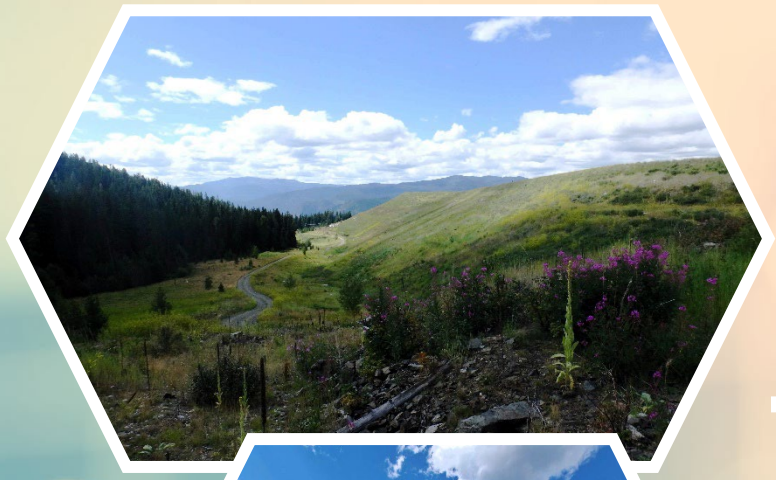


CODE GUIDANCE

June 2024

Health, Safety and Reclamation Code for Mines in British Columbia

Part 10 – Tailings Storage Facilities (TSF) and Dams

BRITISH COLUMBIA
Ministry of Energy, Mines and Low Carbon Innovation

Table of Contents

Tables and Figures

Purpose of Guidance Document

This guidance document provides specific guidance and context to owners, Engineers of Record, regulators, consultants and auditors on the Ministry of Energy, Mines and Low Carbon Innovation (EMLI) expectations for the application of the Code, and to assist operations in understanding and complying with the Health Safety and Reclamation Code for Mines in British Columbia (referred to as 'HSRC' or 'the Code' in the document below), when it comes to tailings management and regulation of dams.

This guidance document is intended to be general and not prescriptive in nature and provide context to clarify the Code requirements. The provisions of the Mines Act (the "Act") and the Code prevail in cases where differences may occur in interpretations of the guidance. Every site presents its own unique set of needs and challenges, and more conservative approaches than those outlined herein may be required in some cases.

The scope of this guidance document is to:

- Provide guidance and context to owners, engineers of record, regulators, consultants, and auditors (or inspectors) on applying Part 10 of the Code;
- Provide references to existing guidelines and acceptable standards of practice; and
- Provide minimum expectations for compliance reporting required by the Code.
- Provide guidance on implementation clauses.

The responsibility and authority for interpretation of this guidance document rests with the Chief Inspector.

Acronyms

AFPR	Annual Facility Performance Report
CDA	Canadian Dam Association
DSR	Dam Safety Review
EDF	Environmental Design Flood
EMLI	Ministry of Energy, Mines and Low Carbon Innovation, formerly Ministry of Mines (MEM) and Ministry of Energy, Mines and Petroleum Resources (EMPR)
EPRP	Emergency Preparedness and Response Plan
EoR	Engineer of Record
EGBC	Engineers and Geoscientists of B.C., formerly Association of Professional Engineers and Geoscientists of B.C. (APEGBC)
ECCS	B.C. Ministry of Environment and Climate Change Strategy, formerly Ministry of Environment (MoE, ENV)
FoS	Factor of Safety
GISTM	Global Industry Standard on Tailings Management
ICOLD	International Commission on Large Dams
ICMM	International Council on Mining and Metals
IFC	Issued for Construction
IFP	Issued for Permitting
IDF	Inflow Design Flood
ITRB	Independent Tailings Review Board
JAIR	Joint Application Information Requirements
MAC	Mining Association of Canada
MAPA	Mines Act Permit Application
MDMER	Metal and Diamond Mining Effluent Regulation
MDRC	Mine Development Review Committee
MEND	Mine Environmental Neutral Drainage
MCE	Maximum Credible Earthquake
MoU	Memorandum of Understanding
OMS	Operations, Maintenance, and Surveillance
PDG	Project Development Group
PFS	Pre - Feasibility Study
PMF	Probable Maximum Flood
PPM	Project Procedures Manual
QA/QC	Quality Assurance/Quality Control
QPO	Quantifiable Performance Objective
RA	Regulatory Approval
RASCI	Responsible, Accountable, Support, Consulted, Informed
TARP	Trigger Action Response Plan
TSF	Tailings Storage Facility

In the new Part 10, many of the regulatory requirements that previously only applied to TSFs, now apply to both TSFs and dams. The following now apply to dams as well as TSFs:

Clause	Title
10.4.2	Dam Qualified Person
10.5.3(1)(c)	Quantifiable Performance Objectives
10.5.5	Failure and Breach or Runout Assessment
10.5.8	Design Slopes
10.5.9	Minimum Factor of Safety
10.6.7	Water Management

Small dams on all mines are potentially eligible for exemption from all the above requirements if they meet the exemption criteria. EMLI understands that changes to the code require time for mines to adjust, so implementation clauses have been added to all changes that require new work from mines. If the implementation timeline is unclear EMLI recommends contacting your inspector for further information. If the manager is concerned that the implementation timeline is too short or if the changes are taking longer than expected, EMLI strongly encourages the manager to engage with EMLI as early as possible.

Changes to the Code

Part 10 has been reordered. The clauses have been grouped broadly by function:

Clause	Function	Description
10.1	Mine Plan and other Plans	Sets out the minimum requirements for all plans submitted to EMLI with a permit application, including major mines and smaller regional mines.
10.2	Permit Application	This section is largely unchanged from the previous version of the code. It includes the information requirements for mines for a permit application and gives the regulatory requirements for a permit application. Guidance for permit applications is available elsewhere depending on the permit type. Section 10.2 also contains exemptions under the code. These exemptions have changed - managers are encouraged to review the code and this guidance document to ensure that they understand how the changes impact their operations.
10.3	Filing and Reporting	In general, the description of a report and the reporting submission date have been grouped together into a single clause in the sections below, however, Section 10.3 includes reporting not included elsewhere in the code.
10.4	TSF and Dams - Responsibilities	This section set out the responsibilities of persons other than the manager.
10.5	TSFs and Dams – Design	This section sets out the requirements for a TSF or dam prior to construction.
10.6	TSFs and Dams – Operations and Closure	This section provides the regulatory requirements for construction, operation, and closure of TSFs and dams.
10.7	Waste Dumps, Pits and Underground, 10.8 Mine Closure, and 10.9 Reclamation Standards	The clauses in these three sections have not been significantly altered from the previous version of Part 10. They are not included in this guidance document. Expansion of regulation to include dams.

General Overview for TSFs and Dams on a Mine Site

Under the 2024 update to Part 10 of the Code, TSFs and dams constructed and operated at mine sites are divided into several categories. The regulatory requirements for each category vary based on the complexity and potential consequences posed by the facility. The facility categories are as follows:

Category	Description
Category 1 (Small dams)	Very small dams associated with water management or sedimentation ponds at a mine and do not impound tailings. Category 1 dams are further divided based on the type of mine: Category 1A dams are located on a placer mine, sand and gravel operation, rock quarry, or industrial mineral mine. Category 1B dams are located on a metal or coal mine.
Category 2 (Small dams)	Small dams associated with ponds on a mine site and do not impound tailings.
Category 3 (Dams and TSFs)	Larger facilities for impounding water, water containing any other substance, tailings, or fluid waste.

The Code defines a dam as a barrier that is constructed for the retention of water, including water containing any other substance including tailings, or flowable tailings. In addition, the Code considers embankments that impound water to be a dam, whether they are a constructed or a natural feature.

Additional guidance related to TSFs and dams is identified throughout the sections of this Guidance Document. Selected guidelines are also listed in Appendix I.

Embankments retaining solids (e.g., sludge ponds) are considered Category 3 dams if the contents are liquefiable and if the retaining structure meets the definition of a dam.

Natural ground or topographic features being used to retain water or tailings are considered the same as a constructed embankment unless it can be demonstrated in writing by a professional engineer that there is no potential for the natural feature to fail due to overtopping, piping, slope failure or other failure mode that results in an unexpected or undesirable release of contents (e.g., dam-style failure scenarios).

Typical water management facilities that may include dams are shown below:

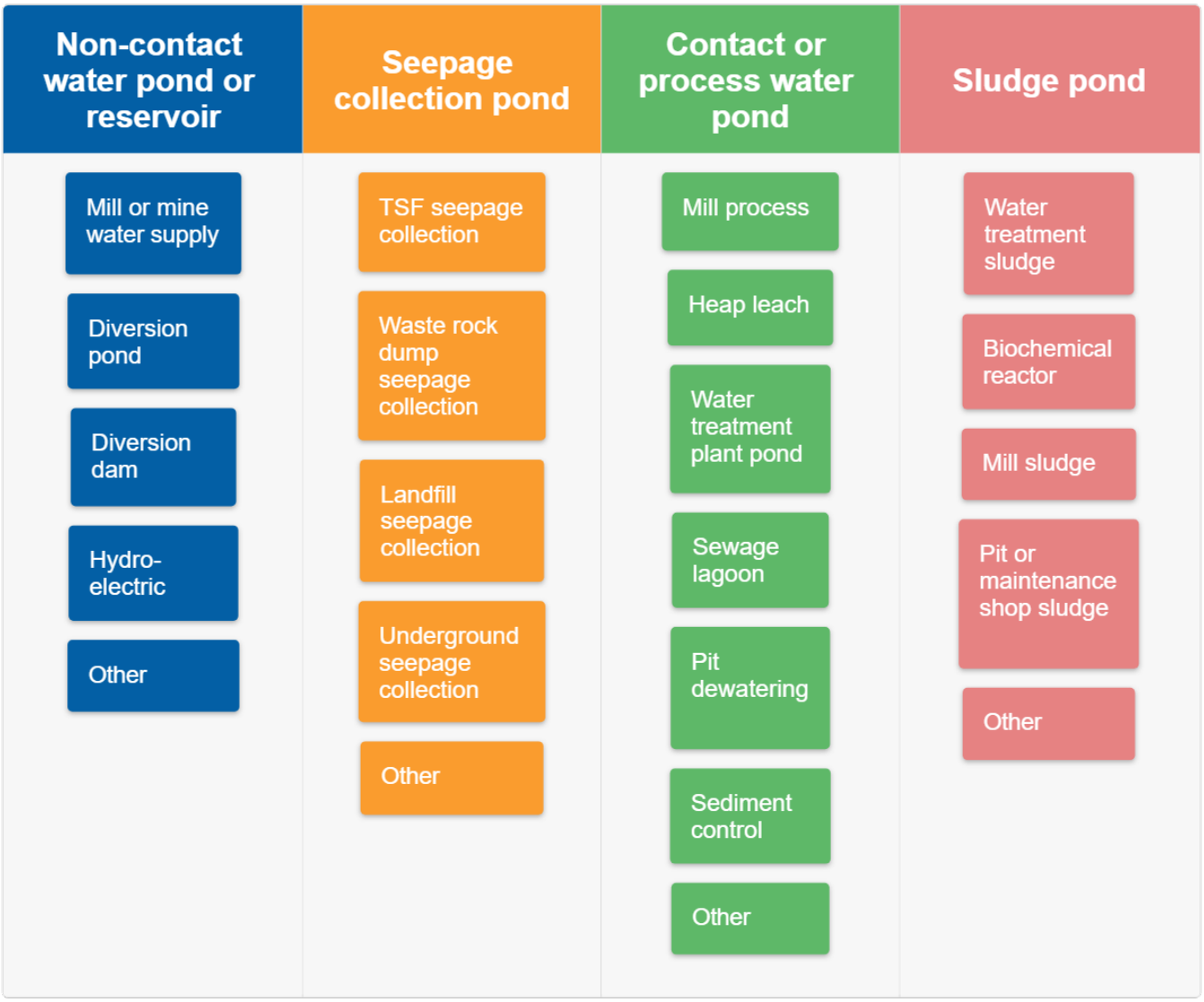


FIGURE 1: TYPICAL WATER MANAGEMENT FACILITIES.

Terminology

Some terminology used in the 2024 Part 10 code update relating to TSFs and dam are explained in the section below.

Tailings Storage Facility (TSF)

TSFs are facilities that store or manage tailings, including aboveground TSFs with or without dams, below-ground or in-pit TSFs, dewatered TSFs (including "Dry Stack"), and co-disposal TSFs. The definition of a TSF has been updated; a TSF now includes the storage facility itself, along with all appurtenant structures involved in the management of the facility and associated operating systems.

The TSF may include, but is not limited to:

- Containment of the tailings and associated water (dams, embankments, stacks, liner systems, cover systems).
- Tailings distribution system (pipelines, flumes, conveyors, trucks).
- Contingency systems, used during 'upset' conditions.
- Tailings dewatering system, including cyclones, thickeners, or filter presses, associated with removing water from the tailings.
- Seepage management (collection ponds and their associated dams, seepage return or management systems, drains, groundwater wells that pump back to the TSF).
- Water distribution and reclaim systems, including associated pipelines (pumping, water reclaim to the plant or mill, etc.)
- Water treatment systems.
- Upstream diversion systems for diverting water away from or around the TSF.
- Surface water management system, including diversions, decant structures, collection ditches, spillways, outlets, flumes, and associated mechanical components.
- Structures or equipment related to surveillance and maintenance.
- Mechanical and electrical controls, including power supplies, associated with the TSF.
- Other site-specific components of the tailings management or water reclaim systems.

Additional Guidance
ICOLD Bulletin 181 Tailings Dam Design - Technology Update.
ICOLD Bulletin 194 Tailings Dam Safety.

Coarse Coal Rejects

"Coarse coal rejects" or "CCR" means the coarse particles remaining from the preparation of coal. For regulatory purposes, the coarse particles remaining from the processing of coal, referred to as coarse coal rejects (CCR), are not considered to be tailings, but one of the waste rock streams. A qualified professional engineer may be required to provide justification to EMLI that the CCR is not tailings as part of the design and permit application to confirm that fine coal rejects are not included in the CCR facility.

Flowable Tailings

"Flowable tailings" are tailings that are flowable under static, dynamic or seismic loading.

Dewatered Tailings

"Dewatered tailings" are tailings that have had the moisture content reduced so as to be handled using dry handling processes. Examples of dry handling processes include hauling with trucks or placing with a conveyor system. If dewatered tailings become saturated, they are no longer considered dewatered tailings.

Co-Disposed Tailings Storage Facility

"Co-disposed tailings storage facility" means a TSF that contains a combination of tailings and waste rock. Co-disposed tailings are tailings stored in a waste dump and do not rely on a dam for containment. Tailings placement can include various configurations such as homogeneous mixing, placement in lifts, or placement in cells, as per the approved TSF design.

TSF and Dam Lifecycle

The typical elements of the lifecycle of a TSF or dam are:

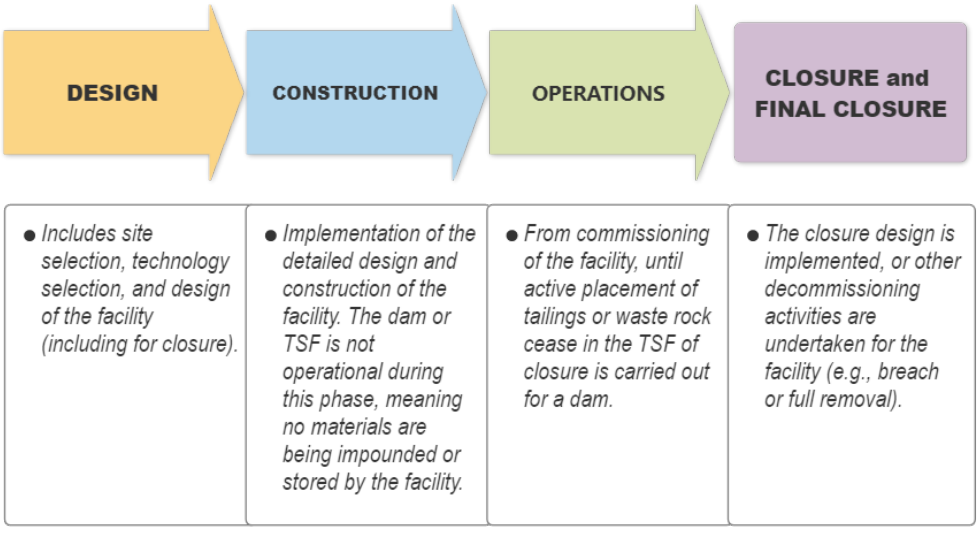


FIGURE 2: TYPICAL LIFECYCLE OF A TSF OR DAM

The level of detail increases as the project progresses from planning to implementation. Further details are provided in ICOLD Bulletin No. 194.

A summary of life of mine regulatory requirements for TSFs and Dams are included in Figure 3.

FIGURE 3: LIFE OF MINES REGULATORY REQUIREMENTS SUMMARY – TSFS AND DAMS.

Reporting Requirements

Reporting requirements have changed in the latest revision of the Code. The requirements are summarized for TSFs and dams in Figure 4, Table 1 and Table 2. Reporting requirements from the Code that are summarized for the closure and reclamation will be updated in the future.

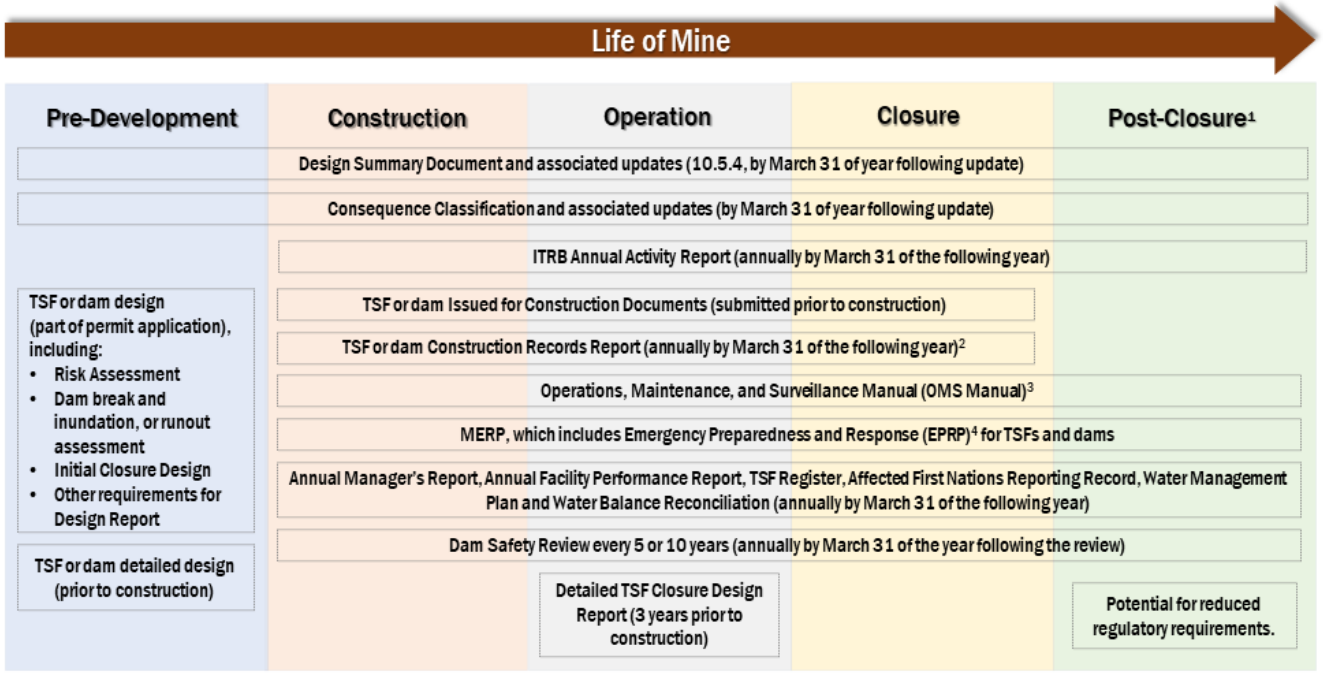


FIGURE 4: REPORTING REQUIREMENTS.

[1] Years on the Life of Mine timeline are for illustration only; mining phases vary for actual Mine Plans.
[2] Required annual updates and testing.
[3] Dam failure and breach/runout assessment requires update if there has been a material change to the design, construction, operation or downstream conditions of the TSF or dam.
[4] Requires annual updates.

TABLE 1: ANNUAL REPORTING REQUIREMENTS RELATED TO TSFS OR TO DAMS.

Document Title[1]	Summary	Code Section
Annual Reclamation Report	• Summary of the reclamation efforts carried out at the mine in the past year. • Summary of environmental monitoring.	10.3.4
Compliance tracking for TSF's and dams	• Summary of outstanding and closed Orders, related to TSFs and Dams on the mine site.	10.3.4
Affected First Nations Reporting Record	• Report indicating which reports were requested by affected First Nation(s), and which reports were provided to them by the mine.	10.3.4
ITRB Activities Report	• High-level summary of ITRB activities in the previous year. • Signed by ITRB members.	10.4.3
Annual Summary of DSR Safety Recommendations	• Summary of remaining recommendations including EoR recommended timelines. • Summary of recommendations completed in the past year.	10.6.2
Register of TSFs and Dams	• Summary of current information related to TSFs and to dams located on a mine site.	10.6.3
Annual Facility Performance Report (AFPR)	• Report documenting the EoR's review and evaluation of the adequacy of performance and operation of the overall facility. • Specific attention on annual physical condition and surveillance results. • Includes a signed and sealed assurance statement, Appendix III.	10.6.4
Summary of AFPR Safety Recommendations	• Summary of recommendations including EoR recommended timelines. • Summary of recommendations completed in the past year.	10.6.4
Water Management Plan and Water Balance	• Reconciliation of the site water balance for the previous calendar. year.	10.6.7

[1]All reports in Table 1 are to be submitted by the manager annually prior to March 31.

TABLE 2: SUMMARY OF OTHER PERIODIC REPORTING AND SUBMISSIONS THAT MAY BE REQUIRED DEPENDING ON ACTIVITIES UNDERTAKEN RELATED TO TSF OR DAM.

Document Title	Summary	Code Section	Due Date & Frequency
Category 1A Dam Assessment	Documented assessment by manager for Category 1A Dams to confirm that the structure meets the exemption requirements.	10.2.11	• Provided to an inspector, upon request.
Category 1B Dam Assessment	Documented assessment by qualified professional for Category 1B Dams to confirm that the structure meets the exemption requirements.	10.2.11	• Provided to an inspector upon request.
Category 2 Dam Assessment	Documented assessment by professional engineer for Category 2 Dams to confirm that the structure meets the exemption requirements.	10.2.11	• Submit completed assessment to EMLI.
5 Year Plan updates	Forward looking plans showing planed mining activities, planned reclamation and closure.	10.3.3	• Submitted within 5 years of the previous submission.
EoR Acknowledgement Letter	Signed, written acknowledgement from the EoR that they have been retained as EoR for a TSF or dam.	10.4.1	• Notification to EMLI within 72 hours of the EoR being retained. • Notification to EMLI of changes to EoR within 72 hours.
TSF and Dams Qualified Person Acknowledgement Letter	Written acknowledgement signed by the manager and the qualified person. The manager has reviewed and accepted the qualified person's experience. The qualified person has accepted the designation.	10.4.2	• Notification to EMLI of changes within 72 hours. • A Dam Qualified Person is a new requirement and the first notification is required on or before May 1, 2025.

Document Title	Summary	Code Section	Due Date & Frequency
Independent Tailings Review Board	Board membership and qualifications; Terms of reference for the ITRB; Updated membership and qualifications when membership changes and Updated Terms of Reference if there are changes.	10.4.3	• Membership, qualifications and Terms of Reference are submitted prior to the ITRB's first meeting. • Updates resulting from changes are submitted prior to the next ITRB meeting after the change.
Duty to Report Safety Issues	Reporting to EMLI from the manager and EoR describing unresolved safety issues.	10.4.4	• The manager submits a deficiency report within 72 hours of receiving notification from the EoR. • The EoR notifies EMLI within 144 hours of notifying the manager.
Design Summary Document	Document for each TSF and Dam from the EoR, summarizing the design of the TSF or Dam, including design basis.	10.5.4	• With permit application. • By March 31 of the year following an update.
Classification of TSFs and Dams	Documented review or update by the EoR of the consequences of potential failure for each TSF or Dam. Assessment of potential consequences related to population at risk, environment, culture, and economic and infrastructure.	10.5.6	• Annual review in AFPR. • Maintained on site. • Included in Design Summary Document.
Justification for Steeper Slopes	Documented justification for TSF or dam slopes steeper than 2H:1V from professional engineer or EoR.	10.5.8	• Submitted to EMLI as required.Authorization required prior to construction.
Justification for Lower Factor of Safety (FoS)	Documented justification for lower FoS for TSF or Dam, from design engineer or EoR.	10.5.9	• Submitted to EMLI as required. • Authorization required prior to construction.
Underground Dams or Bulkheads Construction Documentation	Construction documents (i.e., drawings, specification, quality assurance/quality control plans, and record drawings for underground dams and bulkheads) from a Professional Engineer.	10.5.10	• Permanent structures authorized prior to construction.

Document Title	Summary	Code Section	Due Date & Frequency
Dam Safety Review	Independent review by an experienced professional engineer (i.e., the Review Engineer). Process and objectives are well laid out in EGBC's Professional Practice Guide for Legislated Dam Safety Reviews (2016a).	10.6.2	• March 31 of following year (recommendations) • June 1 of following year (dam safety review report) • Frequency as per Code Table 10-6.
Issued for Construction Documents	Issued for Construction drawings, specifications, and summary construction schedule. Quality assurance/quality control plans approved by the EoR.	10.6.5	• Submitted prior to each stage of construction of the TSF or dam.
Construction Records Report	Documents the construction activities that occurred in the previous calendar year. Includes a signed and sealed assurance statement from the EoR available in Appendix III.	10.6.5	• By March 31 of the year following construction.
OMS Manual	Document describing the operations, maintenance, and surveillance requirements for a TSF or Dam.	10.6.6	• Reviewed annually by the EoR. • Provided to an inspector upon request.
Unpermitted Discharge from a mine site	Notification is provided to EMLI, affected First Nations and communities.	10.6.7	• Notification given when the mine learns that a discharge is necessary or required.
Risk Assessment	Assessment by a qualified professional identifying the risks associated with a TSF or dam, based on potential hazards and consequences.	10.6.8	• Prepared prior to initial filling, records maintained in site filing system. • Annual review by EoR, included in the AFPR.
Change Register	To document material changes for the TSF or dam related to the design, construction, operation, or closure.	10.6.9	• Changes acknowledged and addressed by EoR. • Provided to an inspector upon request.

Document Title	Summary	Code Section	Due Date & Frequency
Change Register	To document material changes for the TSF or dam related to the design, construction, operation, or closure.	10.6.9	• Changes acknowledged and addressed by EoR. • Provided to an inspector upon request.
Emergency Preparedness and Response Plan	TSF specific emergency response plan integrated into the overall mine emergency response plan.	10.6.10	• Tested annually and updated based on test results. • Submitted to EMLI with the MERP under HSRC 3.7.1.
Initial Closure Design Report	Closure design by a professional engineer that shows how closure of the TSF or dam is feasible.	10.6.12	• With permit application. Updated and submitted to EMLI within 5 years of last submission.
Detailed Closure Design Report	Detailed design by a professional engineer for the closure of the TSF.	10.6.12	• Submitted 3 years prior to planned closure.

Best Available Technology

For a new TSF or significant expansion of a TSF, mines can consider a variety of tailings technologies to demonstrate that the Best Available Technology (BAT) is being identified for the site.

As described in the MAC Tailings Guide (2021), BAT is, "...the site-specific combination of technologies and techniques that is economically achievable and that most effectively reduces the physical, geochemical, ecological, social, financial and reputational risks associated with tailings management to an acceptable level during all phases of the life cycle, and supports an environmentally and economically viable mining operation."

The objective of BAT is to determine the tailings management methodology, which will provide a safe, stable facility with an acceptable level of impact and risk for the full life cycle of the facility. BAT will be a site-specific determination and depend on a variety of criteria. BAT can be re-evaluated at various points throughout the lifecycle of the facility, given the likelihood that tailings technologies will evolve over the life of the mine. Good practice is to review and explore alternative tailings technologies at various stages of the facility lifecycle.

