ASME/ANS RA-S-2008 (Revision of ASME RA-S-2002)

Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications

AN AMERICAN NATIONAL STANDARD









ASME/ANS RA-S-2008 (Revision of ASME RA-S-2002)

Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications

AN AMERICAN NATIONAL STANDARD





œ.

Copyright \bigcirc 2008 by the American Society of Mechanical Engineers. No reproduction may be made of this material without written consent of ASME.

The 2008 edition of this Standard is being issued with an automatic addenda subscription service. The use of addenda allows revisions made in response to public review comments or committee actions to be published as necessary. The next edition of this Standard is scheduled for publication in 2010.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the ASME Web site under the Committee Pages at http://cstools.asme.org. [Interpretations are also included with each edition and addenda.]

ASME is the registered trademark of The American Society of Mechanical Engineers.

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not "approve," "rate," or "endorse" any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assumes any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

No part of this document may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

The American Society of Mechanical Engineers Three Park Avenue, New York, NY 10016-5990

Copyright © 2008 by THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS All rights reserved Printed in U.S.A.

Copyright \mathbb{C} 2008 by the American Society of Mechanical Engineers. No reproduction may be made of this material without written consent of ASME.



CONTENTS

| Foreword | | iv |
|-------------|---|------------|
| Preparation | of Technical Inquires to the Committee on Nuclear Risk Management | v |
| Committee F | Roster | vi |
| Preface | | viii |
| PART 1 | LEVEL 1 AND LERF PROBABILISTIC RISK ASSESSMENT GENERAL | |
| Soction 1 1 | REQUIREMENTS | 1 1 |
| Section 1-2 | Acronyme and Definitions | 17 |
| Section 1-3 | Risk Assessment Application Process | 20 |
| Section 1-4 | Risk Assessment Technical Requirements | 26 |
| Section 1-5 | PRA Configuration Control | 28 |
| Section 1-6 | Peer Review | 29 |
| Section 1-7 | References | 31 |
| Section 1-8 | For Further Reading | 32 |
| Nonmandato | ry Appendix | |
| 1-A | PRA Maintenance, PRA Upgrade, and the Advisability of Peer Review | 33 |
| PART 2 | INTERNAL EVENTS AT POWER PROBABILISTIC RISK ASSESSMENT REQUIREMENTS | 39 |
| Section 2-1 | Risk Assessment Technical Requirements for Internal Events at Power | 39 |
| Section 2-2 | Peer Review for Internal Events at Power | 119 |
| Section 2-3 | References | 121 |
| PART 3 | FIRES AT POWER PROBABILISTIC RISK ASSESSMENT REQUIREMENTS | 122 |
| Section 3-1 | Risk Assessment Technical Requirements for Fire Events at Power | 122 |
| Section 3-2 | Peer Review for Fire PRA at Power | 186 |
| Section 3-3 | References | 189 |
| Nonmandato | ry Appendix | |
| 3-A | FPRA Methodology | 190 |
| PART 4 | EXTERNAL EVENTS AT POWER PROBABLISTIC RISK ASSESSMENT | . |
| Castion 11 | REQUIREMENTS | 205 |
| Section 4-1 | Poor Review for External Events at Power | 205 |
| Section 4-3 | Documentation Requirements for External Events at Power | 275 |
| Section 4-4 | References | 275 |
| | | _, 0 |
| Nonmandato | ry Appendices | 200 |
| 4-A 4 P | List of External Events Kequiring Consideration | 280 |
| ч-D 4-С | Solomic Margin Assessment Mathadalagy: Primer | 203 |
| 4-D | Seismic Margin Assessment Applications Guidance, Including Seismic Margin Assessment With Enhancements | 200 205 |
| | | 290 |
| PART 5 | LOW POWER AND SHUTDOWN PRA | N/A N/A |

×

Copyright \bigcirc 2008 by the American Society of Mechanical Engineers. No reproduction may be made of this material without written consent of ASME.

FOREWORD

The ASME Board on Nuclear Codes and Standards (BNCS) and American Nuclear Society (ANS) Standards Board mutually agreed in 2004 to form a Nuclear Risk Management Coordinating Committee (NRMCC). This committee was chartered to coordinate and harmonize Standards activities related to probabilistic risk assessment (PRA) between the two Standards development organizations (SDO). A key activity resulting from NRMCC was the development of PRA Standards structured around the Levels of PRA (i.e., Level 1, Level 2, Level 3) to be jointly issued by the two societies.

The scope of the initial issue of the ASME RA-S standard included Level 1 and Large Early Release Frequency (LERF) for internal events at power. In parallel with the development of ASME RA-S, ANS was developing companion PRA Standards covering external events, internal fire, and low power and shutdown conditions. These Standards are ANSI/ANS-58.21–2003, ANSI/ANS-58.23–2007, and ANS-58.22 (in development), respectively. ANS-58.22 will be added once it is approved as a revision or addendum. The three existing Standards are assembled together as a revision to ASME RA-S. Consequently, this revision to ASME RA-S is being issued with the revised identity of ASME/ANS RA-S–2008.

A major objective of the combined Standard is to ensure consistency in format, organization, language, and level of detail of the Standard. In assembling the component Standards the following criteria were used:

- (a) the requirements in the Standards would not be revised or modified
- (b) no new requirements would be included
- (c) the numbering scheme of the technical requirements would be preserved
- (d) the common requirements across the Standards would be consolidated into a single place
- (e) the commentary and nonmandatory requirements would be retained

Implementation of the consensus process for this Standard revealed that preserving the exact same requirements from the component Standards created certain technical issues that will need to be addressed in a revision or addendum of ASME/ANS RA-S–2008.

During the development of the ASME RA-S and the ANS companion, titled PRA Standards for Internal Fires, External Events, and Low Power and Shutdown Conditions, concerns were raised by stakeholder organizations and SDOs with respect to stability and consistency in requirements between the Standards. Thus, a key objective of this Standard is to improve consistency and foster stability by enabling future changes to be applied across the various PRA scopes that previously existed as separate Standards. It is anticipated that efficiencies and improvements will result from maintaining, interpreting, and implementing one PRA Standard as opposed to four separate Standards. Additionally, the identification of common processes in general requirements sections for such areas as PRA configuration control, peer review, maintenance versus upgrade, and use in risk-informed applications can now be provided, which further supports consistency and stability. Using a single committee responsible for this Standard provides a single point of response to inquiries and places the expertise necessary to address and coordinate activities in a single cognizant group supported by responsible technical societies. In addition, this Standard is intended to determine the technical adequacy of a PRA such that the PRA can be used in decision making.

The Committee on Nuclear Risk Management (CNRM) operates under procedures accredited by the American National Standards Institute (ANSI) as meeting the criteria of consensus procedures for American National Standards. The initial Standard was approved by the ASME Board on Nuclear Codes and Standards and subsequently approved by ANSI on April 9, 2008.

CNRM is responsible for ensuring that this Standard is maintained and revised as necessary following its original publication. This includes appropriate coordination with and linkage to other Standards under development for related risk-informed applications.





This is a free preview. Purchase the entire publication at the link below:

Product Page

S Looking for additional Standards? Visit Intertek Inform Infostore

> Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation