CANADIAN DAM ASSOCIATION
ASSOCIATION CANADIENNE DES BARRAGES

December 7, 2014

Mount Polley Independent Expert Engineering Investigation and Review Panel
5B – 940 Blanshard Street
Victoria, BC V8W 3E6
via: www.mountpolleyreviewpanel.ca

Re: Canadian Dam Association – Submission to the Mount Polley Independent Expert Engineering Investigation and Review Panel

The Canadian Dam Association (CDA) is pleased to put forward the following in response to the invitation for written submissions to the Mount Polley Independent Expert Engineering Investigation and Review Panel.

The Association strongly supports the BC Ministry of Energy and Mines' appointment of the Independent Panel to "*report on the cause of failure and to make recommendations to government on actions that could be taken to ensure that a similar failure does not occur at other mine sites in BC.*" While the CDA is not in a position to provide commentary as to the likely cause(s) of failure, we greatly appreciate the opportunity to provide input to the Panel in regards to steps that can be taken to reduce the risk of future failures.

Although the root causes of the Mount Polley Tailings Dam failure are yet to be determined, what is known is that proper technical guidance and education for dam owners, consultants and regulators is germane to preventing failures. Therefore, the CDA puts forth the following recommendations for consideration by the Panel:

Recommendation 1: *The Province of BC should seek to partner with industry associations, such as the CDA, on the delivery and stewardship of guidance documents and professional development that promote a common understanding of good practice in managing the safety of tailings dams.*

Recommendation 2: *The Province of BC should consider means to participate in and support the development of guidance documents, such as the CDA Technical Bulletins on Emergency Management and on Dam Safety Reviews, in order to create reference points for industry good practice.*

Recommendation 3: *The Province of BC should consider means to participate in, and support, the CDA in its plans to develop guidance documents on methods related to dam breach analysis and consequence assessments for tailings dams.*

Recommendation 4: *The Province of BC should consider creating a database of incidents and "near misses" that have occurred at tailings dams, such that transparency with the public is assured and industry is informed so that lessons learned can be applied to other facilities.*

Though the seriousness of the Mount Polley breach cannot be overstated, the Province of British Columbia is not uniquely exposed to the risks associated with tailings (and conventional water retaining) dam failures. In fact, preventable dam failures can, and do, occur in Canada and elsewhere, presenting valuable opportunities to learn lessons. The CDA asks that the Panel consider addressing through its report this broader context of safe dams, so that the Province can leverage on the resources and common interests of the Federal Government, other provinces and territories, and professionals engaged in the practice of dam engineering to bring about the changes necessary to ensure the safety of the public and our environment.

Recommendation 5: *The Province of BC should seek to engage its provincial and territorial counterparts, federal agencies and industry associations in dialogue to develop a national strategy – aligning their common interests in good practice – towards addressing the issue of dam safety in Canada.*

We have attached Part II – Supporting Information, which serves to further detail the issues being identified to the Panel for its consideration. In addition we are forwarding to your attention copies of the *CDA Dam Safety Guidelines* and *CDA Guidelines for Public Safety Around Dams*, along with their supporting Technical Bulletins for your use.

In closing, we would like to re-iterate our support for the overall direction of the Panel. We look forward to the opportunity to work with the Ministry to refine and implement any Panel recommendations that serve to advance the practice of safe dams, in order to achieve our shared objective of sustainable development and responsible water resource management.

The CDA would be pleased to discuss our comments and additional technical details directly with the Panel at your convenience.

Sincerely,

Gilles Bourgeois, P. Eng.
President, CDA

Part II – Supporting Information

The following is supporting information submitted by the CDA for consideration by the Panel, and provides additional information in support of our recommendations.

