

The Executive is grateful for the ongoing support and efforts of ANCOLD representatives in the ICOLD technical committees. These efforts and the relationships maintain ANCOLD's reputation as a strong contributor to ICOLD's technical activities.

### *ICOLD Asia Pacific Region Meeting*

The ICOLD Asia-Pacific Group (APG) Meeting was held as part of the meetings preceding the symposium. The ANCOLD Chair provided a short presentation on the requested theme for the role of dams in energy transition and water security in response to climate change.

In APG there are significant differences in institutional arrangements between the member countries. The voluntary and self-funded approach taken by Australia and New Zealand is quite different to that in several Asian countries where government and direct company support is more commonplace. This results in a significant difference in the scope of activities that ANCOLD can contribute to in this forum in comparison with some other countries.

The Asia Pacific Group continues to gain traction amongst its members and reaching out beyond the core membership of Japan, Korea and China.

The Executive continues to search for meaningful ways in which ANCOLD can engage in this forum for the benefit of members.

## ICOLD Technical Committee Reports

### *COMMITTEE A - COMPUTATIONAL ASPECTS OF ANALYSIS AND DESIGN OF DAMS (2020-23)*

#### **Committee A Workshop**

Committee A workshop "Capitalisation of the Results of the Benchmark Workshops" was presented on 11th June 2023 by members of a Committee A working group to share the status of the Bulletin under preparation. It has been decided that the original bulletin scope will be divided and presented as the following separate Bulletins:

- Benchmark Workshops on Concrete Dams
  - Static analyses
  - Analyses of dams affected by swelling
  - Thermal/Thermo-Mechanical analyses for construction of arch and RCC dams
  - Seismic analyses
  - Probabilistic safety analysis and risk assessment of concrete dams
- Benchmark Workshops on Embankment and Rockfill Dams
  - Static analyses of embankment and rockfill dams
  - Seismic behaviour
  - Failure/rapid drawdown, internal erosion and overtopping
  - Probabilistic safety analysis and risk assessment of embankment dams

The Bulletin is expected to go for ICOLD review by the end of 2023 and for final publication in 2024.

#### **"Committee A" Annual Meeting**

The annual meeting of Committee A took place on 12th June 2023, with Guido Mazzà (Italy) as Chairman and Gerald Zenz (Austria) as Vice-Chairman, with representatives from 22 countries and five external observers.

The main outcomes of the annual meeting are summarised below:

#### **1. Bulletin on Non-Linear Modelling of Concrete Dams (NLMCD).**

The coordinator of the working group informed the Committee that the final version of the Bulletin has been completed. The editing process is underway, and the final version will be sent to the ICOLD Chair, the Vice Chair and the Committee

Members by the end of July 2023. According to the rules defined by the ICOLD Board, the Bulletin Non-Linear Modelling on Concrete Dams will be sent to the ICOLD Board to start the required process for approval and then publication, including its translation into French.

## **2. Bulletins on Capitalization of the results of past ICOLD Benchmark Workshops.**

The draft Bulletins on Capitalization of the results of past Benchmark Workshops related to concrete dams and embankment dams are close to being completed.

As far as the completion of the Bulletins, the expectation is to have the final versions ready by the end of 2023.

The editing of the two Bulletins, according to the rules requested by the editor Balkema, will be done within February 2024 in order to forward the final version to the ICOLD Central Office to be include in the process of publication.

## **3. Bulletin on Arch Dams**

The Bulletin is under joint preparation of Committees D and A. Given the volume of information developed so far, it has been proposed that the Bulletin be divided into Simplified (Bulletin I) and Detailed (Bulletin II) on Arch Dam Design Methodologies and Criteria.

The Table of Contents of the Bulletins will be as follows:

- 1-Introduction
- 2-Historical perspective of concrete arch dam development
- 3-Arch dam design philosophy and basic concepts
- 4-Analysis Methods
- 5-Design Authentication
- 6-Material Properties
- 7-Loads
- 8-References

Preliminary dates for publication of the Arch Dams Bulletin are 2024 for Bulletin I, and 2025 for Bulletin II.

## **4. Upcoming 17th Benchmark Workshop**

It has been confirmed that the 17th Benchmark Workshop will be held in Sofia, Bulgaria, tentatively in September 2024. The following Themes have been proposed for the event:

- Theme A: Behaviour of the 130 m high Tsankov Kamak Arch Dam under normal operational and seismic conditions.
- Theme B: Behaviour of the 40 m Plovdivtsi Rockfill Dam with an asphaltic-concrete core under normal operational conditions.
- Theme C: Behaviour (2D and 3D) of Nam Ngum 3 CFRD Dam (210 m high, 520 m crest length).
- Theme D: Open theme.

### **Francisco Lopez**

ANCOLD Representative

## ***COMMITTEE B – SEISMIC ASPECTS OF DAM DESIGN (2020-23)***

### **Committee Meeting**

A Committee Meeting was held on 12 June 2023 with attendance by a number of member countries. The following items were discussed:

- Report on activities since last Annual Meeting
- Discussion on various seismic conferences
- Proposal for technical questions for ICOLD Congress in Chengdu. A question on “Earthquake performance and safety of dams” was later accepted at the General Assembly.

- Overview of 12th ICOLD European Club Symposium
- Overview of 18th World Conference on Earthquake Engineering to be held in Milan Italy in June/July 2024
- Overview of effects of recent Turkey earthquakes
- Technical presentations by various national representatives

As part of the technical presentations by various national representatives, a number of member countries noted that they are reviewing their seismic hazard maps, which is resulting in changes to hazard (examples included lower hazard in Norway, and higher hazard in Austria and New Zealand). NZ also provided an update to their new Dam Safety Management regulation, which will be implemented in 2024, and how it applies to seismic assessments.

Committee members also discussed the upcoming release of a reference book, 'Earthquake Engineering for Dams and Reservoirs' which is due to be available for purchase at the end of 2023. The book includes contributions from many internationally renowned seismic experts.

