SUNI Review Complete
Template=ADM-013
E-RIDS=ADM-03

ADD: Robert Roche-Rivera, Bridget Curran, Kyle Song, Mary Neely
Comment (1)
Publication Date: 8/20/2021
Citation: 86 FR 46888

PUBLIC SUBMISSION

As of: 10/13/21 12:53 PM
Received: October 12, 2021
Status: Pending_Post
Tracking No. kuo-qfzy-n33c
Comments Due: October 19, 2021
Submission Type: Web

Docket: NRC-2021-0117
Acceptability of ASME Code Section III, Division 5, “High Temperature Reactors”

Comment On: NRC-2021-0117-0001
Acceptability of ASME Code Section III, Division 5, High Temperature Reactors

Document: NRC-2021-0117-DRAFT-0004
Comment on FR Doc # 2021-17916

Submitter Information

Name: N. Prasad Kadambi
Address:
Bethesda, MD, 20817
Email: prasad@kadambiecpl.com
Phone: 301-502-1531

General Comment

I am offering the comments in the enclosed file with the purpose of promoting modernization of NRC staff practices. As I point out in the enclosure, the staff is not doing enough to develop practices that would achieve the objectives of the Nuclear Energy Innovation and Modernization Act. Also, it does not appear that the NRC staff is approaching the regulation of non-LWR advanced reactors in a consistent and coherent manner. Such an approach would identify the attributes, in context, of applying the huge amount of work that has gone into development of ASME Section III, Division 5 in a way that would comport with the Commission's direction in SRM-SECY-98-0144. These attributes would relate directly to "reasonable assurance of adequate protection" for advanced reactors employing components operating at temperatures higher than the current operating fleet.

N. Prasad Kadambi Ph.D. P.E.

Attachments

Comments for NRC-2021-0117

Input for NRC-2021-0117 on ASME Section III, Division 5

By

N. Prasad Kadambi Ph.D. P.E.

Retired NRC Staff

It is unfortunate that the NRC staff has chosen to use the old-fashioned guidance structure of updating a LWR Regulatory Guide supported by a NUREG for advanced reactor high-temperature components. It would have been more beneficial to use a structure that would be amenable to accomplish the aspirations of the Commission's direction in SRM-SECY-98-0144, "White Paper on Risk-Informed and Performance-Based Regulation" (White Paper). Such a structure would seek to accomplish outcomes consistent with recent statements by the staff regarding regulating toward "reasonable assurance of adequate protection". Clearly such a structure would focus on safety decision-making rather than specifying a process for compliance with a prescriptive set of rules that is codified in the ASME Section III, Division 5 (S-III-5) standard.

The decision-making would take as input information from results produced by application of S-III-5 to a set of components. This set of components would be functional contributors to some significant feature of an advanced reactor design. The application of S-III-5 to the components would produce information which characterizes the capabilities of systems that support the design feature. The designer incorporates these system capabilities to achieve functional purposes to be provided by the design feature. The functional requirements associated with design feature would be met by systems that perform to set criteria to deliver physical needs of the design. Ideally, the functional requirements and criteria would be demonstrably fit-for-purpose with no unnecessary requirements. Achieving all this would be in keeping with the Commission's White Paper.

The range of application for S-III-5 is vast when liquid-metal-cooled, gas-cooled, and molten-salt fueled or cooled reactors are considered. The multitude of possibilities of materials, construction methods, and service environments make sensible prescriptive approaches almost impossible. Yet the combination of NUREG-2235 and DG-1380 that the NRC staff has chosen to employ uses just such an approach. It appears that the regulated community is so much in need of S-III-5 that no negative comments have come forth so far even though the cost impacts are likely to be substantial and sub-optimal. It appears that this community is not paying attention to the costs of implementing S-III-5. Under the circumstances, it falls to the NRC to meet its obligations under the Nuclear Energy Innovation and Modernization Act (NEIMA) to find a risk-informed and performance-based (RIPB) approach to fulfill its role in reducing the costs of advanced reactors.

S-III-5 requires the designer to provide a complete Design Specification which fulfills Owner/Operator responsibilities while also complying with whatever the local regulatory authority requires. The combination of NUREG-2235 and DG-1380 shows scant recognition of the fact that Design Specifications that draw only on S-III-5 would be quite incomplete. S-III-5 does look to ASME Section III, Division 1 rules for many needs. However, this only makes the process more prescriptive and convoluted. The pursuit of a less prescriptive approach needs to

look to what the Commission has explicitly offered by way of remedies for this type of situation in the White Paper.

It should be clear to the staff at this point of its rulemaking that the needs for the 10 CFR Part 53 would motivate the NRC staff to seek RIPB solutions for advanced reactors. RIPB solutions will require that the design function not operate in a silo, ignoring construction and operation needs as has been the practice in the past with the existing LWR fleet. The combination of NUREG-2235 and DG-1380 essentially continues existing practices by ignoring the Commission's recognition that NRC should offer flexibility to determine how to meet the established performance criteria in ways that will encourage and reward improved outcomes. In the context of 10 CFR Part 53, the improved outcomes clearly relate to functional success and not just avoidance of component failure.

The NRC staff has immediate access to a number of guidance documents and research products that could address an RIPB approach to S-III-5. NUREG/BR-0303, "Guidance for Performance-Based Regulation" offers guidance for employing risk-informed, performance-based, and RIPB approaches to all NRC regulated activities. It also offers a methodology for using a structured set of performance objectives capable of dealing with the integrated decision-making necessary to roll-up component performance capabilities into functional performance success. Early research related to alternatives to prescriptive regulation is documented in NUREG/CR-5392, "Elements of an Approach to Performance-Based Regulatory Oversight". Additional research related to decision-making under uncertainty is documented in NUREG/CR-6833, "Formal Methods of Decision Analysis Applied to Prioritization of Research and Other Topics". The American Nuclear Society's Risk-Informed, Performance-Based Principles and Policy Committee (RP3C) has considerable information on application of RIPB methods for advanced reactors.

In summary, the combination of NUREG-2235 and DG-1380 falls short of providing guidance that would accomplish the objectives of NEIMA. The NRC staff should recognize this as part of the NRC-2021-0177 comment resolution process. Additionally, there is an opportunity to propose activity that focuses on achieving the Commission's objectives in the White Paper.