Background on the Canadian Dam Association

The CDA was established in 1996 through the merger of the Canadian Dam Safety Association (CDSA) and the Canadian Commission on Large Dams (CANCOLD). The unification of the two organizations created an association which represents the broad interests of the dam industry in Canada, with our Mission and Objectives being;

Mission: *The Canadian Dam Association will be the recognized leader in advancing knowledge and practices related to dams, consistent with social and environmental values.*

Objectives: *Through engaging, involving and serving the Canadian dam community, the objectives of the CDA are:*

- Encourage responsible practices and management throughout the life cycle of dams
- Continually improve information on, and knowledge of, dams
- Foster an awareness and understanding of dams and related issues
- Disseminate and exchange information and knowledge related to dams.
- Support the development of skills and expertise in dam disciplines
- Provide broad representation of the dam community in Canada
- Contribute the Canadian perspective to the international dam community

The CDA is a non-governmental not-for-profit organization that brings together regulators, dam owners, consulting engineers, contractors and associated service providers, and their organizations, from across Canada and internationally. The CDA utilizes an active website (www.cda.ca), a quarterly bulletin, email distributions, an annual conference and periodic workshops to communicate with our membership and all those with an interest in dams.

The CDA provides training on our award-winning *Public Safety Around Dams Guidelines* with nine two-day workshops delivered on the topic since the *Guidelines* were released in October 2011. We are currently developing the training program associated with the newly released *Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams,* for delivery beginning in 2015.

Role of the Canadian Dam Association

In Canada, the licensing and regulation of dams is generally under provincial or territorial jurisdiction. There are four provinces with forms of regulatory guidance: Alberta, British Columbia, Quebec and Ontario. The Canadian Nuclear Safety Commission is responsible for the

regulation of tailings dams associated with uranium mining and the Federal Government is accountable for dams on federal waterways, including canals.

The Canadian Dam Association is an industry association and has no regulatory authority. The CDA does publish guidance on the design, construction and safe operation of all dams, including tailings dams. These documents have been prepared by volunteer practitioners, many of whom are recognized leaders in their fields both within Canada and internationally. While the CDA guidelines and bulletins provide valuable assistance to regulators, dam owners and dam managers, they are neither standards nor regulations. It is worthwhile to note that in many instances the CDA guidelines and bulletins have been adopted for use in other jurisdictions.

Technical Publications of the Canadian Dam Association

The CDA has produced a series of guidance documents in the form of Guidelines and Technical Bulletins for use by the membership. Typically the CDA will appoint a Working Group or Committee and task it to develop the guidance documents, drawing upon members' expertise and in consultation with those active in the field both within Canada and internationally. The documents are prepared in draft, then workshops are held to solicit feedback and input before being finalized.

To date the CDA has published the following documents:

- CDA *Dam Safety Guidelines* (1995, revised 1999, 2007, 2013), including nine associated Technical Bulletins;
    i. Inundation, Consequences and Classification for Dam Safety (2007)
    ii. Surveillance of Dam Facilities (2007)
    iii. Flow Control Equipment for Dam Safety (2007)
    iv. Dam Safety Analysis and Assessment (2007)
    v. Hydrotechnical Considerations for Dam Safety (2007)
    vi. Seismic Hazard Considerations for Dam Safety (2007)
    vii. Geotechnical Considerations for Dam Safety (2007)
    viii. Structural Considerations for Dam Safety (2007)
    ix. Application of Dam Safety Guidelines to Mining Dams (2014)

- CDA *Guidelines for Public Safety Around Dams (2011),* including three associated Technical Bulletins;
    i. Signage
    ii. Booms and Buoys
    iii. Audible and Visual Signals

Of note in the above listing is that CDA Mining Dams Committee recently issued guidance on dam safety for tailing dams and other mining dams, following a five-year period of input, review and comment. The new publication - *Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams* - addresses technical aspects of mining dam safety. This *Bulletin* was released in October 2014.

In addition to the recently released *Application of Dam Safety Guidelines to Mining Dams*, the CDA currently has underway the development of two additional guidance documents directly relevant to the on-going safety of tailings dams: Technical Bulletins on *Dam Safety Reviews* and on *Emergency Management for Dam Safety*.

Recommendations

The CDA understands that the mandate of the Panel is "*to make recommendations to government on actions that could be taken to ensure that a similar failure does not occur at other mine sites in BC."* Therefore, this submission offers a number of recommendations for consideration by the Panel.