### **Symposium – Special Session on Seismic Event in Turkey**

As part of the symposium sessions, the Committee also facilitated an hour-long special session on the seismic event in Turkey that occurred on 6 February 2023. The Magnitude 7.8 earthquake caused more than 50,000 deaths. 140 dams were inspected immediately after the earthquake and several embankment dams were damaged, but no catastrophic release of water was reported. This session included detailed presentations on the nature of the Turkey earthquakes, an overview of the impacts on local dams, and specific details on a number of analyses undertaken on dams damaged during the event.

### **Committee Workshop**

The Committee facilitated a workshop on Sunday 11th June 2023 to present the preliminary work undertaken on a new Bulletin that will provide guidance on the "Seismic aspects of safety-critical electro-mechanical and hydro-mechanical equipment". The purpose of the workshop was to provide an overview of observed effects, information on the proposed bulletin and some case studies.

Presentations included:

- Introduction and overview
- Proposed bulletin content
- Case study 1 "Seismic Qualification of Spillway Gate Power & Control Equipment"
- Case study 2 "Seismic Finite-element analysis of a radial gate"

The Bulletin is intended to cover hydro-mechanical equipment, and their associated control and power systems, and is being developed due to concerns regarding the lack of industry guidance on the topic.

The draft table of contents is:

- Introduction
- Safety-critical equipment (identification and elements)
- Earthquake hazards
- Case histories
- Hydrodynamic loading
- Seismic performance and safety criteria
- Design process
- Design analysis
- Seismic qualification and certification
- Operation, maintenance and surveillance requirements
- Safety reviews
- Conclusion
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**Ian Landon-Jones**  
ANCOLD Representative

**Colleen Baker**  
ANCOLD Observer

## COMMITTEE C – HYDRAULICS FOR DAMS (2019-22)

Technical Committee C for “Hydraulics for Dams” met as part of the ICOLD Annual Meeting in Gothenburg in June 2023. The chair of the committee provided an update on bulletins currently being prepared for publication, as follows:

- Bulletin 172 “Technical Advancements in Spillway Design - Progress and Innovations from 1985 to 2015” – Finalisation of the bulletin was delayed, and the content has subsequently been reviewed and updated to present information through to 2020. It is expected that this will be published in 2023.
- Bulletin 176 “Blockage of Reservoir Outlet Structures by Floating Debris” – The English version has been published on the ICOLD website with the French translation underway and being reviewed. Potentially targeting finalisation in 2024. It must be noted that Bob Wark (the ANCOLD representative on TC-C) was the chair of the sub-committee for the development of this guideline.
- Further to this, Bulletin 162 “Environmental Fluid Mechanics” was published in 2021 with significant inputs from Bob Wark as a member of the sub-committee.

The main focus of the agenda in Gothenburg was discussion of the draft content being developed for a new bulletin entitled “Hydraulic and Structural Design of Chute Spillways and Uprating of Spillways - Recent Developments”. Chapters cover aspects including high velocity flow and aerator design on smooth and stepped chutes, structural design for spillway chutes, comparison of design processes for dissipators downstream of smooth and stepped chutes and approaches for increasing capacity of spillways. The latter will be presented as case studies noting that this needs to be expanded to provide examples from other countries including Australia. Information that could be used as case studies would be welcomed from members. The intent is for a compiled first draft to be prepared next year prior to the annual meeting.

A new bulletin entitled “Surveillance of Spillways” is also being prepared jointly with TC Q for Dam Surveillance. This bulletin aims to refocus attention on and provide systematic guidance for surveillance of spillway structures. The first draft is well advanced and will be reviewed leading up to the next committee meeting.

A virtual meeting is planned for November this year to further review progress on the various bulletins.

**James Willey**

ANCOLD Observer

## COMMITTEE D – CONCRETE DAMS (2018-21)

Technical Committee D (TC-D) met in person and online in Gothenburg. There was a total of 29 Committee members in attendance, either in person (21) or online (8). In addition, there were 17 observers. The main items up for discussion at the meeting were as follows.

### 1. Status of Bulletins prepared by Technical Committee D

TC-D currently has a number of bulletins at various stages of preparation tabulated below.

No.	Bulletin Title (Pre-print version available on ICOLD website)	Date of English Version	Country in charge of French Translation	Status of Translation	Status of publication
145	Physical properties of hardened conventional concrete in dams	2012	Morocco	Complete	Forthcoming 2023
165	Selection of Materials in Concrete Dams	2013	France	Complete	Forthcoming 2023
184	Management of expansive chemical reactions in concrete dams and hydroelectric projects	2019	Canada / Switzerland	In progress	
177	Roller Compacted Concrete Dams	2019	Canada & Spain in own initiative	Complete	Published in 2020
198	Aging of Concrete Dams	2023	TBD	TBD	

## **2. *Bulletin on Considerations for Ageing Concrete Dam***

This Bulletin was proposed and approved to progress at the Ottawa meeting in 2019.

During the initial drafting of the document, coordinated through virtual meetings during 2021, it was identified that this would lead to a large document, and it was decided to split it into two separate bulletins. The first of these includes the topics of Physical Properties of Ageing Concrete & Expectations for Ageing Concrete Dams, along with a discussion of Managing Ageing of Existing Concrete Dams. The final draft of this first bulletin was circulated to Committee members for comments in early 2023 and subsequently submitted to ICOLD Central Office for circulation to the National Committees. Some comments have been received, most notably on formal aspects from the Technical Committee O and on bulletin content from the French Committee (CFBR) Mirror Group on Concrete Dams. It was approved by the Gothenburg General Assembly.

A second separate bulletin will commence after the Gothenburg meeting and to be completed within the new Committee term 2024-2027. It will provide guidance on systematic approach for condition assessment, progressive screening for data collection, selection of method for analyses and Fa framework for prediction of remaining service-life.

## **3. *Bulletin on Arch Dam Design Methodologies and Criteria***

Having been proposed at the 2018 Vienna meeting, the preparation of the bulletin has been ongoing since then. The proposed bulletin is a cooperation between TC-D and TC-A (Computational Aspects of Analysis and Design of Dams).

