

TRANSACTIONS
OF THE FOURTEENTH INTERNATIONAL CONGRESS
ON LARGE DAMS

COMPTES RENDUS
DU QUATORZIÈME CONGRÈS INTERNATIONAL
DES GRANDS BARRAGES

*INTERNATIONAL COMMISSION
ON LARGE DAMS*

151, BOULEVARD HAUSSMANN - 75008 PARIS - FRANCE
TÉLÉPHONE : 764-68-24 - 764-67-33 - TÉLEX : 641320 F

COMMISSION INTERNATIONALE
DES GRANDS BARRAGES

FOURTEENTH INTERNATIONAL
CONGRESS ON LARGE DAMS

RIO DE JANEIRO, Brazil
3-7 May 1982



QUATORZIÈME CONGRÈS
INTERNATIONAL
DES GRANDS BARRAGES

RIO DE JANEIRO, Brésil
3-7 mai 1982

TRANSACTIONS
COMPTES RENDUS

NOTE

1. Units of Measurement

1.1. As for the previous Congress and though some authors do not fully agree, we attempt to follow the recommendations of the International System of Units (SI).

For example, hm^3 and km^3 were preferred to 10^9 and 10^9 m^3 , or million and billion cu.m. See Bulletin 34 "ICOLD Guide for the International System of Units (SI)", page 13.

1.2. The decimal sign may be the full stop (Anglo-Saxon usage) or the comma (European usage); but as a safeguard against confusion, full stop (period) and comma are used as decimal sign only. Where the number of digits before or after the decimal sign exceeds three, the digits should be divided into groups of three by half spaces.

2. General Papers

General Papers from G.P. 10 onwards were received too late for examination by the General Reporters.

AVERTISSEMENT

1. Unités de Mesure

1.1. Comme pour le Congrès précédent et bien que certains auteurs manifestent des réticences à ce sujet, on s'est efforcé de suivre les recommandations du Système International d'Unités (SI).

Par exemple, on a utilisé plus volontiers hm^3 et km^3 au lieu de 10^9 m^3 et 10^9 m^3 ou million et milliard de mètres cubes. Voir Bulletin 34 « Guide CIGB du Système International d'Unités (SI) », page 13.

1.2. De même, on a retenu le point (usage anglo-saxon) et la virgule (usage européen) comme signe décimal, mais pour éviter toute confusion, la virgule et le point ne sont utilisés que comme signe décimal. Aussi, quand le nombre de chiffres avant ou après la virgule est supérieur à 3, les chiffres sont groupés par 3, chaque groupe étant séparé par un court espace.

2. Rapports de Synthèse

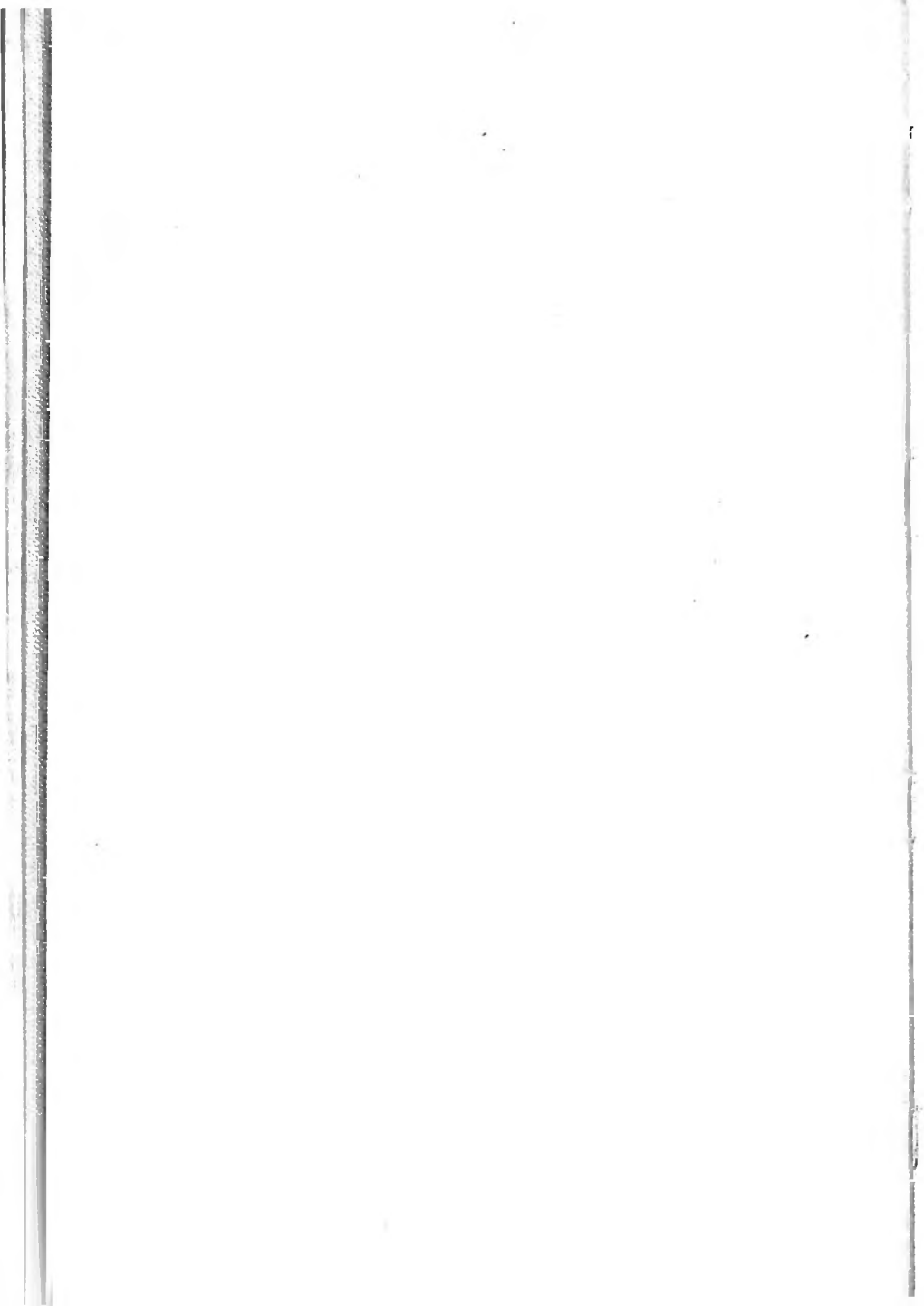
Les Rapports de Synthèse à partir du R.S. 10 sont arrivés trop tard pour être examinés par les Rapporteurs Généraux.

