

**STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION**

_____)
In the Matter of:)
)
)
PROPOSED AMENDMENT)
TO 20.6.2 NMAC (Copper Rule))
_____)

No. WQCC 12-01(R)

EXHIBIT SCOTT – D-6



**CANADIAN DAM ASSOCIATION
ASSOCIATION CANADIENNE DES BARRAGES**

CDA 2010 Annual Conference
Congrès annuel 2010 de l'ACB

Niagara Falls, ON, Canada
2010 Oct 2-7

Regulation of Dams and Tailings Dams in Canada

Paul Campbell, P.Eng., MCIP, NB Department of Environment
Michel Dolbec, ing., M.B.A., Centre d'expertise hydrique du Québec
Glenn Ford, Government of Yukon, Environment
Garth I. Haack, P,Eng, Saskatchewan Watershed Authority
Nick Heisler, IJC
William Jolley, British Columbia Environment
Ramy Kamel, Ph.D., P.Eng, British Columbia
Stan Kaczmarek
Loius Marcoux,
Clyde McLean, M.A.Sc, MBA P.Eng, Newfoundland and Labrador
Tim Moulding, M.Sc., Saskatchewan Ministry of the Environment
Mike Passey, Ontario Ministry of Natural Resources – Biodiversity Branch
André Roy, ing., M.Sc., Parks Canada Agency, Dam Safety Program Specialist
Xueqing(Grant) Su, Ph.D, PEng., Canadian Nuclear Safety Commission
John Theakston, P.Eng, Nova Scotia Environment
Karyn M. Wog, M.Eng, P.Eng, Alberta Environment - Dam Safety

ABSTRACT:

Regulation of dams in Canada is a provincial/territorial responsibility and is similar to other areas of provincial jurisdiction such health and education. Unlike other countries, Canada does not have a federal regulatory agency or over-arching program which guides the development of requirements for the safe management of dams. The Canadian Dam Association (CDA), a volunteer organization was formed in the 1980s to provide dam owners, operators, consultants, suppliers and government agencies with a national forum to discuss issues of dam safety in Canada. The Dam Safety Guidelines developed by the CDA can provide regulators with a basis for evaluating the safety of dams within their respective jurisdictions. This paper will outline the legislation regarding dams in Canada, and examine how the principles and practices outlined within the CDA Dam Safety Guidelines are being used by regulators within various Canadian jurisdictions.

A comparison of CDA with ASDSO (Association of State Dam Safety Officials - USA) will be made to highlight the similarities and differences in dam safety applications between Canada and the Unites States.

Key Words: Regulation of dams, Dam Safety, Tailings

Regulation of dams in Canada is a provincial/territorial responsibility and is similar to other areas of provincial jurisdiction such health and education. Unlike other countries, Canada does not have a federal regulatory agency or over-arching program which guides the development of requirements for the safe management of dams. The Canadian Dam Association (CDA), a volunteer organization was formed in the 1980s to provide dam owners, operators, consultants, suppliers and government agencies with a national forum to discuss issues of dam safety in Canada. The Dam Safety Guidelines developed by the CDA can provide regulators with a basis for evaluating the safety of dams within their respective jurisdictions. This paper will outline the regulations regarding dams in Canada, and examine how the principles and practices outlined within the CDA Dam Safety Guidelines are being used by regulators within various Canadian jurisdictions.

1 HISTORICAL PERSPECTIVE AND EVOLUTION OF LEGISLATION

1.1 Federal History

Prior to 1894, the Riparian Doctrine of English common law was adopted in Canada and provided the basis of early Canadian water law in Canada in places where water seemed to be abundant. The owner of land adjacent to a water body could make reasonable use of the water so long as it did not interfere with the similar right of other riparian owners

1.1.1 Western Canada

Development of western Canada during the mid and late 1800s resulting in increasing water use for agricultural irrigation, railroad and water use for stream trains, and water supply to new and growing towns and cities. This put heavy demands on a scarce resource. In 1894, the *Northwest Irrigation Act* was activated.

1.1.2 1894 Northwest Irrigation Act

The Act allowed for the allocation of surface water by government for irrigation and other purposes. A license was not required for domestic use. This Act facilitated the use of surface water for others and not just riparian land owners. An applicant had to demonstrate the use of the water. An administrative paper was issued that outlined to the applicant the details of the allocation and specifying a priority number.

1.1.3 The 1900s

During this time the western part of Canada continued to grow and develop. Manitoba became a province in 1870, and BC followed in 1871. Alberta and Saskatchewan became provinces in 1905. In 1903 the Canadian Pacific Railway becomes involved in irrigation projects, to counteract water scarcity, to encourage settlement. The 1930 Natural Resources Act transferred water resources to a provincial jurisdiction. In 1935, the federal Prairie Farm Rehabilitation Association (PFRA) was established with the mandate of water development and soil conservation in response to the drought conditions during the Dirty Thirties. In 1939 World War II began and continued into the mid 1940s which, during this time there is significant economic development in Canada to support the war effort. After a short depression that often follows cessation of war, Canada continued in the 1950s and 1960s with major economic expansion. The major impacts were shifts towards gas powered engines and turbines and population expansion resulting in significant municipal growth.

1.2 1930 Natural Resources Transfer Act

The Natural Resources transfer Act (1930) led to the Provinces of Alberta, Saskatchewan and Manitoba assuming jurisdiction over all natural resources, including water, except those on federal land and water sources involving inter-provincial and international agreements. Prior to 1930 water priorities between Alberta, Saskatchewan and Manitoba were held together. The transfer of water rights from a federal to a provincial

jurisdiction is a significant event. From this Act, and the connection of dams with water resources, dams and dam safety also became a provincial responsibility.

2 PROVINCIAL HISTORY

The evolution of provincial legislation regarding dams was influenced by the availability or scarcity of water, historical events and economic demands.

2.1 Evolution of the Water Act in Alberta

The Post-War boom was felt in Alberta with significant economic expansion in industry, agriculture and oil industry. The switch to gas powered engines and turbines resulted in a significant increase in licenses for irrigation. Municipal growth and development resulted in increased demands for domestic water use, irrigation water for parks, green spaces and golf course etc. Shortages of water occur, and the response of the governments was the building of dams. In addition, the increase demand for electrical resources supported the development of hydro-electric generation.

In 1968, the *Alberta Irrigation Act* brought all irrigation districts under uniform legislation and set procedures for the administrative aspects of the districts. The Master Agreement on Apportionment was completed between Alberta, Saskatchewan and Manitoba. In this agreement, Alberta must pass at least 50% of flows in Alberta must pass into Saskatchewan. This necessitated the need for even more diligent monitoring of license amounts and allocations within Alberta.

The economic boom of the 1970s and early 1980's combined with climate effects and consecutive dry year periods, with the longest being 8 consecutive years, saw an exponential demand for irrigation. In 1971 groundwater, which was previous excluded from the water licensing, became an issue and was include in licensing and allocation administration. The dry years highlighted the need for in-flow stream needs to maintain enough flow to maintain aquatic and riparian ecosystems. Dry conditions in 1984 resulting in the first provincial action of water mastering, licenses were shut off after certain dates and unused licenses were cancelled.

2.2 Eastern Canada

2.2.1 Ontario

In Ontario water was generally considered to be abundantly available and did not require investing the allocation of water resources in the Crown. As a result, the allocation of water resources continued to be managed by the common law application of the riparian doctrine. The protection of riparian rights became codified within various pieces of provincial legislation, including those acts governing dam construction and other works on lakes and rivers.

In 1927, Ontario introduced The Lakes and Rivers Improvement Act (LRIA), bringing together six previous acts governing the construction of dams and other works on lakes and rivers. The main purpose of the Act at that time was the protection of public interest in rivers, timber-driving, timber slide companies, and waterpower privileges.

When the LRIA was passed, most dams were constructed for log driving, water supply, and waterpower purposes. Between 1927 to 1950, very few dams were constructed for private recreation. Many of the industrial mill dams were built prior to the 1940's. The legislation, technology, and standards that existed did not adequately address the protection of persons and property and did not recognize the need to protect the aquatic natural resources to the standards of today.

2.2.2 Quebec

As in Ontario, scarcity of water is not an issue in the Province of Quebec. The Civil Code of Quebec, a codified legal system originally based on the Napoleonic Code of France, has a different approach than in the other provinces and territories of Canada. In Quebec, The Civil Code is a combination of the Civil Code and statute law. This differs in other parts of Canada where the system is a combination of common law and statute law.

The Civil Code of Québec, in harmony with the Charter of human rights and freedoms and the general principles of law, governs persons, relations between persons, and property. The Civil Code comprises a body of rules which, in all matters within the letter, spirit or object of its provisions, lays down the *jus commune*, expressly or by implication. In these matters, the Code is the foundation of all other laws, although other laws may complement the Code or make exceptions to it.¹

3 PHILOSOPHIC FOUNDATIONS OF ACTS GOVERNING DAM REGULATION IN CANADA

3.1 First in Time, First in Right (FTFR)

The principle of FTFR applies in British Columbia, and Alberta.

