CDA MINING DAMS BULLETIN

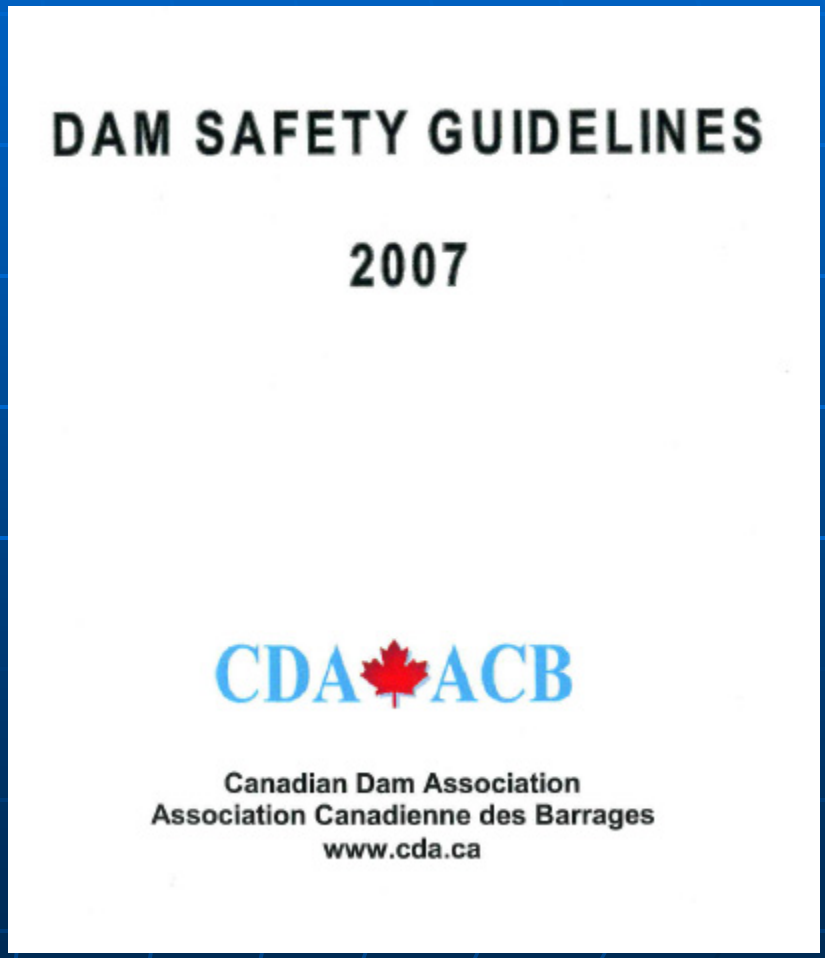
Vancouver
BC MEND ML/ARD Workshop
December 5, 2013

Dams and Water Covers Over Long Term

- Follow on Bill Price's Presentation
- Risks, challenges, liability with dams supporting water covers over long term
- From a dam safety perspective, prefer dry covers, but know not always possible
- Technical guidance needed to support design of these dams

CDA Dam Safety Guidelines

- Latest version issued in 2007
- Main sections:
  - Principles
  - General guidance
  - Bulletins (geotechnical, hydrotechnical, seismic, etc.)



