



A fog blanket over
Upper Yarra
– Sam Weatheritt, AECOM

National & International Relations

ANCOLD places importance on engaging with ICOLD and other bodies by taking an active role in technical groups, engaging with similar national dam organisations and developing relationships with international technical and industry leaders.

ICOLD

With ongoing impacts from the Covid-19 pandemic, the ICOLD Board postponed the latest ICOLD Congress until 27 May to 3 June 2022 in Marseille, France. While the delayed date and easing situation with the pandemic did permit the Congress and Annual General Assembly meeting to proceed, there was reduced attendance from ANCOLD either due to residual cautions and reservations about travel or other commitments. The ANCOLD Deputy Chair represented ANCOLD at the Annual General Assembly as the Chair was not able to attend due to unavoidable work commitments on significant flood events in Queensland. While attendance was also reduced for ANCOLD representatives on ICOLD technical committees, several ICOLD technical committees continued to make good progress with virtual meetings held online.

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 Congress Program in June 2022. The ANCOLD Deputy Chair participated and provided a short update on ANCOLD activities during the year prior.

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

The workshop “ICOLD Bulletin on Nonlinear Modelling of Concrete Dams” was presented on 28th May 2022 by members of the Committee A working group, who are currently finalising the technical content of the Bulletin.

The presenters walked the audience through the advances made to the following chapters that compose the upcoming Bulletin:

1. Why and when nonlinear modelling of concrete dams is needed
2. Types of structural nonlinearities
3. Finite element solution methods
4. Finite element software and capabilities for the nonlinear modelling of concrete dams
5. Selection of material parameters for practical nonlinear modelling of concrete dams
6. Examples and case histories

A copy of the powerpoint presentation of the Committee A Workshop is available by contacting the ANCOLD representative for this committee.

“Committee A” Annual Meeting

The annual meeting of Committee A took place on 29th May 2022, with Guido Mazzà (Italy) as Chairman and Gerald Zenz (Austria) as Vice-Chairman, representatives from 20 countries and 8 external observers.

The main outcomes of the annual meeting are summarised below:

- ***Report on the 16th Benchmark Workshop on Numerical Analysis of Dams:***

Organised by the ICOLD Committee A, the workshop was held in Slovenia on 5th and 6th April 2022, for the following themes:

- Theme A: Dam behaviour prediction of a double-curvature arch dam subject to ambient conditions and static loads. It required model calibration, short-term prediction and long-term behaviour prediction.
- Theme B: Evaluation and prediction of the behaviour of the Beauharnais concrete dam / power station affected by AAR phenomena. It required analysis of chemical reaction, hygral fatigue, temperature effects and consideration of reinforcement.
- Theme C: Behaviour of a 35m high zoned embankment dam with a clay core. It required construction and calibration of a 2D model and seismic analysis.

- Theme D: Open theme

A copy of the presentation in the 16th Benchmark Workshop is available by contacting the ANCOLD representative for this committee.

- ***Progress of the ICOLD Bulletin on Capitalisation of Past Benchmark Workshops on Concrete Dams:***

Historical concrete dams themes of the benchmark workshops will be grouped under the following categories:

- Static analysis and interpretation of measurements
- Seismic analysis
- Thermal analysis, fracture mechanics, swelling
- RCC dams thermal analysis
- Probabilistic analysis and risk assessment of concrete dams

A quick summary of each topic on the proposals for the critical assessment & shortcoming sections were presented and discussed during the meeting. In the final version of the Bulletin, emphasis will be put on the general conclusions, on the feedback and suggestions for future workshops and to identify reference cases that could be used to test a new software or methods.

It is expected that the Bulletin will be ready for comments by the end of 2022.

A copy of the presentation on the ICOLD Bulletin on Capitalization of Past Benchmark Workshops on Concrete Dams is available by contacting the ANCOLD representative for this committee.

- ***Progress of the ICOLD Bulletin on Capitalisation of Past Benchmark Workshops on Embankment Dams:***

Historical embankment dams themes of the benchmark workshops will be grouped under the following categories:

- Static behaviour
- Seismic behaviour
- Stability analysis
- Seepage, erosion and overtopping
- Behaviour of impervious elements
- Risk assessment

It is expected that the Bulletin will concentrate on numerical modelling aspects that are relevant in today's practice. Likewise, the Bulletin will highlight the most relevant conclusions reached during each benchmark workshop and suggest possible improvements in light of more recent advances in numerical analysis of dams.

