RILEM State of the Art Reports

Victor Saouma Editor

Diagnosis & Prognosis of AAR Affected Structures

State-of-the-Art Report of the RILEM Technical Committee 259-ISR

Preface

With the aging of our infrastructure, ASR will become increasing prevalent, more so than we have suspected so far. Whereas this particular aging process is unsightly and mildly disruptive for buildings, pavements, or railroad ties, ASR is a major societal problem when it affects dams, large bridges, or even nuclear structures. In those situations, one must decide whether to maintain the structure under continuous auscultation, or simply decommission it. The associated costs are enormous.

Given the increasing prevalence of ASR, this book is timely, pertinent, and necessary. While tools for assessing this particularly complex and confounding phenomenon have long existed, until now they have not been assembled into a single authoritative source. Unfortunately, in my own observation, the lack of organized information has already allowed inadequate assessments and poorly informed decisions about some critical ASR-infected infrastructures. Recently, for example, I evaluated the response by the U.S. Nuclear Regulatory Commission to a license amendment request submitted on behalf of a major nuclear power plant suffering from ASR. The agency's evaluation of the problem was shockingly simplistic and ill-informed, and yet the license for continued operation for an additional 30 years was approved[1]. Thus, it is my hope, as a scientist and concerned citizen, that this book will strengthen government oversight of the risks posed by ASR in critical infrastructures by providing them with a comprehensive assessment methodology.

This volume represents four years of work by RILEM's Technical Committee 259-ISR Prognosis of Deterioration and Loss of Serviceability in Structures Affected by Alkali-Silica Reactions. I had the honor and pleasure to chair it and closely work with some of the world's best experts in the field.

As is often the case, the addressed topics do not represent what I anticipated during our first meeting in 2014. Our original focus was narrow and possibly ill defined, but after many, at times spirited, discussions I realized that the scope should be broadened. At times, this was based on committee discussions, and at others, I allowed myself to unilaterally seek additional participation. This led to substantial reshaping and enrichment of our original ideas.

[1] [293], [292] [267]

In the process of editing, I have avoided two major pitfalls. First, I realized the folly of trying to build a consensus on a proposed method of diagnosis/prognosis emanating from our committee, but have rather let "a hundred flowers blossom" for the benefit of allowing many perspectives. Secondly, I have refrained from constraining the content of solid contributions by some of the participants who wanted to dwell in more details than others. Likewise, I have at times curtailed some coverage, or simply not included others whose work was not yet sufficiently mature for inclusion.

There are twenty-six chapters, and four major appendices broken into four sections. Again, no chapter length was imposed, and one should not assume that those who embrace brevity are deficient in quality.

It is my hope that this book will be accessible as a mine for both engineers consulting it as a starting point of an investigation and for researchers starting with a literature survey.

I have reviewed each contribution, at times questioned the authors, and redone some of the figures. In so doing I have converted most of the submitted Word files into the more aesthetically pleasing format provided by LaTeX. Likewise, each of the 380 citations found an entry in the BibTeXdatabase. Finally, I have tried, albeit imperfectly, to index the book but am certain to have missed some key entries. In the end, I am pleased to provide our publisher with a copy-ready manuscript that would only require minimal editing before publication.

Finally, and on a personal level, whereas I am both indebted and humbled by the knowledge of all the contributors, my greatest satisfaction was not in assiduously editing this book, but in meeting so many interesting colleagues and getting to know them on a personal level. They have my deep appreciation.

Victor Saouma
Boulder, CO.
December 2019

Acknowledgements

The editor would like to thank Dr. Manouchehr Hassanzadeh who was an early supporter of this endeavor and who has written the template followed by all contributors in the Prognostic part.

In addition, he would like to acknowledge the financial support of the US Nuclear Regulatory Commission through Grant No. NRC-HQ-60-14-G-0010, and the US Bureau of Reclamation through Assistance Agreement R18AC00055. Their support has greatly contributed to make this report a reality.

RILEM Technical Committee 259-ISR
Prognosis of deterioration and loss of serviceability in structures affected by alkali-silica reactions

Chairman

Victor Saouma

Secretaries

Leandro Sanchez
Yann LePape

Active Committee Members

This book is authored and edited under the auspices of RILEM Technical Committee TC 259-ISR. It presents technical contributions from RILEM members and international partners that provide an outline of the state-of-the-art in diagnosis and prognosis of concrete structures affected by alkali silica reaction (ASR).