Each license, or registration, is given a priority number that corresponds to the date the complete application was received or accepted. A license which has an earlier priority date is considered to be a more senior license than one with an earlier priority date (junior license). All licenses, other than household use, are ranked according to seniority and not according to purpose (i.e., no one purpose is more important than another). A priority call can be made when a senior license holder is not receiving the entitled allocation.

This foundation has several implications related to dams. Junior license holders with dams must accommodate any senior license owners with dams upstream and downstream or within the affected basin. Dam owners may have to alter flows or lower reservoirs if more senior license holders call for priority.

3.2 Riparian Rights

The Riparian Doctrine of English common law still exists as a guiding principle in the allocation of water use in Ontario.

The ownership or exclusive right to use water is not vested in the Crown. Water is considered a right in common and cannot be privately owned. As water is a shared resource, all those who own property adjacent to water are entitled to share in its reasonable use. This right of reasonable use provide riparian owners with the rights that include:

1. right of access to the water;
2. right of drainage
3. rights relating to the quantity (flow and level) or water;
4. rights retaining to the quality of water;
5. rights relating to the use of water; and
6. rights of accretion.

Applicants who are applying for approval under the LRIA need to be aware of the rights of riparian owners and need to take into account the effect that the proposed work will have on the rights of riparian owners.

3.3 Managed Use

This principle applies in Saskatchewan.

In the management of water resources in the Province of Saskatchewan, water ownership is vested to the Provincial Crown. A water rights license is issued to a proponent under the Act, but is not specifically linked to the adjoining land and is, therefore, not transferable upon change in ownership of the property. The Act does not recognize any priority system for water rights e.g. "first in time, first in right". In times of water shortages, the Authority manages the equitable distribution of water.

4 CURRENT LEGISLATION AND GOVERNANCE

4.1 Newfoundland and Labrador

The Department of Environment and Conservation and more specifically the Water Resources Management Division is responsible for administering the Water Resources Act (WRA) which is used to manage the provinces water resources. The Water Resources Act (WRA) has the authority to require proponents to obtain permits for new dams and maintenance of existing dams, as per Section 48 of the WRA. It is through the Section 48 permits that dam owners are notified of the CDA requirements for Dam Safety Reviews and Emergency Preparedness Plans (EPP). In addition, Sections 43 (Maintenance and inspection of dams) and 44 (Safety of works) of the WRA provide the department with the authority to require dam owners to make repairs if the structure are not considered to be safe. The province does not currently have dam safety regulations as separate legislation.

4.2 Prince Edward Island

As of 2003, there were no dams meeting the CDA definition in this province.

4.3 Nova Scotia

The Environment Act requires that a person hold an approval from the Minister of Environment before commencing or continuing an activity designated under the Activities Designation Regulations. The Activities Designation Regulations designate the use or alteration of a watercourse or water resource as an activity if the use or alteration is for a number of specific purposes. These purposes include; the construction or maintenance of a dam or other in-stream structure, the storage of water in excess of 25,000 m³, and the withdrawal of water in an amount greater than 23 000 L per day. A dam constructed for mine tailings management also requires approval under these regulations. However, most dam-related approvals are associated with consumptive use of water, or non-consumptive use of watercourses or water resources (e.g., wildlife management). Although Nova Scotia does not have legislation directly on dams or dam safety, a dam-owner may be required to obtain an approval for certain activities associated with dams.

Neither the Act nor the Activities Designation Regulations define the term "dam". The CDA guidelines are not specifically referenced in the Act, the regulations or in the standard conditions on approvals.

The Approvals Procedure Regulations sets out procedural aspects of the approval regime, including the manner for application for an approval, the purpose and scope of an application review, financial security requirements, and requirements pertaining to abandonment and rehabilitation of a site covered by an approval. The Approvals Procedure Regulations state that the review of an application for an approval shall determine whether the impact on the environment of the activity conforms with regulations made pursuant to the Act, or to policies, standards or guidelines prescribed or adopted by the Minister.