It is expected that the Bulletin will be ready for comments by the end of 2022.

A copy of the presentation on the ICOLD Bulletin on Capitalisation of Past Benchmark Workshops on Embankment Dams is available by contacting the ANCOLD representative for this committee.

- ICOLD Bulletin on Non-Linear Modelling of Concrete Dams.
- The final version of this Bulletin is expected to be ready for comments around August 2022. Publication is expected in 2023.
- ICOLD Bulletin on Arch Dam Design Methodologies and Criteria
- The Bulletin is under a joint preparation between Committees D and A. Committee A is charged with Chapter 4 – Analysis methods, which includes the following topics: (i) Computer software, verification and validation; (ii) Geometric definition and layout; (iii) Linear static and periodic analysis methods; (iv) Thermal and thermo-mechanical analyses; (v) Non-linear static analysis methods; (vi) Linear dynamic analysis methods; (vii) Non-linear dynamic analysis methods; (viii) Post processing for the design of new arch dams.
- Organisation of the 17th Benchmark Workshop:
The next Benchmark Workshop on Numerical Analysis of Dams will be held in Sofia, Bulgaria., with likely dates in Q3 2024. Possible themes for the workshop include:

- Theme A: Behaviour of the 130 m high Tsankov Kamak Arch Dam under normal operational conditions.
- Theme B: Behaviour of the 40 m Plovdivtsi Rockfill Dam with an asphaltic-concrete core under normal operational conditions.
- Theme C: Analysis of the 70 m high Nam Ngum 3 CFRD (hydroelectric project under construction).

Francisco Lopez

ANCOLD Representative

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

A face-to-face meeting was held on 29 May 2022. The participants did not report the occurrence of any earthquakes in the last 12 months that had caused damage to dams.

Committee members from Italy, South Korea, USA and Switzerland submitted various reports. The topics of the presentations included:

- A presentation was made on ‘Performance of large dams under the 2016-2017 Seismic sequence in Central Italy’. Between August 2016 and January 2017 four earthquakes of magnitude 5.5 to 6.5 occurred in the high hazard seismic area of Central Italy. Significant structural damage occurred to the buildings of towns, but only minor damage occurred at nearby dams with the closest dam, Poggio Cancelli (embankment dam), being only 6km from the epicentre. It was subjected to a maximum PGA of 0.57g. Other dams sustained PGAs of 0.11g (Fiastrone dam), 0.13g (Sella Pedicate dam) and 0.44g (Scandarello dam).

Scandarello dam suffered slight damage of the concrete crest roadway and parapet walls and appurtenant works. Fiastrone dam exhibited increased seepage on the downstream face and cracking of on-site buildings. Both Fiastrone and Scandarello dams suffered significant increased seepages that have partially recovered.

- The USSD earthquake committee is currently preparing or updating guidelines on:
 - ‘Analysis of seismic deformations of embankment dams’ (under peer review). It includes a comparison of 10 different non-linear analysis models.
 - Update of ‘Selection of earthquake ground motion parameters of dams’
 - Update of ‘Seismic design and evaluation of structures appurtenant to dams’.

It was also reported that in the USA there is a general trend to use risk informed decision making for dam safety management which has been driven by the larger dam owners, namely USBR, USACE and FERC. State owners have been slower to adopt.

- A paper was provided from the 4th International Dam World Conference (Portugal, 2020) on ‘Safety Performance of dams in Chile’s highly seismic environment’. Conclusions reached included:

The study of dams built from 1853 up to 2015 showed that:

- No concrete dams (built 1910 to 2012) suffered meaningful damage.
- Only two relatively small earth dams, built in the 1920s by private agriculture associations suffered serious damage. Other private irrigation small earth dams had suffered some reparable damage.
- No major earth dam, rock-fill dam or gravel dam has suffered meaningful damage, except Cogotí rock-fill dam and Coihueco earth dam that had suffered reparable damage.
- No large tailings dam built after 1965 has failed or had suffered meaningful damage.

It is important to mention that in the particular case of tailings dams, after the collapse, or flow failure, of El Cobre Dam that occurred in 1965, the upstream method of construction, as it was applied by Chilean practice, was banned by law in 1970. There are no upstream tailings dams approved and built in Chile after 1965. The tailings dams that have failed after 1965 are mostly relatively small upstream tailings dams built before 1965.

- iv. A paper was provided titled 'Numerical and physical analysis on the response of a dam's radial gate to extreme loading performance' with a case study on Iran's Karkheh dam. Particular attention is made of the determination of the hydro-dynamic loading on the radial gates.

