



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
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June 11, 2021

MEMORANDUM TO: Kevin Hsueh, Chief
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Division of Risk Assessment
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SUBJECT: SUMMARY OF NUCLEAR REGULATORY COMMISSION
PUBLIC MEETING ON MAY 13, 2021 TO DISCUSS THE
REVISION OF REGULATORY GUIDE 1.183

On May 13, 2021, the U. S. Nuclear Regulatory Commission (NRC) staff conducted an Observation Public Meeting (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21132A280) to communicate additional information regarding potential changes to main steam isolation valve leakage pathway modeling methods as they relate to Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors." This is the third public meeting held to discuss efforts to revise RG 1.183.

Purpose

Communicate additional information regarding potential changes to main steam isolation valve leakage pathway modeling methods as they relate to RG 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors." In addition, NRC staff answered questions, and accepted feedback on potential improvements that the staff should consider during the revision of RG 1.183.

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Meeting Summary

The NRC staff's presentation (ADAMS Accession No. ML21124A121) provided the staff's key messages for the revision of RG 1.183. The topics discussed included three proposed aerosol deposition models proposed technical assessment on seismic analysis for an alternative drain pathway, and proposed changes associated with recommendations resulting from the recent

Differing Professional Opinion (DPO) panel report addressing a DPO entitled, “Crediting Safety Systems with a Deterministic Source Term” (ADAMS Accession No. ML21067A645).

The staff provided a brief background of its efforts to revise RG 1.183. The presentation noted that during the time since initial issuance of RG 1.183, the staff has documented and discussed issues associated with Main Steam Isolation Valve (MSIV) leakage pathway modeling in numerous requests for additional information, safety evaluations for Boiling Water Reactors, the NRC Regulatory Information Summary 2006-04, “Experience with Implementation of Alternative Source Terms,” dated March 7, 2006 (ADAMS Accession No. ML053460347) and in multiple public workshops on RG 1.183

As provided in the previous two public meetings, the staff communicated that in October 2009, the Draft Regulatory Guide (DG) – 1199 (ADAMS Accession No. ML090960464) was issued for public comment as a proposed revision 1 of RG 1.183. The staff informed external stakeholders that since the RG 1.183 revision project will involve another opportunity for stakeholders to review and comment on an updated DG, that the staff will not be providing formal responses to the public comments on DG-1199. However, comments received on DG-1199 are being considered by staff during the development of the new DG for revision 1 of RG 1.183.

The staff also reiterated the intent to make the DG for revision 1 of RG 1.183 available for public comment in the fourth quarter of calendar year of 2021. After the public comment period, the staff will address any public comments and update the RG based on those comments as appropriate.

Following the staff’s communication of the history and background of the efforts to update RG 1.183, the staff discussed some of the specific proposed updates to the RG. The topics for proposed revision that were discussed included: 1) potential changes to the RG from the disposition of recent DPO panel report; 2) aerosol deposition models; 3) MSIV leakage related changes under consideration; and 4) technical assessment on seismic analysis for alternative drain pathway. Throughout the discussion of the topics, the staff responded to several questions from industry representatives and accepted feedback to consider for potential improvements on the RG.

DPO - deterministic fuel melt source term

The staff discussed the proposed changes in response to the DPO panel report. It was noted that the staff is proposing a reinstatement of the Maximum Hypothetical Accident (MHA) and included in this proposal would be a removal of mechanistic explanations for the deterministic fuel melt source term. Also noted is that a loss-of-coolant accident (LOCA) is proposed to be defined as an event resulting in the loss of the ability to cool the core not necessarily tied to a failure of the reactor coolant system. The MHA LOCA would be defined as an unspecified event resulting in substantial meltdown of the core with subsequent release into the containment of appreciable quantities of fission products. The DPO panel recommendations include the elimination of the assumption of a 2-hour delay in the distribution of the fuel melt source term into the containment and the elimination of the R-Factors in the Sandia method (ADAMS

Accession No. ML083180196). Staff noted that Appendix A in the update to the RG will describe acceptable assumptions for the evaluation of the MHA LOCA.

- During the discussion of the DPO, staff was asked if the use of the MHA was an outcome in response to the DPO panel recommendation. Staff noted that the DPO panel recommended that in the case of the MHA the staff should not try and make mechanistic assumptions about how the source term is created. The panel recommendation is that a deterministic source term to test the plant systems and containment is used. In this case, the source term is not mechanistically based; instead, it is deterministically overlaid over the plant response.
- Staff was asked if use of the MHA would be applicable to both BWRs and Pressurized Water Reactors (PWRs). Staff responded that use of the MHA would be applicable to both BWRs and PWRs.
- A member of the industry representatives commented that use of the Sandia method is not prevalent because the impact of using this method would result in radiological analysis results that would exceed regulatory limits. Staff was asked if use of the MHA would impact the assumptions from the Alternative Source Term such as iodine percentages, species of isotopes, and timing associated with the source term release. Staff noted that use of the MHA would not affect any of those assumptions.