Alternatives Assessment

To demonstrate the selection of BAT for tailings, a multiple criteria alternatives assessment is required in Mines Act Permit Applications that include one or more TSFs, under Section 10.2.2(f). Alternatives can consider new technologies and improved practices and can also be carried out when a TSF expansion is being developed.

Additional Guidance

Government of Canada: Guidelines for the Assessment of Alternatives for Mine Waste Disposal (2013).

International Council of Mining & Metals (ICMM): Good Practice Guide Tailings Management (2021).

Various design concepts, technical options, and sites are weighed against each other to support the site selection and tailings technology selection and to compare how various options meet desirable or required objectives for the TSF. The level of detail for the alternatives assessment is commensurate with the scope and stage of the project.

First Nation Engagement and Inclusion of Local Indigenous Knowledge

Engagement with First Nations is a complex process and will vary between each individual Nation. Managers are required to make reasonable efforts to engage with each affected First Nations throughout the lifecycle of a TSF or a dam. The 2024 update to Part 10 of the Code has formalized a mine's requirements to engage with affected First Nations and a mine's requirements to incorporate Indigenous knowledge into TSF's and dams. Table 3 below identifies the relevant code clauses.

TABLE 3: CODE REQUIREMENTS RELATED TO LOCAL INDIGENOUS KNOWLEDGE.

Code Section	Requirement
10.5.2(3)	Consideration of local Indigenous knowledge as part of the site characterization for the TSF or dam.
10.5.3(3)	Consideration of local Indigenous knowledge as part of the design for the TSF or dam.
10.5.6(3)	Consideration of local Indigenous knowledge as part of the classification of TSFs and dams. This may be of particular relevance to consideration of potential losses related to environment, health, social and culture.
10.5.7(5)	Consideration of local Indigenous knowledge as part of the environmental design flood criteria.
10.6.1(b)	Indigenous knowledge received from First Nations should not be disclosed without prior written consent from the First Nation.
10.6.7(3)	Consideration of local Indigenous knowledge as part of the water balance and water management plan development.

Code Section	Requirement
10.6.12(7)	Consideration of local Indigenous knowledge as part of closure plan development for the TSF or dam, specifically related to development of the land and water use objectives.

Local Indigenous Knowledge

As defined in the Code, Indigenous knowledge means, "...the knowledge Indigenous peoples have, that (a) has been acquired through their unique cultures, languages, spiritual teachings, values, history, governance, legal systems, experiences and observations within their traditional territories, and (b) is dynamic, holistic, intergenerational and continuously evolving within contemporary society."

Traditional knowledge is the knowledge and values, which have been acquired through experience, observation, from the land, from spiritual teachings, and handed down from one generation to another. Indigenous knowledge is a valid and essential source of information about the natural environment and its resources, the use of natural resources, and the relationship of people to the land and to each other.

Code Exemptions Applicable to TSFs and Dams

The Code includes exemptions under Section 10.2.10 and 10.2.11 related to some small mines, non-active TSFs, low consequence Category 3 Dams, Category 1 Dams, and Category 2 Dams. These exemptions are summarized in Table 4. Figure 5 provides a schematic to aid in determining the facility type, based on the sizing criteria. Refer to Appendix II for additional details on Category 1A and 1B dams.

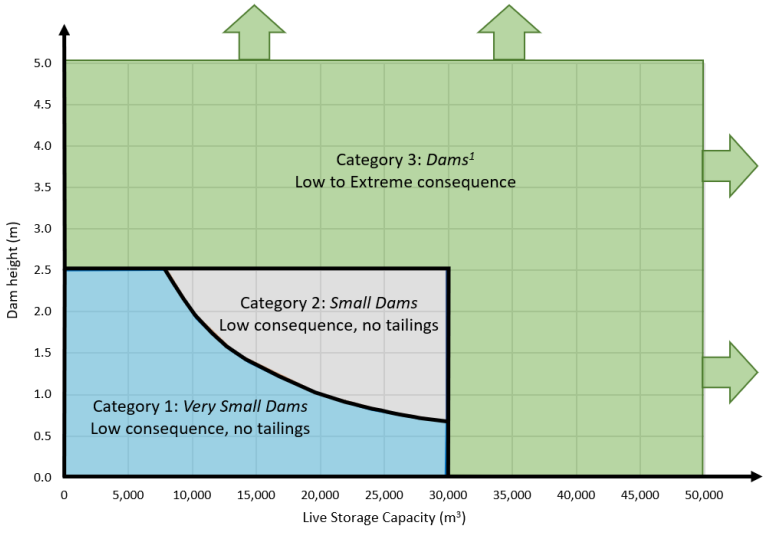


FIGURE 5: DETERMINING THE FACILITY TYPE.

[1]Category 3 applies to all TSFs regardless of size.

TABLE 4: SUMMARY OF FACILITY TYPES.

Facility Type	Code Section	Exemption Criteria	Exempted Code Sections
Non-active TSF	10.2.10(2)	• TSF or dam initially permitted before July 20, 2016. • Not active. • No adverse material changes after this subsection comes into force.	10.5.7 Seismic and Flood Design Criteria. 10.5.8 Design Slopes. 10.5.9 Minimum Factors of Safety.
Low consequence water dam Category 3	10.2.10(3)	• Dam that exceeds criteria for Category 2 Dams. • Low consequence. • Initially permitted before this subsection comes into force. • Does not impound tailings.	10.5.2 Site Characterization. 10.5.4 Design Summary Document. 10.5.5 Failure and Breach or Runout Assessment. 10.5.7 Seismic and Flood Design Criteria. 10.5.8 Design Slopes. 10.5.9 Minimum Factors of Safety.
Category 1 dam	10.2.11	• Live storage (m^3) x dam height (m) is less than 20,000 m^4. • Small low consequence facility, meeting sizing requirements in Code Table 10-1. • Low consequence, as per Code Section 10.5.6 or conditions in Category 1 Dam Assessment (Appendix III). • Does not contain toxic or deleterious substances, other than suspended solids. • Contains no tailings.	10.4.1 through 10.6.13: 10.4 TSFs and Dams – Responsibilities. 10.5 TSFs and Dams – Design. 10.6 TSFs and Dams – Operations and Closure.
Category 2 dam	10.2.11	• Live storage is less than 30,000 m^3 AND height is less than 2.5 m. • Small low-consequence facility, meeting sizing and other. requirements in Code Table 10-2. • Low consequence, as per Section 10.5.6. • Contains no tailings.	10.4.1 through 10.6.13: 10.4 TSFs and Dams – Responsibilities. 10.5 TSFs and Dams – Design. 10.6 TSFs and Dams – Operations and Closure.

Exemptions

10.2.10 (1) Sections 10.2.1 to 10.2.5 do not apply to placer mines, sand and gravel pits and quarries unless required by the chief permitting officer.

Guidance

Section 10.2.10(1) continues some of the exemptions for smaller mines, however, many of the exemptions for smaller mines have been removed. Code Section 10.2.11 (below) adds exemptions for dams on small mines.

Before reading any more of this section of the guidance document, owners and managers of placer mines, sand and gravel pits and quarries are strongly encouraged to read the guidance for Section 10.2.11 if after reading the guidance for Section 10.2.11 it is determined that the 10.2.11 exemptions do not apply to one or more structures on a mine.

EMLI advises the mine manager that many of the exemptions from the previous code, no longer apply to their mine.

10.2.10 (2) Sections 10.5.7, 10.5.8 and 10.5.9 do not apply to a TSF that
- (a) was granted the initial permit before July 20, 2016,
- (b) is not active, and
- (c) has no adverse material change after the date this subsection comes into force.

Guidance

Under Section 10.2.10(2) of the Code, active or operational TSFs and most dams are no longer eligible for Code exemptions. This means that active TSFs or water management facilities with dams that were constructed in the past (for example, 30 or 40 years ago) and continue to be operated, are no longer exempt from Code requirements. Implementation of these changes are expected to require time. Implementation clauses have been added to 10.5.7, 10.5.8 and 10.5.9. The implementation period has been set to 3 construction seasons and can be reviewed in the specific sections of the Code and this guidance document.

Active water management facilities or sedimentation ponds include those that continue to receive, impound, or manage water on the mine site and have not been decommissioned. Active TSFs are those that continue to be used for tailings deposition.

Non-active TSFs, which were initially permitted prior to July 20, 2016, and have not had an adverse material change to the TSF after subsection 10.2.10 (2) comes into force remain exempted from 10.5.7, 10.5.8 and 10.5.9.

Adverse material change is a material change to the facility (which may include changes to the facility itself, the upstream or downstream areas, climate, hydrology, environment,

cultural aspects, geological or geotechnical understanding of the structure or foundation, or other site characteristics) that has or may have an adverse effect on the TSF or dam.

Some examples of adverse material changes could include:

- Removing dam fill material to steepen the downstream slopes (and potentially decrease stability); or
- Storing water in an inactive TSF that had a dry cover system.

An example of a material change that is potentially not adverse would be installing a closure spillway.

This allows for improvements to a TSF or dam over time, without triggering the need to fully upgrade the facility to the current Code requirements.

10.2.10 (3) Sections 10.5.2, 10.5.4, 10.5.5, 10.5.7, 10.5.8 and 10.5.9 do not apply to a category 3 dam that
- (a) was granted the initial permit before the date this subsection comes into force,
- (b) is low consequence as determined in accordance with section 10.5.6, and
- (c) does not contain tailings.

Guidance

These are low consequence Category 3 dams associated with water management on a mine site and permitted prior to the 2024 Code coming into force. They cannot contain or manage tailings, and they are low consequence as per Code Section 10.5.6.

10.2.11 (1) Sections 10.4.1 to 10.6.13 do not apply to category 1A dams, category 1B dams and category 2 dams.

(2) A dam is a category 1A dam if
- (a) the dam is at a placer mining site, a sand and gravel pit, a rock quarry or an industrial mineral mine, and
- (b) the manager assesses that the following apply:
  - (i) the dam meets all the requirements in Table 10-1
  - (ii) the dam contains no tailings
  - (iii) there is no identifiable human population at risk of injury in the event of a breach of the dam other than through unforeseen misadventure
  - (iv) there is no potential for human loss of life in the event of a breach of the dam
  - (v) there are no seasonally or permanently occupied buildings or infrastructure within 500 m downstream of the dam;
  - (vi) the dam does not contain toxic or deleterious substances, excluding suspended sediment.

(3) A dam is a category 1B dam if
- (a) the dam is at a metal or coal mine, and

(b) a qualified professional assesses that the following apply:
  (i) the dam meets all the requirements in Table 10-1;
  (ii) the dam contains no tailings;
  (iii) in the event of a breach of the dam, other than through unforeseen misadventure,
    (A) the effect of water released to receiving streams on aquatic or terrestrial habitat is short-term and reversible,
    (B) there is no identifiable human population at risk of injury, and
    (C) there is no potential for human loss of life;
  (iv) there are no seasonally or permanently occupied buildings of infrastructure within 500 m downstream of the dam.

Guidance

Category 1 was developed to reduce administrative requirements for small low consequence dams associated with sedimentation or wash ponds as part of the mining operations. Category 1 dams have two sub-categories based on the mine type:

Category 1A dams are located at placer mines, sand and gravel pits, rock quarries and industrial mineral mines, while **Category 1B dams** are located at coal or metal mine sites.

The sizing requirements for Category 1 dams are included in Table 5 (Table 10-1 of the Code). Category 1A dams are evaluated by the manager; Category 1B dams are evaluated by a qualified professional. Table 6 provides examples of sizing for these dams. To be eligible, facilities cannot store tailings.

TABLE 5: CATEGORY 1A AND 1B DAM REQUIREMENTS (CODE TABLE 10-1).

Dam Criteria	Required Value
Height* (m) x Storage Volume (m^3)	< 20,000 m^4
Maximum Dam Height*	2.5 m
Minimum Crest Width	3 m
Dam Slopes	2H:1V or flatter
Maximum Water Level	0.5 m below the dam crest

*As measured from the lowest point of the downstream toe of the dam to the crest of the dam.

TABLE 6: EXAMPLES OF CATEGORY 1 DAM ALLOWABLE HEIGHT AND STORAGE VOLUME.

Dam Height (m)	Storage Volume (m^3)	Dam Height (m) x Storage Volume (m^3)
1.0	20,000	20,000 m^4
1.5	13,000	20,000 m^4
2.0	10,000	20,000 m^4
2.5	8,000	20,000 m^4

10.2.11(2)(b) and (3)(b) require a dam to be assessed against the requirements provided in the Code. Appendix II contains example assessment forms and guidance to assist with the assessment. The Category 1 Dam assessment does not need to be submitted to EMLI but is made available upon request by a Mines Inspector (10.2.11(5)). The requirements in Code Table 10-1 are limits: if the assessment determines that one or more of the limits has been exceeded the manager can undertake work to modify the dam to meet the requirements for exemption. Modification of the dam might not be permitted under the mine's current permit; in this situation the manager can update their Notice of Work or complete a Notice of Departure Self-Assessment.

"Unforeseen misadventure" has a legal meaning in this situation. Mine managers are encouraged to err on the side of caution when completing the assessment. An example of 'unforeseen misadventure' may be a situation where someone travelling on a dirt bike happens to be below a dam when it fails; however, if there is a known trail frequented by recreational users below the dam, this may not be considered 'unforeseen' in the event of a dam failure. When in doubt, mine managers are advised to seek advice from a qualified professional.

10.2.11 (4) A dam is a category 2 dam if a professional engineer
- (a) assesses that the dam meets all the requirements in Table 10-2, and
- (b) submits the assessment to the chief inspector.

(5) The assessments referred to in subsections (2) (b), (3) (b) and (4) (a) must be made available to an inspector on request.

Guidance

Category 2 was developed to reduce design, operational, and administrative requirements for mines that have dams associated small low-consequence sedimentation or wash ponds. Small water management facilities at all types of mining operations may be eligible. The sizing requirements for Category 2 Dams are included in Table 7 (Table 10-2 in the Code).

TABLE 7: CATEGORY 2 DAM REQUIREMENTS (CODE TABLE 10-2).

Dam Criteria	Required Value
Maximum Storage Volume[1]	30,000 m^3
Maximum Dam Height[2]	2.5 m
Contents	Does not impound tailings
Dam Slopes	2H:1V or flatter
Maximum Water Level	0.5 m below the dam crest or as determined by a P.Eng.
Consequences of potential failure scenarios	Low[3]

[1]As calculated based on the maximum water level.
[2]As measured from the lowest point of the downstream toe of the dam to the crest of the dam.
[3]As determined under Code Section 10.5.6.

A Category 2 dam is assessed by a Professional Engineer to meet the requirements in Table 7 (Code Table 10-2). Submit the assessment to the Chief Inspector.

As with Category 1 dams, the requirements in Table 10-2 are limits. If the assessment determines that one or more of the limits has been exceeded (even by the smallest amount) the manager can undertake work to modify the dam to meet the requirements for exemption. Modification of the dam might not be permitted under the mine's current permit in this situation the manager can update their Notice of Work or complete a Notice of Departure Self Assessment.

10.2.11 (6) The manager must ensure that all category 1A dams, category 1B dams and category 2 dams are properly inspected, maintained and repaired in a manner that keeps the dams in good operating condition.

Guidance

Category 1 and 2 dams have reduced administrative requirements as summarized in Table 5. The Code requires that Managers ensure that Category 1A, 1B and 2 dams are properly inspected, maintained, and repaired. The following are best practices to be undertaken by the Manager or delegated to other mine personnel:

- Periodic inspections of the dam (e.g., annually, or more frequently) to assess its condition and determine if maintenance is required.
- Develop and implement a standard operating procedure for the dam. This includes monitoring water levels in the water management facility below the maximum water level requirements included in Table 5 (Code Table 10-1).
- Keep the Category 1 or Category 2 dam assessment up to date. This means it would be routinely reviewed, and updated if there are changes to operations related to the facility, to the facility itself, or to downstream conditions.
- Include the dam in the overall mine closure plan.

Filing and Reporting

Code clauses 10.3.1 and 10.3.2 are unchanged from the earlier version of the code. The clauses have been renumbered but the content is the same. In future if these clauses are updated, this guidance document may also be updated to include updated guidance.

Mine Plans, Reclamation Plans and Closure Plans

10.3.3 (1) Unless otherwise stated in the permit, the manager must ensure that the mine plan, reclamation plan and closure plan are

(a) developed and provided to the chief inspector on commencement of operations, and

(b) updated and provided to the chief inspector at a minimum, every 5 years.

(2) The manager must ensure that the reclamation plan outlines the progressive reclamation activities planned for the 5 years following the date on which the mine plan is updated in accordance with subsection (1) (b).

(3) The manager must

(a) ensure that reasonable efforts are made to engage with each affected First Nation in order for each First Nation to identify if it wants to receive the mine plan, reclamation plan or closure plan described in subsection (1), and

(b) provide to each First Nation a copy of each of the most recent plans identified by the First Nation under paragraph (a) of this subsection, in accordance with the timeframe applicable with respect to the chief inspector.

Guidance

The initial mine plan and reclamation and closure plan is submitted with the Mines Act Permit Application. Reclamation and Closure plans are expected to be submitted every 5 years after commencement of construction.

Guidance on five-year Reclamation and Closure plans can be found:

For major mines:	Section 5 of the 2024 Joint Application Information Requirements Coordinated authorizations - Province of British Columbia (gov.bc.ca)
For regional mines:	Developing a Reclamation and Closure Plan for Regional Mines: Mining and Exploration, June 2024.

Reclamation and Closure plans include the closure designs of key infrastructure such as TSFs, dams, dumps and portals. The closure design reports prepared by professional engineers may be separate, but the closure designs are incorporated into the Reclamation and Closure plans.

Additional Reporting Requirements

10.3.4 (1) In addition to other reporting requirements set out in this Part, the manager must

(a) annually provide to the chief inspector

(i) a description, in a form specified by the chief inspector, of the reclamation and environmental monitoring work referred to in section 10.2.2 (e), by March 31 of the following year,

(ii) a summary of outstanding TSF and dam orders issued by inspectors, including the scheduled completion dates, by March 31 of the following year, and

Guidance

This is the Annual Reclamation Report (ARR). It has been given a new clause number, but the requirements remain unchanged. Guidance for the ARR can be found in the Annual Reclamation Reports page of the BC Governments website:

https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/permitting/reclamation-closure/annual-reclamation-reports.

The mine manager can include the summary of outstanding orders with the annual TSFs and dams summary required under 10.6.2 (4) and 10.6.4(5)(b).

(iii) a report, respecting each affected First Nation, that lists

(A) the documents the First Nation identified under subsection (2) (a) of this section and sections 10.3.3 (3) (a), 10.4.3 (8) (a), 10.5.4 (3) (a), 10.6.2 (5) (a), 10.6.3 (3) (a), 10.6.4 (6) (a), 10.6.5 (6) (a), 10.6.7 (11) (a), 10.6.12 (8) (a) and 10.7.1 (3) (a), by March 31 of the following year, and

(B) the documents provided to the First Nation under subsection (2) (b) of this section and sections 10.3.3 (3) (b), 10.4.3 (8) (b), 10.5.4 (3) (b), 10.6.2 (5) (b), 10.6.3 (3) (b), 10.6.4 (6) (b), 10.6.5 (6) (b), 10.6.7 (11) (b), 10.6.12 (8) (b) and 10.7.1 (3) (b), by March 31 of the following year, and

(b) provide other reporting as directed by the chief inspector.

(2) The manager must

(a) ensure that reasonable efforts are made to engage with each affected First Nation in order for each First Nation to identify if it wants to receive any of the documents described in subsection (1) (a) (i) and (ii), and

(b) provide to each First Nation a copy of each of the most recent documents identified by the First Nation under paragraph (a) of this subsection, in accordance with the timeframe applicable with respect to the chief inspector.

TSFs and Dams - Responsibilities

There are several key roles required under the Mines Act (the Act) and the Code for the management, design, construction, operation and closure of a TSF or Dam. Additional guidelines are included in Appendix II, with some additional resources with specific information on roles and responsibilities identified below.

Additional Guidance

Mining Association of Canada (MAC): A Guide to the Management of Tailings Facilities (2021).

International Council on Mining and Metals (CMM): Good Practice Guide Tailing Management (2021).

The **manager**, appointed under Section 21 of the Act, is ultimately responsible for the safety of all TSFs and dams on the mine site; this means the Manager is responsible for ensuring that proper operation, inspection, maintenance and closure of the TSF or dam and related work is undertaken in a manner that keeps TSFs and dams, and related work, in good condition regardless of the dam Category or Consequences of Potential Failure.

Engineer of Record

10.4.1 (1) The manager must ensure that a professional engineer, who has the technical expertise and experience commensurate with the complexity of the TSF or dam, is retained as the engineer of record for each TSF and dam.

Guidance

The Engineer of Record (EoR) is a professional engineer registered to practice in BC. The role of the EoR is to provide assurance that applicable regulations and guidelines have been followed, and that the standard of practice has been met with respect to site characterization, design, construction, monitoring and closure. The EoR certifies that construction meets the intent of the design. It is the responsibility of the manager to retain an EoR for each TSF or dam on the mine site, unless exempted under 10.2.11. It is a best practice to retain an EoR during the pre-development (planning and preliminary design) phase of a project but is required for design when a permit application is submitted under Code clause 10.5.1.

The definition of a Tailings Storage Facility has been updated. The role of the EoR has been expanded to include all appurtenant structures involved in the management of the facility as well as the TSF itself. Where a TSF or other type of impoundment has more than one

dam, all dams that are part of that facility fall under the responsibility of a single EoR, although there may be one or more EoRs for a mine with more than one TSF.

EoR Education, Training, and Experience

The **EoR** is a Professional Engineer with sufficient relevant experience, commensurate with the complexity, risk, and operational status of the TSF or dam.

EGBC's Professional Practice Guideline for Legislated Dam Safety Reviews in BC (2023) provides additional guidance on the qualifications for the professional engineer undertaking a dam safety review. These qualifications related to education, training and experience may also be applicable to the role of EoR.

The roles and responsibilities of the EoR in relation to TSFs and dams include:

- Holds the professional responsibility for the facility design and is responsible for evaluating the adequacy of the as-built facility relative to the design in consideration of applicable regulations, standards, criteria and guidelines.
- Undertakes the Annual Facility Performance Review (AFPR).
- Participates in Dam Safety Reviews.
- Participates in risk assessments.
- Reviews and provides input into the OMS Manual and the EPRP.
- Provides Quantifiable Performance Objectives (QPO) and monitoring frequencies, within the OMS Manual, as required to support the function of the facility as designed.
- Provides construction Quality Assurance, either in person or by supervising other engineers.
- Provides guidance and oversight to investigations and studies required to adequately characterize the site.
- A Duty to Report any safety issues.

10.4.1 (2) The manager must, within 72 hours of an engineer of record accepting the role, provide the chief inspector with the engineer of record's written acknowledgement that the engineer of record

(a) has the commensurate expertise and experience referred to in subsection (1), and

(b) is accepting the role of engineer of record.

Guidance

It is the manager's responsibility to notify the Chief Inspector of changes to the EoR within 72 hours of the change.

EMLI considers that the current EoR is in the role until written notification has been provided by the EoR documenting their departure. A best practice is for an exiting EoR is to notify EMLI independently that they are no longer retained by a mine in the role of EoR, including the effective date. The EoR can include any reasons supporting their departure in the letter. If a change in EoR is planned EMLI would appreciate as much advance notice as possible.

Additional Guidance
EGBC Guide to the Standard for Direct Supervision. V3.0 2023.
EGBC Guide to the Standard for Documented Checks of Engineering and Geoscience Work V 3.0 2023.
EGBC Practice Advisory Relying on the Work of a Specialist V1.1 2023.

GOOD PRACTICE

The Manager should develop the necessary succession planning, in coordination with the EoR, to minimize gaps in the event of a change. A succession plan is not a Code requirement, but succession plans should be developed as good practice for key personnel related to the TSF or dam, including the EoR. In some cases, a Deputy EoR role may be valuable in support of the EoR that is familiar with the TSF and dams. In the event of a change of the EoR, the outgoing EoR may participate in implementing the succession plan.

10.4.1 (4) A reference to the engineer of record in this Part includes the qualified professionals under the supervision of the engineer of record, except with respect to

(a) the references to engineer of record in this section and sections 10.4.4, 10.6.2 (3) (a) and (b), 10.6.4 (3) and (4), 10.6.6 (7) (b), 10.6.7 (7) (b) and 10.6.9 (2), and

(b) the second reference to engineer of record in sections 10.5.2 (2), 10.5.3 (2) and 10.5.4 (2) (a).

Guidance

The EoR role is filled by a person and not by a company. The EoR may act individually or as a coordinating professional, except as required in (a) and (b), meaning that the EoR leads or coordinates a group of professionals who will support various aspects of the

characterization, design, construction and oversight of the TSF or dam. The exceptions in (a) and (b) are responsibilities that the EoR is responsible for completing as an individual.

TSF Qualified Person and Dam Qualified Person

10.4.2 (1) The manager must

(a) designate a TSF qualified person for safe management of each TSF,

(b) designate a dam qualified person for safe management of each dam not associated with a TSF,

(c) provide to the chief inspector a written acknowledgement,

(i) signed by the manager, that each qualified person referred to in paragraph (a) or (b) has the technical expertise and experience commensurate with the complexity of the TSF or dam, as applicable, and

(ii) signed by the qualified person, confirming the person accepts the role of qualified person under paragraph (a) or (b), as applicable,

Guidance

The role of Qualified Person carries significant responsibilities and requires a person with sufficient experience and expertise to meet the requirements. It is the manager's responsibility to make sure that the designated person has sufficient skills and experience to be a TSF or dam Qualified Person. The letter submitted to the Chief Inspector does not need to include the resume of the designated person; a statement from the manager acknowledging, in the manager's opinion, the designated person has the requisite skills is sufficient. It is the responsibility of the Qualified Person to sign the letter accepting the role.

10.4.2 (1) The manager must

(d) if the qualified person under paragraph (a) or (b) changes, notify the chief inspector within 72 hours.

Guidance

The manager is responsible for informing the chief inspector of any changes to the TSF or Dam Qualified Person within 72 hours of the change. In the event of an extended absence, such as parental leave of the TSF or Dam Qualified Person, it is the manager's responsibility to delegate the duties to an alternate to fulfill the responsibilities of the Qualified Person. Whether the change is temporary or permanent, the manager is responsible for submitting a notification under (c) to the Chief Inspector.

10.4.2 (2) A qualified person referred to in subsection (1) (a) or (b) must, as a result of the person's knowledge, training and experience,

(a) be qualified to organize, supervise and perform duties related to the safe management of the TSF or dam, as applicable,

(b) be familiar with the provisions of the Mines Act, the code and the regulations that apply to the safe management of TSFs or dams, as applicable,

(c) be capable of identifying potential or actual danger to people or the environment as it relates to TSFs or dams, as applicable, and

(d) be the holder of a supervisor's certificate, as required under section 1.12.7 of this code.

Guidance

The manager is responsible for appointing a Qualified Person for each TSF and dam on the mine site. A Dam Qualified Person is a new requirement. Section 10.4.2(1)(b) comes into force May 1st, 2025. It is expected that mines will implement this as soon as practically possible. Depending on the complexity of the TSFs and dams at the site:

- Each TSF and dam is assigned a Qualified Person to act as a single point of contact for the dam or TSF.
- The Qualified Person duties may be designated as a portion of a mine employee's duties or the manager's duties and may not necessarily be a separate position if the site is small and the TSF(s) and/or dam(s) are not complex or high risk.
- A mine site may have more than one Qualified Person. One person can be the Qualified Person for more than one TSF or dam. Each TSF or dam only has one Qualified Person.
- The manager is responsible in determining if more than one Qualified Person is required.

Information about the supervisor's certificate is available on the Mines Certifications page of the BC Government website:

https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/health-safety/certifications.

The certificate can be completed through Open School BC:

https://www.openschool.bc.ca/minessupervisor/

Independent Tailings Review Board

10.4.3 (1) The manager of a mine with one or more tailings storage facilities must establish an Independent Tailings Review Board, unless exempted by the chief inspector.

(2) The manager must ensure that reasonable efforts are made to engage with affected First Nations regarding the establishment of the Independent Tailings Review Board prior to requesting an exemption as set out in subsection (1).