Copies of presentations and papers are available on the ANCOLD website.

The topic of establishing a strong motion database for dams was discussed. Previous attempts have been made by various bodies to establish such a database, but the ideas were abandoned due to some individual countries (including Japan, Italy, Switzerland) not being willing to make such data publicly available.

An update of the draft bulletin on "Interpretation of seismic data from Japan" was presented.

The USSD guideline on non-linear seismic analysis of embankment dams, which will soon be released, will be used as a basis for a similar proposed ICOLD bulletin.

A sub-committee of T. Matuschka (NZ), I. Landon-Jones (Australia) and K. Addo (Canada) has been formed to prepare a new bulletin on 'Seismic aspects of safety-critical electro and hydro-mechanical equipment'. An initial virtual meeting was held in December 2021. This subject ties in with the work being done by the ICOLD Hydro-mechanical committee which is reported separately.

Steady progress was reported to be occurring on the other terms of reference.

Ian Landon-Jones

ANCOLD Representative

COMMITTEE C – HYDRAULICS FOR DAMS (2019-22)

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

Robert Wark

ANCOLD Representative

Committee D – CONCRETE DAMS (2018-21)

The committee met for the first time since the Ottawa Congress in 2019. However, a number of sub committees have been active over this period. The 2022 meeting was both an in person and virtual meeting. The main items for discussion at the meeting were as follows.

1. ICOLD Congress Question 104 "Concrete Dams Design Innovation and Performance"

The ICOLD General Assembly at Ottawa 2019 approved Question 104 "Concrete Dams Design Innovation and Performance" as the President's Question. This was the first dedicated Congress question on concrete dams for some 30 years. A presentation of an excerpt of the Question 104 General Report, general insights, setup of the four Q104 sessions was provided by Ibanez de Aldecoa (Spain), who was the general reporter.

2. Bulletin on Arch Dam Design Methodologies and Criteria (Shaw / Salamon)

Quentin Shaw (South Africa) presented an update on the progress of the bulletin.

The preparation of the bulletin is progressing with the aim to submit the Final Draft to the Committee in 2022 for comments to allow submission to the Central Office in time for approval at the ICOLD General Assembly 2023.

A draft appendices "Lexicon of Terms for Arch Dams" & "Definitions of Various Arch Dam Types" was circulated prior to the Marseille meeting. This was discussed and received general consensus.

3. Bulletin on Considerations for Ageing Concrete Dam

This Bulletin was proposed and approved 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 draft of this was presented to the committee in May, for discussion at the meeting. It is planned that the draft will be finalised after the meeting and recirculated to the Committee for final comment. Submission for approval is expected for the General Assembly 2023.

It was proposed that the second separate bulletin will be commenced during the new Committee term 2021-2024 and is expected to comprise providing guidance on Systematic Inspection and Condition Assessment of Ageing Concrete Dams, Analysis and proposing a Framework for Estimating the Remaining Lifetime of Ageing Concrete Dams. A working draft is envisaged during 2023.

A possible third bulletin may be considered, which would deal with Repair / Remediation of Ageing Concrete Dams.

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:

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 of the bulletin 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 commissioned committees considering the alkali-aggregate reaction mitigation and risk assessment of concrete mixture designs with alkali-silica reactive (ASR) aggregates. It was agreed to await outputs from RILEM committees regarding prevention guidelines.

Status of Part 3: Development of a database on expanding concrete dams case histories was suspended as certain countries advised that publication of critical information on their dam assets was not permitted anymore. However, USBR has initiated the development of a web-based database of dams affected by AAR. Consideration was given to expanding this database to worldwide, but still maintained by USBR. Individual national committees will be approached to provide data to this database.

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.

It was agreed by the committee that there would be benefits in combining the two databases, with commitments from the committee members to assist in providing updated data for input to the databases.

6. Sustainable Concrete Dam Construction

The Committee has had in its terms 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 was proposed. The first Bulletin was proposed to focus on current status and the way forward, including methodologies to measure sustainability footprint (e.g., embodied energy, embodied carbon dioxide); discuss present legislation and where that legislation might be going; discuss and compile possible ways to reduce the carbon footprint of concrete dams. This first Bulletin is targeted for completion in 2024. The first update, possibly by 2026, is presently proposed to contain a series of examples of the calculation of the embodied energy and embodied carbon footprint of concrete dams and some case histories.

