



LES COMPTES RENDUS  
DU NEUVIÈME CONGRÈS INTERNATIONAL  
DES GRANDS BARRAGES

THE TRANSACTIONS  
OF THE NINTH INTERNATIONAL CONGRESS  
ON LARGE DAMS

COMPTON PUBLISHING  
INTERNATIONAL CONGRESS  
ON LARGE DAMS

THE TRANSACTIONS  
OF THE INTERNATIONAL CONGRESS  
ON LARGE DAMS

COMMISSION INTERNATIONALE  
DES GRANDS BARRAGES  
de la Conférence Mondiale de l'Énergie  
Bureau Central :  
11, rue de Téhéran - Paris-VIII

INTERNATIONAL COMMISSION  
ON LARGE DAMS  
of the World Power Conference  
Central Office :  
11, rue de Téhéran - Paris-VIII

NEUVIÈME CONGRÈS INTERNATIONAL  
DES GRANDS BARRAGES

ISTAMBOUL, Turquie  
4 - 8 SEPTEMBRE 1967

NINTH INTERNATIONAL CONGRESS  
ON LARGE DAMS

ISTANBUL, Turkey  
4 - 8 SEPTEMBER 1967

COMPTES RENDUS  
TRANSACTIONS

**VOLUME II**  
**QUESTION N° 33**

THE UNIVERSITY OF CHICAGO  
DEPARTMENT OF CHEMISTRY  
57 SOUTH EAST ASSEMBLY AVENUE  
CHICAGO, ILLINOIS 60607  
TEL: 773-936-3700

COMPUTER INVESTIGATION  
OF THE  
MATHS

BY  
J. H. HARRIS

PHYSICAL CHEMISTRY  
OF LIQUIDS

PHYSICAL CHEMISTRY  
OF LIQUIDS

COMPUTER INVESTIGATION  
OF THE  
MATHS

VOLUME II

CHICAGO, ILLINOIS

NEUVIÈME CONGRÈS DES GRANDS BARRAGES  
Istamboul 1967

---

**Question n° 33**

**TITRE**

**Dispositions temporaires et permanentes pour contrôler les apports et le niveau de la retenue des barrages.**

**COMMENTAIRES**

Les rapports traiteront :

a) des dispositions à prendre, compte tenu des conditions hydrologiques et hydrauliques, pour assurer, durant la construction et l'exploitation, le contrôle des apports et du niveau de la retenue;

b) des problèmes posés par l'exploitation et l'entretien des évacuateurs de crues et des vidanges.

NINTH CONGRESS ON LARGE DAMS  
Istanbul 1967

---

**Question n° 33**

**TITLE**

**Temporary and permanent provisions for the control of flows.**

**COMMENTS**

The papers should deal with :

a) the hydrologic and hydraulic considerations in the design of dams and ancillary works to ensure the safe passage of flood flows both during construction and in operation;

b) the problems involved in operation and maintenance of spillways and outlets.

MEMORANDUM FOR THE CHIEF OF BUREAU

DATE: 10/15/54

TO: SAC, NEW YORK

FROM: SAC, NEW YORK

SUBJECT: [Illegible]

RE: [Illegible]

[Illegible text]

[Illegible text]

[Illegible text]

MEMORANDUM FOR THE CHIEF OF BUREAU

DATE: 10/15/54

TO: SAC, NEW YORK

FROM: SAC, NEW YORK

SUBJECT: [Illegible]

RE: [Illegible]

[Illegible text]

[Illegible text]

[Illegible text]

[Illegible text]

[Illegible text]