An undertaking that involves transferring water between drainage basins, if the drainage area containing the water to be diverted is larger than 1 square kilometre, must first be assessed under the Environmental Assessment Regulations made under the Environment Act, giving the opportunity for public input. An undertaking that disrupts a total of 2 ha or more of any wetland also requires assessment under these regulations. For projects not falling under the Environmental Assessment process, the Approvals Procedure Regulations

provide a discretionary power to require an approval applicant to provide a consultative process in the areas where the project will be located

4.4 New Brunswick

Statutory Authority for the regulation of dam construction, operation and maintenance is established in the NB Clean Water Act, Sections 15(1) to 15(3).

Section 15(1) addresses the planning and permitting of construction and operation of any dam or diversion or any other project or structure that alters a watercourse or a wetland. The project proponent must provide the Minister with plans and such other documents as the Minister may require, and must obtain a permit from the Minister under the "Watercourse and Wetland Alteration Regulation".

Section 15(2) states that the owner shall maintain the project or structure in good repair at all times. The section also refers to any other structure that lies within or crosses all or part of a watercourse or wetland. Thus, all dams or structures that were constructed prior to the date of the provisions of the Act and the Regulations must be kept in good repair. The section also establishes that the responsibility for the planning, construction and operation of dams lies with the owner.

Section 15(3) provides the Minister with further authority to order inspections, engineering documentation, repairs or modifications and to order the owner or operator to meet any other terms and conditions that were part of the permit approval.

4.5 Quebec (2000)

The Quebec Dam Safety Act (2000) and Dam Safety Regulations (2002) are highly comprehensive in scope and were prepared as a outcome from the 1996 Saguenay flood events.

Prior to the Dam Safety Act (2000) was in force in April 2002, the only legislation concerning dams was the Watercourse Act governing the construction and maintenance of dams. The Watercourses Act dates back to 1856 and was one of the first Acts of Lower Canada. The main objective for this Act was the utilization of watercourses in a relation to industrialization for the Province of Quebec (Lower Canada). In 1918, the Act was modified to address issues with respect to the right of occupation of land and dam safety. The modification included an obligation that no dam may be constructed or maintained unless the plan and specifications relating thereto have previously been approved by the Government. The main focus for dams was the regulation flow to ensure a uniform water supply to water-works systems, mills, and hydraulic power. In 1964, as a result of several dam failures, one of which included a death, the obligation for approval of plans and specifications was extended to all dams.

4.6 Ontario

The Ontario Lakes & Rivers Improvement Act (LRIA) and Ontario Regulation 454/96 require that the location and plans and specifications for dam works be approved by the Ministry of Natural Resources (MNR). Under the LRIA, the MNR must approve the location and plans and specifications for dam construction, alterations, improvements and repairs.

The purposes of this Act are to provide for:

- a. management, protection, preservation and use of the waters of the lakes and rivers of Ontario and the land under them;
- b. protection and equitable exercise of public rights in or over the waters of the lakes and rivers of Ontario;
- c. protection of the interests of riparian owners;
- d. management, perpetuation, and use of the fish, wildlife, and other natural resources dependent on the lakes and rivers;

- e. protection of the natural amenities of the lakes and rivers and their shores and banks; and
- f. protection of persons and of property by ensuring that dams are suitably located, constructed, operated and maintained and are of an appropriate nature with regard to the purposes of clauses (a) to (e).

The Act gives the Minister the right to inspect a dam and order an owner to change the reservoir water level, prepare a management plan for the operation and maintenance of a dam or remove an unauthorized dam.

4.7 Saskatchewan

Water Course Dams

The Saskatchewan Watershed Authority (the Authority) regulates the development and use of water in Saskatchewan. The Authority's regulatory responsibility is vested under *The Saskatchewan Watershed Authority Act, 2005* and its regulations. *The Act* establishes the Watershed Authority and outlines the Authority's mandate to manage, control and protect the water resources, watersheds and related lands by regulating water development and water use. In addition to its regulatory role, the Authority is responsible of the operation and maintenance of 45 dams within the Province of Saskatchewan, the largest being Gardiner Dam. *The Act* does not have specific dam safety provisions; however, any person wishing to construct and operate a dam must first obtain approval under *The Act* from the Authority.

The Act has a well defined process for the approval of new works including a review of water allocation; land control, ancillary permits (environment), construction drawings, methods and time frames for proposed construction, inspection of completed works and miscellaneous conditions for operation. *The Act* is largely mute on the need to inspect and maintain dams, assemble emergency preparedness plans, commission dam safety reviews and other related ownership responsibilities. The legislation also does not provide any guidelines, standards or procedures to owners to ensure an appropriate level of safety to the public.

