

Dam Safety

Presentation By:

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Who will you be hearing from?



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Topics

- 1 Dam Fundamentals
- 2 Why is Dam Safety Important?
- 3 The Canadian Dam Association
- 4 Operation, Maintenance and Surveillance



1 Dam Fundamentals

What is a Dam?

A **barrier** constructed for the retention of **water, water containing any other substance, fluid waste, or tailings**, provided the barrier is capable of impounding **at least 30,000 m³ of liquid and is at least 2.5 m high**. Height is measured vertically to the top of the barrier (i) from the natural bed of the stream or watercourse at the downstream toe of the barrier, in the case of a barrier across a stream or watercourse; or (ii) from the lowest elevation at the outside limit of the barrier, in the case of a barrier that is not across a stream or watercourse.

The term dam includes appurtenances and systems incidental to, necessary for, or connected with the barrier. The definition **may be expanded to include dams less than 2.5 m high or with an impoundment capacity of less than 30,000 m³ if the consequences of dam operation or failure are likely to be unacceptable to the public**, such as dams that create hydraulic conditions posing a danger to the public; dams with erodible foundations that, if breached, could lower the reservoir by more than 2.5 m; or dams retaining contaminated substances.

- Dam Safety Guidelines (Canadian Dam Association, 2007)

Types of Dams

Embankment Dams

- Earthen or Earth-fill dams
- Rock-fill dams

Concrete Dams

- Gravity dams
- Arch dams
- Ambursen dams

Other

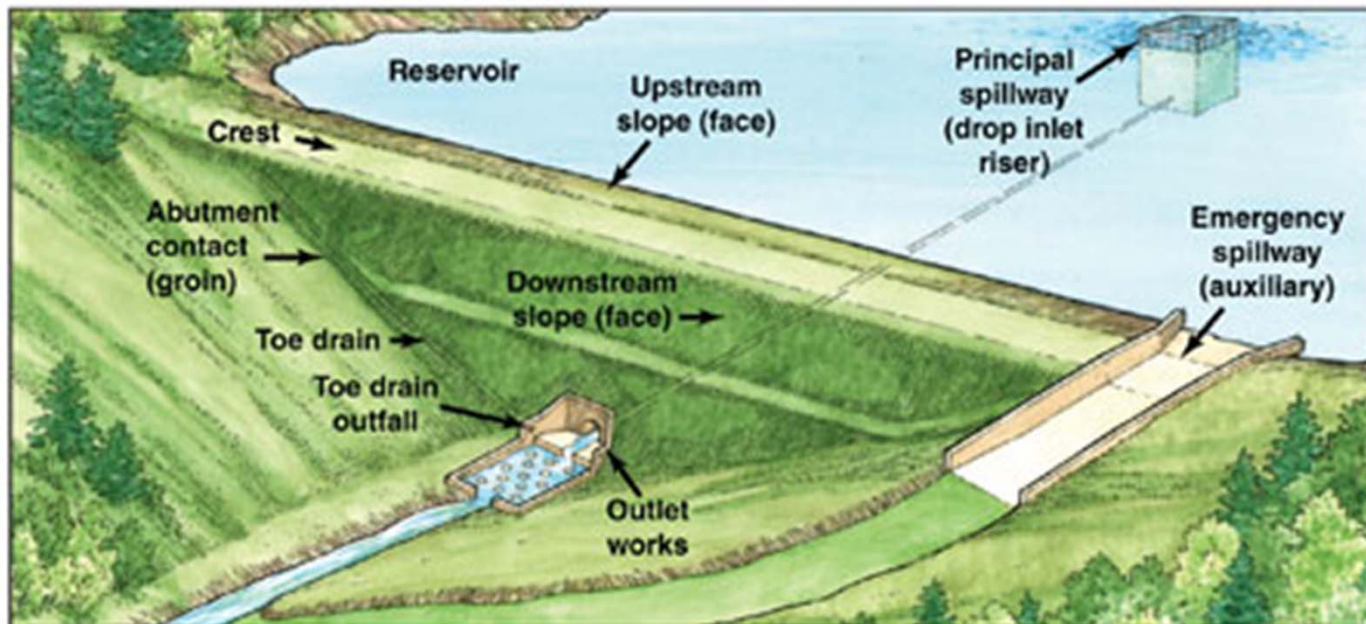
- Masonry dams
- Timber crib dams
- Combination dams

