



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001**

June 14, 2018

The Honorable Kristine L. Svinicki
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: SUMMARY REPORT – 652nd MEETING OF THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS, April 5-7, 2018

Dear Chairman:

During its 652nd meeting, April 5-7, 2018, the Advisory Committee on Reactor Safeguards (ACRS) discussed several matters and completed the following report, letter, and memoranda:

REPORT

Report to Kristine L. Svinicki, Chairman, NRC, from Michael L. Corradini, Chairman, ACRS:

- “Draft SECY Paper, ‘Functional Containment Performance Criteria for Non-Light Water Reactor Designs’,” dated May 10, 2018

LETTER

Letter to Victor M. McCree, Executive Director for Operations, NRC, from Michael L. Corradini, Chairman, ACRS:

- “Safety Evaluation for WCAP-17938-P, Revision 2, ‘AP1000 In-Containment Cables and Non-Metallic Insulation Debris Integrated Assessment’,” dated April 12, 2018

MEMORANDA

Memoranda to Victor M. McCree, Executive Director for Operations, NRC, from Andrea D. Veil, Executive Director, ACRS:

- “Documentation of Receipt of Applicable Official NRC Notices to the Advisory Committee on Reactor Safeguards for April 2018,” dated June 13, 2018

- “Regulatory Guide,” dated June 13, 2018
 - RG 6.6, “Acceptance Sampling Procedures for Exempted and Generally Licensed Items Containing Byproduct Material” (withdrawal – no review)

HIGHLIGHTS OF KEY ISSUES

1. Advanced Reactor Functional Containment SECY Paper

The Committee met with representatives of the NRC staff to review draft SECY Paper, “Functional Containment Performance Criteria for Non-Light Water Reactor Designs.” The staff paper defines ‘functional containment’ as a set of barriers, other than a containment structure, that effectively limit the physical transport and release of radioactive materials to the environment. The staff will seek Commission approval to continue developing a methodology that could be used to develop performance criteria for structures, systems, and components and corresponding programs to limit release of radionuclides from non-light-water designs. The Committee finds the methodology proposed by the staff to be worthy of further development.

Committee Action

The Committee issued a report to the NRC Chairman on this matter, dated May 10, 2018, with the following conclusions and recommendations: 1) The concepts of containment, confinement, and functional containment, as well as the need for them, have been under discussion for decades. With one exception (Fort St. Vrain), no commercial reactor has been licensed without a containment. Licensing a plant under functional containment performance criteria will be a major change in the implementation of regulations, 2) The non-light-water reactor functional containment principles proposed in the staff paper provide a vision for setting licensing policy and developing functional containment performance criteria, 3) A technology-inclusive, risk-informed, performance-based methodology should be adopted for establishing performance criteria for structures, systems, and components and corresponding programs to limit the release of radioactive materials from non-light-water reactor designs, and 4) A functional containment should include multiple barriers as defense-in-depth features that should be minimally dependent upon each other and diverse in nature.

2. WCAP-17938-P, Revision 2, “AP1000 In-Containment Cables and Non-Metallic Insulation Debris Integrated Assessment”

The Committee met with representatives of the NRC staff and Westinghouse Electric Company to review topical report WCAP-17938-P, Revision 2, “AP1000 In-Containment Cables and Non-Metallic Insulation Debris Integrated Assessment” and the associated staff safety evaluation. The AP1000 Design Control Document (DCD) addresses Generic Safety Issue (GSI) 191 which includes the requirement that fibrous debris not be generated during a loss-of-coolant accident. The topical report describes three specific matters related to GSI-191 not previously addressed in the DCD:

- Determination of the zone of influence for a loss-of-coolant water jet within which unprotected cable could produce fibrous debris

- Demonstration that non-metallic insulation, which will be added in certain locations in the reactor cavity, will not be a source of debris, including due to chemical precipitation
- Use of NEI 04-07, "PWR Sump Performance Evaluation Methodology," including its staff safety evaluation, to define the design basis debris generation break size