The purpose of the bulletin has been defined as:

- Providing a guideline defining the appropriate methodologies and associated criteria for the design of new concrete arch dams associated with modern analysis methods.
- Establishing analysis methodologies for each stage of arch dam design.
- Establishing appropriate criteria for structural design.

Given the extent of content that has been generated, it was decided to produce the bulletin in two volumes. It is anticipated that the Final Draft will be circulated to the Committee members for comments at the end of 2023 to allow submission to the Central Office in time for approval at the 2024 General Assembly.

## **4. *Expansion Phenomena in Concrete Dams (Charlwood)***

The Bulletin was initiated in 2012, however it was proposed at the 2018 Vienna Meeting to split the bulletin work into three volumes:

1. Managing Expanding Concrete Bulletin
2. Prevention of Expanding Concrete Bulletin
3. Case Histories of Expanding Concrete Bulletin

The first bulletin “Management of Expansive Chemical Reactions in Concrete Dams & Hydroelectric Projects” was approved by the ICOLD General Assembly in Ottawa in 2019 as Bulletin No.184 and is currently in the initial stage of translation into French.

The committee is considering if Part 2 should be developed by the committee or link to the work of RILEM (from FRENCH translation of International Union of Laboratories and Experts in Construction Materials, Systems and Structures). RILEM has recently established new Technical Committees (e.g., 300-ARM: Alkali-aggregate reaction mitigation; 301-ASR: Risk assessment of concrete mixture designs with alkali-silica reactive (ASR) aggregates) that discuss those questions. Connections between TC-D and the relevant RILEM committees have been established.

Status of Part 3: - has been suspended.

## **5. *RCC & CMD Database***

A database of worldwide RCC dams has been compiled and is maintained by Malcolm Dunstan (UK), (<https://rccdams.co.uk>). A similar database of worldwide Cemented Materials Dams (CMD) has been compiled and is maintained by the ICOLD Technical Committee P on Cemented Materials Dams.

The two databases will be integrated; however, no timeframe has been set.

## **6. Proposed NEW Bulletin on Raising of Concrete Dams**

The bulletin was proposed under the previous terms of reference, with the intention of building upon the white paper prepared by the USSD and expanding this with international experience. The USSD white paper “U.S. Concrete Dam Raise Experience” is in the process of finalisation. USBR have commenced developing a database of concrete dam raises as part of the white paper. It is proposed to expand this to a World Register of Raised Concrete Dams as part of the TC-D Raising Concrete Dams bulletin work.

It is proposed for the TC-D to commence the preparation of the bulletin in 2024.

## **7. Sustainable Concrete Dam Construction**

The Committee has had in its terms of reference a document on ‘The sustainability of concrete dams’ for a number of years, however progress has been limited. A recent initiative from Malcolm Dunstan (UK) has provided a strong momentum to continue activities on a document related to the sustainability of concrete dams.

A fast-track multiple-bulletin approach is proposed. The three proposed volumes are:

- Volume 1 - Design and Construction
- Volume 2 - Determination of GHG Emissions
- Volume 3 - Whole Life-Cycle of Concrete Dams

The draft Volume 1 was issued to committee members before the Gothenburg meeting for review and comment, and further discussed at the meeting. This provides guidelines for materials selection, design and construction, including various practical options to reduce Greenhouse Gas (GHG) emissions. The bulletin is targeted at owners, financial bodies, designers and contractors. With emphasis on the planning, design and construction phases of particularly Roller Compacted Concrete (RCC) dams, as essentially the standard approach to large concrete dams, it discusses a way forward for substantial GHG emissions reduction and provides recommendations regarding efficiency of concrete dam construction, materials with emphasis on reducing cement consumption, dam design and construction, construction equipment and their fuels, bidding for design and construction and the role of standards are discussed. And although this was targeted at concrete dams, it was intended to provide the initial discussion of the reduction of GHG across all forms of dam construction.

It was agreed to continue the submission and circulation process on the basis of the presented Volume 1 draft and according to ICOLD requirements for approval at the next General Assembly in 2024.

Volume 2 is planned to address the determination of GHG emissions is planned to address the determination of the GHG emissions from the concrete dam construction with a focus on the quantification of GHG emissions (as CO<sub>2</sub>e) from different Roller-Compacted Concrete (RCC) and Traditional Mass Concrete (CVC) dam design and construction scenarios (together with case histories and examples). It is proposed to have a draft ready for review for the 2024 meeting.

Volume 3 will commence following the completion of Volume 2.

### **Peter Buchanan**

ANCOLD Representative

## COMMITTEE E - EMBANKMENT DAMS (2020-23)

The following presents a summary of the Embankment Dams Committee meetings held during the 2023 ICOLD Congress in Gothenburg, Sweden. There are several bulletins in various stages of preparation as summarised in Table 1.

Table 1. Status of bulletins within Embankment Dams Committee

Bulletin	Status
Internal Erosion and Piping, Volume 2	Volume 2 is case studies and supports Bulletin 164 already published. The translation into French has been completed and Volume 2 will be published shortly.
Concrete Faced Rockfill Dams	Draft bulletin has been prepared and issued as draft for comment to the committee.
Geotextiles in Dams	In draft, working toward having a draft prepared by end of 2023.
Cracking and Deformation in Dams	In early preparation. Aiming for draft of bulletin to committee for ICOLD 2024.
Compaction	An initial draft has been prepared and the second draft is being worked on, aiming for draft issue at end of 2023.
Cofferdams	In preparation. Aiming to have a draft prepared by end of 2023.
Cut-off Walls	In planning, likely update of Bulletin 150 adding case history information.

### 1.0 Bulletin on Concrete Faced Rockfill dams:

Alberto Marulanda (Columbia) is leading the update to the bulletin on Concrete Faced Rockfill dams (Bulletin 141 dated 2011) considering the developments since issue of the bulletin regarding the compression failure of vertical joints in the upstream face slab.