Guidance

An ITRB is advised to review and comment on all phases of the TSF lifecycle, from construction to closure. As best practice, inclusion of an ITRB during the pre-development or permitting phase is encouraged. Engaging an ITRB in the early stages of the facility design may be beneficial. It can add significant value to the project and provide a greater level of confidence during the permitting process related to many components including the alternatives assessment and ultimate design selection. The manager is responsible for establishing an Independent Tailings Review Board (ITRB) for all TSFs on the mine site.

EMLI established 4 minimum criteria that mines are required to meet to be eligible for an exemption under (1). The criteria listed below are from the July 14, 2017, letter "Re: Independent Tailings Review Boards Exemption Screening Criteria" ORCS: 14590-20:

- The TSF must be closed.
- The TSF must have a low consequence classification.
- Engineer of Record (EoR) must be in place for the TSF; and
- The TSF must have been subject to a Dam Safety Review in the last 5 years.

Managers apply to EMLI for an exemption to the requirement for an ITRB, and TSFs that meet the screening criteria are assessed on a case-by-case basis. Section (2) is a new requirement and is added to the screening criteria listed above before the chief inspector considers exempting the Mine from the requirements under 10.4.3. Mines with TSFs that do not meet the screening criteria may still apply for exemptions, variances or permit amendments to reduce the frequency of ITRB meetings. Permit amendments are discussed further in section 10.6.13 of the Code and this guidance document.

10.4.3 (3) The manager must ensure that the composition and qualifications of the Independent Tailings Review Board is commensurate with the complexity of the TSF.

Guidance

An ITRB is composed of independent subject matter experts who have extensive knowledge in the design, construction, operations, maintenance and surveillance of a TSF, and who have not been involved in or responsible for the design, operation, or construction of the facility. An ITRB provides independent third-party oversight of the EoR

and is intended to provide the manager with non-binding advice about the safety and operation of a TSF.

The size and represented disciplines of an ITRB and frequency of meetings are based on complexity of the tailings system in terms of risk, consequence, disciplines of substance and the operational phase of the TSF. The board size could vary from one to numerous members, depending on the complexity of the TSF. It is the manager's responsibility to assess the qualifications of the different ITRB members. The EoR can provide advice on board selection if the Manger is unfamiliar with construction and operation of a TSF.

10.4.3 (4) The manager must provide to the chief inspector
(a) a list of the Independent Tailings Review Board members and their qualifications, and
(b) an update when the Board's membership changes.
(5) The manager must ensure that terms of reference for the Independent Tailings Review Board are developed and updated, taking into consideration the complexity of the TSF.

Guidance

It is the managers responsibility to ensure that the Chief Inspector receives the list of board members and their qualifications prior to depositing tailings in a TSF. The manager is also responsible for notifying the Chief Inspector when changes occur to the ITRB, prior to the annual report after the change takes effect. Membership in the ITRB is expected to vary throughout the lifecycle of the TSF depending on the expertise of the subject matter experts reviewing the performance of the facility.

A term of reference (TOR) is required to be developed for the ITRB. The TOR documents contain the scope and purpose of the ITRB.

The ITRB is tasked with the following duties:

- Provide independent advice to senior mine management whether the TSF is designed, constructed, operated and closed appropriately, safely and effectively.
- Provide practical guidance, perspective, experience and standard/best practices from other operations.
- Review and comment on the planning and design process, monitoring programs, data analysis methodology and work performed by site team and/or contracted consultants.
- Provide non-binding advice and guidance but does not direct the work or perform the role of the Engineer of Record.
- An ITRB is not required for dams that are not part of a TSF's ancillary infrastructure but may be considered best practice for other mining dams with a High, Very High, or Extreme consequence of potential failure.

The ITRB is intended to provide an independent review of the work of various specialists and have experience generally greater than the EoR. EMLI also encourages changing the make up of the ITRB to reflect the stage of development of the TSF.

Report on Annual Activities of the ITRB

10.4.3 (6) The manager must make an annual report of the activities of the Independent Tailings Review Board that describes the following:

(a) a summary of the reviews conducted that year, including the number of meetings, topics discussed and attendees;

(b) whether the work reviewed that year meets the Board's expectations of good practice;

(c) any conditions that the Board is aware of that may compromise tailings storage facility integrity;

(d) signed acknowledgement by the members of the Board, confirming that the report is a true and accurate representation of their reviews.

(7) The manager must provide to the chief inspector the annual report referred to in subsection (6) by March 31 of the following year.

Guidance

The manager submits the summary report to EMLI, per 10.4.3(7). Often the summary report is produced by the ITRB members on behalf of the manager. It is the manager's responsibility to ensure that the summary report includes the following:

- A summary of reviews, including documents reviewed by the ITRB, site visits and inspections by the ITRB and topics of discussion within the ITRB meetings. This is intended to be a summary of the work conducted by the ITRB and does not need to include a detailed analysis of the reviewed documents nor the potential recommendations that result from the discussions.
- If the board feels that some of the work reviewed does not qualify as good practice, identify this in the report. At the manager's discretion the ITRB can provide advice to the EoR. Advice from the ITRB is non-binding; the EoR is professionally responsible for the TSF.
- If the board feels that conditions exist at the TSF that may compromise the TSF's integrity, they are obligated under 10.4.3(6)(c) as well as under their professional associations to include this in their annual report.
- Each of the Board members signs the report acknowledging its accuracy.
- The ITRB will often provide more detailed reports or memorandums to the manager, with a more in-depth summary of the review, and any recommendations or observations made by the ITRB. Such reports do not need to be submitted to EMLI.

10.4.3 (8) The manager must

(a) ensure that reasonable efforts are made to engage with each affected First Nation in order for each First Nation to identify if it wants to receive any of the documents described in subsections (4) and (6), and

(b) provide to each First Nation a copy of each of the most recent documents identified by the First Nation under paragraph (a) of this subsection, in accordance with the timeframe applicable with respect to the chief inspector.

Guidance

The manager is responsible for ensuring that reasonable efforts are made to engage with each affected First Nations.

The manager is responsible for providing reports to each First Nation that has identified a desire to receive such reports as described in subsections (4) and (6).

Duty to Report Unresolved Safety Issues

10.4.4 (1) If the manager receives written notification from the engineer of record that a TSF or dam safety deficiency is not being addressed in an appropriate time period, the manager must, within 72 hours of receiving the written notification,

(a) report the deficiency to the chief inspector, and

(b) provide a copy of the report referred to in paragraph (a) to the engineer of record.

(2) If the manager does not provide the report to the chief inspector and the engineer of record in accordance with subsection (1), the engineer of record must, within 72 hours immediately following the expiration of 72-hour period set out in subsection (1), report the unaddressed TSF or dam safety deficiency to the chief inspector.

Guidance

The Duty to Report safety issues is specific to a TSF or dam. It is the manager's Duty to Report any notifications received from the EoR to EMLI within 72 hours if the notification is issued pursuant to 10.4.4.

EMLI expects that safety issues are first reported by the EoR to the TSF or Dam Qualified Person and the manager, and that most issues are resolved at this level. The AFPR facility safety recommendations, required in Section 10.6.4(2)(i) of the Code, is how the manager and EoR manage safety recommendations for a TSF or dam under normal conditions. However, the Duty to Report pursuant to 10.4.4 is triggered, if in the opinion of the EoR:

- safety issues are not being adequately addressed, or
- safety issues are not being addressed in a timely manner, or
- the next scheduled reporting deliverable is not an appropriate timeline, or

- recommendations as detailed in 10.6.4(2)(i) of this guidance document are not being resolved in a timely manner.

Examples of types of issues that could be reported to the Chief Inspector include on-going, high priority recommendations related to TSF or dam safety that are not being adequately addressed, such as:

- Significant on-going dam deformations outside of design expectations.
- Significant and uncontrolled water storage capacity issues.
- Safety issues related to the TSF or dam reported to the manager, but there has not been a satisfactory resolution to the issue.
- Time sensitive safety issues that are not being addressed in a timely manner; or
- Other safety concerns that, in the opinion of the EoR, are not being adequately addressed and that could pose a threat to the mine employees, the public or the environment.

The notification from the EoR under 10.4.4(1) and 10.4.4(2) is a written notification. EMLI advises the EoR to clearly state in the written notice that the notification is pursuant to 10.4.4 (Duty to Report) of the Health Safety and Reclamation Code. Clearly stating this will avoid confusion and distinguish from other recommendations or notifications.

The Duty to Report safety issues applies to all phases of a facility's lifecycle. Refer to the flowchart in Figure 6 for guidance of how an unresolved safety issue may be reported to the Chief Inspector.

If the EoR feels that the dam safety issue is not being addressed after sending the written notification, or the issue has not been reported to EMLI by the manager within the required 72 hours, the EoR is required to inform the Chief Inspector directly within 144 hours of their initial notification to the manager, in consideration of the urgency and any changing conditions.

Additional Guidance
The EGBC Code of Ethics) and associated EGBC Guide to the Code of Ethics (Section 4.9) also establishes Duty to Report requirements for the EoR.
EGBC Guide to the Code of Ethics https://www.egbc.ca/Complaints-Discipline/Code-of-Ethics/Code-of-Ethics
EGBC Duty to Report https://www.egbc.ca/complaints-discipline/complaints-discipline/duty-to-report

This clause is exclusive to safety issue notifications sent to the manager by the EoR, pursuant to Code section 10.4.4. A dam safety incident that has already occurred, or is imminently expected to occur, with or without the involvement of the EoR is reported under Section 1.7.1 (Reportable Incidents). Incidents that meet the requirements of Section 1.7.1 are reported to:

- Mine Incident Reporting telephone – 1 888 348 0299
- Mine Incident Reporting email – MineIncidents@gov.bc.ca

Mine Safety Incidents pursuant to 10.4.4 are reported to the Mine Incident Reporting telephone and email (above) and the Chief Inspector is notified by email at both email addresses:

- Mine.Safety@gov.bc.ca
- technicalcompliance@gov.bc.ca

Each incident reported under 10.4.4 will be assessed by EMLI on a case-by-case basis. Upon receipt of the notification EMLI will contact the manager directly and the EoR. It is expected that the EoR and manager continue working towards a resolution of the issue.

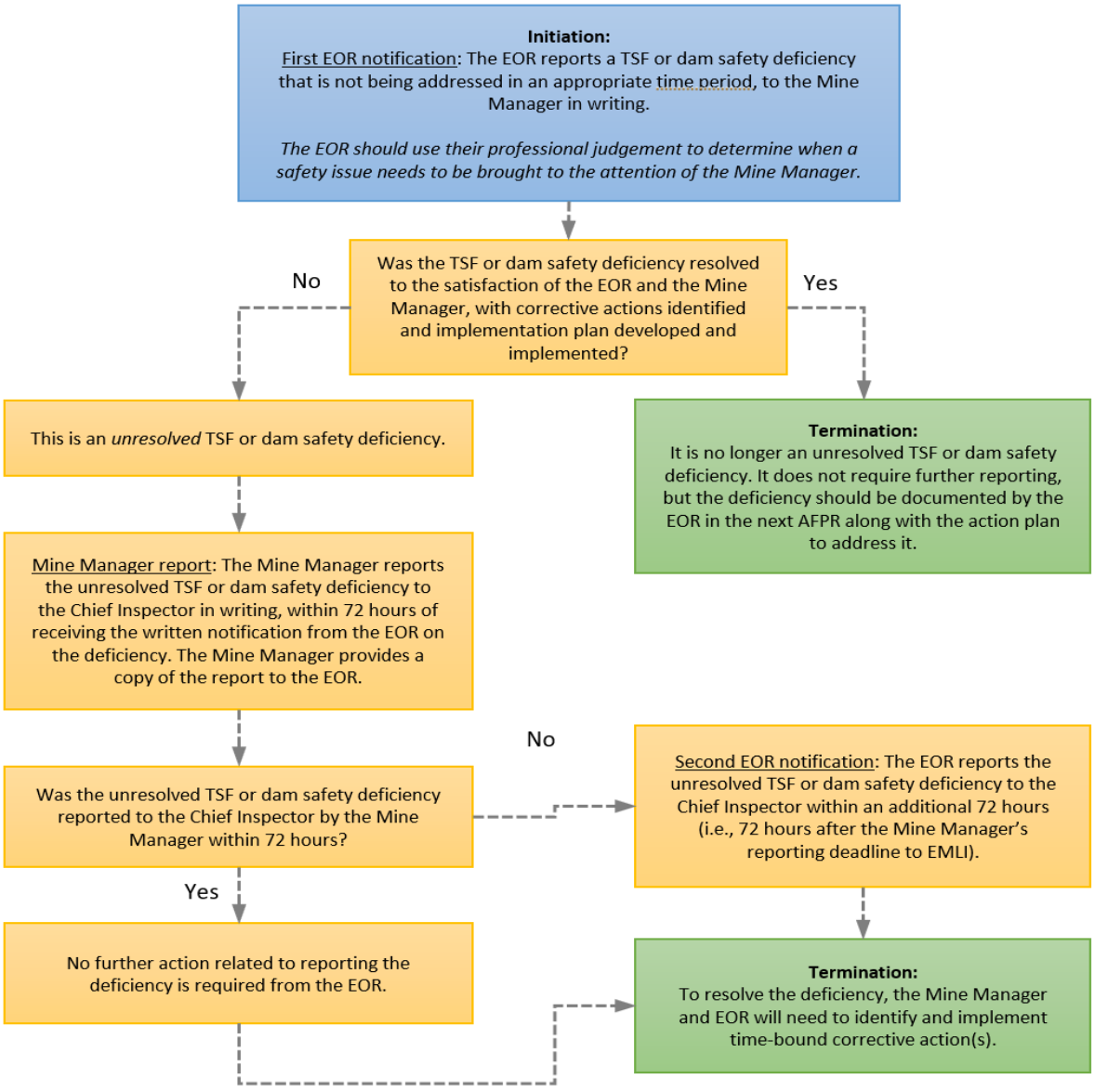


FIGURE 6: REPORTING UNDER 10.4.4 DUTY TO REPORT SAFETY ISSUES.

TSFs and Dams – Design

Design Responsibility

10.5.1 The manager must ensure that tailings storage facilities and dams are designed by, or under the direct supervision of, the engineer of record.

Guidance

Larger dams with complex sites typically require a team of professionals with specialized skills to produce a safe, robust dam design. The EoR is responsible for ensuring that the members of the team have the requisite skills to perform the tasks as assigned.

Additional Guidance
EGBC, Practice Advisory – Relying on the Work of a Specialist, 2023.
EGBC, Quality Management Guides – Guide to the Standard for Direct Supervision.
EGBC, Quality Management Guides – Guide to the Standard for Documented Independent Review of High-Risk Professional Activities or Work.

Where design and/or construction records are not available for a TSF or dam, the manager is responsible for ensuring that assessments are undertaken by the EoR to determine the design and construction methodology and to assess the condition of the structure(s) against current design standards. The assessment will likely also include recommendations to bring the structure(s) up to current design standards. The recommendations typically form part of the recommendations included in the Annual Facility Performance Report or Dam Safety Review report.

Site Characterization

10.5.2 (1) The manager must ensure that the engineer of record develops a site characterization for each TSF and dam, which supports the design of the TSF or dam, and includes the following:

(a) climate, hydrology and climate change;

(b) summary of environmental setting;

(c) site surficial geology, geomorphology and geohazards;

(d) bedrock geology, geotechnical conditions, hydrogeology and seismotectonic conditions;

(e) representative plans and cross-sections of interpreted geological and geotechnical units, and groundwater conditions;

(f) a signed and sealed assurance statement, in a form specified by the chief inspector.

(2) The manager must ensure that the site characterization for the TSF or dam is reviewed and updated by the engineer of record when the engineer of record considers it appropriate.

(3) The manager must ensure that, when the site characterization for the TSF or dam is developed or reviewed,

(a) reasonable efforts are made to engage with affected First Nations, and

(b) local Indigenous knowledge received under paragraph (a) is considered.

Guidance

Site characterization activities are iterative, and EMLI expects that the mine will develop continual improvement of the site throughout the lifecycle of the project, from planning to closure. Updated site characterization is particularly important when subsequent dam raises are expected. EGBC have prepared a guidance document for characterization of dam foundations. EMLI expects EoRs to consider these guidelines for all TSFs and dams in BC.

Additional Guidance

Engineers and Geoscientists of British Columbia (EGBC): Guideline for Site Characterization for Dam Foundations in British Columbia (2016).

Mining Association of Canada (MAC): A Guide on Climate Change Adaption for the Mining Sector (2021).

Under 10.5.2 (1)(f), a Site Characterization Assurance Statement from the EoR and the supporting qualified professionals who have contributed to the site characterization is required (Appendix III). This is typically included with a site characterization or a design report.

It is likely that older facilities will not have a well documented site characterization that conforms to the Code. In situations where the Site Characterization does not exist or does not conform to Code requirements or EGBC guidelines, EMLI expects the manager and EoR to develop a site characterization based on readily available information that is commensurate with the risk and complexity of the facility. Recommendations to address any gaps in the characterization are typically documented in the next AFPR as the EoR considers it appropriate.

Design Report

10.5.3 (1) The manager must ensure that, for each TSF and dam, a design report is developed by the engineer of record, that includes

(a) an analysis of the following, to support the design of the TSF or dam:

(i) the site characterization as set out under section 10.5.2;

(ii) tailings characterization and management, in the case of TSFs;

(iii) the consequences of potential failure scenarios as set out under section 10.5.6;

(iv) the risk assessment as set out under section 10.6.8;
(v) stability, deformation and other assessments, as considered appropriate by the engineer of record;
(vi) seepage and groundwater management;
(vii) water balance and water management;
(viii) closure,

(b) consideration of the following:
(i) mining or tailings processes;
(ii) environmental factors;
(iii) hydrological conditions and other conditions associated with climate change,

(c) a description of the proposed quantifiable performance objectives, and

(d) the design summary document developed or updated, as appropriate, under section 10.5.4 (1).

(2) The manager must ensure that the design report developed under subsection (1) is reviewed and updated by the engineer of record when the engineer of record considers it appropriate.

(3) The manager must ensure that, when the design report is developed or reviewed,
(a) reasonable efforts are made to engage with affected First Nations, and
(b) local Indigenous knowledge received under paragraph (a) is considered.

Guidance

The design report would typically be prepared for the full life of mine with additional design report updates prepared for each major stage of construction or when there are material changes to either the design or the understanding of site conditions. The current design report captures or references any important design details from previous reports. The design report is expected to be detailed design.

In addition to the bullets listed in 10.5.3(1)(a), the design report may also include the following:

- Summary of site selection, based on an alternatives assessment.
- Summary of selection of the tailings technology.

Under 10.5.3 (1)(c), Quantifiable Performance Objectives are specific to the site and may include items such as:

- Piezometric elevations
- Minimum beach widths
- Seepage rates
- Maximum allowable pond elevation

Design Summary Document

10.5.4 (1) The manager must ensure that the engineer of record develops a design summary document that summarizes the items listed in section 10.5.3 (1) (a) to (c) in the form of a table specified by the chief inspector.

(2) The manager must ensure the design summary document is

(a) reviewed and updated by the engineer of record when the engineer of record considers it appropriate, and

(b) provided to the chief inspector by March 31 of the year following the year it is updated.

(3) The manager must

(a) ensure that reasonable efforts are made to engage with each affected First Nation in order for each First Nation to identify if it wants to receive the design summary document as developed under subsection (1) or updated under subsection (2), whichever is the most recent, and

(b) provide a copy of the most recent document to each First Nation that identifies under paragraph (a) of this subsection, it wants to receive it, in accordance with the timeframe applicable with respect to the chief inspector.

Guidance

The Design Summary Document, sometimes known as a Design Basis Summary, summarizes the key design constraints, design criteria, critical assumptions and design intent of a TSF or dam, throughout the lifecycle of the facility including closure. It provides a concise summary of current design assessments and reports, which may be numerous and complex, depending on the TSF or dam.

A table of key information is often sufficient as a Design Summary Document. Refer to appendix V for the form of the table specified by the Chief Inspector under 10.5.4 (1).

Failure and Breach or Runout Assessment

10.5.5 (1) The manager must ensure the engineer of record develops a failure and breach or runout assessment for each TSF and dam that contains the following:

(a) an analysis of the failure modes and the expected results of each failure mode;

(b) potential dam failure scenarios;

(c) estimates of inundation or runout areas, if applicable;

(d) estimates of breach and arrival times, if applicable.

(2) The manager must ensure that the assessment under subsection (1) is reviewed by the engineer of record and updated prior to a material change to the design, construction, operation or downstream conditions that has affected or may affect the potential inundation or run out area.

Guidance

A dam failure and breach assessment, or runout assessment, is required for each TSF or dam. Dam breach methodologies cover the spectrum from flow failures for saturated materials to landslide runout mechanism for partially saturated materials. Co-disposal or dewatered tailings facilities are often considered as partially saturated. However, depending on site specific foundation and downstream conditions, a flow-type failure is a possibility.

Dam failure and breach assessments or runout assessments are based on the reasonable worst-case failure mode that could be physically possible for a TSF or dam. The assessment considers a range of modes, including a sunny day failure, a flood induced failure and the expected case.

The determination of the reasonable worst-case scenario requires robust justification by the EoR. The selected methodology is determined by the EoR, considering industry standard of practice, and be commensurate with the complexity of the facility and the downstream area. A reasonable worst-case scenario recognizes that there may be a risk of some uncertainty in our understanding of the foundation soils, pore pressures, dam construction processes, groundwater conditions, etc. which could theoretically lead to a lower factor of safety and potentially lead to significant deformation of the dam.

The dam failure and breach assessment or runout assessment requires updating in consideration of any changes to the dam and/or the downstream conditions (i.e., such as new development downstream).

Additional Guidance
CDA Technical Bulletin: Tailings Dam Breach Analysis (2021).
ICOLD: Bulletin 194 Tailings Dam Safety (2022).

Failure Modes and Failure Scenarios

The terms *'failure mode'* and *'failure scenario'* are related, but not the same. A failure mode, Figure 7, describes the series of events in which a failure may occur. It includes inputs from the failure mechanism, the initiating event, and the failure process.

A failure scenario is what occurs if there is a failure, from beginning to end, which includes the downstream consequences. The relationship between failure mode and the failure scenario is shown in Figure 7, with an example included in Figure 8.

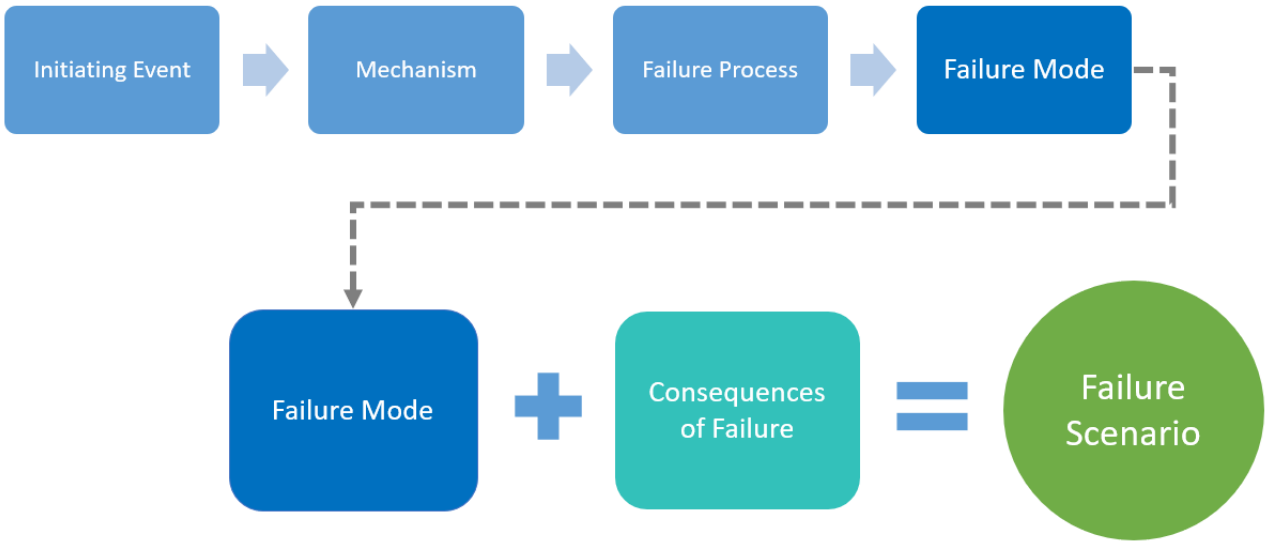


FIGURE 7: RELATIONSHIP BETWEEN FAILURE MODE AND FAILURE SCENARIO.

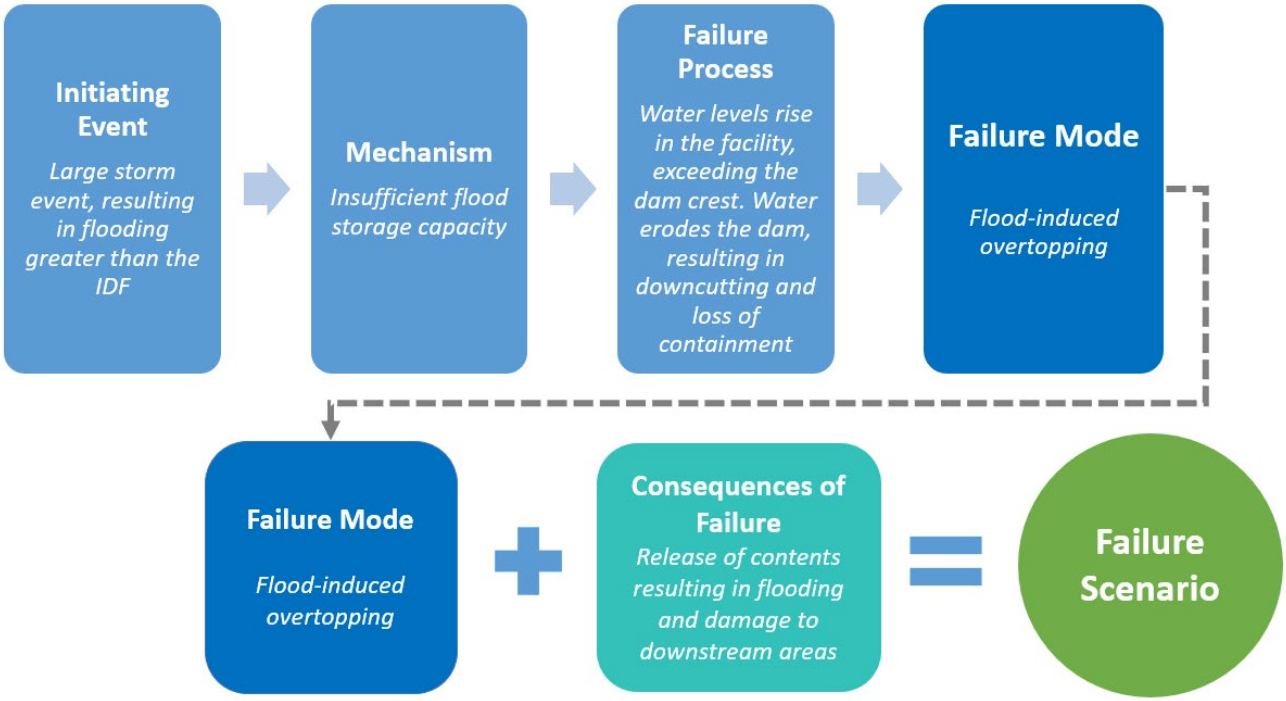


FIGURE 8: EXAMPLE OF A FAILURE MODE AND FAILURE SCENARIO.

Dam Breach and Runout Modelling

Dam breach and runout modelling includes a breach hydrograph estimate, along with inundation modelling using appropriate hydraulic or landslide models. Estimates of maximum flow depths and velocities, time of flood arrival and estimated severity of the flood (depth times velocity).

For TSFs, there is the possibility that either or both inundation (hydraulic) and runout (landslide) mechanisms could be modelled.

For co-disposal TSFs, which behave as rock dumps, runout assessments may be appropriate, and guidance is provided in Guidelines for Mine Waste Dump and Stockpile Design (Hawley and Cunning 2017).

A simplified dam failure and breach assessment or runout assessment could be carried out for a low consequence TSF or dam to get an initial estimate of the consequences of a potential failure. The initial simplified assessment may be appropriate to satisfy 10.5.5(1) for low consequence TSFs or dams, provided all the 10.5.5(1) bullets are completed. Higher consequence facilities can not rely on simplified methods.