Tailings Dams

In Saskatchewan, tailings dams/impoundments are addressed in the "Mineral Industry Environmental Protection Regulations, 1996" as part of a pollutant control facility. Lately, the province has been encouraging below grade tailings management in the north. For potash, dams and dykes for tailings impoundments are usually not associated with watercourses and dam heights tend to be short.

4.8 Alberta (1978)

Dam Safety was legislated in Alberta in 1978. As a result of the transfer of federal water resource assets to the provinces in the early 1970s, economic growth and building of dams, it was determined that specific legislation regarding the safety of dams be established in Alberta.

Issues and constraints continued through the 1980s and 1990s. Water was governed under many pieces of legislation. In 1999 the Water Act came into effect. The Act governs how the government manages water resources in the Province. The Dam Safety legislation was included in the Water Act under the Regulations.

Alberta has Dam Safety legislation as a part of the Water Act and Water Act, Water (Ministerial) Regulations. Part 6 of the regulations is Dam and Canal Safety. The Regulation does not differentiate dams based on their use. As a result, traditional water course crossing dams and tailings and waste impoundments, not on a water course and created by dams, are regulated by Dam Safety legislation.

Alberta was the first jurisdiction in Canada with formalized Dam Safety legislation in 1978. Two key factors in supporting the development of the legislation was the transfer of federal water resources assets to the provinces in the early 1970s and the dam failures in the United States, most notably the Teton Dam. The legislation applies to new and existing dams.

4.9 British Columbia (2000)

The Water Act of BC, originally established in 1909, has authority over dams and holds dam owners liable for any damage caused by the construction, operation or failure of their dam. Under the Water Act, dam owners are responsible for; obtaining a water licence and complying with its terms and conditions, and maintaining historical records of all observations, inspections, maintenance items, instrumentation readings, etc. Under the Water Act, dam owners are responsible for: obtaining a water licence and complying with its terms and conditions, and maintaining historical records of all observations, inspections, maintenance items, instrumentation readings, etc.

The Dam Safety Regulation was passed into law as Regulation 44/2000 under the Water Act effective February 11, 2000. The objective of the Regulation is to mitigate loss of life and damage to property and the environment from a dam breach by requiring dam owners to inspect their own dams, undertake proper maintenance, and ensure that these dams meet ongoing engineering standards. The requirements under the Regulation are based on the complexity of the dam and the potential downstream consequences defined in Schedule 1 of the Regulation. Dam owners must satisfy all ongoing requirements and may also need to meet special and/or additional requirements.

Design, operation, closure, and reclamation of Mine Tailing Dams and Impoundments are regulated by the Health, Safety and Reclamation Code for Mines in British Columbia (Code) under the Mines Act (2003), which was first enacted in 1969.

4.10 Yukon

There is no specific legislation governing dams in Yukon. Dams are primarily regulated by water licenses issued under the Yukon Waters Act. In the Yukon, 19 of the 29 known dams are associated with mines.

4.10.1 Water Board

The owner of a dam must apply to the Yukon Water Board for a water license. Water licenses in Yukon are for use of water and/or deposit of waste. In the case of dams, the thresholds for dam height, storage and hazard will determine if a license is required. The following criteria apply to the licensing of dams under the Yukon Waters Act:

- No license required for the construction of a dam less than 3 metres high, less than 10 000 m³ of water is stored and no hazard is posed.
- A type "B" water license is required for construction of a dam more than 3 metres high but less than 8 metres high, more than 10 000m³ but less than 60 000 m³ of water is stored and the dam poses no hazard.
- A type "A" water license is required if the dam is greater than 8 metres in height, more than 60 000 m³ of water is stored or where a hazard is posed.

Type A water licenses are for larger projects and have a mandatory public hearing. Type B water licenses are for smaller projects and have a public hearing at the discretion of the Water Board. The Water Board can require a public hearing for any project if it decides that a hearing is in the public interest, or because an interested party requested a hearing and the Water Board agreed.

If a license is issued, it will contain conditions which the licensee must adhere to. In the case of a dam this includes, but is not limited to; monthly and annual reports, an annual geotechnical inspection, dam safety reviews every five years, monitoring of piezometers, water levels and outflows. CDA Guidelines are used to help set these conditions.

4.10.2 Water Resources, Yukon Environment

Once a dam has been licensed, Water Resources of Yukon Environment takes on a monitoring and enforcement role. Information from monthly, annual and annual geotechnical reports are passed on to Water Resources. Water Resources also conducts routine inspections of dams and works with dam owners to insure compliance to the license conditions.