A draft has been prepared and is with the Embankment Dams Committee for review. A second draft is in preparation including a section on numerical analyses – aiming to circulate the update by the end of 2023. Committee A on numerical analyses and Committee B on Seismicity will be requested to review this updated draft of the bulletin.

### 2.0 Bulletin on Geotextiles in Dams:

The Embankment Dams committee has reviewed the purpose and scope of this bulletin following review by the committee and comments received by J.P. Giroud on a previous draft. The committee is working toward an update of the bulletin targeting the end of 2023.

### 3.0 Bulletin on Deformation and Cracking in Embankment Dams:

This bulletin is focused on transverse (or diagonal) cracking and hydraulic fracture associated with differential embankment deformation for evaluation of the potential failure mode of concentrated leak internal erosion and piping. The presentation to the committee provided an update of the case history information on transverse cracking associated with cross valley differential settlement.

Preparation of a draft is in progress with the aim of submitting the draft to the Embankment Dams Committee in 2024 for discussion at the 2024 ICOLD meeting.

### 4.0 Bulletin on Compaction:

A draft has been prepared and issued to the Embankment Dams Committee for review and comment.

Jean Jacques Fry (France) presented on the status of the bulletin on compaction for earthfill embankments. Further information is sought from the members of the committee on practices adopted in their country related to preparation and compaction of earthfill. This additional information is to be incorporated into a second draft of the bulletin.

### **5.0 Bulletin on Cofferdams:**

This will be a joint bulletin with Committee M (Operation, Maintenance and Rehabilitation of Dams) and is designed to be an update on Bulletin 48a (River control during dam construction published in 1986). Dave Paul (USA) presented on the progress of the bulletin which is currently being drafted. Aiming for the end of 2023 for the first draft to be prepared.

### **6.0 Bulletin on Cut-off Walls:**

Dave Paul (USA) is leading the bulletin on cut-off walls. Progress on this bulletin is presently on hold whilst the coffer dam bulletin is being worked on.

There has been significant advancement in cut-off wall technology since the ICOLD Bulletin 51 (1985) on "Filling materials for watertight cut off walls". The scope of this bulletin is to cover the advancements in cut-off wall technologies and application. It is proposed to focus on concrete, plastic concrete, soil-cement-bentonite and cement-bentonite cut-off walls.

### **7.0 Other Information and Presentations**

The Embankment Dams Committee has 38 members and 7 co-opted members. 19 members, 2 co-opted members and 36 observers attended the meeting on 11th June 2023.

Six new members were welcomed at the meeting and each new member provided a brief presentation of their background. They include Dr Krzysztof Radzicki (Poland, co-opted), Zaleski Janusz (Poland representative), Magnus Ljunggren (Sweden representative), Priscu Caius (Romania, co-opted for Tailings), Jean-Yves Morency (Canada, co-opted) and Timur Ulyashenkov (Russia, co-opted).

The Committee held two technical sessions at ICOLD 2023:

- Concrete Faced Rockfill Dams: Alberto and Camilo Marulanda presented on the current state of practice on design and construction of CRFDs and the session was attended by 50 delegates. A copy of this presentation can be provided to anyone interested.
- Geotextiles in Filters of Dams: the session presented on the history of the update of bulletin 55, the contents of the 2019 updated bulletin and the comments received. The workshop was attended by 20 delegates.

Presentation at the committee meeting included:

- Dave Paul presented on the ongoing grouting program at Mosul Dam.

#### **Gavan Hunter**

ANCOLD Representative

## ***COMMITTEE F - ENGINEERING ACTIVITIES WITH THE PLANNING PROCESS FOR WATER RESOURCES PROJECTS (2014-22)***

The ICOLD Technical Committee F – Engineering Activities with the Planning Process for Water Resource Projects had a reset at the ICOLD Meeting in Marseille, France in 2022. Eric Haplin, from the USA, facilitated these discussions with a presentation entitled "Planning for the Future: Modernizing the Planning Process for Water Resources". At this meeting it was agreed that there were a number of "cross-cutting issues" above the Technical Committee level that needed to be addressed by ICOLD (eg. Climate Change, Risk Informed Decision Making, Sustainable Development, Environmental Concerns, River Basins & Systems). Following the 2022 meeting, Perry Mitchelmore from Canada joined the Technical Committee, and prior to the 2023 meeting, it was agreed that Eric Haplin would become the new Chair of Committee F.

Following on from this reset in 2022, the Technical Committee worked in 2022/23 on developing the new terms of reference for the committee, as well as provide more thought around how ICOLD should address "cross-cutting issues" that span across various committees, as this is a critical issue for Committee F. As a result, Committee F prepared a "Framework for Committee F: Engineering Activities in the Planning Process for Water Resource Projects – Addressing the Cross Cutting Issues of the Present and Future" (provided as an attachment). This document was shared with the ICOLD Board, other ICOLD Technical Committees and ICOLD Regional Clubs. This document presented a number of alternative options on how these cross-cutting issues could be addressed.



Prior to the 2023 meeting, Committee F also prepared a draft outline for a proposed Bulletin on the Planning Process for Water Resource Projects. It is recognised that the planning process for water resource projects are governed in part by regional governance, laws, and cultures and in part by the best practices in planning studies for water resource projects, the focus of this bulletin will be on the second part.

The ICOLD Committee F met in Gothenburg, Sweden on Monday, 12 June 2023. Following some introductory presentations and discussions, the draft outline for the proposed Bulletin was discussed in detail and modifications made as appropriate. In addition to this, a number of detailed presentations were given, namely:

1. Andrew Watson from BC Hydro gave a presentation on experience with the planning of Site C Clean Energy Project, a project on the Peace River in BC, Canada (provided as an attachment). The presentation covered a project overview and history, staged approach to evaluation and approval, project organisation, scope of stages and decision points, formal environmental review, decision to proceed to construction, procurement, permits and construction update. This was an excellent case study of a large water infrastructure project and the required planning processes.
2. Presentation by the Spanish National Committee of a document entitled “European Green Deal and Dams” (provided as an attachment). Under the Green Deal there are a number of issues related to dams, which need to be further reviewed and are discussed in this document, namely:
  - > The integration of energy systems and the role existing storages and new pumped hydro energy storages can have.
  - > Adaptation to climate change and the role that reservoirs can play in flood and drought management and the influence on the guarantee of water supply.
  - > The biodiversity strategy with an aim to address the restoration of obstacle-free rivers, ecological flows and sediment flow.