The CDA's guidance documents described above are recognized by regulatory authorities throughout Canada and internationally as representing industry good practice. They are high-quality documents produced and reviewed by some of the leading experts in the field. These guidance documents are produced by volunteers with limited financial support, which impacts the timely delivery of the documents. Once produced, there is an on-going need for stewardship of the publications and dissemination through training workshops and seminars. Therefore, the CDA proposes the following recommendation:

Recommendation 1: *The Province of BC should seek to partner with industry associations, such as the CDA, on the delivery and stewardship of guidance documents and seminars that promote a common understanding of good practice in managing the safety of tailings dams.*

Following the failure of the Mount Polley Tailings Dam, the Chief Inspector of Mines for British Columbia issued an Order on August 18, 2014 that all tailings dam owners, agents or managers responsible for tailings dams were to provide a Dam Safety Inspection, a Dam Classification, Emergency Preparedness and Response Plans (EPRPs) including a Dam Break Inundation Study, and third party review by December 1, 2014. The reference point for the EPRP and inundation studies quoted in the Order is the *CDA Dam Safety Guidelines*. While the *CDA Dam Safety Guidelines* do provide a good reference point, as part of the CDA's desire to maintain the technical guidance available to practitioners at current good practice levels we have created a working group to review the Emergency Management components of the *Guidelines* and to develop a specific Technical Bulletin on the subject. The BC Government could leverage on this

initiative to further its interests of promoting safe tailings dams by supporting the CDA. Therefore, the CDA proposes the following recommendation:

Recommendation 2: *The Province of BC should consider means to participate in and support the development of guidance documents, such as the CDA Technical Bulletins on Emergency Management and Dam Safety Reviews, in order to create reference points for industry good practice.*

As part of the good practice related to dam safety, one of the key steps of a dam safety program is to assess the classification of the dam in case of failure. The CDA *Dam Safety Guidelines* provide guidance on a classification level based on risk of loss of life, damages to infrastructure, and environmental and cultural losses. A significant step in assessing the consequence is a dam break analysis. While dam breach parameters and dam break modeling for conventional water dams is fairly well understood, this is far from being the case for tailings dams. Given the uncertainty in the dam break assumptions and modeling results, care should be taken in assessing the accuracy of dam break analysis results and related inundation maps. The work being done in British Columbia in this regard could be of value to CDA as we develop industry guidance for dam break analysis. Therefore, the CDA proposes the following recommendation:

Recommendation 3: *The Province of BC should consider means to participate in, and support, the CDA in its plans to develop guidance documents on methods related to dam breach analysis and consequence assessments for tailings dams.*

The study of incidents often triggers improved safety by identifying and guarding against workplace hazards as well as driving changes in the public domain as they relate to accident prevention. Lessons can be derived from data analysis across a spectrum of incidents to identify systemic issues, in addition to the detailed assessment of individual cases in order to understand the risks associated with a particular set of hazards. Other hazardous industries such as the airline industry, with well-established incident-reporting processes, have been able to show a correlation between high levels of incident reporting and reduced levels of high- and medium-risk occurrences.

In the dam industry, there are a number of well-documented case histories of dam failures, and various databases have attempted to collate them. However, when compared with other hazardous industries, dam safety incident reporting is poorly undertaken. Reports of dam failure often lack sufficient details to completely understand the modes of failure and the interdependencies, and unlike other industries, there are very few reports of “near misses” which can provide important lessons towards mitigating risks. In fact, in Canada there is no

definitive source of information regarding incidents at tailings dams despite a number of occurrences. This is needed for the industry both to learn lessons and to maintain transparency with the public. Therefore, the CDA proposes the following recommendation:

Recommendation 4: *The Province of BC should consider creating a database of incidents and near misses that have occurred at tailings dams, such that transparency with the public is assured and industry is informed so that lessons learned can be applied to other facilities.*

Though the seriousness of the Mount Polley breach cannot be overstated, the fact remains that the Province of British Columbia is not uniquely exposed to the risks associated with tailings (and conventional water retaining) dam failures. In fact, preventable dam failures can and do occur in Canada and elsewhere, presenting valuable opportunities to learn lessons. The CDA asks that the Panel consider addressing through its report this broader context of safe dams, in order that the Province can leverage on the resources and common interests of the Federal Government, other provinces and territories, and professionals engaged in the practice of dam engineering to bring about the changes necessary to ensure the safety of the public and our environment. Therefore, the CDA proposes the following recommendation:

Recommendation 5: *The Province of BC should seek to engage its provincial and territorial counterparts, federal agencies and industry associations in dialogue to develop a national strategy – aligning their common interests in good practice – towards addressing the issue of dam safety in Canada.*