4.11 Non-Provincial Dams

4.11.1 Parks Canada Agency

Parks Canada Agency (PCA) is responsible for the management and operation of a network of national parks, historic sites, canals and marine conservation areas that include the ownership and operation of more than 250 dams and water-retaining structures. The main function of most of these dams is to allow recreational navigation in conjunction with lock systems along canals and waterways and to regulate water level. Most of the dams and water-retaining structures are located in Ontario and Québec, but there are some in almost every province.

In 2009, a new directive came into effect to implement a Dam Safety Program for all Dams and Water-Retaining Structure located on PCA property. The purpose of this Directive is to ensure a consistent approach within PCA in the management of its dams and water-retaining structures throughout their life cycle, by providing consistent, national guidelines for the design, construction inspection and maintenance of these dams and water-retaining structures. Where not specified in this Directive, good dam safety practice as represented by the CDA Dam Safety Guidelines shall be followed.

This Directive applies to all dams and water-retaining structures owned by PCA or located on PCA property. Dams and water-retaining structures owned by PCA and operated and maintained by others, shall as a minimum, meet the requirements of this Directive. All new/replacement leases/licenses issued for dam sites must contain a clause requiring the owner/lessee/licensee of the Dam to have a program in place that is equal or more stringent than outlined in this Directive.

4.11.2 Canadian Nuclear Safety Commission

Most of the dams in the nuclear industry are mining dams. They are generally regulated under the umbrella of the Atomic Energy Control Act (before 2000) or the Nuclear Safety and Control Act (after 2000), through either an independent licence or a licence with other nuclear facilities. There are no specific guides or regulations for dam safety.

All projects in the nuclear industry including the project involving mining dams are currently regulated by the Canadian Nuclear Safety Commission (CNSC), established in 2000 under the Nuclear Safety and Control Act (NSCA). The CNSC regulates the use of nuclear energy and materials to protect health, safety, security and the environment, and to respect Canada's international commitments on the peaceful use of nuclear energy. The CNSC staff review applications for licences according to regulatory requirements, make recommendations to the Commission, and enforce compliance with the Nuclear Safety and Control Act, regulations, and any licence conditions imposed by the Commission.

Before a project proceeds to licensing, it should pass the Canadian Environmental Assessment under the authority of the Canadian Environmental Assessment Act or a similar process. CNSC closely oversees the project from site preparation, to construction, operation, decommissioning, and abandonment of the project by issuance of the licences in different stages and conducting regular compliance inspections.

4.11.3 International Joint Commission (IJC)

Dams that are international, they cross the Canada-US border and fall under the Boundary Waters Treaty of 1909, are the oversight of the International Joint Commission, and consequently under Federal jurisdiction.

The Boundary Waters Treaty of 1909 established certain principles, obligations and procedures to be followed by Canada and the United States to prevent disputes and settle issues along their common boundary. The governments agreed in Article III that all future uses, obstructions and diversions of boundary waters on either side of the line that affect the natural level or flow of those waters on the other side would be approved by the Commission unless they are provided for in a special agreement between the United States and Canada. Article IV creates similar requirements for works in waters flowing from boundary waters or in rivers that cross the boundary if they raise water levels upstream in the other country.

When considering applications for the approval of Regulated Facilities, the Commission must follow certain principles set out in Article VIII of the treaty. These include requirements for the protection of interests in the other country if the works will increase natural levels. The Commission's Orders generally contain conditions concerning the maintenance and operation of Regulated Facilities and specify limits or operating bands for water levels and flows. Furthermore, the Commission almost always appoints boards of control to ensure that Regulated Facilities are operated in accordance with its Orders.

The Canadian federal government has in the past stated that the setting of regulations on dams, dam safety and maintenance in Canada, fall within the purview of the provinces. However, sections 91, 92 and 132 of the Constitution Act, 1867 (see Appendix 3 for text) suggest that these matters do not fall exclusively under provincial jurisdiction particularly at the international border between Canada and the United States. The Canadian federal government therefore should also play a role in this area where structures are on or cross the Canada/U.S. boundary. Section 91 gives the federal government authority to make laws for peace, order, and good government, including public safety, and specifically for defence, navigation and shipping, and works extending beyond the limits of a province. Under section 132, the federal government has authority to implement Empire Treaties,⁸ such as the Boundary Waters Treaty of 1909 under which many of these dams have been approved by the IJC whose approval orders set up ongoing control entities. The federal government is also responsible for the conduct of Canada's international relations including those with the United States.

