliance periods for addressing seismic stability or safety concerns.<br><br>Please note that this allowance of an unspecified "specified return period" appears unnecessarily vague and actually does not provide a minimum standard. |