



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 – 0001**

May 20, 2009

The Honorable Gregory B. Jaczko  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**SUBJECT:     PROPOSED RESOLUTION OF GENERIC SAFETY ISSUE - 163,  
                  “MULTIPLE STEAM GENERATOR TUBE LEAKAGE”**

Dear Chairman Jaczko:

During the 562<sup>nd</sup> meeting of the Advisory Committee on Reactor Safeguards, May 7-8, 2009, we reviewed the proposed resolution of Generic Safety Issue (GSI-163), “Multiple Steam Generator Tube Leakage.” GSI-163 addresses the concern that a design basis main steamline break may lead to the rupture of multiple steam generator tubes and the depletion of the reactor coolant inventory. Our review of the proposed resolution of GSI-163 is an example of our long-standing interest in the integrity of steam generator tubes. During our review, we had the benefit of discussions with the staff and of the documents referenced.

**RECOMMENDATION**

1.           GSI-163, “Multiple Steam Generator Tube Leakage,” should be closed.

**BACKGROUND AND DISCUSSION**

Steam generator tubes make up a significant part of the pressure boundary for the primary coolant system of any pressurized water reactor. These metal tubes are susceptible to degradation by a variety of corrosion, fatigue, and wear mechanisms. Some degradation mechanisms have been mitigated over the years by changes in water chemistry and alloys used for the tubes. Today, a persistent concern that remains important is stress corrosion cracking, especially in the vicinity of drilled plate tube support structures where water chemistry can be quite aggressive.

By means of plant technical specifications, licensees are required to assure with high confidence that steam generator tubes have sufficient integrity to survive normal operations as well as possible design basis accidents, such as the rupture of a main steamline outside of the containment boundary. Licensees do this with a program of periodic inspections of tubes and repair or plugging of tubes that show degradation in excess of conservative thresholds. Methods for tube inspection and thresholds for tube plugging or repair have had to evolve as the mechanisms of tube degradation have changed.

Rupture of a single steam generator tube is itself a design basis accident and plant systems are capable of coping with such an event. GSI-163 was established because of concerns that methods for inspection of tubes and detection of degradation could leave in operation many

tubes that would fail in the event of a main steamline break outside of containment. The coolant inventory in plant systems that cope with the rupture of a single tube or a few tubes might be exhausted by the rupture of or even significant leakage from multiple tubes. The reactor coolant inventory is expelled outside the containment and the accident could progress to core damage.

The NRC staff and the nuclear industry have undertaken extensive programs to revise tube inspection methods and protocols to ensure steam generator tube integrity. Performance-based requirements have been incorporated into pressurized water reactor technical specifications. Licensees are required to make projections of acceptable tube behavior over the interval between steam generator tube inspections. Through various tasks within the Steam Generator Action Plan (SGAP), the staff has shown that processes hypothesized to rupture multiple tubes during design basis events are unlikely or physically impossible.

We conclude that GSI-163 can be closed as proposed by the staff.

Our interest in the integrity of the primary coolant pressure boundary and the degradation of steam generator tubes is sustained. We appreciate the opportunity to review steps taken by the staff to complete or otherwise disposition elements of its SGAP.

Dr. William J. Shack did not participate in the Committee's deliberations regarding this matter.

Sincerely

*/RA/*

Mario V. Bonaca  
Chairman

References:

1. Letter to Edwin M. Hackett, Nuclear Regulatory Commission, transmitting Proposed Closeout Package - Generic Safety Issue 163, "Multiple Steam Generator Tube Leakage," 3/9/2009 (ML090690074)
2. U.S. Nuclear Regulatory Commission, Advisory Committee on Reactor Safeguards, NUREG-1740, "Voltage-Based Alternative Repair Criteria," 3/31/2001, (ML0107503151)

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Letter to the Honorable Gregory B. Jaczko, Chairman, NRC, from Mario V. Bonaca, Chairman, ACRS, dated May 20, 2009

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