Dam Functions

- Power generation
- Water supply
- Irrigation
- Flood control
- Land reclamation
- Diversion
- Navigation



Dam Components



2 Why is Dam Safety Important?

Why is Dam Safety Important?

The public and the environment shall be protected from the effects of dam failure, as well as release of any or all of the retained fluids behind a dam, such that the risks are kept as low as reasonably possible.

- Dam Safety Guidelines (Canadian Dam Association, 2007), Principle 1A

Why is Dam Safety Important?



Figure No. 5 - Testalinden Dam Failure (near Oliver) June 13, 2010



3 The Canadian Dam Association

Canadian Dam Association (CDA)

About CDA

- Not a regulatory organization
- Canadian National Committee of the International Commission on Large Dams (ICOLD)
- Members include Owners, Operators, Regulators, Consultants and Suppliers

Mission

To encourage cooperation, advance technical knowledge, and build competency related to dams in Canada.

Publications

- Dam Safety Guidelines (2007/ 2013)
- 2016 Dam Safety Review Technical Bulletin
- Public Safety Around Dams (2011)
- Miscellaneous Technical Bulletins

\$75 for members
\$175 for non-members



Dam Hazard Classification

Dam class	Population at Risk	Incremental Losses		
		Loss of Life	Environmental & Cultural	Infrastructure & Economics
Low	None	0	Minimal Short term	Low Limited infrastructure
Significant	Temporary only	Unspecified	Marginal Restoration possible	Marginal Some infrastructure
High	Permanent	10 or fewer	Significant Restoration possible	High Affects infrastructure
Very High	Permanent	100 or fewer	Significant Restoration impractical	Very High Important infrastructure
Extreme	Permanent	More than 100	Major Restoration impossible	Extreme Critical Infrastructure

4 Operation, Maintenance, and Surveillance

Operation, Maintenance, and Surveillance

Principles

Principle 2A

Requirements for the safe operation, maintenance, and surveillance of the dam shall be developed and documented with sufficient information in accordance with the impacts of operation and the consequences of dam failure.

Principle 2B

Documented operating procedures for the dam and flow control equipment under normal, unusual, and emergency conditions shall be followed.

Principle 2C

Documented maintenance procedures shall be followed to ensure that the dam remains in a safe and operational condition.

Principle 2D

Documented surveillance procedures shall be followed to provide early identification and to allow for timely mitigation of conditions that might affect dam safety.

Principle 2E

Flow control equipment shall be tested and be capable of operating as required.



Typical Contents of an OMS Manual

1. PROJECT DESCRIPTION

- Overview
- Infrastructure
 - Communications
 - Access Routes
 - Public Safety

2. OPERATION

- Roles and Responsibilities
- Water Management
- Operating Procedures
 - Normal Operations
 - Flood Operations
 - Unusual Operations
 - Emergency Operations
- Records (Logs)
- Flow Control
 - Equipment and Facilities
 - Water Level Gauge Systems
 - Supervisory Control Systems
 - Emergency Systems

3. MAINTENANCE

- Maintenance Programs
- Concrete Structures
- Embankment Structures
- Steel Structures
- Other Dam Structures
- Spillway Structures
- Penstocks, Tunnels, and Pressure Conduits
- Infrastructure (Access, Utilities)

4. SURVEILLANCE

- Visual Inspections
- Dam Instrumentation
- Response to Unusual Conditions
- Documentation and Follow-up

5. MAINTENANCE AND TESTING OF FLOW CONTROL EQUIPMENT

Questions?