Peter Buchanan

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 has struggled since a number of the committee members left. This was only made worse with the lack of face-to-face contact during the period of covid-19 travel restrictions, when the ICOLD Meeting was not able to occur.

In 2021, Johanne Bibeau from Canada, the Chairperson of Committee F, engaged with the ICOLD Executive to seek assistance to increase numbers in Committee F. Through this process, Eric Haplin, from the USA, joined Committee F. Throughout the first half of 2022 Johanne, Eric and Richard Herweynen (ANCOLD Representative), met to plan for a reset of Committee F in the lead up to the ICOLD 2022.

Technical Committee F met as part of the ICOLD Meeting in Marseille, France on 29th May 2022. A key objective of this meeting was to reset and create a plan for Committee F, and to try to attract more committee members from a wider regional representation. As a result, a presentation was prepared by Committee F entitled “Planning for the Future: Modernizing the Planning Process for Water Resources”, which was the basis of the discussions and is available by contacting the ANCOLD representative for this committee.

It was agreed as part of this meeting that the recommended path forward for Committee F was to update the currently prepared Position Paper on an Improved Planning Process for Water Resource Infrastructure – Comprehensive Vision Based Planning (Nov. 2019), into a Bulletin, incorporating the following:

1. Update regional considerations: (a) address both planning for new dams (Asia, Africa and South America) and planning for major modifications (Europe, North America, Australia); and (b) recognise ethics, cultures, and governance have large regional variances.
2. Update the planning framework to include social, environmental, and economic objectives within a modern governance framework.
3. Update the planning principles to reflect the ethics of today.
4. Update the planning process to show a modern, six-step process that uses risk analysis and evaluation within formulation.
5. The planning scope needs to broaden the planning team make and improve early data collection.
6. Plan formulation should expand the considered planning scenarios and update the planning decision-basis.
7. Planning needs more robust environmental considerations including revised operational procedures, minimise greenhouse gases, restore sediment transport, make dams more fish friendly, more fully utilise in-stream hydropower and hydro/solar farms and embrace ESG (environmental, social, governance) principles.
8. Planning should move professional development to a ‘transdisciplinary’ approach.
9. Ultimately, produce modern, coordinated new planning guidance documents.

It was also agreed that cross-cutting issues above the Technical Committee level should be addressed by ICOLD. This includes the following topics: sustainable development goals (SDG); engineering sustainability; climate change impacts; risk informed decision making; green principles; and hydropower as a priority. It was also agreed that Technical Committee F should collaborate more with other Technical Committees, including Environmental, Dam Safety, Dam and River Basin Management, World Registry of Dams, and Climate Change.

Committee F also talked briefly at the Regional ICOLD Meetings (Africa, Asia and the Americas) on 28th May 2022 to encourage greater attendance and representation by these regions, given they are the regions where new dams are being planned for and built, and to create interest in the new direction of the committee. Committee F also presented at the General Meeting and Assembly on 31st May 2022, the main points being:

1. We cannot plan for the next century of dams with the last century’s approach to planning.
2. Society’s ethics are changing, so should ours.
3. We need to achieve diversity in membership of Committee F.

4. Initially focus on planning for new dams, then dam modifications.
5. ICOLD should address cross-cutting issues corporately.
6. Committee F has a plan to move forward.

Hopefully, with this significant reset to Committee F, there will be more substance to share in future years.

Richard Herweynen

ANCOLD Representative

COMMITTEE H - DAM SAFETY (CODS) 2021

The 2022 annual meeting of the committee on Dam Safety was held on 29th May 2022.

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 provides suggested principles and information on the contemporary applications and methods used for consequence assessment. The objective is to support dam managers to make informed decisions about the need, purpose, and scope for consequence analysis.

It is aimed to complete the bulletin for publication by ICOLD following the 2023 meeting in Sweden.

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 organisations including the Board of Directors, CEOs, etc.

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 program for these bulletins is to have them approved at the meeting in India in 2024.

Presentation on World Bank Good Practice Note on Dam Safety

The objective of the Good Practice Note (GPN) on Dam Safety is to provide additional guidance to World Bank staff on the application of relevant requirements under the Environmental and Social Framework (ESF). It provides guidance on using a risk management approach to the application of the dam safety requirements.

Updating Bulletin 130 on Risk Assessment

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.

Des Hartford will develop a draft term of reference for review.

Updating Information on Dam Failure

After updating Bulletin 99, Frederic LAUGIER, Michel Poupart and Guirec Prevot have continued to track dam failures and dam incidents since 2018. The presentation provided some recent dam failure and dam incident cases in the world.