10.5.5 (3) If, before the date this section comes into force, a breach and inundation study or a failure runout assessment was completed in accordance with section 10.1.11 of the code, as it read immediately before its repeal,

(a) the manager must ensure that, before May 1, 2026, the engineer of record updates the study or assessment so that the requirements of subsection (1) (a) to (d) of this section are met,

(b) despite its repeal, section 10.1.11, as it read immediately before its repeal, continues to apply with respect to the study or assessment until the study or assessment is updated in accordance with paragraph (a) of this subsection, and

(c) on the date this section comes into force, the manager must comply with subsection (2) of this section with respect to the study or assessment, before and after it is updated in accordance with paragraph (a) of this subsection.

Guidance

Most operating mines will have a failure and breach or runout assessment for its TSF. The assessment may not include all the new requirements listed in subsections (a) through (d) under subsection (1). Mines are required to maintain the existing study and, pursuant to 10.5.5(3)(a), mines are required to update the existing study to comply with 10.5.5(1)(a) through (d) by May 1st, 2026. Mines are given 2 years to collect the necessary data, potentially carry out numerical modeling and update the report.

Section 10.5.5(3)(c) ensures that the existing assessment continues to be reviewed and updated as required while the mine is updating to the new requirements.

10.5.5 (4) If, before the date this section comes into force, a breach and inundation study or failure runout assessment was not completed in accordance with section 10.1.11, as it read immediately before its repeal, the manager is not required to comply with subsections (1) and (2) of this section until May 1, 2026.

Guidance

Non-TSF dams on mine sites that were not previously required to have the failure assessment are required to develop an assessment by May 1st, 2026.

Classification of TSFs and Dams

10.5.6 (1) The manager must ensure that, for each TSF and dam, the engineer of record

(a) determines the potential failure scenarios to be used to determine the consequences of the potential failure scenarios as described in Table 10-3, and

(b) reviews the failure and breach or runout assessment as set out in section 10.5.5 in making the determination under paragraph (a).

(2) The manager must ensure that the engineer of record documents the following for each TSF and dam:

(a) a determination, in accordance with Table 10-3, of the consequences of potential failure scenarios for the TSF or dam with input from other qualified professionals and persons with relevant areas of knowledge, as needed and appropriate;

(b) changes to the consequences of potential failure scenarios.

(3) The manager must ensure that, in determining the consequences of potential failure scenarios referred to in subsection (2) (a),

(a) reasonable efforts are made to engage with potentially affected First Nations, and

(b) local Indigenous knowledge received under paragraph (a) is considered.

Guidance

TSFs and dams are classified based on their Consequences of Potential Failure. An assessment is completed to determine the Consequences of Potential Failure for various scenarios. The reasonable worst-case scenario is selected as the governing consequence of a potential failure of the TSF or dam. The reasonable worst-case failure scenario requires robust justification by the EoR.

The Consequences of Potential Failure scenarios assessment may be developed as a stand-alone document, or incorporated into another report, such as the design report.

The consequences of potential failure are described in Table 8 (10-3 of the Code) below.

TABLE 8: CONSEQUENCES OF POTENTIAL TSF OR DAM FAILURE SCENARIOS (BASED ON ICOLD 2024)(CODE TABLE 10-3).

Consequences of Potential Failure Scenarios	Potential Loss of Life[1]	Potential Losses[5]		
		Environment[2,3]	Health, Social and Cultural	Infrastructure and Economics [4]
Low	none	Minimal short-term loss of environmental values. No expected impact on livestock or fauna drinking water. Limited area of impact and restoration feasible in short term.	Minimal effects and disruption of business and livelihood. No measurable effects on human health. No disruption of heritage, recreation, community or cultural assets.	Low economic loss: area contains limited infrastructure or services.
Significant	none	Limited loss or deterioration of environmental values. Potential contamination of livestock or fauna water supply. Moderate area of impact and restoration possible.	Limited effects and disruption of business and livelihood. No measurable effects on human health. Limited loss of regional heritage, recreation, community or cultural assets.	Moderate economic loss: losses to recreational facilities, seasonal workplaces and infrequently used transportation routes.
High	1 - 10	Significant loss or deterioration of critical environmental values. Potential contamination of livestock or fauna water supply. Potential area of impact 5 km^2 to 20 km^2. Restoration possible within a moderate time frame.	Many people affected by disruption of business, services or social dislocation. Significant loss of regional heritage, recreation, community or cultural assets. Potential for some short-term human health effects.	High economic loss: losses affecting infrastructure, public transportation, commercial facilities or employment. Moderate relocation costs and/or compensation to communities.
Very High	10 to 100	Major loss or deterioration of critical environmental values including rare and endangered species of high significance. Potential area of impact >20 km^2. Restoration or compensation possible but very difficult and requires a moderate to long time frame.	A high number of people affected by disruption of business, services or social dislocation for more than one year. Significant loss of national heritage, recreation, or community facilities or cultural assets. Significant long-term human health effects.	Very high economic loss: losses affecting important infrastructure, services (e.g., highway, industrial facilities or storage facilities for dangerous substances) or employment. High relocation costs and/or compensation to communities.
Extreme	> 100	Catastrophic loss of critical environmental values including rare and endangered	A large number of people affected by disruption of business, services, or	Extreme economic loss: losses affecting critical infrastructure or

Consequences of Potential Failure Scenarios	Potential Loss of Life[1]	Potential Losses[5]		
		Environment[2,3]	Health, Social and Cultural	Infrastructure and Economics [4]
		species of high significance. Very large areas of potential impact. Restoration or compensation in kind impossible or requires a very long time.	social dislocation for years. Significant national heritage or community facilities or cultural assets destroyed. Potential for Severe and/or long-term human health effects.	services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances or employment. Very high relocation costs and/or compensation to communities and very high social readjustment costs.

[1]Potential Loss of Life: This includes population at risk, and an allowance for people who may be within the inundation zone on a short-term or intermittent basis (e.g., seasonal or recreational visitors, temporary travelers or workers). There are several methods used to estimate potential loss of life.
[2]Environmental values: Include aquatic and terrestrial habitat and life, the presence of rare and endangered species, and ecosystem integrity. Significant loss of environmental values is referenced to the percentage of the regional values.
[3]The potential effects due to released tailings or process water consider the geochemical properties, restoration time and the effectiveness of restoration.
[4]Infrastructure and economics: Include indirect and tangible losses.
[5]Consequences shown are indicators and professional judgement is used to select the appropriate consequence category for the dam.

For TSFs or other facilities with multiple dams, consequences of potential failures are determined for each dam. The highest consequences of potential failure for an individual dam becomes the consequences of potential failure for the overall facility.

TSFs that do not include dams, such as in pit, co-disposal or de-watered are still assigned consequences of potential failure scenarios as outlined in Table 8 (Code Table 10-3), though the modes of failure and the methods for determining impacts of failure will be different. The methods for determining the consequences of potential failure scenarios for TSFs that do not include dams are determined by the EoR undertaking the Consequences of Potential Failure Scenarios assessment.

Additional Guidance
Canadian Dam Association (CDA): Dam Safety Guidelines (2013)
CDA: Technical Bulletin, Application of Dam Safety Guidelines to Mining Dams (2019)
CDA: Technical Bulletin, Revision to Consequences of Failure – Environment Consequences Classification (2023)
ICOLD: Bulletin 194 Tailings Dam Safety (2022)
Global Tailings: Global Industry Standards on Tailings Management (2020)

Consequence of potential failure for each structure are:

- stated in the TSFs and Dams Register and the design summary document,
- reviewed as part of the AFPR and DSR, and
- updated in the event of a material change to the TSF or dam.

CDA Technical Bulletin, Revision to Consequences of Failure – Environmental Consequence Classification (2023) provides additional guidance to determine environmental consequences of a potential failure.

Seismic and Flood Design Criteria

The Code requires that the design of TSFs and dams use seismic and flood design criteria based on the Consequences of Potential Failure. Sediment ponds and seepage collection ponds associated with a TSF, but which are not part of the main TSF, may have a separate determination of consequence of potential failure. These may include seepage collection ponds or sediment management ponds at the toe of the main TSF. The minimum Seismic and Flood design criteria are set out in Table 10-4 of the code.

10.5.7 (1) The manager must ensure that the engineer of record designs each TSF or dam so it meets the minimum seismic and flood criteria set out in Table 10-4.

Guidance

The minimum requirements for flood and seismic criteria are summarized in Table 9 (Code Table 10-4). The EoR is responsible for determining the magnitude of the design events, through consultation with other specialists as needed.

All TSFs and dams are required to safely manage the Probable Maximum Flood (PMF) and the 1/10000 or Maximum Credible Earthquake (MCE) at Final Closure. Mines are encouraged to begin planning for this eventuality as early as possible in the mine life.

The intent of Final Closure criteria is to implement a higher standard of design criteria for TSFs and dams for the Final Closure state (when monitoring and maintenance requirements are minimal, if any).

TABLE 9: MINIMUM FLOOD AND SEISMIC DESIGN CRITERIA FOR TSFS AND DAMS (TABLE 10-4).

Consequence Classification	Annual Exceedance Probability, years					
	Flood Criteria		Final Closure	Seismic Criteria		Final Closure
	TSFs	Dams		TSFs	Dams	
Low	1/3rd between 1/1,000 and PMF[1]	1/200	PMF	1/2,475	1/200	1/10,000 or MCE[2]
Significant		between 1/200 and 1/1,000			between 1/200 and 1/1,000	
High	1/3rd between 1/1,000 and PMF			1/2,475		
Very High	2/3 between 1/1,000 and PMF			½ between 1/2,475 and 1/10,000 or MCE		
Extreme	PMF			1/10,000 or MCE		

[1]PMF means Probable Maximum Flood
[2]MCE means Maximum Credible Earthquake

10.5.7 (2) The manager must ensure that, if a dam contains flowable tailings or water containing tailings, it meets the seismic and flood criteria set out in Table 10-4 for TSFs.

Guidance

This clause clarifies that TSFs that include dam(s) refer to the TSF column and not the dam column in Table 9 (Code table 10-4). The dam column is for non-TSF dams.

10.5.7 (3) The manager must ensure that the engineer of record designs the inflow design flood of each TSF or dam so that it addresses the following:

(a) evaluation of scenarios of frequency, intensity and duration to identify controlling events;

(b) consideration of rain or snow;

(c) consideration of the effect of the seasons.

(4) The manager must ensure that the criteria respecting the environmental design flood is determined by the engineer of record.

(5) The manager must ensure that, when the criteria respecting the environmental design flood criteria is determined,

(a) reasonable efforts are made to engage with affected First Nations, and

(b) local Indigenous knowledge received under paragraph (a) is considered.

Flood Design Criteria

The flood criteria in the Code applies to flood events and their effects both internally and externally to the TSF or dam. The flood design criteria related to TSFs and dams are the Inflow Design Flood (IDF), the Environmental Design Flood (EDF) and external flood effects. For TSFs and dams built on a floodplain or in areas where natural flood hazards exist, the flood criteria are the same IDF.

Rain-on-snow events are typically considered when determining controlling flood events.

The controlling event that results in the IDF flows is determined by the EoR. In previous versions of the Code, the minimum required storm event duration for facilities without a spillway that were storing the IDF was 72 hours. This is no longer the case, and a site-specific controlling event duration is determined for each TSF and dam.

Additional Guidance
ICOLD: Bulletin 194 Tailings Dam Safety (2022)
CDA: Dam Safety Guidelines (2013)
CDA: Technical Bulletin, Application of Dam Safety Guidelines to Mining Dams (2019)
ANCOLD's Guidelines on Tailings Dams: Planning, Design, Construction, Operation and Closure (2019). (A methodology on consequence assessment of an EDF release (a spill) from a TSF)

The EoR establishes an acceptable time period over which normal operating water levels are re-established in the facility. Quantifiable Performance Objectives (QPO) and Trigger Action Response Plans (TARP) are developed to support this. Refer to Section 10.6.

10.5.7 (6) Despite subsection (1), the manager may, for final closure of a TSF or dam classified as low consequence of potential failure as set out Table 10-3, apply to the chief permitting officer for an exemption to the final closure flood criteria, final closure seismic criteria, or both, as set out in Table 10-4.

Guidance

Owners may apply for an exemption to Final Closure design criteria for Low consequence TSFs or dams. Applications are reviewed on a case-by-case basis and require robust rationale from the EoR.

10.5.7 (7) Subject to subsection (8), if, on the date this section comes into force, a TSF or dam exists and the manager does not meet a requirement as set out in subsections (1) to (5) of this section, with respect to the TSF or dam,

(a) the manager is not required to meet the requirement with respect to the TSF or dam until November 1, 2026, and

(b) despite its repeal, section 10.1.8 of the code, as it read immediately before its repeal, continues to apply to the TSF or dam in respect of the subject matter of the requirement referred to in paragraph (a) of this subsection, until the earlier of the following:

(i) the manager meets the requirement;

(ii) November 1, 2026.

(8) If, immediately before the date this section comes into force, an exception respecting section 10.1.8, as set out in section 10.1.19 (2) of the code, as it read immediately before its repeal, applied to a TSF or dam, the exception continues to apply to the TSF or dam until the earlier of the following:
(a) section 10.2.10 (2) applies to the TSF or dam;
(b) November 1, 2026.

Guidance

In 2016, the Code Part 10 was updated to include minimum seismic and flood criteria for TSFs. Mines permitted before the 2016 revision were exempted from the new minimum criteria and instead typically followed design criteria as outlined in the CDA Dam Safety guidelines. Mines with active TSFs or dams that were previously exempt have lost their exemption under this revision of the Code.

10.5.7(7)(a) provides three construction seasons to complete any necessary design modifications, earthworks or other engineering required to bring the mine into compliance for the following:

- Mines with active TSF's or dams that were permitted before 2016 and have now lost their exemptions, and
- Mines permitted after 2016.

10.5.7(7)(b) ensures that the minimum seismic and flood criteria established in the previous version of the Code for dams permitted between 2016 and 2024 continue to apply while the mine is making any necessary changes to the TSF or dam.

10.5.7(8) continues the exemption for mines with TSFs or dams permitted before 2016 while the mine is making the necessary updates to the TSFs or dam to bring it into compliance with the new requirements under section 10.5.7.

Design Slopes

10.5.8 (1) For a TSF or dam that has an overall downstream slope steeper than 2H:1V, the manager must submit justification by the engineer of record for the selected design slope and receive authorization by the chief permitting officer prior to construction.

Guidance

The minimum design slope applies to the overall TSF or dam slope, at any section of the TSF, measured from crest to toe; not to localized lifts or benches with steeper sections.

Authorization is required from the Chief Permitting Officer prior to constructing a facility with steeper than 2H:1V design slopes. This application is typically submitted as a Mines Act Permit Application with a clear indication that it is pursuant to 10.5.8(1) of the Code.

10.5.8 (2) Subject to subsection (3), if, on the date this section comes into force, a TSF or dam exists and has an overall downstream slope steeper than 2H:1V,

(a) the manager is not required to comply with subsection (1) of this section with respect to the TSF or dam until November 1, 2026, and

(b) despite its repeal, section 10.1.9 of the code, as it read immediately before its repeal, continues to apply to the TSF or dam until the earlier of the following:

(i) the manager complies with subsection (1) of this section;

(ii) November 1, 2026.

(3) If, immediately before the date this section comes into force, an exception respecting section 10.1.9, as set out in section 10.1.19 (2) of the code, as it read immediately before its repeal, applied to a TSF or dam, the exception continues to apply to the TSF or dam until the earlier of the following:

(a) section 10.2.10 (2) applies to the TSF or dam;

(b) November 1, 2026.

Guidance

In 2016, the Code was updated and a maximum steepness was introduced, unless justification was provided by the EoR. Mines permitted before the 2016 revision were exempted from the new maximum slope. Mines with active TSFs or dams that were previously exempt have lost their exemption under the latest revision of the Code. The maximum slope criteria are new requirements for dams as well as for active TSFs permitted prior to 2016.

10.5.8(2)(a) provides three construction seasons to complete any necessary design modifications, earthworks or other engineering required to bring the mine into compliance, or conduct field investigations and studies to support a justification for steeper slopes for the following:

- Mines with active TSF's or dams that were permitted before 2016 and have now lost their exemptions, and
- Mines permitted after 2016.

10.5.8(2)(b) ensures that the maximum slope steepness requirements established in the previous version of the code for TSFs permitted between 2016 and 2024 continue to apply.

10.5.8(3) continues the exemption for mines with TSFs or dams permitted before 2016 while the mine is making the necessary updates to the TSFs or dam to bring them into compliance with the new requirements by November 1st , 2026

Minimum Factors of Safety

10.5.9 (1) The manager must ensure that all TSFs and dams meet the criteria for minimum factors of safety set out in Table 10-5.

(2) If a TSF or dam has a calculated factor of safety that is less than the criteria for minimum factors of safety set out in Table 10-5 that must be met under subsection (1), the manager must submit justification by the engineer of record for the selected factor of safety and receive authorization by the chief permitting officer prior to construction.

Guidance

The minimum factor of safety (FOS) requirement was introduced in 2016. The minimum FOS was 1.5 under static loading conditions, and only applied to TSFs. The minimum requirements have been updated to reflect that calculated FOS will be different under different loading conditions, and now apply to both TSFs and dams. If the minimum FOS is less than those shown in Table 10 (Code Table 10-5) the mine manager can make changes to the TSF or dam to increase the factor of safety or submit a justification from the EoR. Changes to the dam will likely require a permit amendment.

A minimum factor of safety applies to all TSFs and dams and is assessed at all critical sections of the TSF, and typically, for the overall slope as well as intermediate critical slopes.

Authorization is required from the Chief Permitting Officer prior to constructing a facility with factor of safety lower than 1.5. This application is typically submitted as a Mines Act Permit Application with a clear indication that it is pursuant to 10.5.9(2) of the Code.

The minimum requirements for Factor of Safety (FoS) and design slopes are presented in Table 10 (Table 10-5 in the Code). The minimum requirements for FOS and design slopes are also applicable to co-disposed and dewatered TSFs.

TABLE 10: MINIMUM FACTORS OF SAFETY AND DESIGN SLOPES FOR TSFS AND DAMS (CODE TABLE 10-5).

Facility	Minimum Factors of Safety				Minimum Design Slope
	Prior to storage of water and tailings	Operations and Closure	Rapid Drawdown – upstream slope where applicable	Post Seismic	
TSF or dam	1.3	1.5	1.2 to 1.3	1.2	2H:1V

10.5.9 (3) Subject to subsection (4), if, on the date this section comes into force, a TSF or dam exists,

(a) the manager is not required to comply with subsection (1) of this section with respect to the TSF or dam until November 1, 2026, and

(b) despite its repeal, section 10.1.10 of the code, as it read immediately before its repeal, continues to apply to the TSF or dam until the earlier of the following:
  (i) the manager complies with subsection (1) of this section;
  (ii) November 1, 2026.

(4) If, immediately before the date this section comes into force, an exception respecting section 10.1.10, as set out in section 10.1.19 (2) of the code, as it read immediately before its repeal, applied to a TSF or dam, the exception continues to apply to the TSF or dam until the earlier of the following:
  (a) section 10.2.10 (2) applies to the TSF or dam;
  (b) November 1, 2026.

Guidance

In 2016, the Code Part 10 was updated and a minimum FOS was added. Mines permitted before the 2016 revision were exempted from the new minimum criteria, however the FOS outlined in the CDA, Dam Safety Guidelines were required for all mines permitted before 2016. Mines with active TSFs or dams that were previously exempt have lost their exemption under the latest revision of the Code.

10.5.9(3)(a) provides three construction seasons to complete any necessary design modifications, earthworks or other engineering required to bring the mine into compliance, or alternatively conduct field investigations and studies to support justification for a lower FOS for the following:

- Mines with active TSF's or dams that were permitted before 2016 and have now lost their exemptions, and
- Mines permitted after 2016.

10.5.9(3)(b) ensures that the minimum FOS criteria established in the previous version of the code for TSFs permitted between 2016 and 2024 continue to apply while the mine is making any necessary changes to the TSF.

10.5.9(4) continues the exemption for mines with TSFs or dams permitted before 2016 while the mine is making the necessary updates to the TSFs or dam to bring them into compliance with the new requirements under section 10.5.9 by November 1st , 2026

Plans for Underground Dams and Bulkheads

10.5.10 (1) The manager must ensure that issued for construction drawings, specifications, and quality assurance and quality control plans respecting structures for impounding water, restraining saturated material or confining air under pressure in an underground opening have been prepared by a professional engineer prior to construction.

(2) The manager must ensure that, prior to using an underground structure referred to in subsection (1), a professional engineer verifies the structure has been

constructed in a manner consistent with the drawings, specifications and plans referred to in subsection (1) and is suitable for the intended use.

(3) Structures in subsection (1) required in the approved closure plan must be authorized by the chief permitting officer prior to construction.

(4) Subsections (1) to (3) do not apply in the case of

(a) a structure less than 1 m in height used solely for

(i) diverting the ordinary drainage, or

(ii) storing water for mining purposes, or

(b) ventilation bulkheads or regulators used solely for ordinary ventilation.

(5) Despite subsection (1), a temporary dam or bulkhead may be constructed in an underground mine during an emergency without meeting the requirements of subsection (1) but no person may be allowed to work in any part of the underground mine that could be affected by the construction or failure of the dam or bulkhead until a professional engineer has verified that the structure is suitable for the intended use.

Guidance

This section is applicable to all underground structures that impound water, saturated material or confine air under pressure.

IFC drawings, specifications and quality assurance/quality control (QA/QC) plans are prepared by a professional engineer prior to construction. Standard designs to be implemented across various locations may be used, however, clearly stating design limitations, including the dimensions, rock quality, and any other influencing factors of the installation area.

As per the EGBC Guide to the Standard for Direct Supervision, the professional engineer responsible for the design and construction verification may have a subordinate complete the work on their behalf, though under the direct supervision of the engineer. It is expected that the following documentation is retained and provided to an inspector upon request:

- Design, specifications, construction and QA/QC plan.
- Construction records, test results and other engineering verification documents.

Underground plugs or bulkheads required for flooding parts of the mine for mine closure require an approval under the Mines Act permit. Failure of these plugs are expected to result in either an initial catastrophic event or long-term impacts to the environment.

Bulkheads constructed for backfilling stopes deep within the mine or regularly constructed for other underground mine uses typically do not require a written authorization for each structure. In some cases, greater detail on the bulkhead design is required during mine permitting, or there may be a condition in the permit for bulkhead designs and operation.

It is not expected that small operational water management or ventilation structures be subject to 10.5.10(1) or 10.5.10(2).

IFCs are not required for a dam or bulkhead constructed underground in the event of an emergency. It is expected that during an emergency the mine carries out all reasonable measures to protect health, safety and environment.

Structures erected for emergency purposes may remain in place, but no one is allowed to be located downstream of the structure until a professional engineer declares the structure is suitable for its intended use. It is expected that all documentation pertaining to the declaration by the professional engineer be retained and provided to an inspector upon request.

TSF and Dams – Operation and Closure

Management System

10.6.1 The manager of a mine with one or more TSFs or dams must

(a) develop and maintain a management system commensurate with the overall complexity of the TSFs and dams and include regular system audits, and

(b) ensure that local Indigenous knowledge received from a First Nation under this Part is not disclosed without prior written consent from the First Nation.

Guidance

Mines are required to develop and implement a management system that defines how the mining company will manage the TSF(s) and/or dam(s) on a mine site, which includes regular system audits. The management system is a framework for continually improving the process of planning, budgeting, constructing, operating, maintaining, monitoring, inspecting, evaluating performance, emergency preparedness and closure of a mine's TSF(s) or dam(s); the management system framework is shown in Figure 9. Appendix IV provides additional details on governance practices for TSFs and dams.

Additional Guidance
Mining Association of Canada (MAC): A Guide to the Management of Tailings Facilities (2021).
International Council on Mining and Metals (ICMM); Tailings Management Good Practice Guide (2021).
Global Tailings Review: Global Industry Standard on Tailings Management (2020).
International Organization for Standardization: ISO 14001-2015 Environmental Management Systems (2015).

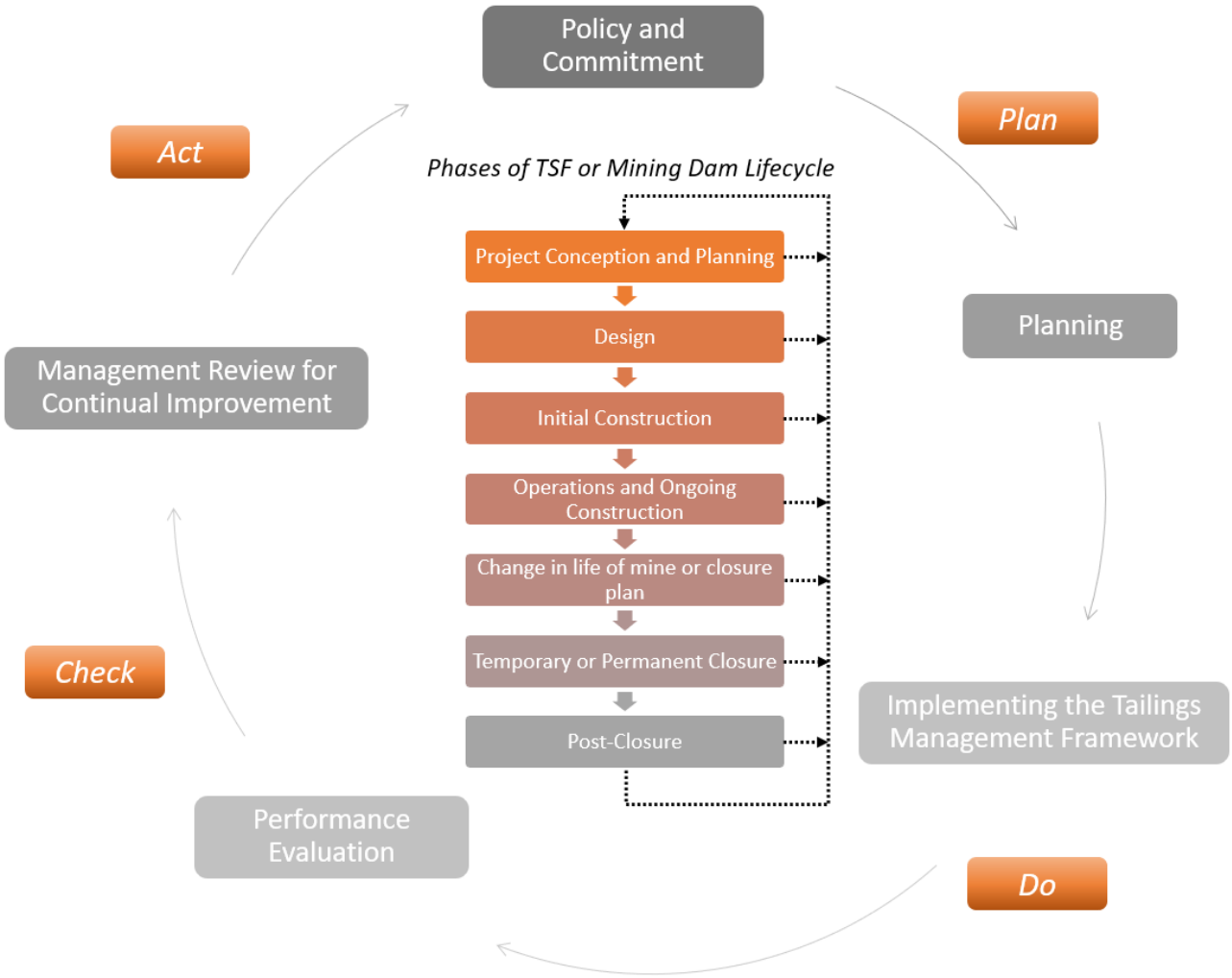


FIGURE 9: ELEMENTS OF THE TAILINGS MANAGEMENT FRAMEWORK (BASED ON MAC 2021A).

Dam Safety Reviews

10.6.2 (1) The manager must ensure that a dam safety review report for each TSF or dam is prepared by an independent professional engineer at the frequency set out in Table 10-6.

Guidance

The purpose of the Dam Safety Review (DSR) is to have an independent professional engineer review and evaluate the performance and operation of the facility relative to the standard of practice. The Code requires that DSRs are completed on a frequency as described in Table 11 (Code Table 10-6). For the purposes of the Code, DSRs also apply to TSFs regardless of whether they have an associated dam (such as co-disposed, in-pit and dewatered TSFs). In cases where there is no dam, some of the DSR requirements may not apply and non-applicable requirements are noted by the reviewing Professional Engineer. The general process laid out in the guidance from CDA and EGBC can be adapted to achieve the same objectives for the third-party independent review of a facility with no

dam. EMLI expects the DSR engineer to follow the EGBC guidelines when conducting the safety review, or alternatively provide written justification.

