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Below is the result of your feedback form. It was submitted by

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Document_Title: Draft Regulatory Guide DG-1217, Protection Against Trubine Missiles

Comments: GE Hitachi Nuclear Energy ("GEH") provides the following comments related to NRC Draft Regulatory Guide DG-1217 (Proposed Regulatory Guide 1.115 Revision 2), "Protection Against Turbine Missiles" (74 Fed. Register 56672; NRC #2009-0481 Nov. 2, 2009). GEH agrees that a general revision to Regulatory Guide ("RG") 1.115, Revision 1 (July 1977) is warranted.

General: GEH recommends that related NRC guidance in NUREG-0800, "Standard Review Plan," also be revised to conform to the final revisions for RG 1.115. The following are suggested changes:

· Section 10.2.3 should be revised to address reductions in the frequencies of turbine missiles due to physical differences of ultra large forgings verses the old style of disks being attached to forged rotor shafts (see, e.g., NRC ESBWR Request for Additional Information 10.2-23 and GEH's response provided in MFN 07-404, Aug. 5, 2007).

· Appropriate changes should address electronic speed control designs and other types of redundant and diverse protection systems like mechanical mechanisms (see, e.g., NRC ESBWR RAIs 10.2-9 and 10.2-18 and associated GEH responses transmitted under Docket No. 52-010 as MFN 06-154, June 12, 2006).

· Appropriate changes should address approaches for less frequent isolation valve testing based upon actual failure rates and accounting for human interactions with testing programs (statistically, human error causes more failures than actual failed valves; see GEH response to NRC ESBWR RAI 10.2-19, transmitted under Docket No. 52-010 as MFN 06-154, June 12, 2006).

· Revise NRC guidance to indicate acceptance of remote indication of valve stroking for purposes of maintaining occupational exposure as low as reasonably achievable (ALARA) in boiling-water reactors ("BWRs"), due to, should not have human visual observation of valve movement.

High-Trajectory Turbine Missiles Pathways: Currently, RG 1.115 addresses only low-trajectory missiles. DG-1217 expands the regulatory guidance to outline acceptable methods of protection against both high-trajectory and low-trajectory turbine missiles. The NRC should consider including additional guidance regarding potential turbine missile pathways for high-trajectory missiles. Otherwise, an analysis could result in identification of overly conservative, unrealistic protection features, such as shielding roofs of reactor buildings, control buildings, fuel buildings, independent spent fuel storage buildings or casks, for extremely low probability scenarios. An alternative is to include guidance that would indicate acceptance of a P4 cut off value of 10-7 where further evaluation is not required for either low-trajectory or high-trajectory turbine missiles.

Design Improvements Have Reduced Probability of Turbine Overspeed Failures: Currently, RG 1.115 discusses the lack of operating data, in combination with the "recurrence of disc or rotor degradation due to other causes," as the basis for use of historical failure rates for the probability of turbine missiles. DG-1217 acknowledges that improvements in turbine design may have reduced the design overspeed failure rate, but

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does not differentiate between disks and forged designs (forged designs have demonstrated a much lower probability of failure). Revised guidance should allow credit for improved mono-block or welded disk/rotor designs in evaluating the probability of turbine missiles. In addition, analyses by turbine manufacturers conclude that no turbine blades/disk parts would exit turbine casings. Guidance should be included as to how an applicant might credit robust designs (with associated confirming analysis) to be exempt from regulatory guidance for protection of e!
ssential equipment from turbine missiles.

As another example, the guidance could address differences in technologies of "shrunk-on" disks and single-piece rotor forgings and, for single-piece rotor forgings, allow credit similar to that allowed for favorably oriented turbines for reduced probability of creating turbine missile damage. With the removal of the historical failure mechanism at the intersection of disks to rotors (where cracks at the disk to keyway and disk bore to shaft occurred), the failure rate should be greatly improved. While DG-1217 does not credit new nuclear power plants using updated designs, these new designs can provide actual field run time to support evaluations, and manufacturers could perform bounding evaluations using additional historical information. The NRC should consider addressing in the guidance credit for improved designs in new nuclear power plants. For example, credit for new designs could be a two-step process: (1) a bounding analyses are used for licensing the new design!
, and (2) a confirmatory report is generated at the conclusion of the manufacturing program to provide assurance the materials of construction, inspections and nondestructive examinations demonstrate conformance with the assumed bounding values in the original analyses.

BWR Design Specific Features Minimize Probability of Missile Ejection: The NRC should consider including guidance that would allow credit for certain BWR design features that are inherent barriers in potential pathways of ejected turbine missiles. The specific design features are the turbine radiation shielding enclosures. These sky-shine shields and radiation shield walls provide mitigating barriers against the remote possibility of an ejected blade penetrating through the turbine casing. The guidance could address how to credit these inherent BWR design features in the analysis of high-trajectory turbine missiles and most low-trajectory potential turbine missiles (excluding those low-trajectory missiles assumed to be ejected inside the shielding enclosures).

Turbine Missile Probability Based on Turbine Orientation: The draft guidance explains that the values in new Table 1 in Section D of DG 1217 have been used since 1986 for unfavorably oriented turbines and for the high-trajectory turbine probability criteria. GEH understands that the probability values represent a method for performing evaluations without requiring justification for values on an individual basis. However, GEH suggests that, even if not before issuing a revision to RG 1.115, the NRC should consider whether industry data since 1986 supports changing the probability for low-trajectory turbine missiles of unfavorable orientations. Additional data may support reducing the value of P1, which is 10 times higher than the value for the same turbine design in the unfavorable orientation.

For example, for a site with two units, if each turbine is designed and tested to the same criteria, it would seem that the probability of a turbine missile should be the same irrespective of orientation. Alternatively, the guidance could address how risk-informed approaches could be used in an evaluation. While there may be insufficient turbine operation time to employ a full risk-informed evaluation on the turbine missile generation, there should be an acceptable approach for event or consequence evaluations using risk-informed methods. For example, the very small chance a turbine missile could strike an essential SSC, divided by the chance it could actually damage an SSC, divided by the number of redundant equipment available could produce a statistically acceptable result for the probability of a turbine missile. This approach could be very useful for future evaluations of sites with multiple units. In addition, a bounding value of less than 10-7 should be considered !
low enough to negate the need for further evaluation of unit-to-unit interactions for sites with multiple units.

Missile Barriers: To the extent practical, the NRC should provide in the guidance standard turbine missile shielding acceptance criteria or equations for evaluating steel and concrete thicknesses credited as missile barriers. This could reduce ambiguity and uncertainty in evaluations of the adequacy of missile barriers.

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