Proposal for Bulletin on Asset Management for Dams

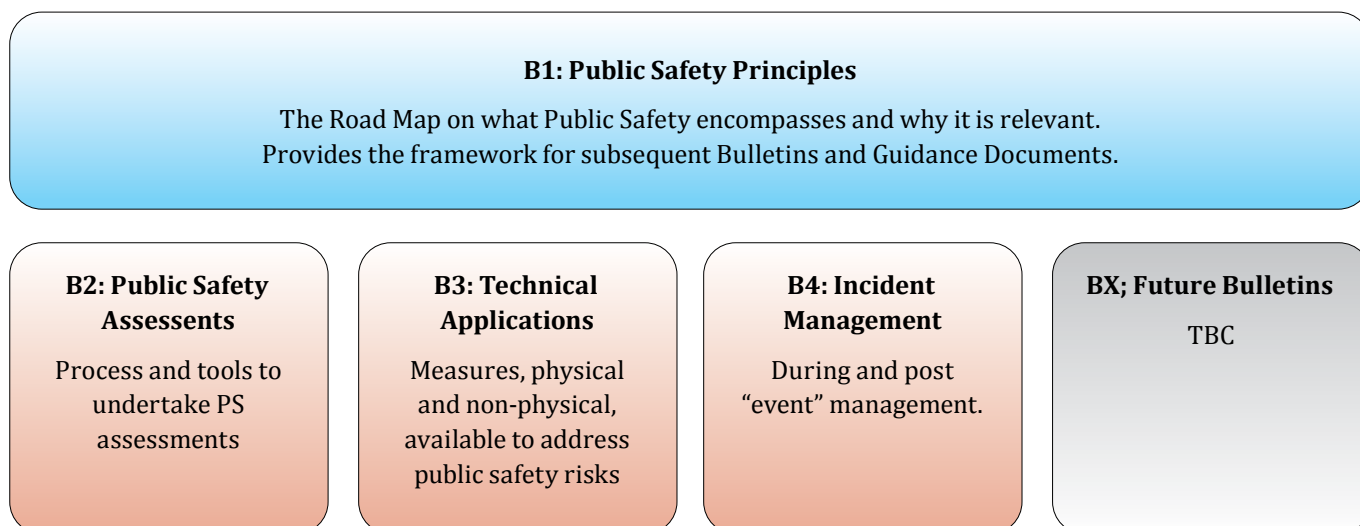
Mr. Dong-Hoon Shin (Korea), jointly with Mr. Arjan Jovani, chairman of ALBCOLD, proposed a suggestion for a new bulletin on “Asset Management of Dams”. A short discussion was conducted on the scope of “asset management” and its relationship with dam safety management. Further improvement of the proposal and more discussions may be necessary.

Shane McGrath

ANCOLD Representative

COMMITTEE I – PUBLIC SAFETY AROUND DAMS

Committee I is working on a series of four Bulletins, which will form the framework for the ICOLD guidance on Public Safety Around Dams. This approach provides the flexibility to add additional guidance bulletins that may be identified as work progresses. It is also intended that the guidance material prepared has relevance across the full spectrum of users that have an interest in public safety; owners, operators, regulators, emergency services, recreational users. Segmenting the material therefore allows individual users to access knowledge most applicable to their area of interest. The structure of the bulletins is:



Framework for ICOLD Public Safety Bulletins

In terms of progress to date, Bulletins B1 and B4 are the most developed, and have been the focus of the Committees work in 2021-2022 – the Committee anticipates these will be ready for National Committee review in Q4 2022 – with the aim to incorporate the comments and propose the Bulletins during the ICOLD 2023. The remaining two Bulletins will follow in 2024.

Angus Swindon

ANCOLD Representative

COMMITTEE L - TAILINGS DAMS & WASTE LAGOONS

2022 has been a busy year with final review and editing of the new Bulletin “Tailings Dam Safety” which has been approved by the ICOLD board. Publishing will be completed late in 2022. I wish to thank ANCOLD members for their contributions from the two rounds of review of this Bulletin. Some very good comments were received which have led to improvements to the document. In a departure from the normal ICOLD Bulletin structure this Tailings Dam Safety Bulletin is intended to be an evolving document with provision for addition of appendices providing update on specific areas of interest. This means ICOLD is open to ongoing review from members with potential to make revisions into the future as new methods and knowledge evolve.