Aerosol Deposition Models

The staff provided an in-depth review of aerosol deposition models to be included in the revised RG 1.183. An outline was provided associated with the creation and content of the Sandia method. It was noted that this method utilizes MELCOR, which is a fully integrated, engineering-level computer code that models the progression of severe accidents in light water reactor nuclear power plants. Following the Sandia method discussion, the presentation focused on a re-evaluation of the accident evaluation report AEB 98-03 "Assessment of Radiological Consequences for the Perry Pilot Plant," dated December 9, 1998, (ADAMS Accession No. ML011230531) with the multi-group method and numerical integration method. The multi-group method is a statistical treatment of assessing the first-order removal processes of gravitational settling from a settling velocity distribution within control volumes. This method develops a representative "effective" removal constant for the purpose of assessing DBA radiological consequences.

- Industry representatives noted that there are sites that have used a 20-group method for calculating aerosol deposition in previously approved applications and asked the staff how the current update of the multi-group method would impact the previously approved applications. In addition, staff was asked if the industry could obtain more information related to the "multi-group" method that is being considered. Staff reiterated that the incorporation of the multi-group method in the updated RG would have no impact on any of the previous approvals, and licensees can continue to use what is in their current licensing basis. Staff noted that for those licensees who choose to take advantage of

the updated seismic analysis, the staff anticipate that they would utilize one of the aerosol deposition models contained in the revision of the RG.

MSIV Leakage Related Changes Under Consideration

The staff discussed the proposed changes for revision 1 of RG 1.183 associated with MSIV leakage. The staff noted that this update will consider endorsing all three aerosol deposition methods as acceptable in regulatory positions (Sandia, multi-group, and numerical integration methods) to be selected in conjunction with the revised seismic analysis. The staff emphasized that it is expected that licensees who would like to utilize the elements of revised seismic analysis included in the revision would also utilize one of the aerosol deposition methods included in the revision. The staff discussed elements of the MSIV leakage methods being considered. These elements include all steam lines would remain intact, no break is assumed, no credit is provided for containment sprays when crediting aerosol removal within the main steam lines, and no credit would be provided for holdup or aerosol deposition within the main steam line prior to the inboard MSIV.

- Industry representatives asked why the staff is taking the position of not crediting containment sprays when crediting aerosol removal within the main steam lines. The staff stated that the regulatory position on crediting containment sprays is being proposed for deletion to be consistent with the newly proposed methods for modeling aerosol removal in the steam line. The starting distribution for these proposed methods was taken from the Nuclear Energy Agency / Committee on the Safety of Nuclear Installations technical report titled, "State of the Art Report on Nuclear Aerosols" or SOAR report. The SOAR report distribution used does not consider the impact of sprays on the containment aerosol distribution.

Technical Assessment on Seismic Analysis for Alternative Drain Pathway

The staff provided information related to a proposed update in revision 1 of RG 1.183 where an applicant may be able to take credit for holdup and retention of MSIV leakage in the main steam lines and condenser. The staff noted that pathway identification and availability guidance currently exist in the current revision (Rev 0) of RG 1.183 in Appendix A, Section 6.5. The staff explained that updated guidance in revision 1 of the RG 1.183 would provide streamlined information needs for seismic capacity of the structures, systems and components in the pathway.

- Industry representatives asked if the staff has compared the information needs expected in revision 1 of RG 1.183 with those in the previously approved BWR Owners Group topical report. The staff stated that the information needs stemming from the previously approved topical report are being considered when developing the information needs for revision 1 of RG 1.183.

Public Feedback

Two members of the public asked questions of the NRC staff at the conclusion of the meeting. The first question was related to the 20-group and multi-group methods. One member of the

public asked if the staff has performed a comparison of results from a previously approved 20-group method and those from utilization of the new multi-group method. The individual believed that the dose consequences would be greatly affected by using these new methods on currently approved plants. The staff responded that they currently do not have a “one-to-one” comparison, and would consider including information associated with this question as part of the RG 1.183 revision package.

The second member of the public had questions related to the MHA and the Maximum Credible Accident (MCA). The member of the public asked if there is a distinction between the MHA and the MCA. The staff responded that MHA and MCA are interchangeable terms, and the staff is using MHA in the update of the RG. The individual further stated that he believes that the MCA is the “worst of the worst” accidents that could occur at a nuclear power plant. The staff responded that the MHA is the bounding accident within a plant’s design basis. Accidents that are beyond design basis are not addressed in this RG.

Meeting Attendance

Approximately 80 participants attended the meeting via teleconference; however, only speakers for this meeting are listed below.

Mark Blumberg	NRC	Micheal Smith	NRC
Elijah Dickson	NRC	Shilp Vasavada	NRC
Mike Franovich	NRC	Shane Gardner	Exelon
John Parillo	NRC	Frankie Pimentel	NEI
Steve Jones	NRC	Gregory Broadbent	Entergy

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