TABLE 11: SCHEDULE OF DAM SAFETY REVIEW PERIODS (CODE TABLE 10-6).

Facility Type	Duration between DSRs (based on Category or consequences of potential failure)		
	Category 1A, 1B, and Category 2 Dams	**Category 3 (Low)**	**Category 3 (Significant to Extreme)**
TSF	Not applicable	10 years	5 years
Dam	Not required	Not required	5 years

A DSR is performed by an independent third-party professional engineer not previously involved with the facility, who has experience commensurate with the complexity of the facility. EMLI recognizes that the number of qualified Professional Engineers able to undertake DSRs may be limited. Mines that are having difficulty meeting the requirements for an independent engineer are encouraged to contact the Chief Inspector early to discuss their proposed alternative.

DSR for Dewatered or Co-disposal TSFs

Tailings and water management facilities without dams are all subject to DSRs. EMLI has maintained the nomenclature of "Dam Safety Review" for consistency with EGBC Professional Practice Guidelines for Legislated Dam Safety Reviews and the CDA Technical Bulletin, Dam Safety Reviews.

Additional Guidance
Canadian Dam Association: Technical Bulletin, Dam Safety Reviews (2016)
Engineers and Geoscientists of BC: Legislated Dam Safety Reviews in BC (2023)

10.6.2 (2) The manager must ensure that the dam safety review report referred to in subsection (1) includes the following for each TSF or dam:

- (a) a summary describing the TSF or dam and its components;
- (b) identification of material changes to the infrastructure TSF or dam since the previous review, as applicable;
- (c) a review of the consequences of potential failure scenarios;
- (d) a review of the design, construction, operation and monitoring of the facility and assessment of its performance;
- (e) a review of the design summary document and design criteria;
- (f) the findings of the dam safety review prepared under this section including any recommended actions and associated timelines;
- (g) a signed and sealed assurance statement by a professional engineer, in a form specified by the chief inspector.

Guidance

In addition to the DSR requirements in the Code, there are further considerations for a DSR detailed in the EGBC DSR guidelines.

The engineer who performed the DSR signs and seals an assurance statement upon completion of the DSR. This is submitted to the Chief Inspector with the DSR report. Pursuant to 10.6.2(2)(g) of the Code, the assurance statement in a form specified by the Chief inspector is the EGBC Assurance statement included as an appendix to the EGBC guideline 'Legislated Dam Safety Reviews in BC' v 4.0, and in Appendix III of this document.

10.6.2 (3) The manager must address each recommended action referred to in subsection (2) (f) by
- (a) ensuring the engineer of record reviews each recommended action and either accepts it or proposes an alternate course of action, and
- (b) completing each recommended action or alternate course of action, as determined by the engineer of record under paragraph (a), within timelines agreed to with the engineer of record.

(4) The manager must provide to the chief inspector the following documents:
- (a) the dam safety review report referred to in subsection (1), by June 1 of the year following the year the report is required to be prepared;
- (b) an annual summary of all the TSF and dam safety recommended actions referred to in subsection (3) (a), by March 31 of the following year.

Guidance

The Annual Facility Performance Reviews Sections 10.6.4(2)(i) and (3) of this guidance document provides guidance on writing effective recommendations. It is expected the DSR engineer consider this guidance prior to completing the recommendations for DSRs on mining dams and use a similar risk-based priority ranking.

The EoR reviews the DSR recommendations and their suggested timelines. The EoR is not required to accept and implement the recommendations as written. If the EoR disagrees with a DSR recommendation(s), the EoR documents the justification along with the proposed alternate course of action and communicates their justification and alternate course of action to the TSF or dam Qualified Person and the manager.

Under 10.6.2(4)(b) the manager's annual summary of TSF and dam safety recommended actions is a confirmation that the manager plans to address the DSR recommendations within recommended timeframes. The manager's annual summary is a separate document from the DSR and can be included with other annual summaries for TSFs and dams (examples include summary of AFPR recommendations (10.6.4(3)), summary of outstanding dam safety orders (10.3.4(1)(a)(ii)) or as a separate cover letter to the DSR report.

10.6.2 (5) The manager must
- (a) ensure that reasonable efforts are made to engage with each affected First Nation in order for each First Nation to identify if it wants to receive any of the documents set out in subsection (4), and
- (b) provide to each First Nation a copy of each of the most recent documents identified by the First Nation under paragraph (a) of this subsection, in accordance with the timeframe applicable with respect to the chief inspector.

Guidance

The manager is responsible for ensuring that reasonable efforts are made to engage with each affected First Nations.

The manager is responsible for providing reports to each First Nation that has identified a desire to receive such reports as described in subsection (5).

Tailings Storage Facilities and Dams Register

10.6.3 (1) The manager must ensure that a register of all TSFs and dams, in a form specified by the chief inspector, is established and submitted to the chief inspector.

(2) The manager must ensure that the register is annually updated and provided to the chief inspector by March 31 of the following year.

(3) The manager must
- (a) ensure that reasonable efforts are made to engage with each affected First Nation in order for each First Nation to identify if it wants to receive the register established under subsection (1) or updated under subsection (2), whichever is the most recent, and
- (b) provide a copy of the most recent register to each First Nation that identifies under paragraph (a) of this subsection it wants to receive it, in accordance with the timeframe applicable with respect to the chief inspector.

Guidance

To assist mines in complying with Code requirement 10.6.3 (1) “in a form specified by the chief inspector”, EMLI has developed an Excel template titled “Register of Tailings Storage Facilities and Dams” (Register) which is available from EMLI.

The TSF and Dams Register includes all tailings and water retaining structures on site, regardless of whether they are currently operating or dormant structures. The purpose of the Register is to collect accurate information regarding tailings storage facilities and dams located on mine sites in B.C.

Annual Facility Performance Report

10.6.4 (1) The manager must ensure that the engineer of record completes a facility performance report annually for each TSF or dam.

Guidance

The purpose of an Annual Facility Performance Report (AFPR) is to review and evaluate the performance and operation of the overall facility, with specific attention to physical condition and surveillance results. The report is prepared, signed, and sealed by the EoR. The inspection may be conducted by either the EoR, or the EoR may designate another Professional Engineer to perform the inspection on their behalf. These reports are submitted to EMLI by March 31st of the following year.

A TSF can include upstream diversion ditches, down stream collection ditches, seepage collection ponds and any other engineering work required for the safe operation of the facility. If the engineered work is required for the safe operation of the facility, then it is considered to be part of the TSF and is included in the AFPR.

All TSFs regardless of consequence level and all Category 3 dams are required to have an AFPR. An AFPR may be specific to one facility, or for smaller low complexity dams can be combined into a single document, provided the content requirements of (2) are met, as determined by the EoR. All AFPRs will be posted on the British Columbia Mine Information website (https://mines.nrs.gov.bc.ca/) and made available publicly.

10.6.4 (2) The annual facility performance report must include the following for each TSF or dam:

(a) identification of whether the consequences of potential failure scenarios as described in Table 10-3 remain appropriate;
(b) a description of any material changes to the design, construction, operation and closure of each TSF and dam, their effect on the safety of the TSF or dam and whether they have been captured in the change register under section 10.6.9;
(c) a description of any updates to the design summary document and design criteria;
(d) a summary of construction and operation activities;
(e) a summary and analysis of the results of surveillance, instrumentation and monitoring;
(f) a review of potential TSF or dam failure modes during the review period;
(g) identification of whether the facility TSF or dam was operated during the review period according to the quantifiable performance objectives set out in section 10.5.3 (1) (c), and summarized and updated under section 10.5.4 and section 10.6.7 (6);
(h) incident reports;
(i) TSF or dam safety recommended actions, including prioritization rankings and timelines for completion.

Guidance

The Code does not differentiate between the general types of TSFs:

- TSFs that store water or saturated tailings
- Dewatered TSFs
- Co-disposed TSFs
- In-pit TSFs

The Code requirements apply equally to all TSFs, however, the information relevant to different types of TSFs may differ. The AFPR is commensurate with the complexity and risk of the TSF or dam. Table 12 includes the information that is typically provided in the AFPR.

TABLE 12: TYPICAL ANNUAL FACILITY PERFORMANCE REPORT INFORMATION.

AFPR Information
Executive Summary
Summary of Facility Description.
Summary of potential dam failure modes and performance of controls.
Summary of consequences of potential failure scenarios and the reasonably worst-case scenario.
Summary of material changes (including construction, development downstream or upstream, changes to stability and/or surface water control, instrumentation and/or visual monitoring record, infrastructure, etc.) and their effect on the safety of the TSF or dam.
Summary of updates to the Design Summary Document and design criteria.
Summary of incident reporting during the review period (related to the TSF or dam).
Summary of review of the OMS manual and EPRP.
Scheduled date for the next formal Dam Safety Review.
Summary table of dam safety recommendations, including prioritization and recommended timelines (Table 6.2 and 6.3).
Facility Description
Summary description of facility components.
Brief history of key construction milestones.
Description of material changes to the facility during the review period, and summary of updates to the change register (10.6.4(2)(b), and 10.6.9(2)).
Review of consequences of potential failure, including performance of controls during the review period. Identification as to whether the assigned consequences of failure remain appropriate. (10.5.5(2), 10.5.6(2)(b), and 10.6.4(2)(a)).
Review of the Site Characterization (10.5.2(2)).
Risk assessment review, including potential failure modes (10.6.4(2)(f) and 10.6.8(2)).
Construction and Operations
Summary of past years' construction (if any) with a description of any problems and stabilization (10.6.4(2)(d)).
Summary of past years operation (tailings deposition, water management, etc.) (10.6.4(2)(d)).
Updates to the Design Report, Design Summary Document and design criteria (10.5.3(2), 10.5.4(2)(a) and 10.6.4(2)(c)).
Updated plan and representative cross sections.
Site Visit and EoR Inspection
Summary of site visit, including any concerns or changes from previous years.
Site photographs.
Site inspection may be completed by others designated by the EoR.
Climate Data Review
Summary of annual climate data and conditions, including temperature, precipitation (rainfall and snow), wind.
Review Climate Change Assessment (10.6.11(2)).

Water Management Review
Summary of water balance review and reconciliation (10.6.7(5)).
Current and predicted storage availability in excess of the design flood (i.e., the ability to store the design flood plus the following year's tailings and water production) (10.6.7(7)).
Water discharge system, volumes and quality.
Seepage occurrence, rate or volume and water quality.
Surface water control and surface erosion.
Surveillance and Monitoring
Review of visual monitoring records from the review period.
Surveillance, monitoring and instrumentation review and analysis 10.6.4(2)(e)), including: • Phreatic surfaces and piezometric data • Seepage flows • Settlement • Lateral movement • Other instrumentation monitoring the dams or TSF (if any)
Review of QPOs and TARPs, and whether the facility operated within the pre-determined QPOs (10.6.4(2)(g) and 10.6.7(6)(b)).
Management System
Identification of key roles: • Manager • EoR • TSF and Dam QP
Summary of incident reporting during the review period, related to the TSF or dam (10.6.4(2)(h).
OMS and EPRP Review, including summary of the EPRP testing and any recommendations (10.6.6(2)).
Dam Safety Recommendations
Including prioritization and timelines for completion (10.6.4(2)(i)). Recommendations include those from the AFPR site visit, other technical reports, third-party reviews (excluding ITRB), and the DSR (10.6.2(3)(a)).
Assurance statement from the EoR
Available in Appendix III.

10.6.4 (2) (i) TSF or dam safety recommended actions, including prioritization rankings and timelines for completion.

(3) The manager must ensure that each TSF or dam safety recommended action included in the annual facility performance report under subsection (2) (i) is implemented within the timeline recommended under that provision unless the engineer of record agrees, in writing, to an alternate course of action or timeline, in which case the manager must ensure the alternate course of action or timeline is implemented.

Guidance

"Dam safety recommendation" is a general term that applies to both TSFs and dams. Dam safety recommendations are provided by the EoR related to the safety of the TSF or dam. These are generally included in the following reports:

- Annual Facility Performance Report (AFPR) by the EoR;

- Recommendation by the EoR in response to a Dam Safety Review (DSR) ; and
- Other technical reports from the EoR.

If the EoR has made recommendations related to TSF and dam safety, in technical reports outside of the AFPR, inclusion of these within the AFPR is recommended.

GOOD PRACTICE

Recommendations are expected to be SMART:

Specific:	Target a particular area for improvement.
Measurable:	Quantify how success is determined.
Achievable:	Can be completed with applicable resources.
Relevant:	Relevant, aligns with the overall safe operation of the facility.
Time:	When does the recommendation need to be addressed.

Recommendations that are not SMART tend to be difficult for mines to complete

GOOD PRACTICE

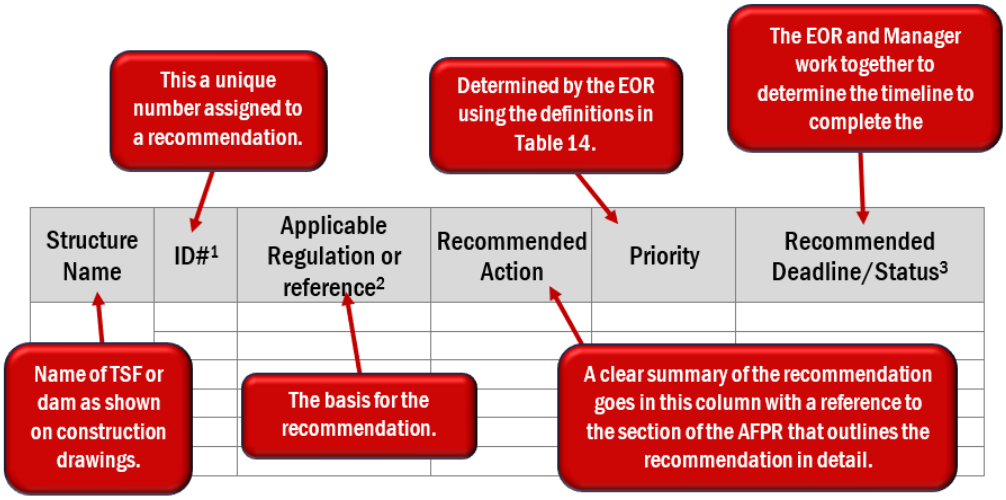
Recommendations describe actions that the EoR feels should be taken but the mine is not undertaking. If the EoR wishes to track a commitment by the mine to continue an activity, consider using wording similar to "*The mine has committed to continue monitoring the QPO at the intervals stipulated in the OMS*" in the text of the AFPR. Rather than including a recommendation that is not time bound to continue a satisfactory activity.

GOOD PRACTICE

Care is required when using words such as "*should*", "*could*" or "*must*" in the text of the AFPR, as they imply a recommendation. All recommendations are expected to be SMART and be included in a summary table as shown in Table 13.

Dam safety recommendations can include non-conformances and technical deficiencies that are related to the safety of the facility. The EoR may also include opportunities for improvement in the AFPR. Dam safety recommendations identified in the AFPR are summarized in a table that contains the information shown in Table 13 and assigned a priority as defined in Table 14.

TABLE 13: ANNUAL FACILITY PERFORMANCE REPORT RECOMMENDATIONS TABLE FORMAT.



[1]Many recommendations can take multiple years to complete. If a recommendation is not resolved before the next AFPR is issued, then the recommendation is carried forward and the ID number does not change in the new AFPR. Recommendations from the DSR retain the ID assigned in that document and are identified with a DSR prefix.
[2]If the recommendation is not followed, could the mine be out of compliance with a Code clause? A requirement in the OMS? An SOP? The Mines Act? The Mines Act Permit? Or something else?
[3]It is the manager's responsibility to complete the recommendation within the time limits set here. The manager is advised to work with the EoR to establish achievable timelines before submission to EMLI. Recommendations from previous AFPR are tracked as completed in this column for one year only. Include status of previous AFPR recommendations unless status was "closed" in the previous AFPR.

TABLE 14: PRIORITIES FOR ANNUAL FACILITY PERFORMANCE REPORT RECOMMENDATIONS.

Priority	Description
1	High probability or actual dam safety issues considered dangerous to life, health or the environment, or risk of regulatory enforcement if not addressed immediately.
2	If not corrected, could likely result in dam safety issues leading to injury, environmental impact, or significant regulatory enforcement; or a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
4	Best Management Practice – further improvements are necessary to meet industry best practices or reduce potential risks.

If there are any TSF or dam safety recommendations or deficiencies that are not being addressed in a timely manner, the manager and/or EoR may consider if these need to be reported under Code Section 10.4.4 (Duty to Report Unresolved Safety Issues) or 1.7.1 (Reportable Incidents, as related to TSFs and dams).

10.6.4 (4) The manager must ensure that the engineer of record provides a signed and sealed annual facility performance report assurance statement, in a form specified by the chief inspector.

(5) The manager must annually provide to the chief inspector, by March 31 of the following year,
  (a) the facility performance report referred to in subsection (1), and
  (b) a summary of all the TSF and dam safety recommended actions, referred to in subsection (2)(i).

Guidance

Pursuant to 10.6.4(4) of the Code, the assurance statement in a form specified by the Chief inspector is included in Appendix III. The Assurance statement is signed and sealed by the EoR and attached to the AFPR. The assurance statement is signed and sealed by the EoR upon completion of the AFPR, which is submitted to the Chief Inspector with the AFPR. An assurance statement form is available on the EMLI website and includes the assurance statement intended to be used.

If a mine is having difficulty retaining an EoR, it is encouraged to notify EMLI, which understands it can sometimes be challenging to find an engineer willing to accept the role of EoR. In these cases, EMLI can provide guidance, as appropriate. In the event that an engineer has not agreed to accept the role of EoR, the AFPR can be submitted by the professional engineer.

AFPR reporting periods may vary between mine sites depending on inspection scheduling and instrumentation and data collection and processing timelines, for example. If the reporting period for the AFPR differs from standard January to December reporting, clearly outlining the non-standard reporting period in the AFPR is required. The reporting period for each AFPR starts at the end of the reporting period for the previous AFPR.

Under 10.6.4(5)(b) the manager's annual summary of TSF and dam safety recommended actions is a confirmation that the manager plans to address the AFPR recommendations within recommended timeframes. The managers annual summary is a separate document from the AFPR and can be included with other annual summaries for TSFs and dams (examples: summary of DSR recommendations (10.6.2(4)), summary of outstanding dam safety orders 10.3.4(1)(a)(ii)) or as a separate cover letter to the AFPR report).

10.6.4 (6) The manager must
  (a) ensure that reasonable efforts are made to engage with each affected First Nation in order for each First Nation to identify if it wants to receive any of the documents referred to in subsection (5), and
  (b) provide to each First Nation a copy of each of the most recent documents identified by the First Nation under paragraph (a) of this subsection, in accordance with the timeframe applicable with respect to the chief inspector.

Guidance

The manager is responsible for ensuring that reasonable efforts are made to engage with each affected First Nations. The manager is responsible for providing reports to each First Nation that identified if they wanted any reports described in subsection (6).

Construction

10.6.5 (1) The manager must ensure that the following documents are prepared by the engineer of record for each TSF or dam:
- (a) issued for construction drawings;
- (b) issued for construction specifications;
- (c) a summary of milestones and key timelines associated with constructing the TSF or dam;
- (d) quality assurance and quality control requirements that meet the issued for construction specifications referred to in paragraph (b).

(2) The manager must ensure that the engineer of record has verified, in a form specified by the chief inspector, that the TSF or dam is ready to receive tailings or water prior to use and submitted the signed and sealed verification to the chief inspector prior to the TSF or dam receiving the tailings or water.

Guidance

Issued for Construction (IFC) drawings and specifications are signed and sealed by the EoR, or a qualified professional engineer working under the direct supervision of the EoR. The IFC documents contain all the necessary information to construct the TSF or dam.

Pursuant to 10.6.5(2) of the Code, the verification in a form specified by the Chief inspector is included in Appendix III. The manager ensures that the EoR signs and seals the verification, and that the verification is submitted to EMLI prior to the TSF or dam impounding any tailings or water.

10.6.5 (3) The manager must ensure that the engineer of record completes a construction records report when construction begins on a TSF or dam, and annually until construction is completed, and includes the following respecting the construction of the TSF or dam:
- (a) geotechnical foundation conditions;
- (b) as constructed representative cross-sections;
- (c) quality assurance and quality control data;
- (d) interpretation of the data;
- (e) a description of any unforeseen deviations or material changes from subsection (1) (a) or (b);
- (f) installed instrumentations.

(4) The manager must ensure that the construction records report includes a signed and sealed assurance statement, in a form specified by the chief inspector, from the engineer of record that the facility substantially complies in all material respects with the original design intent and that the TSF or dam is suitable for use.

Guidance

The Construction Records Report (CRR) confirms that a constructed facility meets the intent of the design and certifies the facility is suitable for operation. It also compiles documentation related to the construction methodology, quality control and quality assurance results, and survey details of the final structure.

Pursuant to 10.6.5(4) of the Code, the assurance statement in a form specified by the Chief inspector is included in Appendix III. The manager ensures that the EoR signs and seals the assurance statement and attaches it to the CRR. The CRR is submitted to EMLI by the mine manager.

10.6.5 (5) Unless otherwise stated in the permit, the manager must provide to the chief inspector

(a) the documents set out in subsection (1), prior to each stage of construction, and

(b) the construction records report as referred to in subsection (3), by June 1 of the year following the year the report is required to be completed.

EMLI advises that early submission of CRRs is a best practice and is encouraged. The CRR is submitted by June 1st in the year following the construction that is described in the report.

10.6.5 (6) The manager must

(a) ensure that reasonable efforts are made to engage with each affected First Nation in order for each First Nation to identify if it wants to receive any of the documents described in subsections (5) (a) and (b), and

(b) provide to each First Nation a copy of each of the most recent documents identified by the First Nation under paragraph (a) of this subsection, in accordance with the timeframe applicable with respect to the chief inspector.

Guidance

The manager is responsible for ensuring that reasonable efforts are made to engage with each affected First Nations. The manager is responsible for providing reports to each First Nation that expressed a desire to receive any reports described in subsection (6).

Operations, Maintenance, and Surveillance (OMS) Manual

10.6.6 (1) The manager must ensure an Operations, Maintenance and Surveillance (OMS) Manual is prepared by one or more qualified persons for each TSF or dam respecting the operations and closure of the TSF or dam.

(2) The manager must ensure that the OMS Manual is reviewed by the engineer of record unless it is prepared by the engineer of record.

(3) Prior to implementation of the OMS Manual, the manager must

(a) ensure that recommendations from the engineer of record, after a review under subsection (2), are addressed, and

(b) review and approve the OMS manual.

(4) The manager must ensure that the OMS Manual is implemented prior to the initial filling of the TSF or dam with tailings or water.

Guidance

All mines with a TSF or dam are required to have an Operation, Maintenance and Surveillance Manual (OMS) for each TSF and/or dam. These may be incorporated together in one document as the manager, Qualified Person and EoR see fit. All activities related to operations, maintenance, and surveillance for the TSF or dam are documented in the OMS.

Additional Guidance
A Guide to the Management of Tailings Facilities (2021).
Developing an Operation, Maintenance, and Surveillance Manual for Tailings and Water Management Facilities (2021).
Tailings Guide Implementation Checklist (2021).

The Mining Association of Canada (MAC) has developed several guidance documents related to management systems and OMS Manuals that can be used as resources for developing OMS Manuals for TSFs and dams. MAC recommends that the OMS be written with as much input as possible from the personnel that will be doing the work. Including the workers in the process increases the usefulness of the OMS and increases the likelihood that the OMS will be used.

10.6.6 (5) The OMS Manual must include the following:

(a) a description of roles, responsibilities and training requirements;

(b) consequences of potential failure scenarios and key design requirements of the TSFs and dams;

(c) an instrumentation, monitoring and surveillance plan;

(d) the quantifiable performance objectives set out in section 10.5.3 (1) (c), and summarized and updated under section 10.5.4 and section 10.6.7 (6);

(e) trigger action response plans in cases of escalating changes of dam safety conditions set out in section 10.6.7 (6);

(f) maintenance and testing requirements for key equipment for safe operation of the TSF or dam.

Guidance

Quantifiable Performance Objectives (QPO) are the measurable monitoring parameters that are set by the Engineer of Record. The EoR also sets predetermined limits beyond which defined action will be necessary. QPOs are identified, and then incorporated into a TARP.

The Trigger Action Response Plan, or TARP, identifies appropriate specific actions to be used in response to observed or measured changes in QPOs that are approaching management objectives. The purpose of a TARP is to help the manager respond to changing situations in a timely manner and take meaningful actions that will keep the mine operating within its predetermined limits. The TARP also includes trigger levels when a mine will alert EMLI. Some triggering events may also require additional reporting pursuant to section 1.7.1 – Reportable Incidents, EMLI advises all mines to include the requirements of section 1.7.1 in the TARP where applicable. The TARP can also include triggers to implement the Mine Emergency Response Plan (3.7.1).

When a QPO threshold has been exceeded this represents upset conditions. EMLI considers it a best practice to report all events in the TARP. EMLI recommends when reporting events that are low risk or that do not required reporting pursuant to section 1.7.1, that the mine clearly state that it is information provided in accordance with the TARP and is not a reportable incident. EMLI recommends that the 'non-reportable' reporting include:

- The QPO trigger level,
- The QPO current level,
- Actions taken in response to date, and
- Expected time to return to normal conditions.

EMLI understands that this is over and above the requirements of the Code. However, if an event does change from being non-reportable into a Reportable Incident (1.7.1), EMLI will expect the mine to provide the history of the event. Early reporting can be time saving if a situation escalates unexpectedly.

10.6.6 (6) The manager must ensure that all employees and contractors involved in the construction or operation of a TSF or dam are trained and qualified, based on the OMS Manual, prior to commencing work at the TSF or dam.

(7) The manager must ensure that the OMS Manual is

(a) reviewed annually by the TSF qualified person or dam qualified person, as applicable, and the engineer of record, and

(b) updated when the engineer of record considers it appropriate.

(8) The manager must ensure that, whenever the OMS Manual is updated, employees and contractors are provided with additional training, as appropriate.

(9) The manager must keep the OMS Manual on site and make it available to an inspector on request.

Guidance

The intention of an OMS is to collect all the knowledge required to operate a TSF or dam into a single source. MAC recommends, and EMLI agrees, that the OMS is written with as much input as possible from the people who will be doing the work. It is the manager's responsibility to ensure that all employees working on or around the TSF or dam receive the training required to complete their work safely. Section 10.6.6(6) through (9) set out the requirements for the manager to ensure that the OMS and training are kept up to date and documented.

The OMS itself, the training records and review records do not need to be submitted to EMLI. However, the manager may be required to demonstrate that training and review has occurred. Robust record keeping is the easiest method to demonstrate this. The AFPR assurance statement does require the EoR to acknowledge that they have reviewed the OMS.

10.6.6 (10) If, before the date this section comes into force, an OMS manual was prepared in accordance with section 10.5.2 of the code, as it read immediately before its repeal,

(a) the manager must ensure that, before May 1, 2025, one or more qualified persons updates the manual so that the requirements of subsection (5) of this section are met, and

(b) subsection (4) of this section does not apply with respect of the manual.

Guidance

Most mines will already have an existing OMS. The requirements under subsection (5) are new with this revision of the Code. When the code comes into force some mines might be out of compliance with one or more of these new requirements. Mines are given a year to update the existing OMS to the requirements under subsection (5).

10.6.6(10)(b) Mines will not be held retroactively out of compliance with subsection (4).

Water Management

10.6.7 (1) The manager must ensure that a qualified professional develops an overall site water balance and overall water management plan for the mine.

(2) The manager must ensure that a qualified professional

(a) reconciles the overall site water balance annually, and

(b) updates the overall water management plan when there are material changes.

(3) The manager must ensure that, when the overall site water balance and overall water management plan is developed under subsection (1) or the overall site water balance is reconciled under subsection (2),

(a) reasonable efforts are made to engage with affected First Nations, and

(b) local Indigenous knowledge received under paragraph (a) is considered.

Guidance

Under the previous code the site wide water balance was completed at permitting and did not require subsequent updates. The new code requires a Qualified Professional to reconcile the overall site water balance annually and update the balance and management plan as necessary. This may be challenging for some mines given that the previous site wide water balance may no longer be valid. Mines do have an implementation period in sub-section (12). Guidance for the content of the water balance is provided in sub-section (8) below.