The final action that occurred was the acceptance of the next steps and commitments from individuals within the committee. Work will continue in 2023/24 on the proposed Bulletin.

**Further reading - visit the [ANCOLD website](#).**

**Richard Herweynen**  
ANCOLD Representative

## **COMMITTEE G - ENVIRONMENT (2020-22)**

In 2020, the term of office of Committee G on the Environment was extended for five years (2020 – 2025). The Committee Chair is Peter Amos (New Zealand), and the two Vice Chairs are Tracey Williamson (Australia) and Blaine Dwyer (USA). The Committee has sixteen country-members and two co-opted members. Eight members were present at the Gothenburg meeting and one member joined online.

The Committee is currently finalising a Bulletin titled *“Integrating dams with the environment - Case studies involving planning, construction and operation of dams demonstrating environmental and socio-economic benefits”*.

This Bulletin provides 12 case studies from 10 countries, which cover the environmental effects of construction and operation of dams, highlighting operational responses to environmental effects and mitigation measures employed for the projects described.

It does not appraise or recommend any one of the various environmental effects assessment methodologies, which are used around the world. The aim of this Bulletin is to illustrate, from different regions of the world, environmental and social practices relating to dams that yield positive benefits.



The aim is to finalise and send the draft Bulletin to ICOLD's Central Office for circulation to National Committees by the end of January 2024.

With completion of this Bulletin coming to an end, the Committee commenced agreement of new Terms of Reference. The following was put forward as the title of the next Bulletin to be drafted: *"Managing Environmental Effects and Enhancing Benefits of Reservoirs: Current and Emerging Methods and Tools"*.

It was agreed that the sections on "effects" and "benefits" would be a short summary and the main effort would be focused on the "methods and tools" section. The Committee will prepare a table with the content list and propose who will contribute to each section, with the aim to commence this work in 2024.

As with the current Bulletin, it was considered that this proposed Bulletin would not be a design standard, and the examples would be for information only.

**Tracey Williamson** (Committee G Vice-Chair)  
ANCOLD Representative

## ***COMMITTEE H - DAM SAFETY (CODS) 2023***

The 2023 annual meeting of the CODS was held on 12th June 2023.

The current terms of reference for the committee are as follows.

### ***TERMS OF REFERENCE (2021-24)***

1. Keep in contact with the Chairs of other ICOLD Committees to ensure coherent works and publications concerning dam safety.
2. Liaise with international agencies and Committees of ICOLD member countries, according to the needs.
3. Coordinate transfer of dam failure database to the ICOLD website and continue collecting information on dam failures.
4. Update of Bulletin 130 – Risk Assessment in Dam Safety Management.
5. Prepare guidance on assessment of consequences resulting from dam failures.
6. Develop generic guidelines for management of dam safety including:
  - a) Concepts, principles, and general framework
  - b) Governance considerations
  - c) Dam owner's role

### ***Progress with draft bulletin on dam failure flood consequence analysis***

The draft bulletin was approved at the Annual General Meeting, provided that some minor changes would be made. These changes are in progress, and it is expected that the document will be finalised and published (pre-issue) before the end of 2023.

### ***Progress with draft bulletins on dam safety***

*Bulletin 1: Dam safety concepts, principles and framework*

*Bulletin 2: Dam safety governance considerations*

These two bulletins were approved by ICOLD in November 2021 (#191 and #192).

Two more bulletins are proposed:

*Bulletin 3: Owner's dam safety policy and organisation* – targets those responsible for developing the owner's policies and organizations including the Board of Directors, CEOs, etc. The structure of Bulletin 3 will be framed in terms of the six stage "Elements of a Management System" illustrated in Figure 3 of ICOLD Bulletin 154. The organisational arrangements set out in the Bulletin will be set out such that it will be scalable for application to any dam owning

organisation. The objective is to have the arrangements for managing dam safety functioning coherently within and in terms of the dam owning organisations overall management arrangements.

*Bulletin 4: Owner's activities to achieve dam safety goals* - targets those responsible for developing implementation procedures and guidelines and includes the Dam Safety Managers, etc. The content of bulletin 4 will cover all phases of the life cycle of dam safety management, including pre-operational phase, operation phase, rehabilitation and renewal phase, and decommissioning and removal phase. For the actions in near future, Robin Charlwood will set up a working group for bulletin 4.

The program for these bulletins is to have them approved at the meeting in India in 2024. Barton Maher was approved as a Coopted member of the Committee to assist in the preparation of these bulletins.

#### ***Bulletin on risk assessment in dam safety management***

It was proposed that rather than attempting to update Bulletin 130 that it would be appropriate to prepare a new bulletin with a focus on the engineering aspects of risk assessment. This Bulletin would cover the full spectrum of approaches and applications that are available including appropriate uses of the methods as well as the strengths and limitations of the methods.

Suzanne Lacasse suggested Terms of References (TORs), complementary to Bulletin 130, but with more “how-to” guidance than Bulletin 130 and the bulletin on Consequences. The TORs include: 1) Motivation for new bulletin, 2) Target group, 3) Objectives of new bulletin, 4) Organisation and working group; 5) Timeline. There were no questions on the proposed TORs but a few questions on the suggested preliminary table of contents. The proposed TORs for a new bulletin were favourably received.

After the meeting, Chairman Zeping Xu will circulate the proposed TORs by email to ask for further comments and suggestions, and then formally approve it. The working group, once completed, will be sent for approval by email.