5 DAM REGISTRIES AND WEBSITES

The CDA has worked to develop a registry and public website of dams found in Canada. Due to variations in legislation and regulation across Canada, a single, comprehensive website under CDA has not been constructed, but some information is available within each province. Currently, the provinces of Ontario, Québec and British Columbia have publically available, web-based registries for dams within those provinces. All other jurisdictions are in various parts of the process of developing a dam inventory within the region and developing a public portal for information access.

Provincial regulations regarding privacy and freedom of information affect what information may be published to a public website. Common in most, but not all, privacy legislation is the concept that information gathered for one purpose, such as the licensing of a dam, cannot be used for any other purposes, such as a public registry, without obtaining approval from the owner of the information. Issues related included the volume of work to contact owners and/or locating dam owners, as they may not be the original owner that licensed the dam. In Québec, the Dam Safety Act declares that the information contained in the inventory is public and it will be published via the web with the exception of personal identification.

Table 1 indicates the status of dam registries within Canada.

Table 1: Dam Registries in Canada as of 2010.

Area	Internal Registry	External (Public) Registry
Newfoundland and Labrador	In Process	Not Available
Prince Edward Island	N/A ¹	N/A ¹
Nova Scotia	Environmental Registry ²	Y ^{2A}
New Brunswick	N	N
Quebec	Detailed Inventory ³	Detailed Inventory ³ (without personal identification)
Ontario	Detailed Inventory ⁴	N
Manitoba	N	N
Saskatchewan	Detailed Inventory	N
Alberta	Detailed Inventory ⁵	N
British Columbia	Detailed Inventory	Partial Inventory ⁶
Yukon		N
Parks Canada Agency	Detailed Inventory	N
Canada Nuclear Safety Commission	N	N
IJC	N	N

N = Not Available

1 PEI has no dams

2 Registry of all approvals to construction and/or maintenance of dams. Dams being inventoried include ones smaller than CDA definition.

2A Subject to the Freedom of Information and Protection of Privacy Act of Nova Scotia.

3 All dams greater than 1.0 metre high and located on a water course.

4 Registry includes provincially-owned dams only. Access must be requested to view registry.

5 All dams including mining dams licensed under the Water Act, with detailed characteristics and reference material and reports.

6 Public Inventory contains limited characteristics. Mining dams available from the mining branch

6 INCLUSION/USE OF CDA DAM SAFETY GUIDELINES

To date, no province or territory explicitly references the CDA Dam Safety Guidelines within its legislation or regulations. The Guidelines are frequently referenced in working documents and regional guidelines and standards of practice and/or parts of the Guidelines explicitly written into the legislation and regulation, but not named as CDA Guidelines.

Although, it may seem odd to not have the CDA Guidelines directly referenced within Provincial legislation, it really reflects the improvements in the industry and society as a whole. In Canada, we can relate it to our Income Tax Process. Within Federal and Provincial taxation acts and legislation outline the roles, responsibilities and accountabilities around the tax process. The taxation guide, the detailed booklet that supports the processes in the tax form, is not part of the taxation legislation. However, the booklet is extremely beneficial to helping a person meeting his/her taxation obligations.

Detailed and prescriptive legislation and regulations are often written for industries or areas of society that require strict regulation, but do not have the knowledge base and understanding to properly meet outcomes. The regulatory documents become cookbooks or how-to books to meet regulatory outcomes. Application of prescriptive regulations relies on the bulk of liability being borne by the regulatory group administering the regulations, and 'declaring' a regulatory outcome achieved by virtue of an applicant completing prescribed steps. For dam safety issues, this is analogous to telling an owner how to build and operate a dam.

In the case of the issues of dam safety, existing legislation in Canada is primarily based on a due-diligence approach. Outcomes and performance measures are defined and the owner must prove that the dam meets the regulated outcomes. The regulator defines *WHAT* must be met, not *HOW* to meet the outcome. This approach is

only successful with knowledgeable and diligent dam owners and operators. It is on this framework that the CDA Dam Safety Guidelines were initiated and continue to evolve for the dam industry in Canada.

7 COMPARISON OF CDA WITH ASDSO (USA)

7.1 Canadian Dam Association

One of the objectives of publishing the CDA Dam Safety Guidelines in 1995 was to provide a basis for development of provincial dam safety legislation and regulations. This objective was repeated in the revised 1999 CDA Guidelines. None of the provinces has adopted the CDA Guidelines in their dam safety regulations, although there are references to aspects of the Guidelines.