A Qualified Professional is a professional licenced to practice in BC under the Professional Governance Act, who is operating in their area of professional expertise and has experience commensurate with the complexity of the project.

The Qualified Professional who prepares and reconciles the site wide water balance and water management plan does not need to be the EoR nor does the qualified professional need to work under the direct supervision of the EoR. The annual reconciliation is submitted to EMLI annually (see subsection (10)).

10.6.7 (4) The manager must ensure that a qualified professional develops a water balance and water management plan for each TSF and dam that is
- (a) integrated with the overall site water balance and overall water management plan referred to in subsection (1), and
- (b) based on the design summary document as set out in section 10.5.4.

(5) Respecting the water balance and water management plan referred to in subsection (4), the manager must ensure that a qualified professional
- (a) reconciles the water balance annually, and
- (b) updates the water management plan when there are material changes.

Guidance

Similar to the site-wide water balance and water management plan the TSF or dam water balance and water management plan are prepared and reconciled annually by a qualified professional. The qualified professional does not need to be the EoR, nor are they required to work under the direct supervision of the EoR. The TSF or dam water balance is integrated into the site wide water balance.

10.6.7 (6) The manager must ensure the engineer of record
- (a) develops quantifiable performance objectives, and trigger action response plans in cases of escalating changes of dam safety conditions, that are informed by the water balance and water management plan for the TSF or dam, and
- (b) reviews and updates the quantifiable performance objectives, and trigger action response plans, as set out in paragraph (a) when the engineer of record considers it appropriate.

(7) The manager must ensure that

(a) the quantity of water predicted by the water balance can be safely stored, and
(b) surplus water balances are reduced in accordance with a plan approved by the engineer of record.

Guidance

In practice, development of QPOs and TARPs require the EoR and qualified professional to work together over multiple iterations of the water balance model. For example, the initial water balance may show water accumulation that is deemed unacceptable by the EoR. The EoR would then set a maximum allowable amount of water accumulation and the qualified professional would reevaluate the water balance model to determine how to manage the water without allowing it to accumulate. The water volumes that require management would then be given to the EoR to design water management facilities to ensure the maximum allowable water volume, identified in earlier steps, is maintained. The AFPR assurance statement contains a statement that the EoR has reviewed the QPOs and TARPs.

The water balance model provides a prediction of expected water flows and accumulation within the TSF or dam. It is the manager's responsibility to ensure that the mine has sufficient infrastructure to safely manage the expected flows. Additionally, the manager is responsible for ensuring that any excess water can be safely stored or discharged. EMLI does not regulate mine water or effluent discharge. Mines are advised to confirm that the necessary permits are in place. When discharging water, safety of the public and workers is paramount. The manager is responsible for working with the EoR to develop a plan to safely discharge the water, ensuring the safety of the public and workers as well as the integrity of the structure.

10.6.7 (8) The manager must ensure that the water balance and water management plans for each TSF or dam referred to in subsection (4) include the following:
(a) water usage, water sources and discharges from the mine;
(b) layout of all water management infrastructure;
(c) location of monitors and methods;
(d) water balance schematics;
(e) climate conditions and hydrology;
(f) groundwater and surface water interactions;
(g) water balance projections.

Guidance

The MAC Tailings Guide (2021a) provides guidance related to what to included in the water management plans for a TSF or dam. The JAIR guideline (2024) also includes requirements for site-wide Water Management Plans and site-wide water balance models. The water balance model evaluates the equation:

Inflows – Outflows = Change in Storage

The complexity of the model is commensurate with the complexity of the facility. For a small low-risk facility with few inputs, and outputs or a flow through facility with an appropriately sized spillway and no expected change in storage, a water balance model could be completed in a spreadsheet using annual average values. For larger or more complex structures a dedicated modeling software using stochastic inputs is typical.

Ground water and surface water are sources and sinks in the water balance and are tracked in the balance. These interactions are also important for the mine to quantify the amount of mine water that will be escaping to the environment through ground water flows. EMLI does not regulate mine water or effluent discharge, however, the mine will typically provide this information to other regulators in BC.

10.6.7 (9) The manager must immediately notify the chief inspector and affected communities and First Nations if any water discharged without a permit occurs or is necessary.

(10) The manager must provide to the chief inspector

(a) the annual reconciliation of the overall site water balance referred to in subsection (2), by March 31 of the year following the year it is reconciled,

(b) the updated overall water management plan referred to in subsection (2), by March 31 of the year following the year it is updated, and

(c) the updated water management plan referred to in subsection (5), by March 31 of the year following the year it is updated.

Guidance

EMLI does not regulate discharge of mine water or effluent. It can happen that excess water accumulates on a mine site even with proper management and adherence to the OMS, SOPs and the Code. If excess water does accumulate and the manager and EoR determine that a discharge is required to protect the health and safety of the public and workers on the site and preserve the stability of the TSF or dam, then it is the manager's responsibility to notify the Chief Inspector, affected communities and affected First Nations. The sooner the notification can be given the better, but at a minimum, notification coincides with the start of the discharge.

The report of the annual water balance reconciliation includes the minimum information outlined in (8) and is submitted every year. Submitting updates to the water management plans is only required if there have been changes to the water management plans. The AFPR assurance statement includes a statement that the EoR has reviewed the Water balance and Water Management Plans.

10.6.7 (11) The manager must

(a) ensure that reasonable efforts are made to engage with each affected First Nation in order for each First Nation to identify if it wants to receive any of the documents referred to in subsection (10), and

(b) provide to each First Nation a copy of each of the most recent documents identified by the First Nation under paragraph (a) of this subsection, in accordance with the timeframe applicable with respect to the chief inspector.

Guidance

The manager is responsible for ensuring that reasonable efforts are made to engage with each affected First Nations. The manager is responsible for providing reports to each First Nation that has expressed a desire to receive any reports described in subsection (11).

10.6.7 (12) If, before the date this section comes into force, an overall site water balance was completed in accordance with section 10.1.3 (d) (xi) of the code, as it read immediately before its repeal, and an overall water management plan was completed in accordance with section 10.1.3 (d) (vi) of the code, as it read immediately before its repeal,

(a) the manager is not required to comply with subsections (1), (2), (3), (10) (a) and (b) and (11) of this section, with respect to the overall site water balance and overall water management plan, until March 30, 2026, and

(b) despite their repeal, sections 10.1.3 (d) (vi) and 10.1.3 (d) (xi), as they read immediately before their repeal, continue to apply to the overall site water balance and overall water management plan, respectively, until the earlier of the following:

(i) the manager complies with subsections (1), (2), (3), (10) (a) and (b) and (11) of this section;

(ii) March 30, 2026.

Guidance

Under the November 2022 code, a mine was required to develop a site-wide water balance (WB) and site-wide water management plan (WMP) during permitting. There was no requirement to update the site-wide WB or the WMP after permitting. Section 10.6.7(10) requires the mine to reconcile the site-wide WB and WMP and submit the results by March 31st of each year. March 30th , 2026 was chosen specifically in subsection (a) to allow the mine 2 years to update the site-wide water reporting, but also have the update completed prior to the March 31st submission date set in subsection (10).

10.6.7(12)(b) ensures that the requirement for a site wide WB and WMP are continuous while the mine is updating the existing reports.

10.6.7 (13) If, before the date this section comes into force, a water balance and water management plan was completed for a TSF or dam in accordance with section 10.1.12 (1) of the code, as it read immediately before its repeal,

(a) the manager is not required to comply with subsections (4) (a) and (8) of this section in respect of the water balance and water management plans until March 30, 2026,

(b) despite its repeal, section 10.1.12 (1), as it read immediately before its repeal, continues to apply to the water balance and water management plan until the earlier of the following:
  (i) the manager complies with subsections (4) (a) and (8) of this section;
  (ii) March 30, 2026, and
(c) subject to subsection (14) of this section, the manager must provide to the chief inspector the annual reconciliation of the water balance by March 31 of the year following the year it is reconciled.

Guidance

Mines were required to have and maintain a TSF WB and WMP under the November 2022 code. Subsection (a) recognises that subsections (4)(a) and (8) are new requirements for the TSF reports and allows mines 2 years to update to the new requirements. As above March 30th was chosen specifically such that the updates will be completed prior to the submission date set for annual reporting.

10.6.7(13)(b) ensures that the requirements of the old code are continuous while the mine is updating to the new requirements.

10.6.7(13)(c) Under the new Code the TSF WB is incorporated into the site wide WB and is reconciled with the site wide WB. The results of the reconciliation are submitted annually on March 31st pursuant to 10.6.7(10)(a). Under section 10.6.7(12) mines are exempt from submitting the annual site wide reconciliation until March 31st , 2026. Subsection (c) requires the mine to submit the TSF WB reconciliation as was required under the November 2022 code.

10.6.7 (14) Subsection (13) (c) of this section ceases to apply after the annual reconciliation of the water balance that is due by March 31, 2025 is provided to the chief inspector.

Guidance

Mines will be submitting the TSF WB reconciliation as part of the site-wide WB under subsection (10) (a) starting March 31st, 2026. Subsection (14) stops the requirement under subsection (13)(c) to submit a TSF WB separately annually after the mine has submitted a TSF WB in 2025.

Risk Assessment

10.6.8 (1) Prior to the initial filling of the TSF or dam with tailings or water, the manager must ensure that a risk assessment is prepared by a qualified professional, with experience commensurate with the complexity of the TSF or dam, that documents the likelihood of potential failure scenarios and the consequences of potential failure scenarios.

(2) The manager must ensure that the engineer of record annually reviews the risk assessment to ensure that the following, at a minimum, are current and appropriate to manage risks:
  (a) the quantifiable performance objectives set out in section 10.5.3 (1) (c), and summarized and updated under section 10.5.4, and section 10.6.7 (6);
  (b) the operating and monitoring requirements set out in the Operations Maintenance and Surveillance Manual prepared under section 10.6.6.

Guidance

The objectives of the risk assessment include:

- Identify all risks associated with the structure.
- Assess the impacts associated with those risks.
- Inform selection of design alternatives for assessment to select best available technology.
- Develop design objectives.
- Determine monitoring objectives.

The AFPR assurance statement includes a statement that the EoR has reviewed the risk assessment and determined that the QPO and OMS are adequate.

Change Register

10.6.9 (1) The manager must develop and maintain a change register, in consultation with the engineer of record, to track material changes to the design, construction, operation and closure of each TSF and dam.
(2) The manager must ensure that the engineer of record acknowledges and addresses all material changes entered into the change register.
(3) The manager must ensure that the change register is made available to an inspector on request.

Guidance

Change is a potential source of risk for a TSF or dam, and management of change throughout the lifecycle is an important part of safe and responsible management of these facilities. Material changes to the processes, personnel, or operations of a TSF or dam are documented in a formal change management process. Cumulative effects of changes, or interactions between multiple concurrent changes that may seem minor on their own, but when combined could have more severe consequences, and are a source of risk. The AFPR assurance statement contains a statement that the EoR has acknowledged and addressed all material changes entered into the change register that year.

Emergency Preparedness and Response Plan

10.6.10 (1) The manager must develop an Emergency Preparedness and Response Plan (EPRP) for potential TSF or dam failures that is included in the Mine

Emergency Response Plan (MERP) required under section 3.7.1 (2) (c) and that contains the following minimum components:

(a) one or more maps showing potential impact zones and potentially affected infrastructure;
(b) emergency escalation levels detailing escalation triggers;
(c) stakeholders, potentially affected First Nations and community warnings and notifications;
(d) emergency responses and procedures including evacuation of mine personnel;
(e) roles, responsibilities and contact information of key personnel.

Guidance

An Emergency Preparedness and Response Plan (EPRP) is required for all TSFs and Dams. The EPRP will change and be updated continuously for all phases of the facility lifecycle. The EPRP is integrated with the Mine Emergency Response Plan (MERP)(3.7.1).

Impact zones and potentially affected infrastructure are based on the dam breach and inundation study or runout assessment. Affected stakeholders, First Nations and communities are identified based on the impact zones and communication standards are set in the EPRP. An EPRP contains multiple levels of risk and the actions required to take in response to the risk. The EPRP lists the roles, responsibilities and contact details of mine personnel and the responsibilities and contact details of external emergency response personnel. There is also a single point of contact with EMLI, provided on the EMLI Mine Incident Reporting website.

The current MERP template is available on the EMLI website.

10.6.10 (2) The manager must ensure that testing of the Emergency Preparedness and Response Plan is conducted in accordance with the following:

(a) functional tests of parts of the plan are conducted annually;
(b) a functional test of the full plan is conducted, at a minimum, every 3 years;
(c) reasonable efforts are made to include potentially affected communities and potentially affected First Nations in the testing under paragraphs (a) and (b).

(3) The manager must ensure that

(a) all identified issues or recommendations as a result of the testing under subsection (2) (a) and (b) are addressed, and
(b) the Emergency Preparedness Response Plan is kept up to date.

Guidance

Annual functional tests of parts of the plan are expected to be desktop exercises that steps through a scenario and confirms the following:

- The listed roles and responsibilities are correct.
- The listed contact details are correct.
- The trigger levels are correct, and
- The response plan is valid and has not been impacted by changes to the mine.

The parts of the plan that are tested include alarms, material sources, emergency radio systems, or suppliers. The annual functional test of the EPRP is separate from and does not replace the annual testing requirements of the MERP.

The functional test of the full plan tests the coordination, command and control between various coordination centres. It can include limited 'boots on the ground' but does not require external agencies to mobilize to site. The functional test of the full plan can replace the annual MERP test in the year that it occurs. It is typical for tests of an EPRP to reveal gaps. When this occurs the EPRP is updated to address the identified issues.

10.6.10 (4) If, before the date this section comes into force, an Emergency Preparedness and Response Plan was made for a TSF or dam in accordance with section 10.4.2 (1) (e), as it read immediately before its repeal,

(a) the manager must, before May 1, 2025, update the plan so that the requirements of subsection (1) of this section are met, and

(b) despite its repeal, section 10.4.2 (1) (e), as it read immediately before its repeal, continues to apply with respect to the plan until the earlier of the following:

(i) the plan has been updated in accordance with paragraph (a) of this subsection;

(ii) May 1,2025.

Guidance

All mines with a TSF were required to have an EPRP under the November 2022 code. The requirements under subsections (1)(a) through (e) are new. Subsection (4)(a) requires mines to update the existing EPRP and gives them until 2025 to complete the update.

10.6.10(4)(b) ensures the requirement to have and maintain an EPRP under the November 2022 code is continuous while the mine is updating to the new requirements. Additionally, the previous version of the Code does not require an EPRP for non-TSF dams. By remaining in force until May 1st, 2025, the November 2022 code provides the mine manager one year to ensure that an EPRP is developed for all dams on the site and incorporated into the MERP, including dams that were not required to have an EPRP under the previous version of the Code.

Climate Change

10.6.11 (1) The manager must engage qualified professionals to assess the hydrological and climate conditions, and other relevant conditions associated with climate change, for each TSF and dam at least every 5 years.

(2) The climate change assessment described in subsection (1) must be reviewed by the engineer of record for the TSF or dam and incorporated into the design summary document as set out in section 10.5.4.

Guidance

Climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (from United Nations Framework Convention on Climate Change).

Climate change with respect to a TSF or dam can affect, for example, the water balance, water cover, floods or severity of floods, runoff, ice formation, vegetative covers, timing of freshet and dry or drought conditions. This is an evolving science with approaches and techniques continuing to be refined. Considering resilience to climate change as part of the design and construction of TSFs and dams closure design is recommended. MAC's Guide on Climate Change Adaptation for the Mining Sector (2021c) outlines a three-stage process that mines can apply to incorporate climate change adaptation considerations into decision-making.

The AFPR assurance statement includes a statement form that the EoR has reviewed the climate change assessment.

Closure Design for TSF and Dams

10.6.12 (1) The manager must ensure that, for each TSF or dam, the engineer of record develops a closure design report that shows how closure of the TSF or dam is feasible.

(2) Despite subsection (1), if, on the date this subsection comes into force, a closure design report for each TSF and dam as described in subsection (1) has not already been submitted to the chief permitting officer under section 10.2.2 (i), the manager must, within 3 years after the date this subsection comes into force,

(a) ensure the engineer of record develops a closure design report for each TSF or dam in accordance with subsection (1), and

(b) provide each closure design report referred to in paragraph (a) of this subsection to the chief inspector.

(3) The manager must ensure that each closure design report referred to in subsection (1) or (2) (a) is

(a) updated by the engineer of record at least every 5 years, and

(b) provided to the chief inspector by March 31 of the year following the update.

(4) No less than 3 years prior to a planned closure of a TSF or dam, the manager must

(a) ensure that the engineer of record updates the closure design report for the TSF or dam that shows in detail

(i) how the TSF or dam will achieve closure, and

(ii) the schedule for implementation, and

(b) provide the closure design report to the chief inspector by March 31 of the year following the update.

Guidance

Many TSFs and dams will need to remain in service well after the mining operation has ceased, as they may be required for long-term water treatment or water management. Feasibility level closure designs are expected to be developed for all TSFs and dams to demonstrate how the facility will feasibly meet its closure objectives.

Mines are given 3 years to submit the feasibility closure design report, if one has not been submitted already. This report is to be updated every 5 years by the EoR.

Detailed design level TSF closure reports are required when the TSF is within 3 years of planned closure. Planned closure can mean any of the following:

- The TSF is filled to its maximum permitted tailings storage capacity.
- The mine has processed all permitted reserves.
- The mine has ceased operations and is not expected to restart within a few years.

10.6.12 (5) If a closure design report is provided to the chief inspector under subsection (4) (b) and, subsequently, the permit respecting the TSF or dam is extended so that the planned closure date is 5 years or longer from the date the updated report is provided to the chief inspector, the manager may update and provide the closure design report of the TSF or dam in accordance with subsection (3) (a) and (b), until such time as subsection (4) applies with respect to the TSF or dam.

Guidance

If a permit is issued extending the mine life and TSF operation, then the Detailed Closure Design Report submitted under (4) would satisfy the requirements of (3)(a) and (b) for the next reporting period. An updated detailed closure design is still needed to satisfy (4) when the mine does eventually plan to close.

10.6.12 (6) A closure design report developed or updated under this section must

(a) address the following:

(i) physical stability for potential long-term changes to slope stability, floods and water erosion, and other natural or mine-induced hazards;
(ii) long-term prevention, mitigation and management of metal leaching and acid rock drainage for the offsite release of mine-affected groundwater and surface water;
(iii) ecological and landform aspects that influence closure;
(iv) land and water use objectives,

(b) include the following:
(i) a design of permanent spillways and other necessary civil works;
(ii) a cost estimate and schedule for implementation;
(iii) a long-term monitoring plan, and

(c) demonstrate how the TSF or dam will meet the criteria for final closure as set out in Table 10-4, subject to section 10.5.7 (6).

(7) The manager must ensure that, in developing the land and water use objectives referred to in subsection (6) (a) (iv),
(a) reasonable efforts are made to engage with local communities and affected First Nations, and
(b) local Indigenous knowledge received under paragraph (a) is considered.

(8) The manager must
(a) ensure that reasonable efforts are made to engage with each affected First Nation in order for each First Nation to identify if it wants to receive each closure design report developed or updated under this section, whichever is the most recent, and
(b) provide a copy of the most recent report to each First Nation that identifies under paragraph (a) of this subsection it wants to receive it, in accordance with the timeframe applicable with respect to the chief inspector.

Guidance

Good Practice mines will reduce their closure timelines and closure costing by building to a Final Closure design from the start. Building to final design also makes progressive closure of a TSF or dam possible. Mines are eligible to apply for bonding reductions if they can demonstrate a reduction in their closure liability.

The Closure Design Report for a TSF or dam (feasibility or detailed) requires a broad range of technical, environmental and social subject matter experts. While the responsibility for preparation of the closure design report rests with the EoR, the EoR is likely not qualified to address environmental, ecological, social and First Nation components. Accordingly, the closure design report has two components:

1. *Engineering*: design of works (dams, water management works) to ensure long-term physical stability considering potential failure modes and design of robust

systems to reduce risks of failure including the potential for acid rock drainage and metal leaching.

2. *Ecological, Social and First Nations*: In developing the engineering design report, the EoR needs to be advised of potential ecological, social and First Nations considerations that could affect the design. The manager is responsible for providing this information to the EoR for consideration in the design.

Controlling Failure Modes for Closure

In the context of the Code and this Guidance Document, the controlling failure mode is physically possible, no matter how low the likelihood of failure. The basis and rationale for eliminating potential failure modes, as not physically possible, are rigorously developed and documented (ICOLD 2022) by the EoR and other supporting professionals. Base the failure mode and resulting inundated area on supportable technical analyses.

10.6.12 (9) If, on the date this section comes into force, the planned closure of a TSF or dam is less than 3 years, or a TSF or dam is inactive, the manager must,

(a) within 3 years after the date this section comes into force,

(i) ensure that the engineer of record updates the closure design report for the TSF or dam that shows in detail

(A) how the TSF or dam will achieve closure, and

(B) the schedule for implementation, and

(ii) provide the closure design report to the chief inspector by March 31 of the year following the update, and

(b) in meeting the requirements of paragraph (a) of this subsection, comply with subsections (6), (7) and (8).

Guidance

Mines are required to prepare a closure plan at permitting and update it every 5 years. Subsection (4) adds a new requirement that the level of effort for the closure plan be increased and the plan that is submitted show in detail how the mine will actually be closed. Under subsection (4) the detailed design is to be submitted three years prior to the actual closure. Some mines will already be closed on the day the new code comes into force others will be closing in less than three years after the day the new code comes into force. Subsection (9)(a) allows mines that are closed or will be closing, three years to submit a detailed closure plan.

Closed TSFs or Dams

The CDA Mining Dams Bulletin indicates that, "…closure is the process of establishing a configuration for the dam with the objective of achieving long term physical, chemical, ecological, and social stability and a sustainable, environmentally appropriate after use. This configuration can be achieved during or after mine operations." (CDA 2019).

10.6.13 (1) must not deposit tailings into the TSF unless the TSF has been reactivated in accordance with paragraph (a).

(2) If the chief inspector declares a TSF closed under subsection (1), the manager

(a) must not reactivate the TSF unless the chief permitting officer grants another permit that allows the reactivation, and

(b) must not deposit tailings into the TSF unless the TSF has been reactivated in accordance with paragraph (a).

Guidance

A TSF that has been inactive (meaning tailings not being deposited into the facility) for more than 12 months can be declared closed by the Chief Inspector. A closed TSF cannot be reactivated without a permit amendment from the chief permitting officer. An application for reactivation of the TSF includes supporting documentation demonstrating the operation of the TSF will be in concordance with the Code, accepted industry practices and any other information required by the chief permitting officer.

10.6.12 (3) The manager of a TSF or dam that has achieved final closure and approval of the engineer of record may apply to the chief permitting officer for the release of permit obligations under the Mines Act.

(4) If the manager of a TSF or dam has completed substantial work towards final closure of the TSF or dam but has not been granted release of permit obligations as referred to in subsection (3), the manager may apply for permit amendments to reduce requirements under this code related to the TSF or dam.

(5) The manager must apply for a permit from the chief permitting officer when a closed TSF or dam is to be altered or used for some other purpose than storage of tailings.

Guidance

Closure of a TSF is done over stages, such as those utilized by CDA (Transition, Active Closure and Passive Closure). Final Closure is the final or ultimate stage of closure of a facility and generally means that the approved closure plan and design has been completed, and the closure objectives are demonstrably achieved.

For consideration for a reduction in Code requirements, an application is submitted that demonstrates successful completion of a major piece of closure work that substantially reduces the risk of the facility, such as a closure spillway. The application also includes recommendations from the EoR with the suggested Code requirements to be reduced.

To be eligible for release of permit obligations, an application is assessed based on data that demonstrates that over a long period of time there have been no changes to the facility, and that risk profile of the facility is similar to the surrounding terrain. This means that the dam or TSF is decommissioned or landformed. The term decommissioning typically refers to the removal or breach of a dam so that it no longer retains flowable tailings or water that may pose safety or environmental concerns. A landform is a facility

that is demonstrated to have a risk profile similar to, or lower than, the surrounding environment.

Removing or breaching a dam are options when considering a dam that impounded water during operations but may not be appropriate for TSFs or other impoundments required to manage water from the mine site during the closure period. The closure plan for a TSF or dam is developed in conjunction with the closure plans for other TSFs or dams on the mine site, as well as the overall mine closure plan. All the closure plans are interrelated but each is able to function as a stand-alone report.

Breaching a dam requires a permit that authorizes the closure design, such as the breached section location, dimensions, design criteria, armoring and surface water management plan.

Table 15 provides context for activities and milestones related to the closure of dams and TSFs on mine sites in B.C., and a conceptual timeline for the closure period is provided in Figure 10[1].

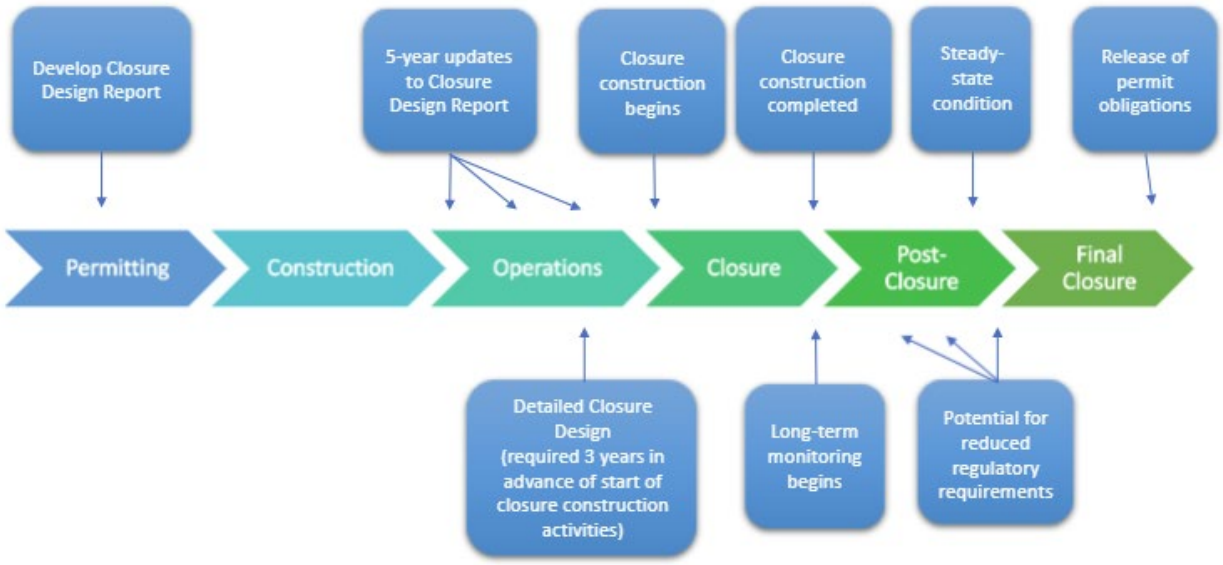


FIGURE 10: TYPICAL CONCEPTUAL CLOSURE TIMELINE FOR TSFS AND DAMS.

[1]Life of Mine timeline is for illustration only. Mining phases will vary for actual Mine Plans.

TABLE 15: CLOSURE ASPECTS FOR TSFS AND DAMS.

Closure Activity	Context
TSF or Dam Closure Objectives	• Developed in consideration of the site closure plan, the TSF or dam closure objectives inform the closure design and configuration. • Consider Health and safety, water stewardship, land use, ecosystem, cultural and local community considerations when developing the closure objectives. There may be other site-specific considerations to be included as well. • Input from affected First Nations is required. Include other stakeholders as well.
Initial Closure Design Report for the TSF or Dam	• Developed in consideration of the overall closure plan and submitted to EMLI as part of the permit application. • Undertake a multi-criteria alternatives analysis for the closure configuration, considering the closure objectives. • Initial Closure design is feasible to construct. • Operators with existing facilities are advised to review their Initial Closure design and ensure that it meets the requirement for "feasible to construct", and that it is at a higher level than conceptual design. Updates to closure plan for existing TSF or dams may be required. • Input from local First Nations and other indigenous groups is required. • Meet relevant industry guidelines with the Initial Closure Design . Refer to Appendix II.
Detailed Closure Design	• Developed and submitted to EMLI at least three years in advance of closure of the mine or TSF. • This is the closure design that will be implemented, although further assessments may still be completed. • Input from local First Nations and other Indigenous Groups is required. • Meets relevant industry guidelines. Refer to Appendix II.
Inactive TSF	• A TSF into which tailings are no longer being actively deposited, may be declared Closed by the Chief Inspector after 12 months of inactivity. • For operations to restart or resume, develop and submit a new permit application to EMLI.
Closure Construction Completed	• The detailed closure design has been fully constructed and implemented, and no further physical changes to the TSF or dam are expected (i.e., construction activities for the closure configuration have been completed).