**TABLE OF CONTENTS
OF VOLUME IV**

	Page
Wording of Question 55	VIII
Table of Contents of Papers on Question 55	IX
Papers on Question 55	1
General Report Question 55 . . .	1103

**TABLE DES MATIÈRES
DU VOLUME IV**

	Page
Libellé de la Question 55	VIII
Table des Matières des Rapports sur la Question 55	IX
Rapports sur la Question 55 . .	1
Rapport Général Question 55 .	1103



PAPERS ON Q. 55

RAPPORTS SUR LA Q. 55

QUESTION 55

Material and construction methods for embankment dams and cofferdams

Subject

- a) Selection of materials.
- b) Testing methods and quality control.
- c) New construction methods and materials.
- d) Upstream membranes and central diaphragms.
- e) Hydraulic fill dams.

Note: Tailings dams are excluded from this question.

QUESTION 55

Matériaux et méthodes de construction des barrages et batardeaux en remblai

Objet

- a) Choix des matériaux.
- b) Méthodes d'essai et contrôle de la qualité.
- c) Nouvelles méthodes de construction et nouveaux matériaux.
- d) Organes minces d'étanchéité sur le parement amont ou dans le corps du barrage (membranes, masques souples, écrans minces).
- e) Barrages par remblayage hydraulique.

Note: Les barrages constitués de stériles sont exclus de cette question.

TABLE OF CONTENTS OF PAPERS
TABLE DES MATIÈRES DES RAPPORTS
QUESTION N° 55

	Page
R. 1. A. CHRAIBI, A. OUSSOU (<i>Maroc</i>). Conception du barrage Ait Chouarit	1
R. 2. N. DINIA, R. SINNIGER (<i>Morocco</i>). Non homogeneous rockfill Testing and treatment	11
R. 3. K. NAKAYAMA, F. ITOGA, Y. INOUE (<i>Japan</i>). Selection and quality control of materials for rockfill dam of pumped storage project in phyllocrystalline schistose area	23
R. 4. R. VIANNA DE ANDRADE, F. LEON BOJANOVICH, R. AMORIM (<i>Paraguay</i>). Construction of rockfill dikes. Transition zones and clay core placed in deep water for Itaipu cofferdams	47
R. 5. T. CHOUDRY, W. BOGDOVITZ, G. CHAVARRI (<i>Venezuela</i>). Construction of cofferdam at Guri with rollcrete	69
R. 6. A.-A. LOISELLE, J.-J. PARÉ, J.-P. TOURNIER, C. PELCHAT (<i>Canada</i>). Méthodes particulières de construction du barrage principal sur la rivière Eastmain	85
R. 7. J.-J. PARÉ, R. ARES, L. CABOT, M. GARZON (<i>Canada</i>). Large scale permeability and filter tests at LG 3	103
R. 8. A. D. McCONNELL, J.-J. PARÉ, N. S. VERMA, D. A. B. RATTUE (<i>Canada</i>). Materials and construction methods for the dam and dyke embankments of the LG-4 project	123
R. 9. J. G. KOBILKA, H. GRASSINGER (<i>Austria</i>). Embankment and cofferdams for run-of-river stations on the Austrian stretch of the Danube river	145
R. 10. Z. PRUSZA V., T. CHOUDRY (<i>Venezuela</i>). Moisture control of residual soils for large dams	167
R. 11. Y. HAMMAMJI, Y. PIGEON, P. M. GREMEAUX, R. ANDERSON (<i>Canada</i>). Noyau de sable-argile pour les digues de l'aménagement hydroélectrique Outardes 2	185
R. 12. W. SCHOBBER (<i>Austria</i>). Concrete core diaphragm walls for high embankment dams ...	201

