

DRAFT – UNCERTIFIED INFORMATION

Question

RAI 4.3.1-2a (Class 1 Fatigue)

Background

By letter dated March 26, 2018 (ADAMS ML18087A188), Entergy Operations Inc. (Entergy, or the applicant) submitted its response to RAI 4.3.1-1. In this response, the applicant identified the specific reactor vessel internal (RVI) components that were analyzed with a time-dependent cumulative usage factor (CUF) analysis in the current licensing basis (CLB) and provided the specific EPRI BWRVIP inspection and evaluation (I&E) reports that applied to the components.

Issue

The staff has been able to verify that the collective set of BWRVIP I&E reports referenced in the RAI response include inspection of all RVI component or component assemblies with CUF analyses in the CLB, with the exception of the core plate and core plate stiffener beams in the RVI design. Specifically, the EPRI I&E methodology in BWRVIP-25 does not include inspections of BWR-6 designed core plate assembly components because the core plate assemblies in these types of BWRs rely on structural wedges for maintaining the core plates in place during postulated design basis loading conditions and events. As a result, the applicant's use of BWRVIP-25 does not demonstrate that fatigue of core plate and core plate stiffener beams will be adequately managed during the period of extended operation in accordance with 10 CFR 54.21c(1)(iii).

Request

Justify that BWRVIP-25 is appropriate and adequate to manage fatigue of the core plate and core plate stiffener beams even though this document does not include inspections of these components.

Otherwise, provide an alternative program or alternate basis for dispositioning the CUF analyses of the core plate and core plate stiffener beams. Justify the basis selected to disposition the CUF analyses of the components in accordance with 10 CFR 54.21c(1)(i), (ii) or (iii).

Response

Fatigue, structural analysis, industry operating experience, and safety consequences were evaluated in BWRVIP-25 before concluding that inspections of the core plate and the core plate stiffener beam are not necessary. An alternate basis for evaluating the CUF analyses of the core plate and core plate stiffener beams is provided. A review of the fatigue calculation determined the usage factors for the core plate and stiffener beams would remain below 1 with the cycles projected for 60 years as identified in LRA Table 4.3-1. The counting of cycles performed under the Fatigue Monitoring Program will ensure these usage factors remain below 1. Therefore, the effects of aging due to fatigue of the core plate and stiffener beams are managed in accordance with 10 CFR 54.21c(1)(iii).

Changes to LRA Sections 4.3.1.2 and A.2.2.1 are identified below with additions underlined and deletions lined through.

4.3.1.2 Reactor Pressure Vessel Internals

The BWR Vessel Internals Program manages aging effects, including cracking due to fatigue for the reactor vessel internals. The program performs inspections and flaw evaluations in accordance with the

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guidelines of applicable BWRVIP reports. This program manages the aging effects of cracking, loss of preload, loss of material, and reduction in fracture toughness for BWR vessel internal components in a reactor coolant environment.

BWRVIP guidance does not specify inspection of the core plate and core plate stiffener beams. A review of the associated fatigue calculation determined the usage factors for the core plate and stiffener beams would remain below 1 with the cycles identified in LRA Table 4.3-1 projected for 60 years of operation. The counting of cycles under the Fatigue Monitoring Program will ensure these usage factors remain below 1. Therefore, the effects of aging due to fatigue of the core plate and stiffener beams are managed in accordance with 10 CFR 54.21(c)(1)(iii).

For other reactor vessel internals components with fatigue TLAs, the effects of aging due to fatigue will be managed by the BWR Vessel Internals Program for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii). For further information, see [Section B.1.10, BWR Vessel Internals Program](#).

LRA Section A.2.2.1

Reactor Pressure Vessel Internals

For reactor vessel internals components with fatigue TLAs, the effects of aging due to fatigue will be managed by the BWR Vessel Internals Program ([Section A.1.10](#)) for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii). The program performs inspections and flaw evaluations in accordance with the guidelines of applicable BWRVIP reports. This program manages the aging effects of cracking, loss of preload, loss of material, and reduction in fracture toughness for BWR vessel internal components in a reactor coolant environment.

BWRVIP guidance does not specify inspection of the core plate and core plate stiffener beams. A review of the associated fatigue calculation determined the usage factors for the core plate and stiffener beams would remain below 1 with the cycles projected for 60 years of operation. The counting of cycles under the Fatigue Monitoring Program (Section A.1.18) will ensure these usage factors remain below 1. Therefore, the Fatigue Monitoring Program will manage the effects of aging due to fatigue of the core plate and stiffener beams in accordance with 10 CFR 54.21(c)(1)(iii).