The Committee were able to run a committee meeting as part of ICOLD 2022 Marseille conference with several new initiatives being raised as follows:

- Due to the ongoing nature of the work of the committee it is intended to change the terms of reference to make it a “Standing Committee”
- The committee intends to initiate a membership drive to attempt to engage more countries with mining industries to be represented
- A new Appendix for the Tailings Dam Safety Bulletin on Risk Management for Tailings Dams is proposed. This will be aimed at interpreting risk assessment methods specifically for use in tailings dam management.
- Country reports were presented from 15 member countries. There was particular interest in the ANCOLD presentation of the structure of our tailings group with the Tailings Dam working group supported by the Peer Support Group and the wider Tailings Interest Group. This was suggested as a good model for other countries
- In the spirit of ICOLD’s interest in engaging with Young Engineers, Committee L propose each country nominate a young engineer to shadow the sitting country committee member. ANCOLD has called for expressions of interest from our members and received a good response. A representative should be appointed by the time of the current ANCOLD meeting
- The committee are developing plans to run training on the Tailings Dam Safety Bulletin in countries where the ICOLD Meeting will be held in coming years. This includes India, 2024, China, 2025 and Iran, 2026.
- Work is continuing on the Tailings Dam registry with assistance of a PhD student Nahyan Rana from Canada. Nahyan’s work has extended the number of known tailings dams considerably, with a current estimate that there could be over 30,000 tailings dams worldwide.

Looking forward to ICOLD 2023 in Gothenburg, Sweden.

David Brett

ANCOLD Representative

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

Although Committee M has met a number of times virtually online over the past two years almost everyone on the Committee made the effort to attend the face-to-face meeting in Marseille.

Committee Chair Dan Johnson has advised his intention to step down from the role as Chair in 2023 and two candidates have been identified to fill his role. Dan has been very effective in his tenure as Chair.

Given tailings dams have a strong linkage with operations the Committee is looking to work closely with Committee L in developing guidance on practice in the tailings industry. Committee M is also responsible to develop training topics to support, identify resource requirements, and suggest training duration to build the capacity of dams professionals in Africa. The plan is for an African training centre to deliver this.

Progress was mostly made on Terms of Reference (TOR) 5 - Lessons Learned in Dam Remediation, where a small team are developing a concise scope to provide a clear focus for the larger group's input.

The Committee also ran a short session on issues from around the world. The following key points might be of interest to dam professionals in Australia:

- USA – drought has been ongoing, western US in particular. Dam rehabilitation is on the agenda and a big program of around \$2b has been promised.
- South Africa – Currently suffering another drought and as a consequence running out of water. There are no new developments in the pipeline and the sector is generally just trying to keep things going.
- India – has 400 new dams under construction along with 300 dams over 100 years old. A significant dam safety program has rehabilitated 223 dams around the country, in response to a new dam safety act which has changed the overall industry outlook.
- Italy – has a number of seismic upgrades underway and is looking at alternatives as energy shortages driven by dependence on Russian gas begin to affect energy security.
- Switzerland – Aiming to increase hydro production, mostly by heightening existing hydro dams.
- UK – New guidelines on emergency drawdown capacity are driving upgrades. However, there are recognised challenges due to the limited capacity of industry and training of dams engineers.
- Sweden – Implementing a national permitting plan for all dams and requirements for fish ways. Dam rehabilitation is also an issue. As energy systems are shifting to account for renewables and the country begins shutting nuclear down as plants age, the dams industry are struggling for experienced resources. Wind energy is becoming cheaper and has less risk than hydropower.
- Norway – similar to Sweden. More hydropower being exported and imported. Electricity price has increased 10x.
- Turkey – Unfortunately there were a number of dams built since 2005 that have turned out to have had poor construction and problems are emerging.
- France – Hot and dry conditions remain, and as a result not so much hydropower energy is available.

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)

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

Peter Hill

ANCOLD Representative

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

A combined face-to-face and virtual meeting was held on 29th May 2022. A full walk through of the final draft bulletin 'Best practices for achieving reliability of flood discharge gates' was undertaken with all outstanding comments and issues discussed and resolved.

A final review is currently being undertaken and the document is being consolidated into a single Word document and formatted in accordance with ICOLD requirements. French translation of the bulletin is also in progress.

A final version is expected to be submitted to ICOLD Central Office by the end 2022. A workshop focused on the bulletin is planned for the ICOLD 2023 Annual Meeting.

Preliminary discussions took place regarding the title of the next planned bulletin. The committee's term was extended until 2025.

Ian Landon-Jones

ANCOLD Representative