

Kommitté: Kommitté C - ICOLD Committee on Hydraulics for Dams

The Committee on Hydraulics for Dams met in Vienna, Austria, on the 1st July 2018.

This was the tenth and last meeting of the Committee on Hydraulics for Dams in the programme to carry out the tasks related to the preparation of complementary issues of Bulletin 58 -1987, as defined by the TOR established by ICOLD in 2008, upon completion of the previous phase.

In 2019 a new phase will start defined by a new TOR and led by a new Chairman. This 2018 meeting, as detailed in the following sections, dealt primarily with the transition and the preparation of a proposal for the new TOR.

Förordnandeperiod: [2013-2017, new terms of reference for 2019 – 2022]

Kommitténs ordförande: [Brasil P Machado, Brasilien, new chair Anto Schleiss, Switzerland]

Svensk delegat: [James Yang, Vattenfall AB/KTH, james.yang@vattenfall.com]

Kommitténs uppdrag:

The new Bulletin "Spillways of dams" will concentrate on large hydropower underdevelopment, more complex about hydraulic point of view, mainly for spillways in view to solve the problems of the increasing discharge capacity, the reduction of the cost and the available width. More environmental requirements will be met, with some new concepts and technical measures to be developed and applied

1. *Everything which concerns of new types of spillways: capacity, shape, (for instance PK weirs)*
2. *New types of energy dissipaters, such as the slit flip bucket, flaring pier gate, jet flows collision combined with plunge pool in arch dam, orifice spillway tunnel, vortex shaft spillway tunnel;*
3. *Aeration and cavitations mitigation measures, mainly concentrated on the large spillway tunnels and chute spillways;*
4. *Flow induced vibration researches considering the large and high head radial gates and emergency gates by physical and numerical models and field observations;*
5. *Hydraulic field observations for the safety, verification of the project.*

Lägesrapport 2018:

1.1 Membership and Participation

The following list depicts the Committee membership participation and the attendance to the Vienna meeting.

COUNTRY PAYS	NAME OF PARTICIPANT NOM DU PARTICIPANT	P / A	OBSERVATIONS
Brazil	B. P. MACHADO (Chairman)	P	
China	GUO JUN (Vice-Chairperson)	A	Replaced by W. XU
Argentina	D. MENÉNDEZ	P	New member
Australia	R. WARK	P	
Belgium	A. LEJEUNE (Chair of Previous Phase)	A	Excused
Bolivia	G. RODRIGUEZ ROCA	A	
Canada	Z. MICOVIC	P	
China	W. XU	P	New member replacing GUO JUN
Czech	J. SPANO	P	New member replacing J.HODAK
France	F. LAUGIER	P	New member replacing B.TAQUET
Germany	R. HASELSTEINER	P	
India	SIBA PRASAD SEN	A	
Iran	A. ZIA	P	New member replacing M.HAKAMI
Italy	A. CAGIANO	P	New member replacing A.PIETRANGELI
Japan	T. TAKATSUKA	P	
Korea	H. KIM	P	New member replacing I.KO
Mexico	H. MARENGO	A	
Netherlands	B. PETRY (Former Committee Chairman)	A	
Norway	H-M. KJELLESVIG	P	

COUNTRY PAYS	NAME OF PARTICIPANT NOM DU PARTICIPANT	P / A	OBSERVATIONS
Portugal	C. M. RAMOS	A	
Portugal	A. PINHEIRO (co-opted member)	A	
Russia	R. SHAKIROV	A	Excused
South Africa	H-J. WRIGHT	P	
Spain	A. GRANADOS	P	
Sweden	J. YANG	P	
Switzerland	A. SCHLEISS	P	Appointed new Chairman
Switzerland	R. BOES (co-opted member)	A	Excused
UK	V. PAVLOV	A	New member replacing P.MASON
USA	J. E. LINDELL	P	
Venezuela	A. MARCANO	A	
USA	G. PAXSON	P	Observer
USA	B. TULLIS	P	Observer
South Africa	J. LOBAARD	P	Observer
Greece	L. BENSASSON	P	Observer

Agenda

Welcome message to the participants
Presentation of new members joining the Committee
Discussions on the proposed Terms of Reference for the new phase of the Committee work
Programme for the preparation of the Workshop to be held next year in Ottawa

Pending work for the publication of Committee bulletins
Final observations and notices offered by Committee Members

Welcome address

The Chairman welcomed participants and informed that the main objective of the meeting was to review the proposal of the Terms of Reference of the new phase of work of the Committee and that this review will be conducted by the new Committee Chairman, Dr. Anton Schleiss.