## TABLE DES RAPPORTS – INDEX OF PAPERS

---

### Question n° 33

		Page
R. 1.	W. PIETZSCH, A. GSAENGER ( <i>German Federal Republic</i> ). Temporary and permanent provision for the control of flows at Lech river powers sites .....	1
R. 2.	J.G. PATRICK ( <i>U.S.A.</i> ). Discharge of flood flows through Wells hydrocombine .....	13
R. 3.	E. SOUCEK, J. N. GAU ( <i>U.S.A.</i> ). Spillways and closures for the large earth dams on the Mis- souri river .....	29
R. 4.	F. E. DOMINY ( <i>U.S.A.</i> ). The safety of dams program of the Bureau of Reclamation ..	57
R. 5.	H. G. ARTHUR, M. A. JABARA ( <i>U.S.A.</i> ). Problems involved in operation and maintenance of spillways and outlets at Bureau of Reclamation dams .....	73
R. 6.	Dr. H. PRESS ( <i>Germany</i> ). The dimensioning of relief and discharge towers .....	95
R. 7.	Est devenu la Communication C. 24.	
R. 8.	J. D. WILLIAMS ( <i>Great Britain</i> ). Flood control at Barikese dam, Ghana, with special reference to the air regulated siphon spillway .....	101
R. 9.	A. R. THOMAS, J. R. GWYTHYER ( <i>Great Britain</i> ). Diversion of the river Jhelum during construction of Mangla dam .....	121
R. 10.	R. E. COXON ( <i>Great Britain</i> ). Control of flows at Kainji dam .....	145



	page
R. 11. D. C. MIDGLEY ( <i>South Africa</i> ). A flood risk analysis for choosing the height of a coffer dam	169
R. 12. O. PFAFSTETTER ( <i>Brazil</i> ). Floods for spillway design	181
R. 13. H. MAKSUD, P. E. L. CABRAL, A. GARCIA OCCHIPINTI ( <i>Brazil</i> ). Hydrology of spillway design floods for Brazilian river basins with limited data	190
R. 14. F. HARTUNG, J. KNAUSS ( <i>German Federal Republic</i> ). Developments to improve economy, capacity, and efficiency of structures controlling the passage of flood water through reservoirs	207
R. 15. B. M. HAINDL K, J. KALIS, Pr. VACHA ( <i>Czechoslovakia</i> ). Combined functional hydraulic structures of earth and rock- fill dams	251
R. 16. S. ANGELIN ( <i>Sweden</i> ). Emergency closure of a deeply located gate system to a diver- sion tunnel	269
R. 17. B. SANDEGREN, R. MELIN ( <i>Sweden</i> ). Dam design in Sweden with special regard to flood run-off	285
R. 18. A. C. XERES, H. GRANGER PINTO, A. CUNHA FERREIRA ( <i>Portugal</i> ). Problèmes hydrauliques dans les barrages-voûtes et voûtes multiples	297
R. 19. A. ALVARES RIBEIRO, L. VEIGA DA CUNHA, D. PINTO DA SILVA, F. OLIVEIRA LEMOS ( <i>Portugal</i> ). Erosion in concrete and rock due to spillway discharges	315
R. 20. D. J. BROEHL, J. FISCH ( <i>U.S.A.</i> ). Solution of vibration problems experienced with Howell- Bunger valves at Round Butte Dam	333
R. 21. A. del CAMPO, J. TRINCADO, J. G. ROSSELLO ( <i>Spain</i> ). Experience obtained in the operation of spillways in "Saltos del Sil" hydroelectric system	347
R. 22. A. GALINDEZ, P. M. GUINEA, P. LUCAS, J. J. ASPURU ( <i>Spain</i> ). Spillways in a peak flow river	365
R. 23. U. UNGAN, G. DORA ( <i>Turkey</i> ). Design of ancillary works of Porsuk II and Alakir dams for flood control	391
R. 24. O. A. BAYAR ( <i>Turkey</i> ). Keban dam and hydroelectric project Firat river, Turkey — Spillway design flood	405

