December 5, 2003

Mr. George Vanderheyden, Vice President
Calvert Cliffs Nuclear Power Plant, Inc.
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS 1 AND 2 – JUSTIFICATION REQUIRED FOR MECHANICAL NOZZLE SEAL ASSEMBLY (MNSA) TO BE USED AS A PERMANENT REPAIR

Dear Mr. Vanderheyden:

The mechanical nozzle seal assembly (MNSA) is a mechanical device that industry is using to provide both sealing and structural integrity for leaking nozzle connections. Currently, MNSAs have been installed on the exterior surfaces of reactor coolant pressure boundary components, as an alternative to weld repairs for leaks in small diameter J-groove welded Alloy 600 instrument nozzles and thermal sleeves. The NRC has accepted MNSA repairs on a temporary basis for two operating cycles. A number of licensees have requested and have been granted NRC approval extending the temporary MNSA repairs beyond the two operating cycles for additional cycles on the same basis as that on which initial approval was granted.

It is the position of the NRC staff that should a licensee decide to keep a MNSA in service beyond the period for which temporary approval has already been granted, the licensee shall provide a justification which supports the approval of the MNSA as a permanent repair. The licensee's justification should include an analysis of the pressure boundary component to which the MNSA is attached and an inservice inspection program to be maintained throughout the licensed life of the facility. The licensee's justification should be submitted for NRC staff review and approval no later than one year prior to the expiration of its existing temporary repair approval period. Additional guidance regarding what information should be included in a licensee's justification is provided in the enclosure.

If you have any questions, or need clarification, you can call me (301-415-1395), Steve Dembek (301-415-1455), or Brian Benney (301-415-3764).

Sincerely,

/RA/

Herbert Berkow, Director
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-317 and 50-318

Enclosure: Analysis and Inspection Criteria

cc w/encl: See next page

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ANALYSIS AND INSPECTION CRITERIA

Analysis of Pressure Boundary Component

The qualification by analysis of the pressure boundary component to which the mechanical nozzle seal assembly (MNSA) is attached by threaded bolts or tie-rods should be based on the calculation of the primary and secondary membrane, bending and shear stresses calculated from a detailed 3-D finite element analysis. The finite element model should encompass the instrument or heater nozzle through-wall hole and the adjacent tapped holes, and for MNSA-2, the machined counterbore within the nozzle hole.

The qualification should include and be based on the following:

- A list of all plant unique pressure boundary design conditions and operating transients, showing operating pressure, mean wall temperature, and wall temperature gradient, for the pressure boundary component.

- Detailed calculation of the load in the highest-loaded bolts or tie-rods, resulting from preloading, maximum operating loads, including seismic loads, and accounting for non-linear loading and unloading load-deformation characteristics of the gasket and Belleville washer packs.

- Demonstration that the primary and secondary stresses resulting from the finite element analysis meet the ASME Section III NB-3200 stress intensity limits and appropriate special stress limits, under all design loading and service condition mechanical and thermal transients, including the effects on the tapped holes due to the highest bolt or tie-rod loads, and demonstration that the Class 1 fatigue analysis of the pressure boundary will not exceed the Code prescribed cumulative usage factor limit of 1.0 for the life of the plant.

- Demonstration that there is no interaction between adjacent pressure boundary regions where MNSAs are mounted.

- ASME Section III minimum wall thickness requirements at the deepest point in the counterbore should be met.

- Demonstration that the ASME Section III NB-3300 area reinforcement requirements are met.

- Reconciliation of the owner's construction code and the replacement code.

Inservice Inspection

Identify what inservice inspection program will be implemented to ensure that the structural and leakage integrity of the MNSA will be maintained throughout the licensed life of the facility. The proposed program should include consideration of the potential for leakage from the MNSA, as well as the potential for leakage from other sources which could impact the integrity of the MNSA. The proposed program should address the type of inspections (e.g., a visual examination VT-2 with insulation removed), inspection scope, periodicity of inspections, inspection qualification, and inspection acceptance criteria.

Identify what inservice inspection program will be implemented to ensure that the structural integrity of the MNSA bolting and threaded holes in the component to which the MNSA is attached will be maintained throughout the licensed life of the facility. The proposed inspections should be designed to detect cracking of the bolting and in the threaded hole due to fatigue, stress corrosion cracking, etc. Disassembly of the MNSA in order to conduct the inspections should be considered. The proposed program should address the type of inspections, inspection scope, periodicity of inspections, inspection qualification, and inspection acceptance criteria.

Identify what inservice inspection program will be implemented to ensure that corrosion detrimental to the structural integrity of the component to which the MNSA is attached will not occur due to exposure of low alloy/carbon steel material in the bore of the penetration throughout the licensed life of the facility. The proposed program should address the type of inspections, inspection scope, periodicity of inspections, inspection qualification, and inspection acceptance criteria.