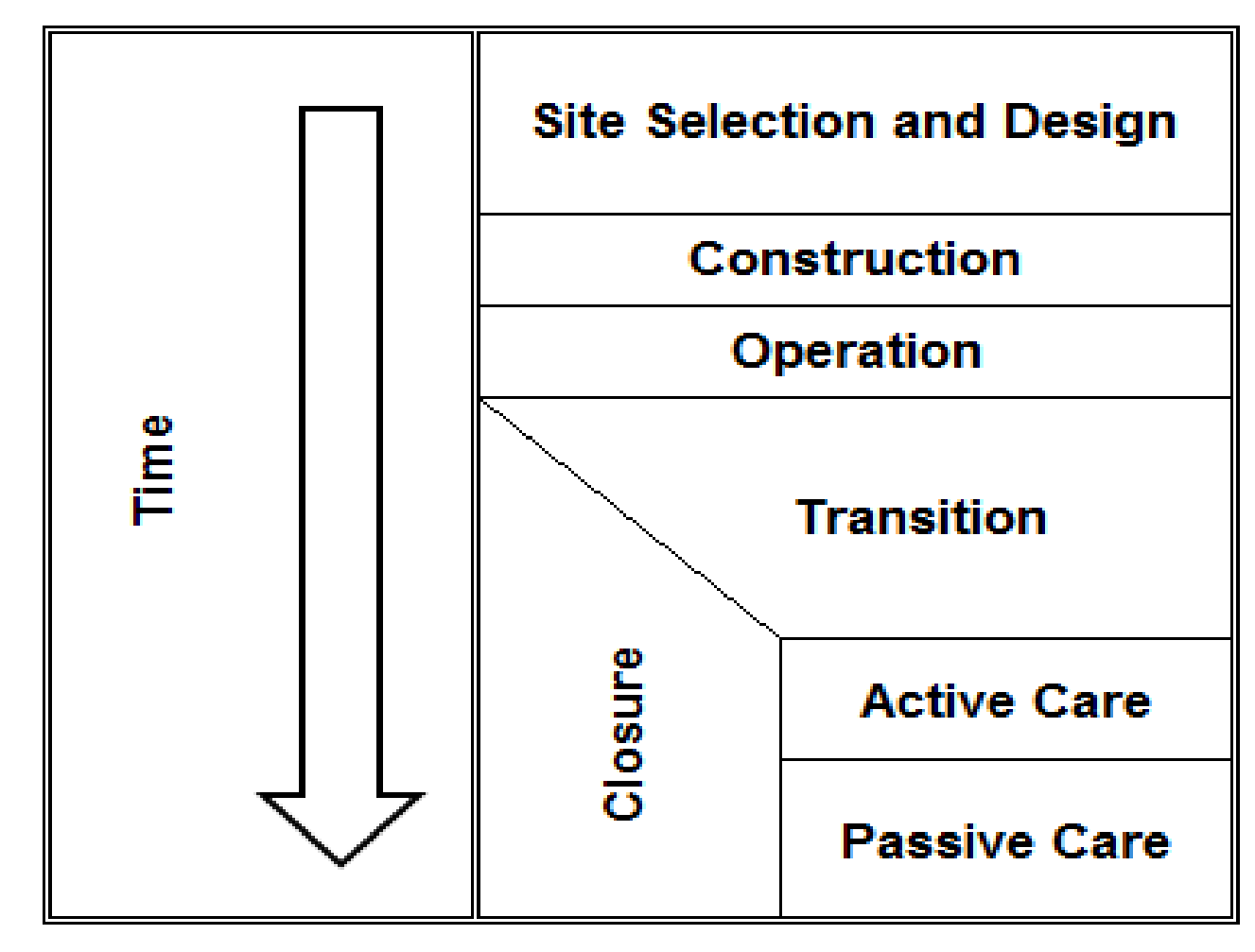
Mining Dams Bulletin

- Supplement to the 2007 CDA Guidelines
- Fills gap between the 2007 Guidelines and the unique technical requirements of Mining Dams
- Addresses items such as:
  - Characteristics of mining dams
  - Environmental consequences
  - Closure and perpetuity

Definition of Mining Dam

- Retaining structure that exists at a mine site or metallurgical plant site that is designed to retain solids and/or contaminated liquids.

Life Phases of Mining Dams



Closure – Active Care Phase

- For wet covers – management of ponds
- Ongoing operation, maintenance, surveillance, inspection
- Decades to hundreds of years
- “Operated”
- Ability to respond to emergencies

Closure – Passive Care Phase

- No active operation of the dams
- No staff on site
- Not able to respond to emergencies quickly
- Reduced ability to manage risks associated with the dams
- Forever
- BUT, not walkaway

Lower Risk Structures/Landforms

- Dams can be modified to become lower risk structures
- If no pond on top, potential to no longer be considered a dam
- Draw on experience from oilsands initiative
- If pond on top, landform approach can still be used to reduce risk and maintenance

Design Guidance – Dams with Wet Covers – Passive Care

- Design life – "till the next ice age"
- Probability of failure approaches one for many failure modes
- Consequences of failure of tailings dams with water covers often under predicted
- Development downstream can change
- Groundwater and surface water criteria can become more stringent

Design Guidance (cont'd)

- Increase factor of safety
- Flatter slopes
- Improve groundwater control
- Typically, design for probable maximum flood and maximum credible earthquake (or higher)
- Climate change
- Increase freeboard
- Wider spillways

Design Guidance (cont'd)

- Reduce reliance on filters
- Limit use of geosynthetics
- Account for changes in drainage within the dam
- Erosion of the slope (> 1 in 100 year event)
- Trees on dams
- Fires, disease, loss of vegetation

Design Guidance (cont'd)

- Engineer of Record over the life of the dam
- Ownership transfers
- Operations, Maintenance, and Surveillance Manuals
- Remote surveillance
- Emergency Response Plan
- If can't monitor or respond, increase criteria

Design Guidance (cont'd)

- Dam safety inspections
- Dam safety reviews (manage risk)

- Financial assurance package needs to account for these items and the time frame

Mining Dams Bulletin

- For CDA Members, on the website: www.cda.ca
- To be published in 2014

- Available at Break