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February 28, 2017

Ms. Cindy Bladey
Office of Administration
Mail Stop: OWFN-12H08
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Request for Public Comment on Draft Regulatory Guide DG-1337, *"Restart of a Nuclear Power Plant Shut Down by a Seismic Event"* (*Federal Register* 81FR76633, dated November 3, 2016, Docket ID NRC-2016-0224)

Project Number: 689

Dear Ms. Bladey:

We appreciate the U.S. Nuclear Regulatory Commission (NRC) efforts to solicit public comment on the proposed Revision 1 of Regulatory Guide 1.167 (as reflected in DG-1337). The NRC draft regulatory guide endorses ANS/ANSI-2.23-2016, with exceptions, relating to post-shutdown inspection and tests, inspection criteria, documentation, and long-term evaluations when the Operating Basis Earthquake or the Safe Shutdown Earthquake (SSE) has been exceeded at a nuclear power plant.

The NRC's proposed revision to the Regulatory Guide takes exception to key aspects of ANS/ANSI-2.23-2016 in a manner that would involve significant efforts by licensees, and are not technically warranted or meaningful in the absence of significant damage. Further, recent operational experience for the 2011 Mineral, Virginia earthquake has demonstrated that the additional analysis involved by the proposed exceptions ultimately provided little or no contribution to safe plant restart. The regulatory burden associated with this earthquake was approximately $25 million and 100,000 man-hours.

The approach provided in ANS/ANSI-2.23-2016 for evaluating plant readiness to restart in the event that the SSE criterion is exceeded in the absence of damage, provides the most balanced, reliable and practical method available. We recommend that Regulatory Guide 1.167 be revised to endorse ANS/ANSI-2.23-2016 without exception.

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Add= E. O'Donnell (exo)

The attachment provides additional comments on DG-1337 in support of this recommendation. The industry would welcome a public meeting to further discuss these comments.

If you have any questions, please contact me.

Sincerely,

Andrew N. Mauer

Andrew N. Mauer

Attachment

c: Thomas Weaver, RES/DE/SGSEB, NRC
Edward O'Donnell, RES/DE/RGGIB, NRC

C.2 Exceptions and Clarifications to Section 7 of ANS/ANSI 2.23-2016

a. Exception to Section 7.3 Recommended Post-Earthquake Action Levels

The approach provided in ANS/ANSI 2.23-2016 (the Standard) for evaluating plant readiness to restart in the event that the Safe Shutdown Earthquake (SSE) criterion is exceeded in the absence of damage, provides the most balanced, reliable and practical method available. This approach is consistent with the approach in NP-6695, conditionally endorsed by Reg. Guides 1.166 and 1.167 and also the more recent IAEA plant response guidance Safety Report 66, Earthquake Preparedness and Response for Nuclear Power Plants.

The procedure in the Standard, if implemented in its entirety, includes: (i) pre-earthquake selection of a representative sample of the most vulnerable safety-related and non-safety-related types of Structures, Systems, and Components (SSC) (termed a smart sample), pre-earthquake inspection and documentation, and periodic baseline inspection of this equipment; and (ii) extensive post-earthquake inspections and tests as a basis for restart. These inspections and tests expand as the level of damage to the plant increases and include comprehensive analytical evaluations before or after restart (depending on observed damage level) if the SSE is exceeded and significant damage is found. Consistent with the observations from a number of nuclear plants that underwent significant beyond-design-basis earthquakes, observation and inspection of the plant itself is the best indicator of potential damage, not instrumental recordings or analyses alone.

Following the Mineral, Virginia M5.8 earthquake of August 23, 2011, which exceeded the North Anna plant's SSE spectra in certain frequency bands, the licensee was requested by NRC to perform sample analyses of SSCs prior to restart. There were no issues identified and no safety benefits resulted from these sample analyses. Thorough walkdowns of plant areas were conducted and SSCs showed no significant damage - consistent with the Cumulative Absolute Velocity for this event. Detailed functional and surveillance tests ultimately led to the conclusion that the North Anna plant was safe for restart. The substantial cost incurred by the licensee was a result of performing additional evaluations of SSCs in accessible and inaccessible areas, to demonstrate that there were no unobserved latent or safety impacts on continued operation from SSCs that were possibly damaged, but not inspected, as a result of the earthquake. These additional evaluations ultimately provided little or no contribution to safe plant restart.

We acknowledge that analysis is sometimes beneficial for passive components such as tanks and heat exchangers and for certain distributed systems such as piping and cable trays. However, these classes of equipment are among the most seismically rugged and are also easiest to assess by observation. Conversely, for the equipment classes (e.g., electrical equipment, relays, contactors etc.) most likely to suffer functional damage or malfunction, analysis to demonstrate lack of damage is usually not practical given the complexity of the component or the inability of the analytical tools to show operability or lack of it. In addition,

the potential latent damage issue has been thoroughly reviewed at nuclear power plants in several past earthquakes such as the Niigata-Chuetsu-Oki earthquake of 2007 for the Kashiwazaki-Kariwa plant, and the Mineral Virginia earthquake of 2011 for the North Anna plant, where the damage levels were 0 or 1. There was no evidence of latent damage identified at these plants, because an exceedance of the SSE alone does not imply the presence of hidden damage.

The industry efforts in response to NRC Fukushima Near-Term Task Force Recommendations 2.1 (for reevaluated seismic hazard) and 2.3 that were recently performed or are being completed (e.g. plant walkdowns, expedited seismic evaluation program, seismic probabilistic risk assessments) and the past initiatives including Individual Plant Examination of External Events and Unresolved Safety Issue (USI) A-46, *"Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors,"* demonstrate that safe-shutdown SSCs have sufficient seismic capacities to withstand accelerations corresponding to SSE and beyond. In most cases, normal startup testing and surveillance are the most reliable and practical ways to ensure lack of hidden damage.

Further to this end, one of the conditions of damage level 0 is that there be no evident damage to not only safety related components but also any non-safety related components and any other items that could have an impact on the safety or operability of the plant. In addition, at damage level 1 no damage is experienced by any safety related or non-safety related component that could have an impact on safe operation of the plant. Finally, action level 1 specifies a progressive series of steps starting with focused inspections and tests of an extensive preselected set of safety related and non-safety related components including those items most likely to be damaged by ground motions (damage indicators). Therefore, the presence of undetected damage is highly unlikely because of the inclusion of the above safeguards, plant specific equipment tests and normal start-up tests.

Based on these comments, we do not support the recommended sample analyses of SSCs being proposed when the SSE is exceeded, without evidence of damage to either industrial type non-safety related or safety related SSCs. Such analyses are unnecessary for safe plant restart and would impose a significant burden on the affected plant.