Membership news and updating of list of participants and addresses

Argentina, which had no representative in the Committee, has indicated Mr. D. Menéndez, whose participation has been approved in the 2017 Prague General Assembly.

New members have been appointed to replace members who retired from the Committee, and whose names will be submitted to General Assembly:

From the Czech Republic Mr. Spano replaces Mr. Hodak

From China Mr. Xu replaces Mrs. Jun Guo

From Iran Mr. Zia replaces Mr. Hakami

From Italy Mr. Cagiano replaces Mr. Pietrangeli

From Korea Mr. Kim replaces Mr. Ko

From the UK Mr. Pavlov replaces Mr. Mason

The Chairman welcomed the new members and stressed the important participation of retired members in the production of the bulletins.

Still pending a confirmation is needed about the continuation of Carlos Matias Ramos, from Portugal, after his retirement from LNEC.

A list of attendance was circulated and email addresses updated or confirmed. The compiled information is attached to this report.

Pending work for the publication of Committee bulletins

The bulletin on *Spillway Innovations* is being translated into French and will be put in the format required for publication by the CRC Publisher. The Chairman will remain available for further doubts and clarifications required.

The bulletin on *Blocked Spillway Passages* was distributed to National Committees of ICOLD and received various comments, some noting the lack of an introduction, the nomination of Committee members and some observing the extent of subjects treated could have been expanded. Robert Wark the co-ordinator of the preparation of the bulletin made a presentation of the issues and explained that the extension of the subjects treated was approved by both Technical Committees involved in its preparation, and that the remaining questions observed by commentators will be taken into consideration in the revision which will be done after considerations by the General Assembly of ICOLD. The General Assembly accepted the bulletin assuming that all comments and suggested modifications will be taken into account in the final revised version.

Discussions on the proposed Terms of Reference for the new phase of the Committee work

The Chairman of the new phase of the Committee, Dr. Anton Schleiss prepared preliminary proposals for the TOR of the new phase of the Committee works, and requested contributions from the members through exchange of emails during the first semester of 2018. Taking these contributions in consideration he has consolidated a final proposal of possible topics which was discussed during the Committee meeting.

The proposed TOR which will be submitted to the General Assembly of ICOLD, will be structured as follows:

Title of the bulletin to be prepared:

Recent and future challenges for spillways of dams

Contents criterion:

Concentrate on current and future issues which influence design and operation of spillways.

List of subjects that could be dealt with in the bulletin:

- *High velocity flow on chutes and corresponding outlet structures (cavitation, air entrainment, waves, flow bulking, splashing, ...) - structural design including drainage systems of chute linings interacting with fluid considering dynamic loadings and vibrations*
- *Need of surveillance and monitoring of spillways; underwater inspection*
- *Selection of type of spillways; new views on gated or non-gated*
- *Robust and flexible spillway design in view of future uncertainties like climate change*
- *Upgrading of existing spillways for increased design discharge; remedial works*
- *Fuse plugs - for design or safety floods or additional risk reduction*
- *Bottom and low level outlets: energy dissipation and sediment flushing*
- *Spillway solution associated with the diversion scheme in very low dams, with downstream reaches of large rivers*
- *Flow induced vibration of large and high head radial gates and emergency gates, transient flow conditions*
- *Shaft, vortex & morning glory spillways; focus on dynamic loading and cavitation risk*
- *Supersaturation of flow downstream of spillways*

After discussion and screening of the topics, it was decided to concentrate on the following items given by the following preliminary list of the bulletin chapters:

1. *High velocity flow on chutes and corresponding outlet structures (cavitation, air entrainment, waves, flow bulking, splashing, etc.)*
2. *Smooth – stepped chutes*
3. *Structural design including joints, sealing, drainage systems of chute linings interacting with fluid considering dynamic loadings and vibrations*

4. *Need of surveillance and monitoring of spillways*
5. *Upgrading of existing spillways for increased design discharge; remedial works*
6. *Supersaturation of flow downstream of spillways*

There was a general agreement to the proposed subjects and to the structure of the final TOR.