	Page
R. 13. H. BEIER, F. LIST (<i>Fed. Rep. of Germany</i>). Trench diaphragms as sealing elements in earth dams	215
R. 14. L. CABOT, J. BRUGGEMAN, R. PICARD (<i>Canada</i>). Compaction control of glacial till core material at LG-3	229
R. 15. S. CHAMPA, B. MAHATHARADOL (<i>Thailand</i>). Construction of Srinagarind dam	255
R. 16. A. D. M. PENMAN, J. A. CHARLES, J. D. HUMPHREYS (<i>Great-Britain</i>). Sandstone rockfill in two dams	279
R. 17. D. J. KNIGHT, N. M. WORNER, J. E. McCLUNG (<i>Great-Britain</i>). Materials and construction methods for a very wet clay core rockfill! dam at Monasavu falls, Fiji	293
R. 18. P. S. MOLYNEUX, J. A. T. ASPDEN, J. S. BRINDLEY (<i>Great-Britain</i>). Marine dam foundations at High Island, Hong Kong	305
R. 19. B. KJOERNSLI, G. KVALE, J. LUNDE, J. BAADE-MATHIESEN (<i>Norway</i>). Design, construction control and performance of the Svartevann earth-rockfill dam	319
R. 20. J. H. YOON (<i>Korea</i>). Testing method and quality control for four dams on the upper Yong San River	339
R. 21. B. I. JIN (<i>Korea</i>). Mechanical compaction of earth and rockfill dams	351
R. 22. L. ALVAREZ, J. LARENAS, A. BERNAL, J. A. MARIN (<i>Chile</i>). Characteristics of the plastic concrete of the diaphragm wall of Convento Viejo dam	371
R. 23. W. BON, A. VEIGA PINTO, E. MARANHA DAS NEVES, R. MARTINS. Rockfill deformations forecast and overflow rockfill dams	391
R. 24. L. BERNELL (<i>Sweden</i>). Experiences of wet compacted dams in Sweden	421
R. 25. H. ZAHAF, A. CLAESSON, S. HOLMQVIST (<i>Sweden</i>). Preparation and compaction of impervious fill on the Bourguiba dam project at Sidi Saad	433
R. 26. E. K. SCHRADER, H. J. THAYER (<i>USA</i>). Willow Creek dam - A roller compacted concrete fill	453
R. 27. J. L. EHASZ (<i>USA</i>). Experience with upstream impermeable membranes	481
R. 28. S. J. VALLESPER (<i>Argentina</i>). Distribution and treatment of the core materials of an embankment dam	485