In the current 2007 CDA Guidelines, a number of principles are outlined under five broad topics: Dam Safety Management; Operation, Maintenance and Surveillance; Emergency Preparedness; Dam Safety Review and Analysis & Assessment. None of these principles address the development of provincial dam safety legislation and regulations. However, in 2004 the Dam Safety Regulators Committee was formed to provide guidance to the CDA Board of Directors and act as the resource on items regarding the legislation governing dams. The CDA has supported the advancement of provincial and territorial regulations for dam safety through this committee.

7.2 Association of State Dam Safety Officials (ASDSO)

ASDSO's origins date from November 1977, when 39 people were killed by the Kelly Barnes dam failure in Toccoa Falls, Georgia. President Jimmy Carter immediately issued an executive order directing the U.S. Army Corps of Engineers to inspect dams nationwide. ASDSO held the first conference in 1984 in Denver, and saw the ASDSO constitution and by-laws adopted by 34 states. Today, ASDSO has more than 2,500 members representing state, federal and local governments; academia; dam owners; manufacturers and suppliers; consultants and others.

ASDSO Mission Statement:

“ASDSO is a non-profit organization of state and federal dam safety regulators, dam owners/operators, dam designers, manufacturers/suppliers, academia, contractors and others interested in dam safety. Our mission is to advance and improve the safety of dams by supporting the dam safety community and state dam safety programs, raising awareness, facilitating cooperation, providing a forum for the exchange of information, representing dam safety interests before governments, providing outreach programs, and creating a unified community of dam safety advocates.”

The support that ASDSO provides for state dam safety programs can be summarized into the following three broad categories: support for legislation and regulations, financial support and targeting specific states for special attention. A comprehensive list of goals, initiatives and priority issues are posted on the Advocacy and Outreach section of the ASDSO web site.

The ASDSO also collects statistics from each of 50 states and publishes a table showing the dam safety budget and staffing levels for each state as well as the number of state regulated dams and dam remediation needs.

8 FUTURE OF THE CDA GUIDELINES

The Canadian Dam Association Dam Safety Guidelines have been in existence for over a decade in Canada. The Guidelines have been revised in 1999 and 2007 and continue to grow. In 2007, technical Bulletins were added to provide more in-depth discussion on particular items related to the dam industry. Additional Bulletins in progress include mining dams, oil sands dam closure and issues related to the operation of small dams.

9 SUMMARY CHART OF DAM SAFETY LEGISLATION IN CANADA

Jurisdiction	Dams	Tailings Dams	Foundation
British Columbia	Water Act	Health, Safety and Reclamation Code for Mines in British Columbia	FTFR
Alberta	Water Act	Water Act	FTFR
Saskatchewan	Saskatchewan Watershed Authority Act	Assessment Act	Equitable Management
Manitoba	Water Resources Administration and Water Rights		
Ontario	LRIA	Mining Act	RU
Quebec	Watercourse Act Sécurité des Barrages (Dam Safety)	La Loi sur les mines (Mining Act)	Watercourse Act and Civil Code
New Brunswick	Clean Water Act		
Nova Scotia	Environment Act Regulations		
Newfoundland Labrador	Water Resources Act	***	
Yukon	Waters Act (Yukon)		
NWT	MVRMA Waters Act		
Nunavut	Waters & Surface Rights Tribunal Act		
Parks			
CNSC	Nuclear Safety & Control Act Uranium Mines & Mills Regulations	Nuclear Safety & Control Act General Nuclear Safety and Control Regulations Uranium Mines & Mills Regulations	
IJC	1909 Boundary Waters Treaty Act		

*** Tailings Dams on natural bodies of water fall under Water Resources Act.

END NOTES

1. Civil Code of Quebec – Preliminary Provision. Éditeur officiel du Québec

REFERENCES

2009. ASDSO. http://www.damsafety.org/media/Documents/STATE_INFO/STATISTICS/2008StateProgramStats.pdf
2009. Alberta Environment. Water Act and Compliance 101 – Introductory Course.
2009. Priscu et al. Mining Dams Safety Regulation – Where Does Canada Stand?. Canadian Dam Association 2009 Conference Proceedings.
2008. International Joint Commission Annual Report for 2008: Boundary Waters Treaty Centennial Edition
2007. Canadian Dam Association. Dam Safety Guidelines
2003. Smith, G. The Status of Dam Safety Legislation in Canada. Canadian Dam Association Bulletin, Spring 2003. Vol.14, No. 2: pp 10 to 20.
1968. Queen’s Printer, Province of Alberta. Alberta Irrigation