Committee Action

The Committee issued a report to the NRC Executive Director for Operations on this matter, dated April 12, 2018, with the following conclusions and recommendation: 1) The methodology described in the topical report to establish the loss-of-coolant accident break size for debris assessment is appropriate, 2) The requirement that non-metallic insulation be encapsulated in containers which are located beyond a specified distance from the origin of a loss-of-coolant accident jet is sufficient to avoid producing fibrous debris from this source, 3) Testing showed that unprotected cables could be damaged and produce fibrous debris when located within a distance from a loss-of-coolant accident jet which is determined by the break diameter, 4) The recommended distance of four break diameters from a loss-of-coolant accident jet, at which unprotected cables would not be damaged, has been shown by testing to be sufficiently conservative to bound plant conditions with high likelihood, and 5) The added provisions that require separate qualification of cabling not covered by the testing performed are appropriate, and the staff's safety evaluation should be issued.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS

- The Committee considered the Executive Director for Operations' response of February 26, 2018, to the October 19, 2017 ACRS letter, "Safety Evaluation for Topical Report ANP-10300P, Revision 0, 'AURORA-B: An Evaluation Model for Boiling Water Reactors; Application to Transient and Accident Scenarios'." The Committee was satisfied with the Executive Director for Operations' response.

SCHEDULED TOPICS FOR THE 653rd ACRS MEETING

The following topic is scheduled for the 653rd ACRS meeting, to be held on May 3-4, 2018:

- APR1400 Large-Break Loss-of-Coolant Accident Topical Report

Sincerely,

/RA/

Michael Corradini
Chairman

- Demonstration that non-metallic insulation, which will be added in certain locations in the reactor cavity, will not be a source of debris, including due to chemical precipitation
- Use of NEI 04-07, "PWR Sump Performance Evaluation Methodology," including its staff safety evaluation, to define the design basis debris generation break size

Committee Action

The Committee issued a report to the NRC Executive Director for Operations on this matter, dated April 12, 2018, with the following conclusions and recommendation: 1) The methodology described in the topical report to establish the loss-of-coolant accident break size for debris assessment is appropriate, 2) The requirement that non-metallic insulation be encapsulated in containers which are located beyond a specified distance from the origin of a loss-of-coolant accident jet is sufficient to avoid producing fibrous debris from this source, 3) Testing showed that unprotected cables could be damaged and produce fibrous debris when located within a distance from a loss-of-coolant accident jet which is determined by the break diameter, 4) The recommended distance of four break diameters from a loss-of-coolant accident jet, at which unprotected cables would not be damaged, has been shown by testing to be sufficiently conservative to bound plant conditions with high likelihood, and 5) The added provisions that require separate qualification of cabling not covered by the testing performed are appropriate, and the staff's safety evaluation should be issued.

RECONCILIATION OF ACRS COMMENTS AND RECOMMENDATIONS

- The Committee considered the Executive Director for Operations' response of February 26, 2018, to the October 19, 2017 ACRS letter, "Safety Evaluation for Topical Report ANP-10300P, Revision 0, 'AURORA-B: An Evaluation Model for Boiling Water Reactors; Application to Transient and Accident Scenarios'." The Committee was satisfied with the Executive Director for Operations' response.

SCHEDULED TOPICS FOR THE 653rd ACRS MEETING

The following topic is scheduled for the 653rd ACRS meeting, to be held on May 3-4, 2018:

- APR1400 Large-Break Loss-of-Coolant Accident Topical Report

Sincerely,

/RA/

Michael Corradini
Chairman

Accession No: **ML18166A262** Publicly Available **Y** Sensitive **N**
 Viewing Rights: NRC Users or ACRS Only or See Restricted distribution

| OFFICE | ACRS/TSB | SUNSI Review | ACRS | ACRS |
|--------|------------|--------------|------------|------------------------|
| NAME | MBanks | MBanks | AVeil | MCorradini (AVeil for) |
| DATE | 06/14/2018 | 06/14/2018 | 06/14/2018 | 06/14/2018 |

OFFICIAL RECORD COPY