Post-closure period	• Starts when the Final Closure construction for the TSF or Dam, along with other reclamation activities, have been completed.
	• Long-term monitoring program begins during the Post-closure Period, and the facility's OMS Manual is updated to reflect this.
	• During the post-closure period, the performance of the dam achieves a steady state condition. This includes:
	  • Pore pressures within the dam have reduced and stabilized.
	  • Erosion gullies that do not self-heal are not forming; dam erosion measures are effective.
	  • Deformations are either non-existent or are at a steady state and do not present a dam safety concern.
	• Many years of monitoring may be required to demonstrate that a TSF or dam has reached a steady-state condition.

Closure Activity	Context

Reduced Regulatory Requirements	• EMLI will consider applications for reduced regulatory requirements, following:
	  • completion of significant closure works on a TSF or dam; and
	  • the TSF or dam can be demonstrated to have an on-going low risk profile, particularly in terms of geotechnical stability and dam safety.
	• Reductions may be granted to operators who apply to EMLI and demonstrate over a long period of time that there have been no changes to the facility, and that a very low risk profile remains as related to safety, health, environment, and communities for the lifespan of the facility.
	• Potential reductions in regulatory requirements may include reduced frequency of:
	  • Annual Facility Performance Review and Annual Manager's Report
	  • Dam Safety Reviews
	  • ITRB meetings, or potential exemption from having an ITRB
	  • Review and updates to management system documents (e.g., OMS Manual, EPRP)
	  • EPRP Testing
	  • Reduced Regulatory Requirements for a TSF or dam is granted by the Chief Permitting Officer on a case-by-case basis, based on site specific conditions and residual risks.

Release of Permit Obligations (partial or full)	• EMLI may consider applications for release of permit obligations, when sufficient monitoring has taken place to demonstrate that no further intervention is required by the operator (i.e., there are no maintenance or monitoring requirements). • Partial release of permit obligations may be granted for specific facilities at the site (i.e., the TSF or dam), but not the full mine site. • The TSF or dam does not pose ongoing material risks to people or the environment. • Justifications are supported by assessments from qualified professionals and the EoR (or Professional Engineer for dams without an EoR), and which have undergone an independent, documented, third-party review. • Release of permit obligations for a TSF or dam is granted by the Chief Permitting Officer on a case-by-case basis, based on site specific conditions and residual risks.

Decommissioning of Dams

The decision to decommission a dam can be complex, with many factors and a wide range of effects to consider:

- Hydraulic changes to the stream after dam removal may result in erosion, bank instabilities, and the loss of flood attenuation capabilities.
- Potential release of excessive sediment impounded in the reservoir and upstream of the dam. The sediment may contain toxic materials and excessive nutrients.

 Additional Guidance
ICOLD Bulletin 153, Sustainable Design and Post-Closure Performance of Tailings Dams (2013).
ICOLD Bulletin 194, Tailings Dam Safety (2022).

- Passage may be restored, both upstream and downstream, for fish and aquatic organisms.
- Vegetation changes along stream, especially upstream in former reservoir area.
- Social and Cultural Considerations.
- Public safety and impacts to downstream infrastructure and property.
- Identified end land uses associated with the reservoir.
- Liability issues related to unsafe dams or dam removal.

Decommissioning or Landforming of Closed TSFs

Decommissioning or landforming a closed TSF is typically completed for the same purpose: to reduce the risk of the TSF to as low as reasonably possible and in a state that can be demonstrated, regular monitoring and maintenance of the facility is no longer required to prevent a release of tailings from the facility. This facility would then be eligible to apply for a release of Code and Mines Act permit obligations.

For tailings behind a dam or contained in a stack or co-disposed dump, this typically means that the tailings are not flowable, and conditions cannot develop that would cause the tailings to be flowable.

For tailings stored below ground, such as closed in-pit TSFs with no dams, where there is no potential for tailings to be released, decommissioning of a TSF is typically simpler.

However, external hazards such as large pit slope failures or other geohazards may impact the facility and cause tailings to be released.

Additional Guidance

FLRNORD Dam Safety Program, Dam Decommissioning Guidelines (2019)

https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/dam-safety/dam_decommissioning_guideline_-_ver_1.pdf

The Chief Permitting Officer is the statutory decision maker on applications for the release of Code and Mines Act permit requirements. All applications are reviewed on a case-by-case basis and require robust supporting documentation from the EoR.

Mine Closure and Reclamation Standard

A Reclamation and Closure Plan describes how a mine will be reclaimed and closed to return the mine site to an environmentally stable condition suitable for future land uses. Reporting requirements from the Code are summarized in Figure 11.

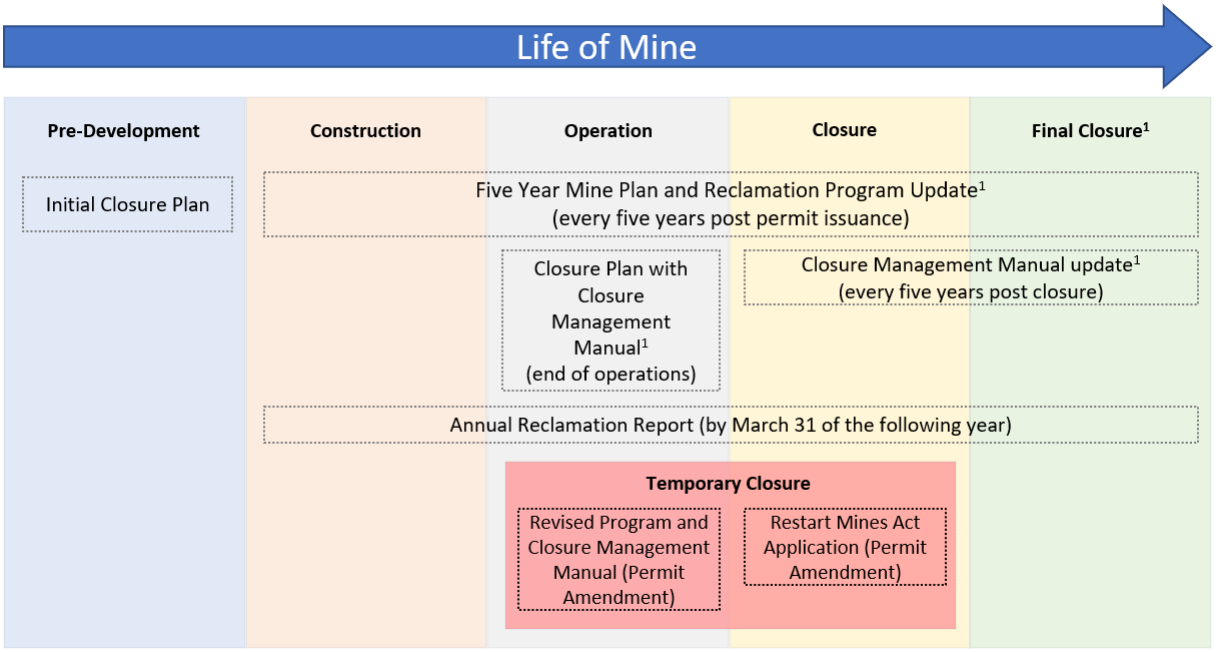


FIGURE 11: LIFE OF MINE REPORTING REQUIREMENTS – RECLAMATION.

[1]Until liability is relinquished / released.
[2]May trigger a permit amendment.

Elements of a Reclamation and Closure Plan

A reclamation and closure plan should address, but not be limited to the following:

- Reclamation objectives, including closure design criteria.
- Progressive reclamation of the site during the life of the operation.
- Removal or stabilization of any structures and workings.
- Design of tailings and waste rock disposal areas.
- Reclamation and re-vegetation of the surface disturbances wherever practicable.
- Methods for protection of water resources.
- Temporary closure plan.
- Cost estimate of the work required to close and reclaim the mine and mine site and

- Plan for ongoing and post-closure monitoring and reporting at the site. A plan should include the establishment of thresholds and identified adaptive management responses should such thresholds be reached.

Annual Reclamation Report

The manager should file an annual report stating what progressive reclamation has been accomplished and the results of environmental monitoring programs.

The annual reclamation report template (short form), which applies to sand and gravel operations, is included in Appendix III (Forms).

Code clauses 10.7.1 through 10.9.22 are mostly unchanged from the earlier version of the code. The clauses have been renumbered but the content is mostly the same. The Mines Audit Unit is currently (April 2024) auditing major mine closure in BC. When the Closure Audit is completed and the results have been released, the closure sections of the Code will be updated. This guidance document will be updated together with the updates to the Code. In general, EMLI is moving more towards a proactive 'begin with the end in mind' approach to TSF and dam closure.

This is reflected in clause 10.6.12 requiring:

- A closure design that shows a feasible closure plan, that is updated every 5 years, and
- A closure plan that shows in detail how the TSF or dam will be closed, submitted 3 years prior to a planned closure.

The guidance below is from the 2016 guidance document. Mine closure is a developing field in the industry. Mines are advised to review the guidance from 2016. Mines are reminded that the guidance from 2016 is likely outdated.

References

B.C. Ministry of Energy, Mines and Low Carbon Innovation (EMLI), B.C. Ministry of Environment and Climate Change Strategy (ECCS). 2024. "Joint Application Information Requirements (JAIR) Guidance Document." April.

B.C. Ministry of Forests, Lands, Natural Resources Operations and Rural Development (FLNRORD). 2019. Dam Safety Program, Dam Commissioning Guidelines.

Canadian Council of Ministers of the Environment (CCME). 2021. Guidance on Good Practices in Climate change Risk Assessment.

Canadian Dam Association (CDA). 2013. "Dam Safety Guidelines 2007 (Revised 2013)."

Canadian Dam Association (CDA). 2016. "Technical Bulletin: Dam Safety Reviews."

Canadian Dam Association (CDA). 2019. "Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams."

Canadian Dam Association (CDA). 2021. "Technical Bulletin: Tailings Dam Breach Analysis."

Canadian Dam Association (CDA). 2023. "Technical Bulletin: Revision to Consequences of Failure – Environmental consequence Classification."

Hawley, M. and Cunning J. 2017. Guidelines for Mine Waste Dump and Stockpile Design.

Engineers and Geoscientists of British Columbia (EGBC). 2016. "Guideline for site Characterization for Dam foundations in British Columbia".

Engineers and Geoscientists of British Columbia (EGBC). 2023. Guide to the Standard for Direct Supervision V3.0

Engineers and Geoscientists of British Columbia (EGBC). 2023. Guide to the Standard for Documented Independent Review of High-Risk Professional Activities or Work V2.0

Engineers and Geoscientists of British Columbia (EGBC). 2023. Guide to the Standard for Documented checks of Engineers and Geoscience Work V3.0

Engineers and Geoscientists of British Columbia (EGBC). 2023. Practice Advisory Relying on the work of a Specialist V1.1

Engineers and Geoscientists of British Columbia (EGBC). 2023. Legislated Dam Safety Reviews in BC.

Engineers and Geoscientists of British Columbia (EGBC). 2021. Guide to Code of Ethics. https://www.egbc.ca/Complaints-Discipline/Code-of-Ethics/Code-of-Ethics

Engineers and Geoscientists of British Columbia (EGBC). Duty to Report. https://www.egbc.ca/complaints-discipline/complaints-discipline/duty-to-report

Global Tailings Review. 2020. Global Industry standards on tailings management.

Government of Canada. 2013. Guidelines for the assessment of Alternatives for Mine Waste Disposal.

International Commission on Large Dams (ICOLD). 2022. “Bulletin No. 194: Tailings Dam Safety.” November. [Unpublished Guideline]

International Commission on Large Dams (ICOLD). 2019. Guidelines on Tailings Dams: Planning, Design, Construction, Operation and Closure.

International Commission on Large Dames (ICOLD) 2013. Bulletin 153: Sustainable design and post-closure performance of Tailings Dams.

International Council on Mining and Metals (ICMM). 2015a. “Critical Control Management – Implementation Guide.” April.

International Council on Mining and Metals (ICMM). 2021. “Tailings Management – Good Practice Guide.” May.

International Council on Mining and Metals (ICMM). 2021. Good practice Guide tailings management.

International Organization for Standardization: ISO 14001: 2015. Environmental management systems.

Mining Association of Canada (MAC). 2021. Tailings guide implementation checklist.

Mining Association of Canada (MAC). 2021a. “A Guide to the Management of Tailings Facilities (Version 3.2).” March.

Mining Association of Canada (MAC). 2021. “Developing an Operation, Maintenance, and Surveillance Manual for Tailings and Water Management Facilities (Version 2.1).” March.

Mining Association of Canada (MAC). 2021c. “Guide on Climate Change Adaptation for the Mining Sector.” June.

Appendix I

Selected Guidelines for Tailings Facilities and Dams

Examples of other guidance that may apply to permitting and regulatory, tailings management and dam safety, risk management, site investigations, design and construction, climate change, indigenous values and engagement, emergency planning, and closure.

Some of the guidelines have a more general application than tailings facilities and dams (e.g., climate change, indigenous values and engagement, or closure).

Permitting and Regulatory

BC Ministry of Energy, Mines and Petroleum Resources: Joint Application Information Requirements for Mines Act and Environmental Management Act Permits (2024).

BC Ministry of Energy, Mines and Low Carbon Innovation (EMLI): Departure from Approval Guidance for Major Mine Permit Holders (2020).

Tailings Management and Dam Safety

Engineers and Geoscientists of BC (EGBC): Legislated Dam Safety Reviews in BC (2023).

Canadian Dam Association (this is not a full list of CDA's technical bulletins):

- Dam Safety Guidelines, Revised 2013 (2007).
- Technical Bulletin: Hydrotechnical Considerations for Dam Safety (2007).
- Technical Bulletin: Surveillance of Dam Facilities (2007).
- Technical Bulletin: Guidelines for Public Safety Around Dams (2011).
- Technical Bulletin: Dam Safety Reviews (2016).
- Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams (2019).
- Technical Bulletin: Tailings Dam Breach Analysis (2021).
- Technical Bulletin: Emergency Management for Dam Safety (2021).
- Technical Bulletin: Revision to Consequences of Failure – Environmental Consequence Classification (2023).

Global Tailings Review: Global Industry Standard for Tailings Management (2020).

International Council on Mining & Metals (ICMM): Good Practice Guide Tailings Management (2021).

International Council on Mining & Metals (ICMM): Conformance Protocols for GISTM (2021).

Mining Association of Canada (MAC): Developing an Operation, Maintenance, and Surveillance Manual for Tailings and Water Management Facilities (2021).

Mining Association of Canada (MAC): A Guide to the Management of Tailings Facilities (2021).

Ministry of Forestry, Lands and Natural Resource Operations, and Rural Development (FLNRO): Dam Safety Guidelines, Inspection and Maintenance of Small Dams.

Risk Management

ISO 31000:2018 Risk Management – A Practical Guide.

International Council on Mining & Metals (ICMM): Good Practice Guide Health and Safety Critical Control Management.

International Council on Mining & Metals (ICMM): Implementation Guide Critical Control Management.

Federal Energy Regulatory Commission (FERC): Risk-Informed Decision Making (RIDM) Risk Guidelines for Dam Safety (2016).

Site Investigations

Association of Professional Engineers and Geoscientists of BC (APEGBC): Site Characterization for Dam Foundations (2016).

Federal Energy Regulatory Commission (FERC): Guidelines for drilling in and near embankment dams and their foundations (2016).

US Bureau of Reclamation (USBR): Guidelines for Drilling and Sampling in Embankments (2014).

Design and Construction

AACE International (AACE): AACE International Recommended Practice No. 18R-97, Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries (2006).

BC Ministry of Environment: Technical Guidance 7 Assessing the Design, Size, and Operation of Sediment Ponds Used in Mining (2015).

BC Ministry of Energy and Mines (MEM): Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in BC (1998).

Engineers and Geoscientists BC (EGBC): Professional Practice Guidelines: Legislated Flood Assessment in a Changing Climate in BC (2018).

Engineers and Geoscientists BC (EGBC): Quality Management Guidelines: Guide to the Standard for Documented Field Reviews during Implementation or Construction (2021).

Environment Canada: Guidelines for the assessment of alternatives for mine waste disposal (2016).

International Committee on Large Dams (ICOLD): Bulletin 194, Tailings Dam Safety (2022).

Hawley and Cunning: Guidelines for Mine Waste Dump and Stockpile Design (2017).

Mine Environment Neutral Drainage (MEND): Report 2.50.1 Study of Tailings Management Technologies (2017).

National Research Council of Canada (NRC): 2020 National Building Code of Canada Seismic Hazard Tool.

Climate Change

BC Ministry of Environment and Climate Change Strategy: Preliminary Strategic Climate Risk Assessment for BC (2019).

BC Ministry of Environment and Climate Change Strategy: Climate Preparedness and Adaptation Strategy: Actions for 2022-2025.

Intergovernmental Panel on Climate Change (IPCC): Technical Summary in Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

Mining Association of Canada: A Guide on Climate Change Adaptation for the Mining Sector (2021).

Canadian Council of Ministers of the Environment: Guidance on Good Practices in Climate Change Risk Assessment (2021).

Indigenous Values and Engagement

BC Declaration on the Rights of Indigenous Peoples Act Action Plan, 2022-2027.

BC First Nations Energy and Mining Council: Mining and Consent Discussion Paper 2021.

BC First Nations Energy and Mining Council: Indigenous Sovereignty Consents for Mining on Indigenous Lands (2022).

BC Environmental Assessment Office: Guide to Indigenous Knowledge in Environmental Assessments (2020).

United Nations Declaration on the Rights of Indigenous Peoples (2007).

International Council on Mining & Metals (ICMM): Good Practice Guide Indigenous Peoples and Mining.

Emergency Planning

Ministry of Energy, Mines and Petroleum Resources: Mine Emergency Response Plan Guidelines for the Mining Industry (2017).

Canadian Dam Association: Technical Bulletin: Emergency Management for Dam Safety (2021).

Federal Emergency Management Agency: Federal Guidelines for Dam Safety – Emergency Action Planning for Dams (2013).

Federal Emergency Management Agency: Emergency Operations Planning – Dam Incident Planning Guide (2010).

Closure

International Council on Mining & Metals: Good Practice Guide Integrated Mine Closure.

Alberta Energy Regulator: Manual 019 Decommissioning, Closure, and Abandonment of Dams at Energy Projects.

BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development: BC Dam Safety Program Dam Decommissioning Guidelines (2019).

International Committee on Large Dams: Bulletin 153 Sustainable Design and Post-Closure Performance of Tailings Dams.

Appendix II

Category I Dam Assessment

To qualify for the Category 1 dam exemption, mines must complete a Category 1 Dam Assessment and maintain a record of the assessment at the mine site, available to an inspector upon request. Category 1 dams consist of two subcategories: Category 1A and Category 1B. Category 1A and 1B dam assessments may follow a similar process, but apply to the following situations:

Category 1A Dams:

- This applies to placer mines, sand and gravel pits, rock quarries, and industrial minerals mines.
- The Category 1A dam assessment is completed by the Mine Manager and documented on the Category 1A Dam Assessment Form in Table 2 of this appendix.

Category 1B Dams:

- This applies to coal or metal mines.
- An assessment is undertaken and signed off by a Qualified Professional.
- The Qualified Professional may choose to use the documented process as described in this appendix, or another appropriate assessment methodology.

Category 1 Dams Assessment Process

Two flowcharts are included in Figure 12 and Figure 13, to assist Mine Managers in determining whether a facility is eligible for the Category 1 Dams exemption. Additional context on terms used in Figure 12 and Figure 13 is included in Table 16. Conceptual schematics of Category 1 dams are included in Figure 14 and Figure 15 (showing a dam on flat ground and sloped ground) and Figure 16 (showing the concept of above-grade or live storage).

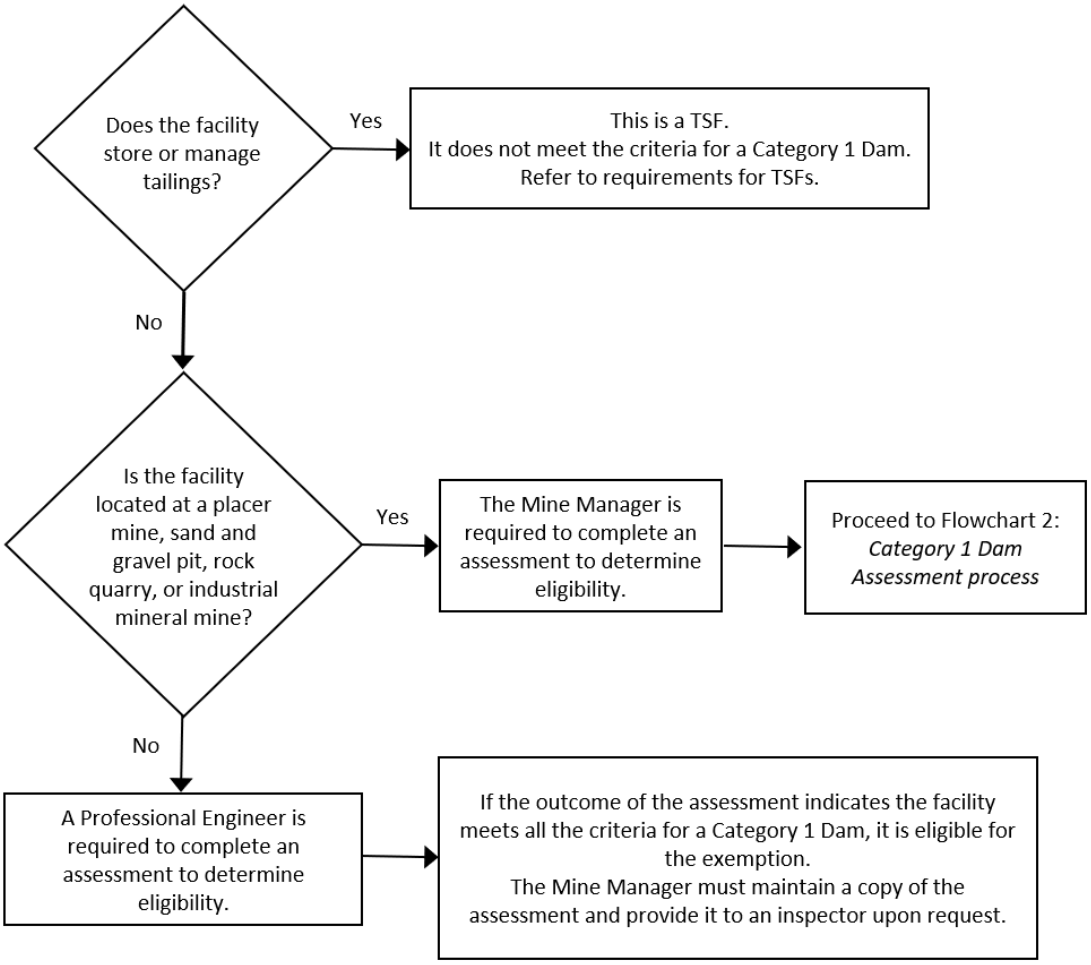


FIGURE 12: IS THE FACILITY ELIGIBLE FOR THE CATEGORY 1 DAM EXEMPTION?

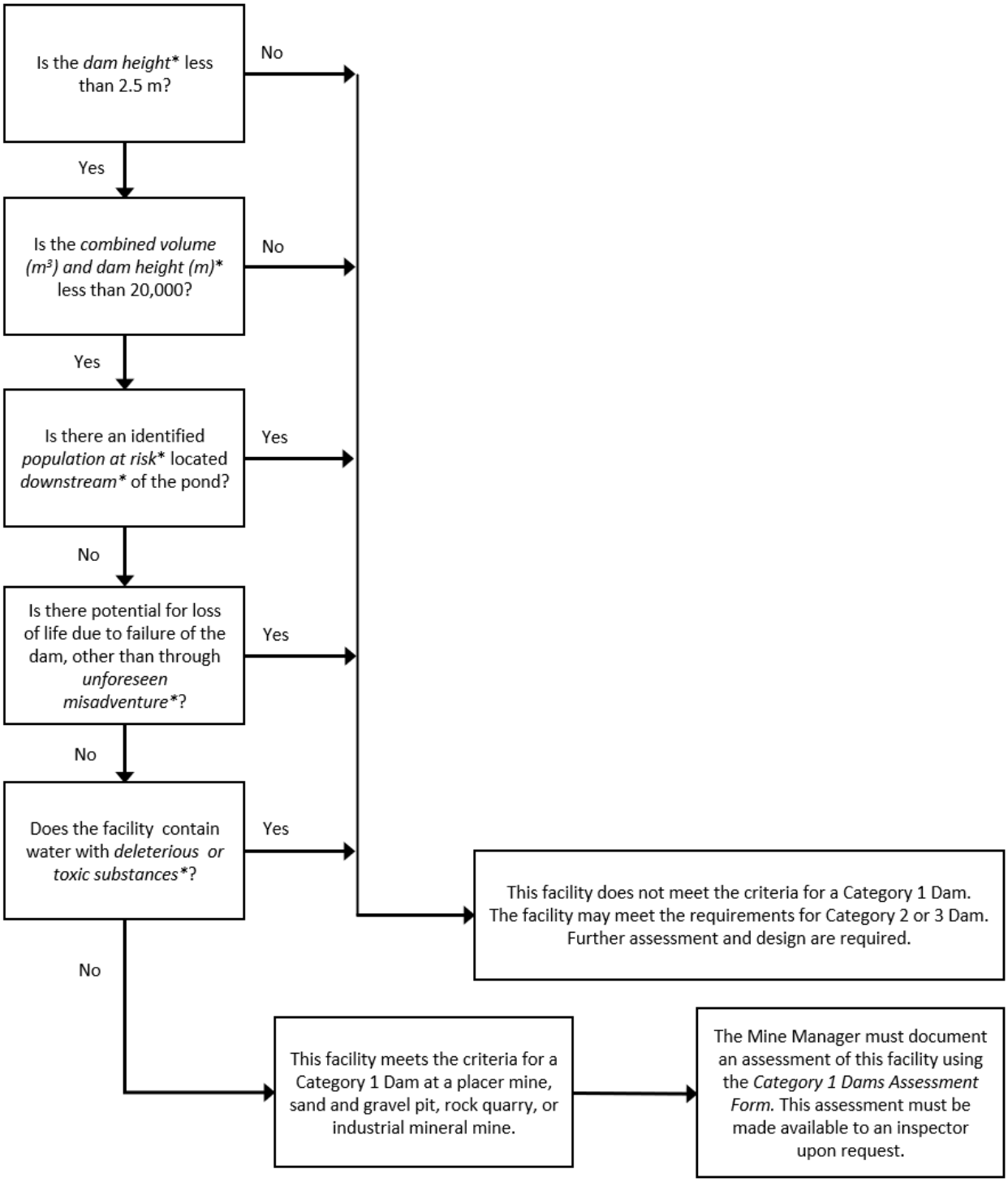


FIGURE 13: CATEGORY 1 DAM ASSESSMENT PROCESS.

TABLE 16: ADDITIONAL CONTEXT ON TERMS USED IN THE ASSESSMENT PROCESS.

