EOR – Canadian Evolving Practice

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Outline

- Personal perspective on EOR.
- CDA initiation of EOR guidance 2013
- Mount Polley the catalyst
- BC Ministry of Energy and Mines (MEM)
- Association of Professional Engineers and Geoscientists of British Columbia (APEGBC)
- Canadian Dam Association (CDA)



Personal Perspective

- Taking responsibility for your work
- Taking responsibility for the dam
- Core tenet of professional responsibility





CDA Initiation of EOR Guidance

- Initiated in 2013
- Identified in the Mining Dams Bulletin in 2014

Mount Polley

- CDA workshop in 2015 with modifications to EOR description
- Draft EOR description sent to CDA members in October 2015



Mount Polley – the Catalyst for EOR

- Business as usual is not an option
- Improvements required in regulatory regime and profession practice
- Five EoRs in 4 years





BC Ministry of Energy & Mines

- Initiated the Code Review 2015- passed into law 2016
- Transfers some of the engineers decision making responsibilities into law:
 - Minimum slopes & factor of safety
 - Minimum seismic & flood criteria
 - Designated EOR
 - Technical Review Board



BC MEM Code

- Code Review: Committee of Industry, Regulators, First Nations, Union/Employees
- Revision of Section 10 for Tailings Dams
- Owner has the "TSF Qualified Person" parallel to EOR

Engineer of Record

- 10.1.5 (1) The manager shall ensure that a Professional Engineer is retained as the engineer of record for each tailings storage facility and dam under their management.
 - (2) The engineer of record, as a qualified professional, has professional responsibility for assuring that a tailings storage facility or dam has been designed and constructed in accordance with the applicable guidelines, standards and regulations.
 - (3) The manager shall notify the chief inspector of the retained engineer of record, of changes in the engineer of record, and the notification shall include an acknowledgement by the engineer of record.



BC MEM Guidance Document

Engineer of Record (EoR) -(Code 10.1.5)

- Is a qualified and competent engineer with experience commensurate with the consequence classification and complexity of the facility.
- The responsibilities of the EoR must be assigned to an individual and not a firm. While there are benefits to retaining a third party engineer for this position, the position may be filled by an employee of the mine.
- Hold the professional responsibility for the facility design, and is responsible for evaluating the adequacy of the as-built facility relative to the design as well as applicable standards, criteria, and guidelines.
- Report on annual Dam Safety Inspections.
- Participates in Dam Safety Reviews.
- Participates in risk assessments.
- Provides Quantitative Performance Objectives and monitoring frequencies required to ensure the facility is functioning as designed for inclusion in the OMS.
- In the event of a change of the EoR, participates in implementing the succession plan, including understanding the risks and liabilities associated with such changes and employing appropriate change management procedures.

NOTE: An Engineer of Record is required to be designated once construction of a facility is underway. A TSF that is still in the planning and design phases does not require an Engineer of Record.



Association of Professional Engineers of BC

- Association of Professional Engineers of BC (Canada)
- Professional Practice Guidelines (level of expectation of the "standard of care")
- Dam Safety Reviews (2013) – assurance that the dam is "reasonably safe"
- Site Characterization for Dam Foundations (2016)





APEGBC

- Dam Safety Review Guideline
- EOR for mining dams



The following information on the role of the EOR is consistent with the documentation prepared by the Canadian Dam Association (CDA):

The Owner is ultimately responsible for the safety and operation of their dam(s) during construction, operation, and closure. Section 2.3 of the *CDA Dam Safety Guidelines* states that the "Owner's policy should clearly demonstrate the organization's commitment to safety management throughout the dam's life cycle". This includes 'delegation of responsibility and authority for all dam safety activities". Further "the owner's staff and any consultants or contractors who carry out dam safety activities on behalf of the Owner should be aware of the decision making process and who is accountable for that". The dam safety Engineer of Record (*EOR*) is an integral part of risk management for mining dams.

The EOR is defined as the professional engineer responsible for assuring that the damis safe, in that it is designed and constructed in accordance with the current state of practice and applicable regulations, statutes, guidelines, codes, and standards. If The EOR is an integral part of the risk management system for dams, and provides design continuity and ongoing technical support to the Owner with respect to dam safety issues over the life of the dam. If

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The EOR is an individual who must be clearly identified by the Owner and must have accepted the responsibility. Whether the EOR is part of the Owner's organization or is contracted externally, they must have the authority and independence to ensure that safety assessments and measures are not compromised by operational concerns. Furthermore, in respect to tailings storage facilities, section 10.1.6 of the Health, Safety and Reclamation Code for Mines in British Columbia requires that the EOR notify the manager in writing of any unresolved safety issues that compromise the integrity of a tailings storage facility.

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The EOR must have knowledge and experience in the design, construction, performance analysis and operations of dams, to a level that is commensurate with the

 $consequence \cdot classification \cdot and \cdot complexity \cdot of \cdot the \cdot specific \cdot dam \cdot or \cdot dams \cdot under \cdot their \cdot technical \cdot authority \cdot \P$

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Recommended minimum qualifications include:

- Typically at least 10 years of related engineering experience¶
- Knowledge of dam design, construction, operations and performance evaluation, gained through solid experience; this broad knowledge is necessary to appreciate the complex issues of dam safety
- Current knowledge of applicable regulations and the state of practice, including CDA Dam Safety Guidelines and other international dam safety guidance¶
- → Registration and good standing with the professional engineering association where the dam is situated¶

"f⁺the·EOR·is·a·consultant, then this individual should be supported by a firm that has dam safety specialists who can provide the necessary support and oversight. ¶ ¶

Canadian Dam Association

- Mining Dams Committee has been working on providing guidance on the EOR
- Draft version of definition and general responsibilities of the EOR are similar to the APEGBC wording
- Concern with it being applied inappropriately – Do all dams need an EOR?
- An "effective" dam safety management system should have activities and responsibilities clearly defined.



SUMMARY

- The EOR designation is good for the Client and good for the Consultants
- Clarifies responsibilities
- Forces clients and engineers to understand responsibilities
- The EOR should be supported by a team proportional to the size and complexity of the dam
- Important for tailings dams that are continually changing
- Working for a Company should not diffuse the professional responsibility of the engineer

