TO: Brooke P. Clark, Secretary  
FROM: Commissioner Baran  
SUBJECT: SECY-22-0053: Recommendations for Modifying the Reactor Oversight Process Engineering Inspections Periodicity

Approved ___ Disapproved ___ Abstain ___ Not Participating ___

COMMENTS: Below _____ Attached  ____ None ____

Entered in STAR
Yes  ___ X ___  
No  ____

Jeffery M. Baran  
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Date
Commissioner Baran’s Comments on SECY-22-0053, “Recommendation for Modifying the Periodicity of Reactor Oversight Process Engineering Inspections”

Engineering inspections are an essential part of the suite of baseline inspections that are conducted at every operating nuclear power plant across the country. They “play an important role in verifying that safety systems are capable of performing their intended safety functions under accident conditions.”¹ Engineering inspections focus on ensuring that a licensee’s engineering activities do not erode safety by introducing latent deficiencies into plant equipment.

NRC began conducting engineering inspections in response to a significant safety event, and these inspections have evolved over the years to confront emerging issues and new findings. In 1985, the Davis-Besse nuclear power plant experienced a serious loss of all the feedwater that removes heat from the reactor core. This event was caused by several safety-related equipment malfunctions. NRC designed the first generation of engineering inspections to determine whether similar problems were present at other nuclear power plants. Twenty years later, in the wake of the discovery of significant degradation of the reactor vessel head due to boric acid corrosion, engineering inspections at Davis-Besse also revealed a potential for clogging of the safety-related emergency core cooling system sump and degradation of pumps under certain accident conditions. As a result, NRC developed a more comprehensive and in-depth engineering inspection in 2005 to verify that safety systems and components were correctly designed and would work when needed. The most recent version of the engineering inspection program, the Design Bases Assurance Inspection, took shape in 2017, following the discovery that a risk-significant emergency core cooling system valve would not have performed its safety function at Browns Ferry during a 19-month period.

As the NRC staff’s Engineering Inspection Working Group concluded, “the current suite of engineering inspections is effective in identifying safety issues.”² In fact, since the year 2000, these inspections have resulted in over 2,000 inspection findings. Most of the findings were Green, but several were White or Yellow. The Working Group explained that one of the reasons the engineering inspection program “added value to reactor safety was its ability to identify latent conditions that would not manifest themselves through routine plant surveillance activities.”³ This helped NRC inspectors identify defective components before they failed. According to the Working Group, “[a]lthough NRC inspection reports would characterize many of these identified conditions as performance deficiencies of low safety significance (Green), some of these deficiencies would have become more risk significant (i.e., greater than Green) if the NRC had not identified the performance deficiency before component failure.”⁴

In this paper, the staff presents three options for changing engineering inspections. All three options involve replacing the current Design Bases Assurance Inspection and some other regional team engineering inspections with a Comprehensive Engineering Team Inspection (CETI) and Focused Engineering Inspections (FEIs). The CETI would verify the ability of plant components to perform their licensing basis functions following plant modifications. Elements of the current heat sink and 50.59 inspections would be rolled into the CETI. CETIs would be performed every three, four, or five years, depending on the option selected by the Commission. In the years a CETI is not performed at a plant, a FEI would be performed instead. FEIs would concentrate on particular engineering areas, which would change each inspection cycle based

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¹ SECY-18-0113 at 4.
³ Id.
⁴ Id.
on criteria established by the staff, such as operating experience, date of last inspection, and risk significance.\(^5\) Examples of potential focus areas include fire protection, aging management, external hazards, and replacement parts, including counterfeit, fraudulent, and suspect items. The staff recommends conducting the CETIs on a four-year cycle, with one CETI and three FEIs at each plant every four years (Option 2).

The engineering inspection program has gone through many iterations over the years, and it is important to adapt the program to reflect current safety needs. It also makes sense to look for ways to achieve the same level of safety while ensuring that inspection time is optimized. Ultimately, a change to the Reactor Oversight Process should rest on a strong safety case.

Here, the staff is recommending two main changes to the current suite of engineering inspections: (1) a change in the content and focus of each year’s engineering inspection and (2) a reduction in the frequency of the comprehensive engineering inspection. In my view, the changes have the potential to improve both safety and the efficiency of inspections.

There is a solid safety basis for moving from the current Design Bases Assurance Inspection to the CETI and FEIs. These newly designed inspections are the result of feedback from inspectors in the field. For safety reasons, the Working Group concluded that a stand-alone engineering team heat sink inspection was not useful and that elements of the inspection should be incorporated into the new CETI. The Working Group found that “because of the small population of heat exchangers/sinks, inspectors routinely inspect the same four or five heat exchangers/sinks every 3 years” and “recent changes at the sites would not likely result in engineering challenges to the heat sink equipment performance.”\(^6\) Similarly, “based on feedback from inspectors currently informing inspections,” the Working Group determined that it would be beneficial to both safety and efficiency to review plant modifications and the associated use of the 50.59 process together, rather than separately as is done now.\(^7\) The safety advantage of the FEI is that it will focus on different and often uninspected, safety-significant areas each year. This provides the NRC staff with the flexibility to shift the engineering inspection focus to areas of emerging need as the nuclear power plant fleet ages. The potential topical areas contemplated by the staff would all be valuable additions to the overall engineering inspection program.

Whether to reduce the frequency of the comprehensive engineering inspection from once every three years to once every four years is a closer call. I was skeptical that there was a sufficient safety case for this proposal in 2018. However, two developments over the last four years have convinced me that this change would produce a real safety benefit. First, in recent years, the NRC staff has already shifted its engineering inspections to focus more on targeted engineering issues, such as environmental qualification and power-operated valves. These more focused inspections have proven valuable. The staff found that the environmental qualification “inspections have improved safety by identifying current deficiencies in licensee programs.”\(^8\) Also, after a year of conducting focused inspections of power-operated valves in 2020, the staff published an information notice documenting the lessons learned from inspection

\(^5\) SECY-22-0053 at 3, 9.
\(^7\) Id. at 7.
\(^8\) Programmatic Lessons Learned from Environmental Qualification Inspections (Aug. 19, 2019) at 1 (ML19183A063).
findings related to the operation, testing, inspection, and maintenance of valves.  Along with the fire protection team inspection, these types of inspections “are representative of FEI engineering inspections.” Because the more focused inspections have been effective and provide the staff flexibility to take a deeper dive into different areas of high safety importance, having an engineering inspection cycle with a slightly greater percentage of FEIs should maintain, or even increase, the overall effectiveness of the engineering inspection program. Second, as NRC has moved away from including contractors in its engineering inspection teams, early planning for inspections has become more vital. A four-year cycle should make it easier for the staff to ensure that inspectors with the necessary specializations are available to staff the different engineering inspections at each nuclear power plant.

For these reasons, I approve the staff’s recommended Option 2 of moving to a four-year engineering inspection cycle of one CETI and three different FEIs. At the conclusion of the first four-year cycle, the staff should evaluate the change to determine whether it has provided the intended safety and efficiency benefits and inform the Commission of its findings.

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10 SECY-22-0053 Enclosure at 3.