#### ***Presentation on World Bank Good Practice Note on Dam Safety***

Mr. Satoru Ueda gave a presentation on dam safety activities of the World Bank. The presentation reviewed dam-related projects portfolio that are funded by World Bank, introduced the existing World Bank knowledge products related to dam safety and applications, as well as follow-on knowledge products for enhancing dam safety and green growth & climate adaptation agenda.

#### ***Presentation on recent dam failures and incidents***

After updating Bulletin 99, Frederic LAUGIER, Michel Poupart and Guirec Prevot have continued to track dam failures and dam incidents since 2018. Mr. Frédéric Laugier from France provided information of the dam failures and accidents cases during 2022-2023. Among the dam failure cases and incidents, the just occurred failure case of the Nova Kakhovka dam in Ukraine and the damage of dams during the strong earthquake in Turkey were notable.

#### ***Presentation on “Enhancing dam safety through contractual strategy”.***

Mr. Michel Lino, president of ICOLD, presented on dam safety aspects in different phases of the project lifecycle and from different stakeholder perspectives, and analyses dam failure records to understand where gaps can be found for a new dam or the rehabilitation of an existing dam. He proposed an enhanced contractual and organisational set-up in dam development.

#### ***Presentation on “Investigation of failure of Edenville and Sanford dams”.***

Mr. John France gave a presentation on the investigation of the failure cases of Edenville and Sanford dams in Michigan, USA on May 19, 2020. The presentation provided a description of the two dams and a brief chronology of the failure. In addition, the analysis of physical mechanism of the failure and the emergency response of the event were also introduced.

#### **Shane McGrath**

ANCOLD Representative

## COMMITTEE I – PUBLIC SAFETY AROUND DAMS

The Committee’s original mandate to address the issue of public safety around dams was expanded in 2022 to include the topic of emergency management for dam safety. The focus of the Committee over the past year has been to complete the drafts of four [4] Bulletins associated with Public Safety Around Dams, and to initiate the work to define the current state of practice with respect to emergency management.

The Committee’s work was summarized during the Gothenburg Annual Meeting with one Dissemination Workshop on Public Safety to socialize the various Bulletins (attended by 46 ICOLD delegates), and one Initiation Workshop to collect input on the topic of Emergency Management.

Committee membership comes from twenty-five participating National Committees. The Committee is expecting that over the course of the next year, leading up to ICOLD 2024 meeting in Delhi, INDIA, that National Committee’s will propose additional members to address the issue of emergency management within their jurisdictions. The Committee plans to reach out to each National Committee, through their President/Chair and Secretary, to request they consider nominating members to ensure the state of practice of emergency management is well represented.

### Public Safety Bulletins

The Committee is working on completing a series of four [4] Bulletins, which will form the framework for the ICOLD guidance on Public Safety Around Dams shown below. The approach the Committee has proposed provides the flexibility to prepare additional guidance bulletins that may be identified as the work progresses.