	page
R. 25. F. SENTÜRK ( <i>Turquie</i> ). Un nouveau type de déversoir: le déversoir fusible.....	421
R. 26. R. SABLJAK ( <i>Canada</i> ). Influence de la forme de l'hydrogramme de crue sur la capacité de l'évacuateur .....	433
R. 27. A. BOURGIN, LEBRETON, PERA, RUEFF, VORMERINGER, DAUZIER, GUILHOT, Y. LE MAY, TERRASSA ( <i>France</i> ). Considérations sur la conception d'ensemble des ouvrages d'évacuation provisoires et définitifs des barrages .....	459
RIQUOIS, PFAFF, SAVEY, HUCHARD, GEHIN, TER MINASSIAN, DESTENAY, ROGER, HUGUENIN, WALTHER, MORENON, LE MAY ( <i>France</i> ). Problèmes posés par l'exploitation et l'entretien des organes d'évacuation des barrages. — Enseignements tirés .....	495
R. 29. H. K. PRATT ( <i>Canada</i> ). The Portage Mountain project spillway and low level outlet works .....	517
R. 30. A. J. O'CONNOR, A. Y. GORDON ( <i>Canada</i> ). Flood flows at the Mactaquac hydro-electric development	539
R. 31. Dr. S. AKSOY ( <i>Turkey</i> ). Vibration investigations on the separation beams of the bottom outlet of Keban-dam .....	561
R. 32. P. E. DROUIN, P. BACAVE, S. GODBOUT ( <i>Canada</i> ). Le Barrage de Manicouagan 5. Ouvrages de Contrôle de la retenue .....	577
R. 33. S. del CAMPO, J. TRINCADO, J. G. ROSSELLO ( <i>Spain</i> ). Some problems in operation of San Esteban dam spillways	599
R. 34. G. H. H. LEGGE, D. C. MIDGLEY ( <i>South Africa</i> ). Protection of pumping intakes against silting at Phalaborwa barrage: a model study .....	619
R. 35. F. H. LYRA, F. E. H. von RANKE ( <i>Brazil</i> ). Inflow design, Furnas reservoir .....	631
R. 36. Y. M. SIMAIKA ( <i>U.A.R.</i> ). Hydrological problems in the control of long-term storage reservoirs with special reference to the high Aswan reservoir	649
R. 37. R. OBERLE, Ch. DUBAS, A. GARDET, J. CHARPIE, J. P. DECOPPET ( <i>Suisse</i> ). Protection contre l'ensablement du bassin d'accumulation de l'aménagement hydro-électrique de la Massa .....	665

	page
R. 38. O. GYORKE ( <i>Hungary</i> ). Some aspects of dam spillway-system's design .....	689
R. 39. J. SZEPESSY ( <i>Hungary</i> ). Determination of the flood discharge to be conveyed during dam construction with regard to the economics of probable flood damages .....	699
R. 40. J. BELLIER, BAUZIL, PELLECUER, COULOMB, JOUANNA, BARGE, BLANCHET, CHARDONNET, J. COMBELLES ( <i>France</i> ). Evacuateurs de crue « longs » .....	707
R. 41. L. BIEGALA, J. BIELAKOWSKI ( <i>Pologne</i> ). Débits possibles des hautes eaux sur la rivière de plaine pen- dant la construction de la chute d'eau .....	714
R. 42. W. BALCERSKI, S. BOLESTA ( <i>Pologne</i> ). Détermination et choix des débits maxima compétents pour le dimensionnement des installations d'évacuation dans les ou- vrages de retenue d'eau .....	733
R. 43. B. R. PALTA, S. K. AGGARWALA ( <i>India</i> ). Operation and maintenance of Bhakra dam spillway .....	745
R. 44. R. S. GILL, P. S. BHATNAGAR ( <i>India</i> ). Control of flows for Beas dam .....	757
R. 45. Dr. M. C. CHATURVEDI ( <i>India</i> ). Hydrologic and hydraulic considerations in water resources projects .....	775
R. 46. C. GEMAEHLING, J. MATHIAN ( <i>France</i> ). Modalités hydrauliques d'exploitation des barrages établis sur le Bas-Rhône .....	797
R. 47. D. TONINI, E. INDRI ( <i>Italie</i> ). Critères d'évaluation des crues prévisibles pour un bassin hydrographique et applications des résultats aux diverses conditions des organes de décharge en phase de construc- tion et pour l'ouvrage achevé .....	823
R. 48. A. GHETTI, G. Di SILVIO ( <i>Italy</i> ). Investigation on the running of deep gated outlet works from reservoirs .....	837
R. 49. F. M. LEARMONTH, N. J. BUTLER ( <i>Australia</i> ). Surface diversion of stream flows during construction of dams in Queensland .....	853
R. 50. R. B. JOHNSON ( <i>Australia</i> ). Flood and multiple-spillway provisions at large earthen dams	877

	page
R. 51. J. M. JORDAAN ( <i>South Africa</i> ). Some aspects of the hydrological design considerations of the Orange river development project .....	899
R. 52. J. TORAN ( <i>Spain</i> ). The downstream viewpoint on spillway safety & economics ..	917
R. 53. A. GALINDEZ, P. M. GUINEA, P. LUCAS, J. J. ASPURU ( <i>Spain</i> ). Historical investigation as a necessary complement for deter- mining the maximum flood (applied to the Douro basin) ..	933