Francesco Amberg
Lombardi Consulting, Switzerland. e-mail: francesco.amberg@lombardi.ch

Prof. Ignacio Carol
Polytechnic of Catalunya, Barcelona Spain. e-mail: ignacio.carol@upc.edu

Dr. Derek Cong
WJE, Austin TX, USA. e-mail: dcong@wje.com

Dr. Alexis Courtois
EDF Direction Ingénierie et Projets Nouveau Nucléaire - Direction Technique, 19 rue Pierre Bourdeix, 69007 Lyon, France. e-mail: alexis.courtois@edf.fr

Dr. João Custodio
LNEC, Lisbona, Portugal. e-mail: jcustodio@lnec.pt

Dr. Steven Feldman

NIST, Materials and Structural Systems Division, Gaithersburg, MD, USA. e-mail: steven.feldman@nist.gov

Dr. Eric R. Giannini
RJ Lee Group, La Crosse, WI, USA. e-mail: egiannini@rjleegroup.com

Nathalie Ishak
Hydro-Quebec, Canada. e-mail: Ishak.Nathalie@hydro.qc.ca

Prof. Laurence Jacobs
Georgia Institute of Technology, Atlanta, USA. e-mail: laurence.jacobs@coe.gatech.edu

Dr. Tetsuya Katayama
Taiheiyo Consultant Co Ltd, Japan. e-mail: katayama@catv296.ne.jp

Dr. Yuichiro Kawabata
Port and Airport Research Institute, Japan. e-mail: kawabata-y@pari.go.jp

Dr. Yann Le Pape
Oak Ridge National Laboratory, TN, USA. e-mail: lepapeym@ornl.gov

Dr. Andreas Leemann
Empa, Swiss Federal Laboratories for Materials Testing and Research, Laboratory for Concrete and Construction Chemistry, Switzerland. e-mail: andreas.leemann@empa.ch

Dr. Renaud-Pierre Martin
Université Paris Est, Materials and Structures Department, Urban and Civil Engineering Testing and Modeling Laboratory (EMGCU), IFSTTAR, French institute of science and technology for transport, development and networks, F-77447 Marne la Vallée, France. e-mail: renaud-pierre.martin@ifsttar.fr

Dr. Esperanza Menendez Mendez
nstitute of Construction Science Eduardo Torroja, Madrid, Spain. e-mail: emm@ietcc.csic.es

Dr. Christine Merz
Merz Ingenieurberatung gmbh, Möriken, Switzerland. e-mail: merz@merz-ingenieurberatung.ch

Dr. Stéphane Multon
Civil Engineering, Paul Sabatier University, and Construction and Durability Materials Laboratory of Toulouse (France). e-mail: stephane.multon@insa-toulouse.fr

Dr. David Rothstein
DRP, A Twining Company, Boulder, CO USA. e-mail: petro@drpcinc.com

Prof. Leandro Sanchez
University of Ottawa, Canada. e-mail: Leandro.Sanchez@uottawa.ca

Prof. Victor E. Saouma

University of Colorado, Boulder, USA. e-mail: saouma@colorado.edu

Prof. Alain Sellier
Civil Engineering, Paul Sabatier University, and Construction and Durability Materials Laboratory of Toulouse (France). e-mail: alain.sellier@insa-toulouse.fr

Dr. Henrik Erndahl Sorensen
Teknologisk Institut, Denmark. e-mail: hks@teknologisk.dk

Dr. Yuya Takahashi
University of Tokyo, Japan. e-mail: takahashi@concrete.t.u-tokyo.ac.jp

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Contributors

Membership and participation in the RILEM TC 259-ISR committee and events has evolved substantially over the active years of the committee (2014-2019). The editor thanks all who have actively contributed to this report through meeting attendance, discussions, and participation in the direct input to the various chapters.