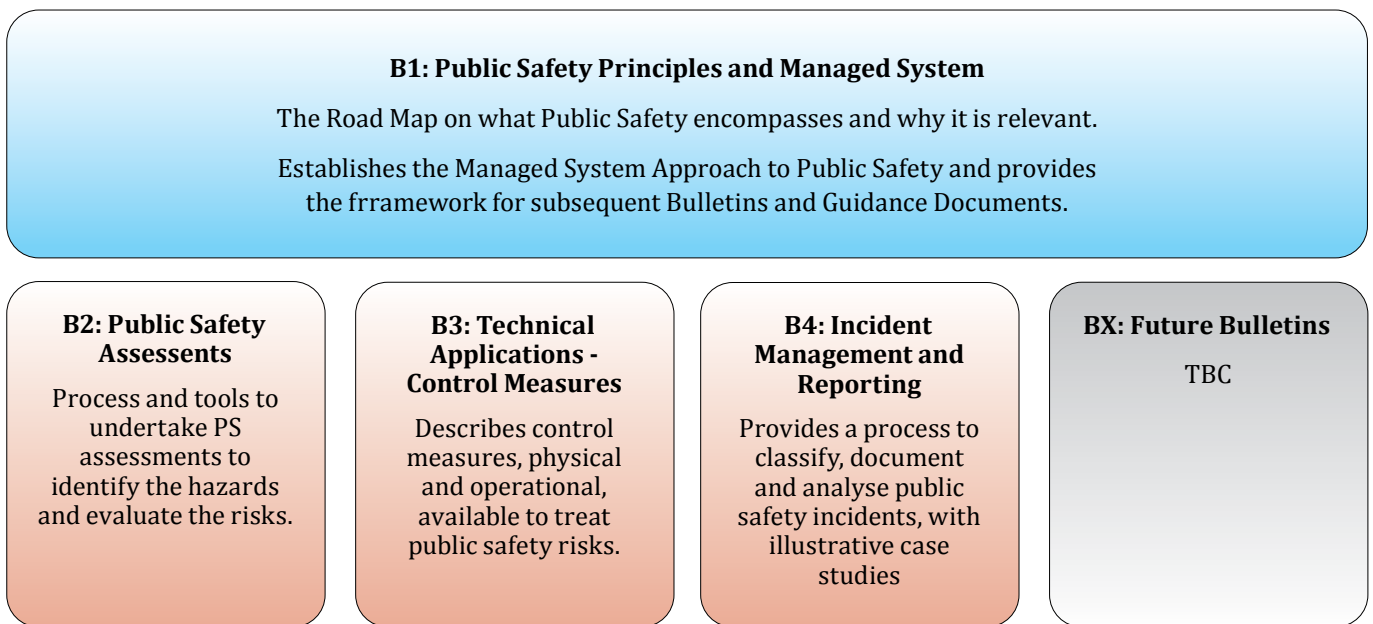


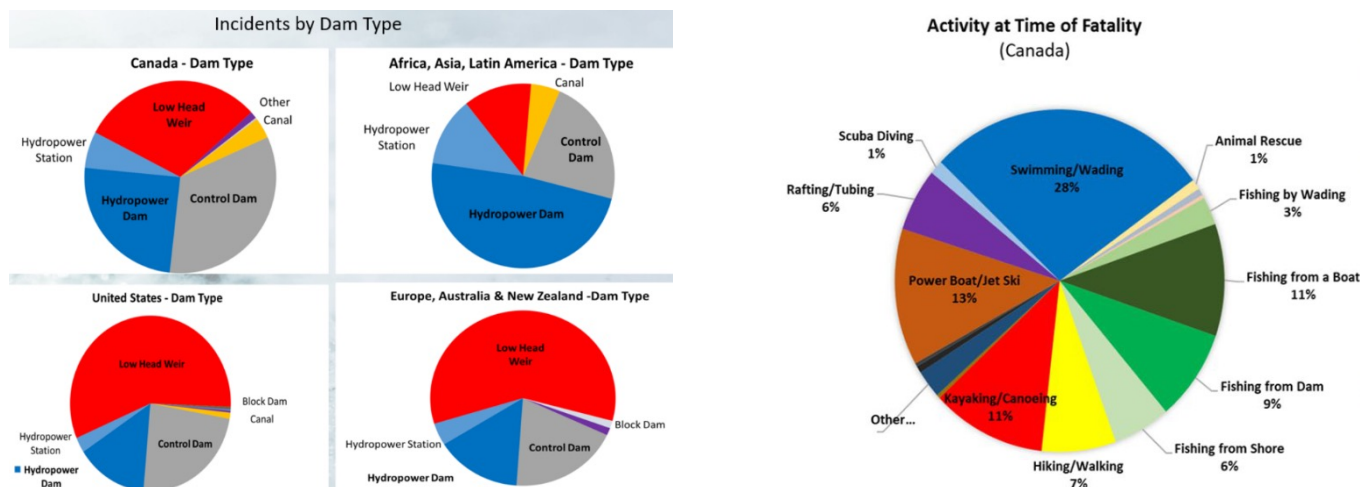
Figure: Framework for ICOLD Public Safety Bulletins

In terms of the Committee work, Bulletin B1 is the most developed, with work on the other Bulletins ranging from final outlines to 80% drafts.

The Committee anticipates Bulletins B1, B2 and B4 will be ready for National Committee review in Q4 2023 – with the aim to incorporate the feedback into Final versions of the Bulletins to be proposed during the ICOLD 2024 meeting in Delhi, INDIA. The remaining Bulletin will follow in 2025.

## Public Safety Incident Database

Under the leadership of Ontario Power Generation, the Committee has contributed to the ongoing development of an international database of public safety incidents, which now holds over 1500 incidents, a number of which are referenced in the Bulletins as illustrative case studies. The database provides some interesting insights into Public Safety hazards and risks, including incident and fatality characterisation such as:



## Emergency Management for Dam Safety

The Committee’s original mandate to address the issue of public safety around dams was expanded in 2022 by the ICOLD General Assembly to include the topic of emergency management for dam safety. The two primary/ deliverables in the revised mandate are to prepare:

- i) State of Practice Report on Emergency Management for Dam Safety (2024)
- ii) Bulletin on Emergency Management for Dam Safety (2025)

The Committee worked over the course of 2022-23 to develop an introductory workshop which was held at Gothenburg on June 11, 2023. The workshop was well received with 50 ICOLD delegates in attendance, identifying several areas for the Committee to address in both the State of Practice Report and the Bulletin.

A survey of practice will be prepared to solicit direct input from the National Committees. The survey questions will be drafted over the course of Q3-2023 and administered by year-end. Additional objectives for the survey are to identify key reference documents and solicit new Committee Members to focus on the issue of emergency management.

As part of preparing the report on the Survey of Practice the Committee will also be identifying other ICOLD Committees with which close collaboration will need to be undertaken – to eliminate overlap and ensure alignment with other initiatives and Bulletins

### Angus Swindon

ANCOLD Representative

## COMMITTEE L - TAILINGS DAMS & WASTE LAGOONS (2020-23)

2023 has been a bit quieter with the new Bulletin “Tailings Dam Safety” completed. Publishing is taking longer than expected but pre-prints are available on the ICOLD Members site. However, the committee has held several meetings to progress various initiatives. One of these is to engage more YPs into the committee with Jarrad Coffey from Rio Tinto being appointed to this position for Australia.

The committee made good progress with preparation of the ICOLD Register of Tailings Dams through the good work of Nahyan Rana. Nahyan now has 20,000 TSFs georeferenced including 689 from Australia. There are still several major country “gaps” in data including India, Russia, Philippines & Indonesia, Mainland Europe (e.g., Spain, Italy, France,

Germany) and Central parts of continental Africa (e.g., Congo, Angola, Uganda). ICOLD are being supported by the Church of England investor group and UNEP in this work.

The terms of reference for the “Standing Committee” have been finalised. This allows the Tailings and Waste Lagoon Committee to continue working on new initiatives without needing to go back to the General Committee for each new project. The Committee accepted a proposal from Joachim Pimenta da Silver from Brazil to focus on a Bulletin on monitoring of tailings dams over the coming year.

The meeting in Gothenburg was very successful with a lot of tailings content. There were short courses on Static Liquefaction and Risk Management for TSFs before the main Conference and a workshop updating the work on the TSF Register. At the committee meeting Country reports were presented from 15 member countries. There were several key-note speakers focusing on tailings issues and workshops including update on the TSF Safety Bulletin and Dam Breach for Tailings Dams.

Planning for India next year is progressing, and the committee is attempting to have items of interest to tailings practitioners on the agenda. Ram Bishwal Asst. Professor (Mining), NIT Rourkela has been appointed as the representative from India and he has already formed a 30 person tailings interest group to work on this. The ANCOLD representative will be seeking help from ANCOLD tailings people to help get good support for INCOLD in this with the aim of spreading knowledge of our new guideline.

**David Brett**

ANCOLD Representative

## ***COMMITTEE M – OPERATION, MAINTENANCE AND REHABILITATION OF DAMS (2020-23)***

Committee M is in a period of transition with Mr. Dan Johnson (USA) progressively handing over the role of Chair to the Mr. Francesco Fornari of Italy. In addition, Mr. Craig Goff (UK) is commencing as Vice Chair. However there was a strong attendance at this year’s meeting and it would be fair to say that these transitions are being well managed and the committee’s work is proceeding well.