	Page
R. 29. A. A. BOROVOI, L. P. MIKHAILOV, I. S. MOISEEV, V. G. RAD- CHENKO (<i>USSR</i>). Soils for and methods of embankment dam construction	503
R. 30. G. REGALADO, B. MATERON, J. W. ORTEGA, J. VARGAS (<i>Co- lombia</i>). Alto Anchicaya concrete face rockfill dam. Behavior of the concrete face membrane	517
R. 31. L. GUSTAFSSON, V. WANHAINEN (<i>Sweden</i>). Cofferdams at hydro power plants in Sweden	537
R. 32. M. BROUSEK, J. SOLTES, M. KRČMA, J. MARKVART, V. TVRDIK (<i>Tchécoslovaquie</i>). Coupures de rivières et batardeaux en matériau trouvés sur le site en Tchécoslovaquie	555
R. 33. T. I. YACOOB (<i>Iraq</i>). Dolomite as core materials for dams	565
R. 34. A. T. BATKOV, CH. B. ABADJIEV (<i>Bulgaria</i>). Earth dam with screen of polymeric films and rubber-bitumen com- position layers	581
R. 35. L. W. DAVIDSON (<i>USA</i>). Upgrading the impervious core quality at Sugar Pine dam	589
R. 36. C. P. THORNE, A. B. LOVE (<i>Australia</i>). The production of transition/filter zone material from quartz mica schist by blasting and earthmoving techniques	609
R. 37. K. A. MURLEY, P. J. CUMMINS (<i>Australia</i>). Design considerations of materials during construction of Dart- mouth dam, Australia	627
R. 38. K. D'ANGREMOND, J. BRAKEL, P. W. J. A. M. SUIJS, F. C. VAN ROODE, C. STIGTER, A. J. WOESTENENK (<i>Nether- lands</i>). Design and construction methods of dams in the Netherlands . .	643
R. 39. J. M. JORDAAN, M. FRINDT, P. DU PLESSIS, M. LOUW (<i>Repu- blic of South Africa</i>). The slurry trench method of constructing a cut off as carried out at Omatoko dam, Namibia (South West Africa)	667
R. 40. T. K. RUMPELT, D. STEPHENSON (<i>South Africa</i>). Stratification of rockfill embankments and the effect on permeability	681
R. 41. J. R. MULLER, J. L. J. VAN DER WESTHUIZEN (<i>South Africa</i>). An earth and rockfill cofferdam constructed in water twelve metres deep	699
R. 42. F. HOLLINGWORTH, F. H. W. M. DRUYTS (<i>Republic of South Africa</i>). Filter cloth partially replaces and supplement filter materials for protection of poor quality core material in rockfill dam	709

	Page
R. 43. A. FRASSONI, U. HEGG, P. P. ROSSI (<i>Italy</i>). Large-scale laboratory tests for the mechanical characterization of granular materials for embankment dams	727
R. 44. P. ANAGNOSTI, M. POPOVIC (<i>Yugoslavia</i>). Evaluation of shear strength for coarse-grained granular materials	753
R. 45. J. SINGH, FIE (<i>India</i>). Placement of pervious and impervious material at Beas dam (Pong)	769
R. 46. Y. J. CHEN (<i>China</i>). Grouting for sealing the cohesive fills of embankment dams ...	785
R. 47. P. A. RAJ, I. M. SHAH (<i>India</i>). Submersible concrete cofferdams for Sardar Sarovar project (India)	799
R. 48. R. BELLOTTI, M. PUCCIO (<i>Italy</i>). Experimental research for the use of some new materials on fill dams	809
R. 49. K. DITTER, W. HAUG (<i>Federal Republic of Germany</i>). Reconstruction of bituminous slope linings at dams and pumped-storage reservoirs	831
R. 50. O. G. DOS SANTOS, ADILSON L. BARBI, A. J. A. SOERENSEN, A. SONODA (<i>Brazil</i>). Quality control and instrumentation of clay core placed in deep water for Itaipu cofferdams	841
R. 51. N. L. DE S. PINTO, B. MATERON, P. LAGOS MARQUES (<i>Brazil</i>). Design and performance of Foz do Areia concrete membrane as related to basalt properties	873
R. 52. PAR UN GROUPE DE TRAVAIL DU COMITÉ FRANÇAIS DES GRANDS BARRAGES. Organes minces d'étanchéité sur le parement amont ou dans le corps de la digue	907
R. 53. GROUPE DE TRAVAIL DU COMITÉ FRANÇAIS DES GRANDS BARRAGES. L'utilisation des géotextiles dans les barrages en terre	935
R. 54. GROUPE DE TRAVAIL DU COMITÉ FRANÇAIS DES GRANDS BARRAGES. Adaptation des méthodes de construction et de conception des barrages en remblai aux matériaux disponibles sur le site	963
R. 55. G. BRAVO GUILLEN, S. URIEL ROMERO, J. R. PEREZ RODRIGUEZ (<i>Spain</i>). "In-situ" tests for control of cracking of the clay core of canales dam (Spain)	989
R. 56. M. SERRANO (<i>Spain</i>). Investigation on construction materials for the Sallente dam ...	1007
R. 57. ALONSO FRANCO, L. ROMERO HERNANDEZ, G. GOMEZ LAA, A. FOYO MARCOS, J. L. FERNANDEZ CASADO (<i>Spain</i>).	

	Page
Materials and foundation in earth and rockfill dams in Spain. Their use and control	1027
R. 58. W. K. SHENOUDA (<i>Egypt</i>). Quality control and testing methods as exercised in the Aswan High Dam	1047
R. 59. L. DE COSSIO, A. SERRANO, V. CUELLAR (<i>Spain</i>). Features and properties of the core material at the Limonero dam	1067
R. 60. F. VILLEGAS (<i>Colombia</i>). Difficulties during construction of the Punchina cofferdam	1081
GENERAL REPORT	1103