Ammar Abd-elssamd
Department of Civil and Environmental Engineering, University of Tennessee, Knoxville, TN, USA e-mail: Ammar-Abd-Elssamd@mocs.utc.edu

Alexandre Boule
EDF – Direction Industrielle – Département Techniques de réalisation et Expertise en Géosciences et Génie civil. 905 avenue du Camp de Menthe, 13097 Aix-en-Provence Cedex 02, France e-mail: alexandre.boule@edf.fr

Dr. Alexis Courtois
EDF Direction Ingénierie et Projets Nouveau Nucléaire - Direction Technique, 19 rue Pierre Bourdeix, 69007 Lyon, France. e-mail: alexis.courtois@edf.fr

Stéphane Cuchet, Holcim (Suisse), Laboratoire des matériaux, Eclépens, Switzerland. e-mail: stephane.cuchet@lafargeholcim.com · Dr. João Custódio
LNEC - National Laboratory for Civil Engineering; Av. do Brasil, 101, 1700-066 Lisboa, Portugal. e-mail: jcustodio@lnec.pt

William Dressel
Civil Engineer, Waterways & Concrete Dams, US Bureau of Reclamation Denver, USA, e-mail: wdressel@usbr.gov

Prof. Benoît Fournier
Universié Laval, Canada. e-mail: benoit.fournier@ggl.ulaval.ca

Dr. Eric R. Giannini
RJ Lee Group, La Crosse, WI, USA. e-mail: egiannini@rjleegroup.com

Bruno Godart
Université Paris Est, Materials and Structures Department, IFSTTAR, French institute of science and technology for transport, development and networks, F-77447 Marne la Vallée, France. e-mail: bruno.godart@ifsttar.fr

Dr. Michele Griffa
Empa, Swiss Federal Laboratories for Materials Testing and Research, Laboratory for Concrete and Construction Chemistry, Switzerland. e-mail: michele.griffa@empa.ch

Dr. Etienne Grimal
Electricité de France, Centre d'Ingénierie Hydraulique, EDF-CIH Technolac, 73373 Le Bourget du Lac Cedex, France. e-mail: etienne.grimal@edf.fr

Dr. M. Amin Hariri-Ardebili

University of Colorado, Dept. of Civil Engineering, Boulder, CO, USA. e-mail: Mohammad.HaririArdebili@Colorado.EDU

Dr. Jean-Marie Hénault
EDF – R&D, 6 quai Watier, 78401 Chatou Cedex, France, e-mail: jean-marie.henault@edf.fr

Prof. Laurence Jacobs
Georgia Institute of Technology, Atlanta, USA. e-mail: laurence.jacobs@coe.gatech.edu

Samuel Johnson
Electric Power Research Institute, Charlotte, NC 28262, USA. e-mail: sjohnson@epri.com

Dr. Tetsuya Katayama
Taiheiyo Consultant Co.Ltd., Sakura, Japan. e-mail: katayama@catv296.ne.jp

Philippe Kolmayer
2Electricité de France, Centre d'Ingénierie Hydraulique, EDF-CIH Technolac, 73373 Le Bourget du Lac Cedex, France. e-mail: philippe.kolmayer@edf.fr

Sihem Le Pape
Department of Civil and Environmental Engineering, University of Tennessee, USA. e-mail: sihem.lepape@gmail.com

Dr. Yann le Pape
Oak Ridge National Laboratory, USA. e-mail: lepapeym@ornl.gov

Dr. Andreas Leemann
Empa, Swiss Federal Laboratories for Materials Testing and Research, Laboratory for Concrete and Construction Chemistry, Switzerland. e-mail: andreas.leemann@empa.ch

Daniel Liechty
Geophysicist, Engineering Geology & Geophysics Group, US Bureau of Reclamation Denver, USA, e-mail: DLiechty@usbr.gov

Barbara Lothenbach
Empa, Swiss Federal Laboratories for Materials Testing and Research, Laboratory for Concrete and Construction Chemistry, Switzerland. e-mail: barbara.lothenbach@empa.ch

Prof. John Ma
Department of Civil and Environmental Engineering, University of Tennessee, USA. e-mail: zma2@utk.edu

Dr. Renaud-Pierre Martin
Université Paris Est, Materials and Structures Department, Urban and Civil Engineering Testing and Modeling Laboratory (EMGCU), IFSTTAR, French institute of science and technology for transport, development and networks,

