NRC Workshop (1of 3): Update to RG 1.183, Revision 1

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January 9, 2024

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Workshop on Revision to RG 1.183 R1

Open and transparent dialogue is critical to identify and resolve key technical issues that pertain to revising RG 1.183 R1

- Industry appreciates the NRC's proposed plan for open and transparent public engagements on revising RG 1.183 R1 during 2024
- Industry recognizes the considerable effort from NRC staff to issue RG 1.183 R1 in 2023
- Industry appreciates the opportunities to provide feedback that will help NRC staff create useful, durable guidance in RG 1.183 R2 that can be readily implemented to support the widespread adoption of ATF/LEU+/HBU fuels
- Industry is sensitive to the adverse real-world consequences resulting from excessive conservatisms applied in dose analysis
- We look forward to having a continuous dialogue on the methodologies and potential approaches that could provide additional realism to these hypothetical conservative models included in the next RG revision

Considerations for Revision to RG 1.183 R1

Many BWRs and PWRs will be challenged to implement HBU and IE resulting from the updated in-containment source term models documented in SAND2023-01313

- The SANDIA reports show that increased burnup and enrichment does not strongly impact in-containment source term
- SAND2023-01313 indicated that suppression pool scrubbing is prevalent in the BWR severe accident progression, significantly decreasing the non-noble gas airborne activity because a large fraction of the release would be scrubbed by the suppression pool
- Sequence of events considered in SAND2023-01313 have not changed since the Individual Plant Examinations (IPEs) documented in NUREG-1560 (1996)
  - Missing improvements in plant safety, such as B5B and FLEX implementations and updated risk insights over the last 30 years as a result of Fukushima learnings and risk-informed applications

Considerations for Revision to RG 1.183 R1

Many BWRs and PWRs will be challenged to adopt a future revision to RG 1.183 R1 incorporating SAND2023-01313 data without significant regulatory and/or modeling changes

- Industry evaluation of the impact of SAND2023 report on hypothetical conservative source terms and radiological consequence analyses for representative BWRs/PWRs concluded that it contains significant changes affecting the implementation of RG 1.183 R1 guidance
  - Much higher iodine, cesium, tellurium releases
  - Longer total release durations, relative to RG 1.183 R0
- Alignment regarding generic impacts on EQ, applicability of existing aerosol deposition models
- RG revision should consider the following changes to improve realism and facilitate implementation:
  - Credit for BWR suppression pool scrubbing
  - BWR MSL deposition, including credit for impaction and addressing DW sprays
  - Acceptability of statistical approaches to dose calculation
  - Addressing cases where combined airborne and water releases are more than core inventory
  - Current basis for end of releases (currently vessel failure) may no longer be applicable
    - Longer duration ignores potential for system restoration, reducing scenario probability

Considerations for Revision to RG 1.183 R1

Assurance of the continued acceptance of previous versions of RG 1.183

- During the September 2023 ACRS meeting, committee members suggested that RG 1.183 R2 supersede and replace both R0 and R1
  - Industry is concerned regarding the assurance of the continued acceptance of both R0 and R1 of RG 1.183
  - R2 superseding and replacing R0 and R1 could significantly impact the current licensing basis of several NPPs
  - Industry's perspective is that it is not uncommon for there to be multiple versions of various regulatory guidance included as part of different plants licensing basis
  - NPPs not considering high burnup or increased enrichment can continue to operate within their existing licensing basis envelope (i.e., Rev 0)
  - Considering backfit and forward fit, how will staff ensure regulatory stability and predictability associated with implementation requirements?

Considerations for Revision to RG 1.183 R1

Potential Areas for Follow-up Analysis

- EPRI has proposed related research that could help inform application of severe accident scenarios
  - Performance of MAAP analyses for scenarios similar to SAND2023-01313
    - Determination of impact of pool scrubbing as predicted by MAAP
  - Review of representative plant scenarios and their relative importance in the PRA as compared to the scenario process in the Sandia report
    - Performance of MAAP analysis with PRA based weighting to determine the impact
  - Review of reactor coolant system pressure boundary failure mechanisms
- Consideration of other research conducted at Sandia regarding Aerosol Transmission through Stress Corrosion Crack-Like Geometries
  - Looking at release through cracks and microchannels may be transferrable to the impaction discussion for MSIV leakage