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FAILURE OF STRUCTURAL OR SEISMIC SUPPORT BOLTS ON CLASS I COMPONENTS

We recently received information from the Connecticut Yankee Atomic Power Company describing bolt failures found during routine in-service inspections at the Haddam Neck pressurized water reactor which may relate to the installation and serviceability of seismic support bolts or other seismic support structures at your facility.

Description of Circumstances

- A. During a visual inspection, several steam generator seismic support holddown bolts were observed to be loose. Subsequent inspections by ultrasonic and impact testing of all 256 bolts identified a total of 24 which had failed and were unable to perform their design function. A preliminary evaluation indicated the bolts had failed in tension apparently from over-torque during the original installation. It was later ascertained by metallurgical and electron microscopic techniques that the failures were the result of stress corrosion, associated with the high pre-stressing, stress risers at the root of the bolt threads and the presence of moisture originally from the concrete and continuing from miscellaneous spills, leakages or high humidity commonly found within containment areas.

In reviewing this problem, it was noted that Section XI of the Boiler and Pressure Vessel Code does not specifically address the inspection of support structures for vessels except for the "support attachment (vessel support skirts) which includes the welds to the vessel and the base metal beneath the weld zone and along the support attachment for a distance of two base metal thicknesses."^{1/} Support members and structures for piping, valves, and pumps within the system boundary "whose structural integrity is relied upon to withstand the design loads and seismic induced displacements" are subject to examination.^{2/}

B. Action Requested

1. Since the various support structures for vessels within containment are subject to the same environment as other support structures described above, but are not subject to the same examination, it is requested that during your next scheduled outage, you selectively examine a representative

^{1/} ASME Boiler and Pressure Vessel Code; Section XI, Table IS-251: Para. H.

^{2/} Ibid; Para. K-2

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portion of the vessel support members and structures, including the bolting material for two Seismic Category I vessels (as defined in Regulatory Guide 1.29) whose structural integrity is relied upon to withstand design and seismic displacements. This examination should include sufficient coverage of each support structure to provide confidence of serviceability.

2. It is requested that you notify the RO Regional Office in writing within 20 days of your proposed schedule for this inspection including the date that your detailed written programs and procedures will be available for RO inspection. Your program shall include, but not be limited to: structures to be examined; inspection methods to be used; and number of bolts per structure examined.
3. If failures are revealed during your inspections, you are instructed to promptly report these as "Abnormal Occurrences" in accordance with the requirements of your license.