F-77447 Marne la Vallée, France. e-mail: renaud-pierre.martin@ifsttar.fr

Benoit Masson
EDF Direction Ingénierie et Projets Nouveau Nucléaire - Direction Technique, 19 rue Pierre Bourdeix, 69007 Lyon, France, e-mail: benoit.masson@edf.fr

Dr. Esperanza Menendez Mendez
Institute of Construction Science Eduardo Torroja, Madrid, Spain. e-mail: emm@ietcc.csic.es

Dr. Christine Merz
Merz Ingenieurberatung gmbh, Möriken, Switzerland. e-mail: merz@merz-ingenieurberatung.ch

Pierre Morenon
Civil Engineering, Paul Sabatier University, and Construction and Durability Materials Laboratory of Toulouse (France). e-mail: morenon@insa-toulouse.fr

Kozo Mukai
Taiheiyo Consultant Co.Ltd., Sakura, Japan.

Prof. Stéphane Multon
Civil Engineering, Paul Sabatier University, and Construction and Durability Materials Laboratory of Toulouse (France). e-mail: stephane.multon@insa-toulouse.fr

Dr. Boumediene Nedjar
Université Paris Est, IFSTTAR/MAST/EMGCU, F-77447 Marne la Vallée, France. e-mail: boumediene.nedjar@ifsttar.fr

Pierre Nicot
Engineer, Transfer Division, Paul Sabatier University, and Construction and Durability Materials Laboratory of Toulouse (France). e-mail: pierre.nicot@insa-toulouse.fr

Dr. Chunyu Qiao
DRP, A Twining Company, Boulder, CO USA. e-mail: joe@drpcinc.com

Prof. Patrice Rivard
Université de Sherbrooke, Canada. e-mail: Patrice.Rivard@USherbrooke.ca

Dr. Simon Roth
HydroQuebec, Direction Expertise Barrages et Infrastructures, Vice-présidence Planification, stratégies, et expertises, Montréal (Québec), CA. e-mail: Roth.Simon-Nicolas@hydro.qc.ca

Dr. Claude Rospars
Université Paris Est, IFSTTAR/MAST/EMGCU, F-77447 Marne la Vallée, France. e-mail: claude.rospars@ifsttar.fr

Dr. David Rothstein
DRP, A Twining Company, Boulder, CO, USA. e-mail: petro@drpcinc.com

Dr. Jerzy Salamon
Technical Specialist, Waterways & Concrete Dams, US Bureau of Reclamation, Denver, USA. e-mail: jsalamon@usbr.gov

Prof. Leandro Sanchez
University of Ottawa, Canada. e-mail: Leandro.Sanchez@uottawa.ca

Prof. Victor E. Saouma
University of Colorado, Dept. of Civil Engineering, Boulder, CO, USA. e-mail: saouma@colorado.edu

Dr. Tomomi Sato
Taiheiyo Consultant Co.Ltd., Sakura. Japan. e-mail: Tomomi_Sato@taiheiyo-c.co.jp

Jerŏme Sausse
EDF Hydro - Direction Technique Générale – Département Surveillance,18 avenue Poincaré, 19100 Brive la Gaillarde, France, e-mail: jerome.sausse@edf.fr

Prof. Alain Sellier
Civil Engineering, Paul Sabatier University, and Construction and Durability Materials Laboratory of Toulouse (France). e-mail: alain.sellier@insa-toulouse.fr

Prof. Yuya Takahashi
Department of Civil Engineering, School of Engineering, The University of Tokyo 7-3-1, Hongo, Bunkyo-ku, Tokyo, 113-8656, Japan. e-mail: takahashi@concrete.t.u-tokyo.ac.jp

Dr. Francois Toutlemonde
Université Paris Est, Materials and Structures Department, IFSTTAR, French institute of science and technology for transport, development and networks, F-77447 Marne la Vallée, France, e-mail: francois.toutlemonde@ifsttar.fr

Dr. Denis Vautrin
EDF – R&D, 6 quai Watier, 78401 Chatou Cedex, France, e-mail: denis.vautrin@edf.fr

Jonathan Wood
Structural Studies & Design, UK. e-mail: jonathan@ss-design.demon.co.uk

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