During the past year Term of Reference (TOR) 3 was completed and is now published on the ICOLD website as Bulletin 178 - Operation of Hydraulic Structures of Dams. Of course, this can now be accessed free of charge to ANCOLD members through the ICOLD website.

There are two bulletins actively under preparation:

1. TOR 2 – Inspection and Construction of Reservoirs in Service- Special Techniques for Rehabilitation under Full Reservoir Operating Conditions, and
2. TOR 5 – Lessons learned from Remediation Projects

A workshop was held on Underwater Inspection and Construction on Sunday, 11 June where a number of helpful examples were presented and commented on by the committee. These examples will form a bulletin that will essentially be a series of examples of “what can be done” under full reservoir conditions. These will include some very advanced diving operations along with the latest in remote vehicle technology that have been successfully used to work at great depth.

TOR 5 was progressed following the committee meeting and now comprises a structure with a series of headings for contributors to write to. The first draft of TOR 5 is expected to be complete within 12 months and will comprise significant learnings from Australia.

In addition to the usual Committee business the meeting was fortunate to receive a presentation by Mr. Cem Aker on dam performance after the significant earthquakes that took place in Turkey in February this year. Mr. Aker detailed the effects that these earthquakes of 7.8 and 7.9 Mn respectively had on the many large dams in their vicinity. It seems that the dams were well designed and constructed (having been led by Turkey’s government works department) with only one dam – Malataya-Sultansuyu Dam - suffering significant damage. This dam is a 60m high 920m long earthfill dam and was full at the time. The dam embankment suffered cracking around 400m long and 4.5 m deep, however

maintained freeboard and the spillway and associated gates and mechanical equipment remained in operation with only superficial cracks observable. No water was released unexpectedly; this performance demonstrated the capacity of a well-designed modern dam to withstand severe loading.

Mr. Aker also outlined the emergency response – which was clearly rapid and provided comfort and critical confidence to those living below the dams, including neighboring countries who had raised their concerns with the Turkish government in the immediate aftermath.

This will also be my final report on Committee M as I will be stepping back from this role in the coming year. It has been an honor to bring Australian experience, approaches and learnings to this committee. I look forward to assisting Australia's incoming representative and will continue contributing over the coming months as the committee's work progresses.

**Steven Fox**

ANCOLD Representative

## *COMMITTEE O – WORLD REGISTER OF DAMS AND DOCUMENTATION (2020-21)*

An update on this Committee was not available at the time of presentation of this Annual Report.

**Robert Wark**

ANCOLD Representative

## *COMMITTEE S - FLOOD EVALUATION AND DAM SAFETY (2020-24)*

A face-to-face meeting was held in Gothenburg on 12 June 2023. Australia was represented by Peter Hill (online) and Michel Raymond (in person). The committee is chaired by Yan Huang (China) following handover from previous chair Michel Tremblay (Canada).

Peter Hill provided an update on progress collating a database of maxima recorded floods and developing regional maxima curves.

Committee S is working on 2 new bulletins:

Extreme Flood Estimation observation, and Uncertainties covering:

1. Extreme flood estimation, by Alan Warren (United Kingdom)
2. Regional Envelope Curves by Peter Hill (Australia)
3. Uncertainty, by Zoran Micovic (Canada)

Flood Risk Assessment covering:

1. Flood risk management under changing environment
2. Flood risk assessment in water conservancy project planning and design
3. Flood risk assessment in real-time operation of engineering works
4. Case studies from different countries

ANCOLD provided feedback on the draft guideline. Although this Bulletin had been drafted to be ready for approval at the 2023 Annual General Assembly, the committee deferred finalisation noting that further revision was necessary to address comments received from the National Committee reviews.

Discussions were held on topics for future bulletins for this committee and a significant weight of consensus tended towards addressing climate change impacts on floods, however it was noted that significant coordination with the Committee Y on climate change would be necessary.

Michel Raymond has now been formally co-opted onto the committee.

**Peter Hill**

ANCOLD Representative

## ***COMMITTEE V - HYDRO-MECHANICAL EQUIPMENT (2019-22)***

A combined face-to-face and virtual meeting was held on 12 June 2023. The whole final draft of the bulletin 'Best practices for achieving reliability of flood discharge gates was worked through with minor adjustments and edits made. Significant work is being undertaken on a new chapter on 'Good Practice Principles' and the Introduction and Conclusion chapters now need to be finalised.

The document is being consolidated into a single Word document and formatted in accordance with ICOLD requirements and the French translation of the bulletin is progressing.

A final version is expected to be submitted to ICOLD Central Office in time for endorsement at the next General Assembly in 2024.

Further discussions took place regarding the title of the next planned bulletin and a shortlist of topics was finalised.

### **Ian Landon-Jones**

ANCOLD Representative

## ***COMMITTEE Y – CLIMATE CHANGE (2017-2023)***

Committee Y is currently finalising a series of three Bulletins:

- Climate-induced Water shortage and Drought Management. Climate resilience of water resource systems
- Flood risk evolution associated to climate change.
- Assess the role of hydropower in climate change mitigation.

At least two of these bulletins are expected to be ready for approval at the 2024 ICOLD annual meeting.

Committee Y has active members from 16 countries, including Australia.

### **ICOLD 2023 annual meeting in Gothenburg, Sweden**

A Dissemination Workshop was held to share the findings of the three draft bulletins, with over 60 participants.

A special SwedCOLD workshop also took place titled Adaptation to Climate Change. Presenters included members of Committee Y, the World Bank and SwedCOLD.

The annual meeting of Committee Y was held in Gothenburg with the main objective being the preparation of a new Terms of Reference for Committee Y for 2024-2027. A brainstorming session was conducted to gather ideas and suggestions from members and ICOLD delegates.

### **Siraj Perera**

ANCOLD Representative