

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON SAFETY OF DAMS  
COIMBRA/23-28 APRIL 1984

# Safety of Dams

*Edited by*

J.LAGINHA SERAFIM

*University of Coimbra, Portugal*



A.A.BALKEMA/ROTTERDAM/BOSTON/1984

## Table of contents

Preface	IX
<b>A. Failures and incidents</b>	
1. Descriptions	
1 Failures of dams due to overtopping <i>J.Laginha Serafim &amp; J.L.Andrade Cavilhas</i>	3
2 Bilan d'interventions réalisées et d'anomalies constatées sur les barrages exploités par Electricité de France <i>J.Combelles</i>	9
3 Failure of an earth dam on Triassic sandstone: Causes of the failure and criteria for reconstruction <i>H.Breth &amp; W.Romberg</i>	15
4 Problems in dam safety encountered in India: Case histories <i>G.S.Narayana, Manohar Singh &amp; A.B.Pandya</i>	21
5 Lessons learnt from South African dam incidents <i>H.J.W.Olwage &amp; C.Oosthuizen</i>	33
2. Causes	
1 Incipient failures of dams built with tropical residual soils and their behavior during seismic events <i>Fabio Villegas</i>	39
3. Statistical studies	
1 Failures of masonry and concrete dams in Europe <i>A.Vogel</i>	45
2 Statistical analysis of deteriorations and failures of dams <i>A.F.da Silveira</i>	55
4. Probabilistic aspects	
1 A probability based evaluation of the safety and risk of existing dams <i>H.Kreuzer &amp; K.Bury</i>	61
2 Warning systems: Application to the reduction of risk costs for new dams <i>M.E.Paté-Cornell</i>	73
3 Risk analysis of spillway design floods <i>P.Boccotti &amp; R.Rosso</i>	85

4 A multi-variate stochastic analysis of risk for a cascade of dams <i>L.Valadares Tavares</i>	93
<b>B. Observed behaviour</b>	
1. Reports	
1 Behaviour and maintenance of some old masonry gravity dams <i>E.Biener &amp; G.Rouvé</i>	101
2 Behaviour and surveillance of Gordon Dam <i>R.H.W.Barnett &amp; S.Giudici</i>	107
3 The behaviour of the Schlegeis arch dam and the measures taken to improve it <i>H.Stäuble</i>	115
4 The influence of concrete rheology over the behaviour of large dams <i>J.Mora Ramos &amp; J.Soares de Pinho</i>	123
5 The safety and endurance of the old dams of Idrija <i>M.Breznik</i>	133
6 Two large embankment dams in Bavaria: Behaviour during first impoundment and comparative considerations <i>F.List &amp; W.Sadgorski</i>	141
7 Integrity monitoring of dams by dynamic tests <i>B.R.Ellis, A.P.Jeary &amp; R.T.Severn</i>	147
8 Earth dam behaviour on the La Grande project <i>J.Jacques Paré</i>	153
9 Remarkable floods of 1981 in South Africa which overtopped several dams <i>W.S.Croucamp &amp; G.P.Carmichael</i>	161
2. Safety control	
1 Comparaison des déplacements expérimentaux fournis par les pendules, à ceux, déterminés par la méthode des éléments finis, au Barrage Idriss Iier <i>M.Lahlou Abdelhadi</i>	167
2 Simulation of service life of a dam: A new approach to design and safety evaluation <i>M.Fanelli, G.Giuseppetti, P.Bonaldi, A.Marazio &amp; R.Ricciioni</i>	173
3 Stress evaluation in concrete dams: The example of Varosa dam <i>J.O.Pedro, A.F.Silva Gomes &amp; R.C.Camara</i>	179
3. Instrumentation for observation	
1 A general view on the safety monitoring of concrete dams in China <i>Jing Xuanlu</i>	189
2 Time evolution of calibration for electro-acoustic strain meters: Experimental research <i>L.Da Deppo &amp; C.Datei</i>	195
3 Auscultation des ouvrages du Rhône et de leurs fondations – Dispositifs, appareillage, mode d'exploitation <i>C.Ricard</i>	201
4 Precision traverses in inspection galleries <i>J.Casaca</i>	209
5 A system for the seismic surveillance of dams <i>F.Anesa, L.Cassia, A.Castoldi &amp; A.Marazio</i>	215

<b>4. Warning systems</b>	
1 Monitoring dams according to risk factors <i>A.F.Silveira, C.A.Florentino, E.Marinha das Neves, A.Silva Gomes &amp; J.C.Piteira Gomes</i>	221
2 Unique monitoring of possible recurring foundation problems at Fontenelle Dam <i>B.C.Murray &amp; S.E.Browning</i>	227
 <b>C. Safety control</b>	
<b>1. Criteria</b>	
1 Dam safety in Australia <i>B.L.Cantwell &amp; D.Anderson</i>	237
2 Some design criteria for large dams on the basis of probabilistic concept of safety <i>Radu Priscu &amp; Dan Stematiu</i>	245
3 A decision model for the implementation of dam safety measures in the Republic of South Africa <i>C.Oosthuizen</i>	253
<b>2. Design and inspections</b>	
1 Dam safety in the United States: What has been gained? <i>Lloyd A.Duscha</i>	259
2 Application of decision analysis techniques in dam safety evaluation and modification <i>J.Lawrence von Thun</i>	265
3 The influence of parameter variation on the reliability of filters <i>K.-J.Witt &amp; J.Brauns</i>	273
4 Monitoring the structural behaviour of dams: Management of surveillance in Italy <i>P.Bonaldi, A.Marazio, R.Ricciioni, M.Fanelli &amp; G.Giuseppetti</i>	281
<b>3. Principles</b>	
1 Possibilities of improving the safety of large dams <i>R.Widmann</i>	291
2 Dams and safety practices in Canada <i>Anthony H.Tawil</i>	297
3 Reliability assessment of concrete dams from the probability of exceptional loads and defective properties of materials and foundations <i>J.Laginha Serafim</i>	305
4 Statistical analysis of distribution of concrete dam rock foundations failures <i>E.S.Kaloustian</i>	311
<b>4. Codes and regulations</b>	
1 Propositions pour une meilleure protection des barrages européens contre les submersions <i>A.Goubet</i>	321
2 Review of design floods, spillway capacities and free boards for embankment dams in Gujarat <i>J.F.Mistry</i>	325