Term	Context
Dam height	▪ This is a vertical distance, measured from the crest of the dam to the lowest point at the dam toe. ▪ Refer to the very small dam schematics (Figure 14). ▪ The best way to measure this is by survey. Alternative methods are acceptable as long as the measured height plus margin of error is less than 2.5 m
Combined volume and dam height	▪ Multiplication of the dam height in meters and the above grade storage volume in cubic meters. ▪ The code uses units of m^4, this is the mathematically correct unit (m x m^3=m^4). When multiplying height by volume the meaningful part is that the result is less than 20,000, the units m^4 do not have a physical meaning. ▪ Using a combined number gives greater flexibility to the operation when sizing the facility. For example, if a dam height of 2.5 m is required, the maximum volume that can be stored in the pond is 8,000 m^3 (20,000 m^4 / 2.5 m = 8,000 m^3). ▪ Refer to the Category 1 Dam schematics (Figures 14, 15 and 16).
Above-grade storage	▪ Refers to the water stored behind the dam, which would be released if the dam were breached or removed. ▪ The above grade storage volume is the volume used in the height x volume calculation (above).
Below grade storage	▪ Refers to storage that is excavated below the elevation of the dam toe. Similar to a “dugout”. ▪ Water stored below grade would not be released if the dam were breached or removed. ▪ Below grade storage is not used in the height x volume calculation (above)
Population at risk	▪ People who would be within the impacted zone if the dam failed. ▪ These can be people who live, work, or play in the area (permanent or semi-permanent basis). ▪ Examples of population at risk (this is not a comprehensive list): ♦ Cottages, or cabins (even if they are occupied infrequently). ♦ Permanent residences (even if they are occupied infrequently). ♦ Indigenous or cultural uses, such as but not limited to: trapping, harvesting, spiritual activities. ♦ Infrastructure (e.g., roads, bridges, power lines). ♦ Offices or worksites, or occupied buildings (even if they are occupied infrequently). ♦ Traffic on roadways or bridges (even if they are used infrequently). ♦ Recreational use (fishing, boating, hunting, camping).
Impacted zone	▪ If the facility were to release the stored contents (e.g., dam failure), this is the area that would be affected by floodwaters or released sediment.
Downstream	▪ The direction in which a stream or river flows. ▪ Downstream of a dam indicates where water would flow, if it were released from the facility.

Loss of life due to unforeseen misadventure	Some definitions of unforeseen misadventure include: ▪ An accidental fatality caused by a risk taken voluntarily by an individual. ▪ A deliberate action taken by an individual that has resulted in their fatality, or someone choosing to put themselves at risk deliberately, resulting in their fatality. ▪ A fatality due to an accident and not negligence or crime. ▪ An example of unforeseen misadventure is: ○ A hiker inadvertently wanders into the area downstream of a dam even though no trail exists. ▪ Unforeseen misadventure is not: ○ A hiker walking on an existing trail downstream of a dam.
Deleterious or toxic substances	▪ For the purposes of the very small dams assessment, this does not include suspended sediment that is non toxic or non deleterious. ▪ If the water in the pond is known to contain toxic or deleterious substances or sediment, then the dam does not qualify as a Category 1 dam. ▪ If a manager has doubts about the toxicity of the contents of the pond, EMLI recommends engaging a Qualified Professional to assess the water and contents. If the assessment shows that the contents are considered non-toxic, attach the results to the assessment form. ▪ From the *Canadian Environmental Protection Act 1999* (Section 64): "A substance is toxic if it is entering or may enter the environment in a quantity or concentration or under conditions that: ♦ have or may have an immediate or long-term harmful effect on the environment or its biological diversity; ♦ constitute or may constitute a danger to the environment on which life depends; or ♦ constitute or may constitute a danger in Canada to “human life or health." ♦ This includes negative effects due to human consumption, or negative effects on wildlife, cattle, etc.

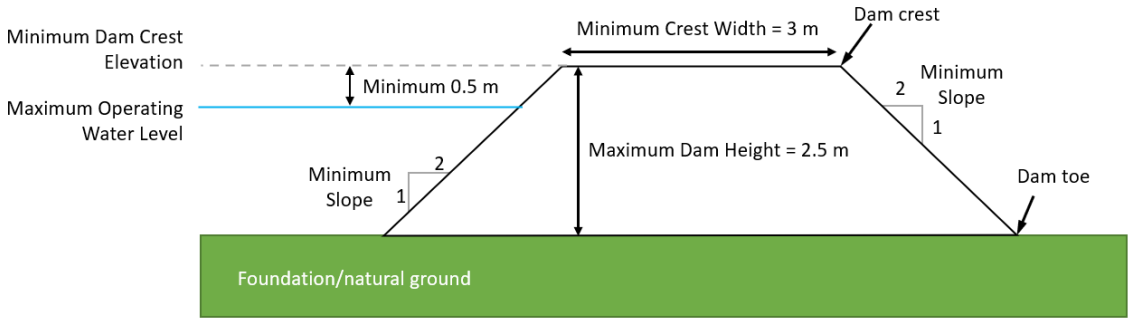


FIGURE 14: VERY SMALL DAM SCHEMATICS ON FLAT GROUND.

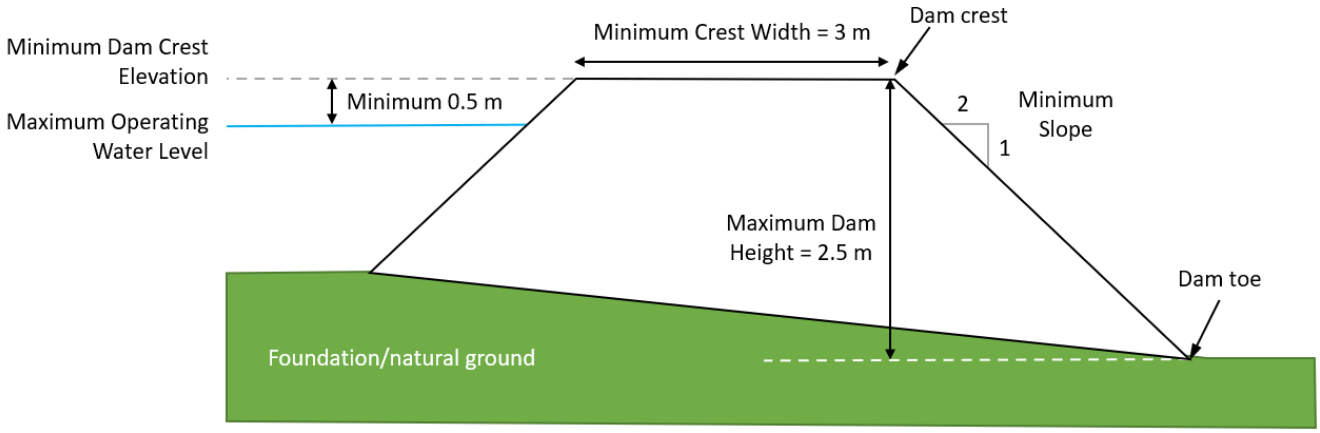


FIGURE 15: VERY SMALL DAM SCHEMATICS ON SLOPED GROUND.

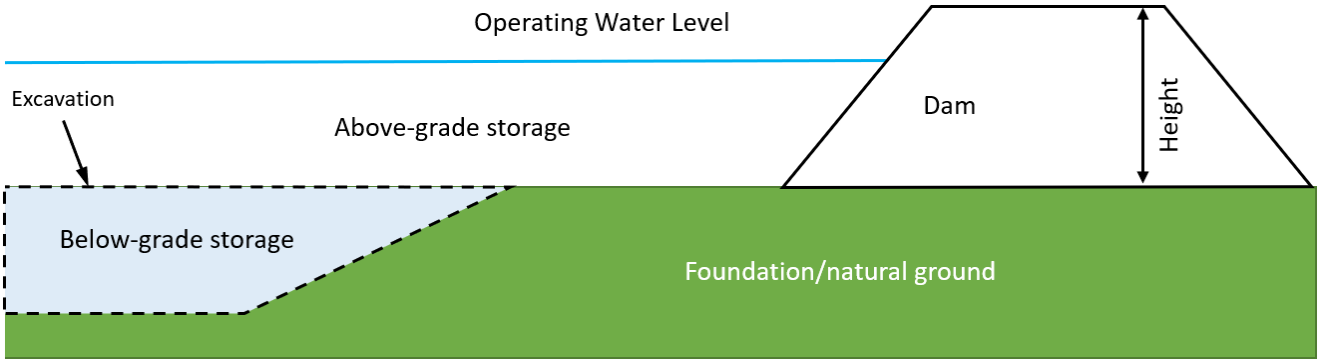


FIGURE 16: ABOVE-GRADE VS. BELOW-GRADE STORAGE.

Category 1A Dam Assessment and Confirmation

The form in Table 17 is to be used by the mine manager of a placer mine, sand and gravel pit, rock quarry, or industrial mineral mine for the purpose of assessing and documenting a dam against the Category 1A Dam exemption, under Section 10.2.11 of the Code.

The Mine Manager documents the assessment using the form in Table 17 by circling either “yes” or “no” for each question. Any supporting documentation for the assessment can be attached to the completed form.

The completed assessment (completed form plus supporting documentation) does not need to be submitted to EMLI, keep the assessment on file and provide it to an inspector upon request.

TABLE 17: CATEGORY 1A ASSESSMENT FORM.

Downstream Review		
I have reviewed the downstream area from my water management facility using Google Earth (satellite view), Bing Maps (satellite view) or equivalent imagery.	YES	NO
I have physically checked the downstream area of my water management facility or sediment pond, for a minimum distance of 500 m.	YES	NO
Downstream Infrastructure		
To the best of my knowledge, I have confirmed that none of the following are within 500 m (downstream) of the water management facility or sediment pond: • Seasonally or permanently occupied buildings, including cottages, cabins, or residences • Indigenous or cultural uses, such as but not limited to: trapping, harvesting, spiritual activities • Roadways or bridges (even if there is only infrequent traffic) • Other infrastructure (e.g., rail lines, power lines, pipelines, etc.) • Work areas, including offices or worksites, including those buildings and worksites on the mine site. • Recreational uses (fishing, boating, hunting, camping, campsites) • Other uses by the public or the workers from the mining operation	YES	NO
Population at Risk and Loss of Life		
To the best of my knowledge, I confirm that: • There is no identified population at risk, based on my response in *Downstream Infrastructure* above. • There is no potential for loss of life due to failure of the dam, other than through unforeseen misadventure.	YES	NO
Facility Purpose and Contents		
I confirm that the contents stored in my facility are for the purposes of: • The purpose of the facility is to provide sediment removal or store wash water from placer mining, sand and gravel pits, rock quarries, or industrial mineral mining operations; and • The facility does not impound water that contains toxic or deleterious substances, excluding suspended sediment.	YES	NO

Facility Size and Components			
Complete the following information related to the size of your facility.			
Component	**Description**	**Value**	**Unit**
Dam height	The vertical distance from the dam crest to the lowest point on the dam toe		m
Storage volume	Above-grade storage volume for the water management facility		m^3
Combined volume and dam height	Dam height (m) x storage volume (m^3)		m x m^3
Is the dam height less than 2.5 m?		YES NO	
Is the combined storage volume (m^3) and dam height (m) exceed 20,000?		YES NO	

If you have answered "yes" to all the questions in Table 17, the facility meets the Category 1 dam exemption under Section 10.2.11 of the Code. The facility will have reduced design, operational, and regulatory requirements, as described in the Code.

Review the assessment annually to determine if there are changes at your site, downstream of the water management facility, or with the water management facility or dam itself, which may change the designation.

Acknowledgement:

Assessment completed by (name and title)	
Date (YYYY-mm-dd)	
Signature	

Appendix III

Annual Facility Performance Assurance Statement

This assurance statement is to be read and completed by the Engineer of Record in conjunction with the Health Safety and Reclamation Code for Mines in British Columbia (HSRC), and the HSRC Part 10 Guidance document. This statement is to be provided to the Chief inspector with the Annual Facility Performance Report (AFPR) in accordance with HSRC S 10.6.4(4). An assurance statement is required for:

- Each Tailings Storage Facility (TSF), including supporting structures such as spillways, seepage collection ponds, diversion channels, etc.
- Dam(s) not part of a TSF.

FORM 1: ANNUAL FACILITY PERFORMANCE ASSURANCE STATEMENT.

Ministry of Energy, Mines and Low Carbon Innovation

Annual Facility Performance Report Assurance Statement

This assurance statement is to be read and completed by the Engineer of Record in conjunction with the Health Safety and Reclamation Code for Mines in British Columbia (HSRC), and the HSRC Part 10 Guidance document. This statement is to be provided to the Chief inspector with the Annual Facility Performance Report (AFPR) in accordance with HSRC S 10.6.4(4). An assurance statement is required for:

- each Tailings Storage Facility (TSF), including supporting structures such as spillways, seepage collection ponds, diversion channels, etc.
- Dam(s) that is not part of a TSF.

Date:
Mine Manager Name:
Mine Name:
Mine Address:

With reference to the Mines Act Permit and the HSRC.

Name of the facility or description:

For a (check one):

☐ TSF, including supporting structures as listed below:

☐ dam (that is not part of a TSF), and supporting structures as listed below:

UTM (location):

Located at (description):

Page 1 of 2

Ministry of Energy, Mines and Low Carbon Innovation

Annual Facility Performance Report Assurance Statement

As the Engineer of Record under HSRC 10.4.1 of the above facility, I have signed, sealed, and dated the attached annual facility performance report in accordance with the Code 10.6.4(4). The AFPR report must be read in conjunction with this statement. In preparing the attached AFPR I have (check all that apply):

- ☐ Reviewed Site Characterization per HSRC 10.5.2(2).
- ☐ Reviewed Design report(s) per HSRC 10.5.3(2).
- ☐ Reviewed the Design Summary document per HSRC 10.5.4(2)(a)
- ☐ Reviewed the Failure and Breach or Runout Assessment per HSRC 10.5.5(2)
- ☐ Reviewed the latest Dam Safety Review report recommendations per HSRC 10.6.2(3)(a)
- ☐ Reviewed the Operations, Maintenance and Surveillance Manual per HSRC 10.6.6(2)
- ☐ Reviewed the quantifiable performance objectives and trigger action response plans per HSRC 10.6.7(6)(b)
- ☐ Reviewed the Risk Assessment per HSRC 10.6.8(2)
- ☐ Reviewed the Climate Change assessment per HSRC 10.6.11(2)

Firm:

Firm Permit to Practice Number:

Address:

Telephone:

EOR Name:

EOR Stamp

Page 2 of 2

Construction Records Report Assurance Statement

This statement is to be read and completed by the Engineer of Record in conjunction with the Health Safety and Reclamation Code for Mines in British Columbia (HSRC), the HSRC Part 10 Guidance document, and the Mines Act Permit for the mine. This assurance statement is to be attached to the construction record reports in accordance with HSRC s 10.6.5(4).

FORM 2: CONSTRUCTION RECORDS REPORT ASSURANCE STATEMENT.

Ministry of Energy, Mines and Low Carbon Innovation — Construction Records Report Assurance Statement	
Date:	
Mine Manager Name:	
Mine Name:	
Mine Address:	
Mines Act Permit Number:	
With reference to Mines Act Permit and HSRC	
Name of facility or description:	
UTM (Location):	
Located at (description):	

As the Engineer of Record under HSRC 10.4.1 of the above facility, I have signed, sealed and dated the attached Construction Records Report in accordance with HSRC 10.6.5(3). That report must be read in conjunction with this statement.

Per HSRC 10.6.5(4), I hereby give my assurance that the facility described in the attached Construction Records Report:

i. Substantially complies in all material respects with the original design intent, and
ii. The facility (named above) is suitable for use.

Firm:		
EoR Name:		EoR Stamp:
Date:		
Address:		
Phone:		
Firm Permit to Practice Number:		
EoR Signature:		

Verification of Construction Assurance Statement

This statement must be submitted to the Chief Inspector of Mines prior to a tailings storage facility or dam receiving tailings or water per Code Clause 10.6.5(2). This statement is to be read and completed by the Engineer of Record in conjunction with the Health Safety and Reclamation Code for Mines in British Columbia (HSRC) and the HSRC Part 10 Guidance document.

FORM 3: VERIFICATION OF CONSTRUCTION ASSURANCE STATEMENT.

Ministry of Energy, Mines and Low Carbon Innovation — Verification of Construction Assurance Statement	
Date:	
Mine Manager Name:	
Mine Name:	
Mine Address:	
Mines Act Permit Number:	
With reference to Mines Act Permit and HSRC	
Name of facility or description:	
UTM (Location):	
Located at (description):	
As the Engineer of Record under HSRC 10.4.1 of the above facility, I hereby verify that the facility is ready to receive: (Initial where appropriate)	

	Tailings only		Water only		Tailings and/or water

Firm:		
EoR Name:		EoR Stamp:
Date:		
Address:		
Phone:		
Firm Permit to Practice Number:		
EoR Signature:		

Appendix IV

In addition to the information provided in Section 6.1 of the Guidance Document, this appendix provides additional information related to good practice in governance of TSFs and dams.

Policy

A Tailings and Water Management policy should be developed by the Mine Manager to describe the commitments the mine will adopt related to those facilities that manage tailings and water. It may or may not be incorporated into the corporate tailings policies, depending on the site and the mining company. The policy may or may not be a stand alone tailings policy, but could be incorporated into another corporate policy.

Policy and commitment recommendations are provided in MAC (2021a) and ICMM (2021) as well as GISTM (2020).

Documents and Records

Sites should have a system for managing and retaining documents, as these documents are critical to the management system and knowledge base. Aligning filing systems to closely resemble an audit system's checklist can be efficient.

Typical key documents and records to be retained are summarized in Table 18 below.

TABLE 18: TYPICAL RECORDS RETENTION FOR TSFS AND DAMS.

Record	Retention Period
Design documents	Permanent
TSF and dams Inventory	Permanent
Permits and Licenses	Permanent
Regulatory Submissions and Responses	Permanent
Tailings and Water Management Plans	10 + years
Closure Plan	Permanent
Construction QA/QC and As-built reports	Permanent
OMS Manual	As revised
Training Records	5 years
Instrumentation and monitoring data	10+ years
HSEC Incident & Inspection Reports	10 years
COI Communications	10 years
Monthly Reports	10 years
Annual Reports	10 years
Inspections and Reviews (AFPR, DSR)	15 years
Audits and Independent Reviews	15 years

The management system documentation should include the names of previous EoRs and the affiliated company name(s); a copy of the document should be kept at the mine site. The associated date range of assessments and designs, site investigation(s) and construction phase(s) completed by each successive EoR should also be documented.

Annual Management Review

Although not required under the Code, an annual management review is used as a tool for continual improvement of the TSF or dam and is considered part of the industry standard for the management of TSFs and dams (MAC 2021a). The annual management review typically provides the Mine Manager an overview of the following:

- Status of actions from the previous management review.
- Suitability, adequacy, effectiveness, and the need for changes to:
  - The tailings and dams management system
  - The EPRP
  - The OMS Manual, and
  - Performance of the TSF or dam
- Effectiveness of risk management
- Adequacy of resources committed to tailings management
- Status of recommendations from the AFPR, DSR, EoR, and EMLI
- Status of the work for the TSF or dam, and
- Integration of tailings management activities with site-wide systems, such as, where applicable, a site-wide environmental and social management system.

The management review process should also identify opportunities for improvement and describe associated action plans.

Documenting Roles and Responsibilities

The roles of individuals involved in the governance of a TSF or dam should establish accountability, responsibility and provide assurance that key activities are appropriately carried out and managed. The responsibilities of the key roles, as well as supporting roles, should be clearly communicated within an organization. A RASCI (Responsible, Accountable, Supporting, Consulted, Informed) table is recommended to clarify and communicate roles and responsibilities required in the management of a TSF or dam.

Based on the MAC (2021a) guidelines, RASCI is an acronym for:

Responsible	The person(s) assigned to ensure the work is completed.
Accountable	The person who makes the final decision and is ultimately answerable.
Supporting	The person(s) providing support to the responsible person.
Consulted	The person(s) who must be consulted before a decision or action is taken.
Informed	The person(s) who must be informed that a decision or action has been taken.

Additional guidance on the application of the RASCI table can be found in ICOLD Bulletin 154 (ICOLD 2017). An example RASCI table is presented in Table 19.

TABLE 19: EXAMPLE TSF AND DAMS ROLES RASCI MATRIX.

Task	Mine Manger	TSF and Dam QP	EoR	ITRB	Operations Personnel	Maintenance Personnel	Surveillance Personnel	Environment Personnel	Review Engineer (DSR)
Governance, Administration and Reporting									
Annual Management Review									
EMLI inspection reports - response									
TSF Annual Manager's Report, and submit									
Annual Facility Performance Report – develop AFPR									
AFPR – submission to EMLI									
Update ITRB terms of reference									
Annual ITRB Report on Activities									
Plan and schedule ITRB meetings									
Plan and schedule Dam Safety Review									
Dam Safety Review – report									
Dam Safety Review – submission to EMLI									
Review and update risk assessment									
Review and update risk registry									
EoR appointment									
EoR succession plan									
Closure Plan									
Review and update OMS Manual									
OMS Manual training									
Review and update EPRP									
EPRP training									
EPRP testing									
Dam inspection training									
Community Engagement									

Task	Mine Manger	TSF and Dam QP	EoR	ITRB	Operations Personnel	Maintenance Personnel	Surveillance Personnel	Environment Personnel	Review Engineer (DSR)
Reportable Incident – reporting									
Operations									
TSF or dam drawdown									
PAG waste rock placement									
Water monitoring and sampling									
Maintenance									
Routine maintenance									
Event-driven maintenance									
Surveillance									
Maintain instrumentation database									
Site climate data collection									
Monthly dam inspections									
Annual EoR site visit									
Water Level monitoring									
Event-driven inspections									
Review and update QPOs									

Succession Planning for Key Roles

Documented succession plans should be developed for key personnel to provide continuity and to minimize gaps for management of the TSF or dam. This includes the TSF and Dams QP, the EoR, the ITRB and key corporate or operational roles, including supervisors.

Succession plans should include descriptions of the roles and responsibilities, required qualifications and process for filling roles in the event of change.

Appendix V

Design Summary Document – Example of Typical Information Requirements.

TABLE 20: EXAMPLE OF TYPICAL INFORMATION REQUIREMENTS.

COMPONENTS	DESCRIPTION	SOURCE
General Site Information		
Mine Location	130 km northwest of XXXXX	
TSF Location	155,888 N, 605,000 E	
Topography	UTS Grid, PhotoSat 2018, LIDA 2021	
Climate/Physiography	Coastal, mountainous	
Key Communities and First Nations	XXXXX and XXX	
Regulatory and Permitting	Operational since 1977, Permit to raise dam to XX m estimated to be Year 2040	
Environment	XX km upstream of significant salmon habitat	
Other		
Mine and TSF Plan		
Tailings production rate	XXX tonnes per day	
Tailings stored	XX Million tonnes – estimated YYY Million m^3	
Ultimate stored tonnage	YY Million tonnes – estimated YYY Million m^3	
Ore process	Copper, molybdenum flotation process with carbon in leach for gold extraction	
TSF Footprint area	XX km^2	
Other		
Design Criteria Basis		
Consequence Classification	Very High	
Dam Breach -worst case release volumes	Sunny Day – 1 Million m3 (25% water:75% tailings) Rainy Day – 2 Million m3 (60% water:40% tailings)	
Seismic	Maximum Credible Earthquake (MCE), Subduction Zone source 150 km, M7.5, Peak Ground Acceleration (PGA) = 0.25	
Flood	Maximum Probable Precipitation (PMP) – 3-day PMP = 350 mm, assume diversions fail	
Environmental Design Flood	1/200 year return period flood	
Estimated allowable seepage	30 L/s – water quality monitoring downstream	
Other		

<table>
<tr><th colspan="3">Design – Geotechnical</th></tr>
<tr><td>Dam geometry</td><td>Centerline dam with 4H:1V downstream slope, current height (2024) 78 m</td><td></td></tr>
<tr><td>Dam Section</td><td>Zoned homogeneous earthfill with upstream spigotted tailings beach
Refer to design representative cross sections</td><td></td></tr>
<tr><td>Static Factor of Safety</td><td>1.5</td><td></td></tr>
<tr><td>Post Seismic Factor of Safety</td><td>1.2</td><td></td></tr>
<tr><td>Allowable deformation</td><td>2 m</td><td></td></tr>
<tr><td>Controlling potential failure modes</td><td>Deformation on a weak clay layer leading to slumping of the dam.
Seismic loading and deformations are higher than design.
Management of pond water to assure IDF storage.</td><td></td></tr>
<tr><td>Drainage and filter controls</td><td>Blanket filter and drain covering 1/3rd of downstream footprint.</td><td></td></tr>
<tr><td>Dam, tailings & foundation strength parameters</td><td><table><tr><th>Zone</th><th>Peak Drained</th><th>Peak Undrained</th><th>Post Seismic</th></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table></td><td></td></tr>
<tr><th colspan="3">Design - Water</th></tr>
<tr><td>Annual water balance</td><td>Average annual negative water balance of XXX m^3 with deficit from groundwater wells.</td><td></td></tr>
<tr><td>Operating water pond volumes</td><td>Target operating pond volume XXXX m3 with storage of spring freshet and drawdown during the year.</td><td></td></tr>
<tr><td>TSF Catchment Area</td><td>XXX km2, diversion channels to divert 1:200-year average 24-hour flow.</td><td></td></tr>
<tr><td>Flood design</td><td>Inflow Design Flood (IDF) = 12 Million m^3 associated with 4 day PMP and average annual snowmelt.</td><td></td></tr>
<tr><td>Spillway design</td><td>Not applicable as IDF is stored.</td><td></td></tr>
<tr><td>Dam freeboard</td><td>XXX m above peak pond level.</td><td></td></tr>
<tr><td>Other</td><td></td><td></td></tr>
<tr><th colspan="3">Quantifiable Performance Objectives</th></tr>
<tr><td>Pore Pressures</td><td>Pore pressures located in foundation clay layer No. 1 monitored to assure pore pressures are within the Trigger Action Response Plan levels.</td><td></td></tr>
<tr><td>Deformation along weak foundation layer</td><td>Inclinometers through foundation clay layer No. 1 monitored to assure deformations are within the Trigger Action Response Plan levels.</td><td></td></tr>
<tr><td>Flood storage and Freeboard</td><td>Available water storage volumes (including freeboard) are monitored to assure that the IDF can be stored.</td><td></td></tr>
<tr><td>Minimum beach length</td><td>250 m.</td><td></td></tr>
<tr><td>Other</td><td></td><td></td></tr>
</table>

Tailings Characterization		
Discharge/placement % solids by weight	Conventional thickeners to 55% solids by weight.	
Specific gravity	2.75	
In situ dry density	Average 1.4 tonne/m^3	
ICOLD tailings type classification	Hard rock tailings.	
Tailings discharge gradation	XX percent fines (<75 microns); YY percent clay(<2 microns).	
Beach slopes	0 to 300 m – 1.5%; 300 m to 1 km – 0.8% Overall slope 1.2%.	
Typical Atterberg Limits	PI = 20%, Limit = 25%, Plasticity Index – 12.	
% sulphide	1.0%.	
Neutralization potential ratio	1.5	
Neutral metal leaching potential	pH >6.	
Constituents of potential concern (COPC)	Dissolved copper and sulphate.	
Other		
Climate		
Monthly average precipitation distribution	Insert table	
Monthly average evaporation distribution	Insert table	
Rainfall events (<1,000-year return period)	Insert table	
PMP / PMF	Fall 4-day PMP with 2 weeks average snowfall XXX mm Spring 4-day PMP with 10-year snowpack XX mm.	
Snowpack design events	1/10-year snowpack = 200 mm precipitation equivalent.	
Other		
Earth Sciences		
Geohazards	Potential for snow avalanches on right bank slopes requires avalanche controls.	
Seismic Hazard Assessment	Earthquake sources: crustal subduction zone at depth of 80 km, M8.5. Local crustal events: M6 at 15 km distance. PGA for return periods: 1/475 to 1/10,000-year.	
Surficial and bedrock geology	Glaciated terrain with interlayered glaciolacustrine and glaciofluvial deposits. Recent swamp deposits excavated from dam footprint Refer to representative design cross sections for foundation units. Key foundation units:	

Tailings Characterization		
	• Upper sand and gravel • Upper glaciolacustrine • Lower sand and gravel • lower lacustrine • Weathered andesite bedrock • Fresh andesite bedrock	
Hydrogeology	Impoundment foundation soils have low permeability with some pervious zones. The TSF impoundment valley has upward gradients due to the surrounding hills. Foundation cut-off zone installed in the dam. foundation to 25 m depth, keyed into dense glacial till.	
Other		
Closure Design		
Physical stability	Dam to be reshaped to manage runoff, covered with topsoil and vegetated; toe buttress to be constructed to increase stability. spillway located in rock in an area with a low dam height. Spigotting of tailings in later years to move pond to the spillway location. Double size spillway to account for potential debris inflows.	
Geochemical stability	Sulphidic tailings will be permanently saturated seepage and impoundment discharged water to be treated until water quality meets allowable discharge limits.	
Ecological and landform aspects	Dam to be reshaped to manage runoff, covered with topsoil and vegetated with native shrubs.	
Land and water use objectives	Potential recreation area. ponds to create aquatic and avian habitat.	
Other		