Definition of new Committee Vice-Chairperson

The Chairman of the new phase of the Committee work, Dr. Anton Schleiss, invited Hilde-Marie Kjellesvig for the position of Vice-Chairperson of the Committee. Mrs. Kjellesvig accepted the invitation.

Conclusion

After covering all the subjects programmed for the meeting the Chairman indicated that this was his last meeting in this position. He expressed this appreciation and thanks for the Committee members along the ten years in which an important technical work was done. He expressed as well his best wishes for the New Chairman, Prof. Anton Schleiss and all the Committee membership in carrying out a new and important phase of the Hydraulics for Dams Technical Committee.

Kommande aktiviteter 2019-2022

The following ICOLD Bulletins on hydraulic appurtenant structures of dams (river diversion, spillways, outlets, hydraulic operation of reservoirs) have been prepared by the committee:

- *Spillways of dams* **Bulletin N° 58-1987**
- *Operation of hydraulics of dam* **Bulletin N° 49a-1986**
- *Spillways, shockwaves and air entrainment* **Bulletin N° 81-1992**
- *Safe Passage of Extreme Floods* **Bulletin N° 142 - 2012**
- *Technical advancements in spillway design - progress and Innovations from 1985 to 2015* **Bulletin N° 172-2018**
- *Blockage of spillways and outlet works* **Bulletin N° ??-2018** (considering wooden debris; in collaboration with committee Dams and Floods)

TERMS OF REFERENCE 2019 – 2022

The new Bulletin "*Recent and future challenges for spillways of dams*" will concentrate on current and future issues which influences design and operation spillways as listed in the following (not exhaustive and final, to be extended and finalized by the committee's work):

- *High velocity flow on chutes and corresponding outlet structures (cavitation, air entrainment, waves, flow bulking, splashing, ...) - structural design including drainage systems of chute linings interacting with fluid considering dynamic loadings and vibrations*
- *Need of surveillance and monitoring of spillways; underwater inspection*
- *Selection of type of spillways; new views on gated or non-gated*
- *Robust and flexible spillway design in view of future uncertainties like climate change*

- *Uprating of existing spillways for increased design discharge; remedial works*
- *Fuse plugs - for design or safety floods or additional risk reduction*
- *Bottom and low level outlets: energy dissipation and sediment flushing*
- *Spillway solutions associated with the diversion scheme at very low dams, with downstream reaches of large rivers*
- *Flow induced vibration of large and high head radial gates and emergency gates, transient flow conditions*
- *Shaft, vortex & morning glory spillways; focus on dynamic loading and cavitation risk*
- *Supersaturation of flow downstream of spillways*

Programme for the preparation of the Workshop to be held next year in Ottawa

Following the rules of ICOLD, a workshop on the proposed contents of the new bulletin has to be presented by the Committee during the next Annual Meeting, in Ottawa, in 2019. For the preparation and presentation of the Workshop on the 10th of June, 2019, the new Chairman established the following responsibilities of members and allowable time for presentation:

- High velocity flow on chutes and corresponding outlet structures (cavitation, air entrainment, waves, flow bulking, splashing,...) (Xu-stepped; Anton Schleiss – smooth) (20 min)
- Uprating of existing spillways for increased design discharge; remedial works (Viktor Pavlov, Hilde-Marie Kjellesvig, Jim Lindell, Frédéric Laugier) (20 min)
- Structural design including joints, sealing, drainage systems of chute linings interacting with fluid considering dynamic loadings and vibrations (Frédéric Laugier) (10 min)
- Smooth – stepped chutes (Alfredo Granados, Xu) (10 min)
- Need of surveillance and monitoring of spillways (Henry-John Wright) (10 min)
- Chute spillway aerators (James Yang) (10 min)
- Supersaturation of flow downstream of spillways (Bob Wark) (10 min)

It was agreed that assigned members will send the new Chairman by 15th of September the titles of their contribution and a three lines content of it, expressed by key-words.



James Yang

Älvkarleby

2018-10-12