Entergy

Entergy Operations, Inc.
P.O. Box 31995
Jackson, MS 39286-1995

CNRO-2002-00002

January 17, 2002

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Entergy Operations, Inc.
Meeting to Discuss Mechanical Nozzle Seal Assembly Design

Arkansas Nuclear One – Units 1 & 2
Docket Nos. 50-313 & 50-368
License Nos. DPR-51 & NPF-6

Waterford Steam Electric Station – Unit 3
Docket No. 50-382
License No. NPF-38

REFERENCE: Letter CNRO-2002-00001 from Entergy Operations, Inc, to the NRC, "Letter of Intent – Proposed Alternatives to ASME Code Requirements," dated January 16, 2002

Dear Sir or Madam:

As discussed in the referenced letter, Entergy Operations, Inc. (Entergy) requested a meeting with the appropriate NRC staff representatives to discuss technical information related to the use of an improved Mechanical Nozzle Seal Assembly (MNSA) on various locations of the Reactor Coolant System (RCS). This meeting is tentatively scheduled for January 31, 2002.

Entergy considers much of the information we will discuss at the meeting to be proprietary and confidential pursuant to 10 CFR 2.790(a)(4) and 10 CFR 9.17(a)(4). As such, Entergy requests the information be withheld from public disclosure. The affidavit supporting this request is provided in Attachment 1. The information to be presented at the meeting is provided in Attachment 2. A redacted version of the information is provided in Attachment 3.

A P01

If you have any questions or require additional information, please contact Guy Davant at (601) 368-5756.

This letter contains no commitments.

Sincerely,

John R. Hamilton
Manager, Engineering Programs

JRH/GHD/baa

Attachments:
1. Affidavit
2. Proprietary Information
3. Redacted Information

cc: Mr. C. G. Anderson (ANO)
Mr. W. R. Campbell (ECH)
Mr. J. T. Herron (W3)
Mr. J. E. Venable (ECH)

Mr. T. W. Alexion, NRR Project Manager (ANO-2)
Mr. R. L. Bywater, NRC Senior Resident Inspector (ANO)
Mr. T. R. Farnholtz, NRC Senior Resident Inspector (W3)
Mr. R. A. Gramm, Section Chief, NRR Licensing Project Directorate IV
Mr. E. W. Merschoff, NRC Regional Administrator, Region IV
Mr. N. Kalyanam, NRR Project Manager (W3)
Mr. W. D. Reckley, NRR Project Manager (ANO-1)

AFFIDAVIT

I, John R. Hamilton, Manager, Engineering Programs, of Entergy Operations, Inc. (Entergy) do hereby affirm and state:

1. Entergy is providing information in support of a request to be made to the NRC staff. The document being provided in Attachment 2 ["Comparison of Mechanical Nozzle Seal Assemblies (MNSA) and a Second Generation MNSA Design (MNSA-2)"] contains technical information developed by Entergy and Westinghouse. This document constitutes proprietary commercial information that should be held in confidence by the NRC pursuant to 10 CFR 9.17(a)(4) and the policy reflected in 10 CFR 2.790, because:

   i. This information is being held in confidence by Entergy.

   ii. This information is of a type that is held in confidence by Entergy, and there is a rational basis for doing so because the information contains commercially viable technical information developed and funded by Entergy.

   iii. This information is being transmitted to the NRC in confidence.

   iv. This information is not available in public sources and could not be gathered readily from other publicly available information.

   v. Public disclosure of this information would create substantial harm to the competitive position of Entergy by disclosing commercially viable technical information.

2. Accordingly, Entergy requests that the designated document be withheld from public disclosure pursuant to 10 CFR 2.790(a)(4) and 10 CFR 9.17(a)(4).

I declare under penalty of perjury that the foregoing is true and correct.

Executed on January 17, 2002

John R. Hamilton

REDACTED INFORMATION

COMPARISON OF

MECHANICAL NOZZLE SEAL ASSEMBLIES (MNSA)

WITH THE SECOND GENERATION MNSA DESIGN (MNSA-2)

REDACTED INFORMATION

COMPARISON OF MNSA AND MNSA-2 DESIGN FEATURES

1.0 BACKGROUND

The Mechanical Nozzle Seal Assembly (MNSA) was designed as a replacement for the partial penetration J-groove welds that attach Alloy 600 nozzles to reactor coolant piping or vessels. MNSA provides a seal against leakage and provides structural restraint for the nozzle even with a 360-degree weld failure. MNSA has been installed on actively leaking nozzles and also as a pre-emptive measure on susceptible nozzles. Its advantage over a welded repair is that it can be installed in much less time than welded repairs on carbon steel vessels. In addition, it does not require drain-down, which can result in significant schedule impact if the leak occurs below the mid-loop elevation or in a pressurizer heater sleeve or instrument nozzle below the refueling water level.

2.0 PURPOSE

Entergy has proposed a second generation of the MNSA, hereafter referred to as the MNSA-2, which takes full advantage of previous qualification and design efforts associated with MNSA. This discussion qualitatively highlights the similarities and the differences between previously installed Westinghouse MNSA and MNSA-2. It was prepared as a quality class 3 document.

3.0 COMPARISON

Both MNSA and MNSA-2 use the same materials of construction and the same seal material. They are both attached with a similar four-bolt pattern. The seal is loaded by tensioning bolts or studs. MNSA-2 uses the same applied torque (or less), than MNSA.

[redacted]

3.1 SEAL POSITIONING / ENCAPSULATION

Both MNSA and MNSA-2 use nuclear grade Grafoil as the sealing material. The seals are procured to the same specification and similar drawings that control the as-received density and configuration. The seals are approximately the same size and are weighed to verify that the density is within a specified range as part of the final inspection. During MNSA assembly, several split components are positioned around the base of the nozzle to create a cavity for the seal. As MNSA is assembled by torquing the bolts, the seal is compressed into a predetermined volume that is smaller than the as-processed seal volume. The MNSA components eventually reach a "metal-to-metal" or hard stop condition. At that point, the compression stress within the seal is significantly higher than reactor coolant pressure and blocks coolant from escaping. In the MNSA design, the seal is applied directly to the

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surface of the vessel as shown in Figure 1, [redacted]. The encapsulating MNSA components must be shaped to fit the particular surface profile adjacent to the nozzle. In the case of heater sleeves, where there are many different surface profiles on the bottom of the pressurizer, a special seal together with customized MNSA machined components are required for each location. [redacted]

[redacted]

The original MNSA design requires that the surface of the pipe or vessel where the seal resides be free of significant surface imperfections. [redacted]

3.2 SEAL LOADING

As described, the original MNSA components reach a metal-to-metal hard stop during assembly. Each design that departs significantly from a previous one is tested with the specific slope geometry, etc. to verify sealing integrity. [redacted]

3.3 LEAK-OFF DIVERSION

The original MNSA has been approved previously by the NRC for a two-cycle period of use based on the NRC's evaluation of potential corrosion effects. The evaluation considered:

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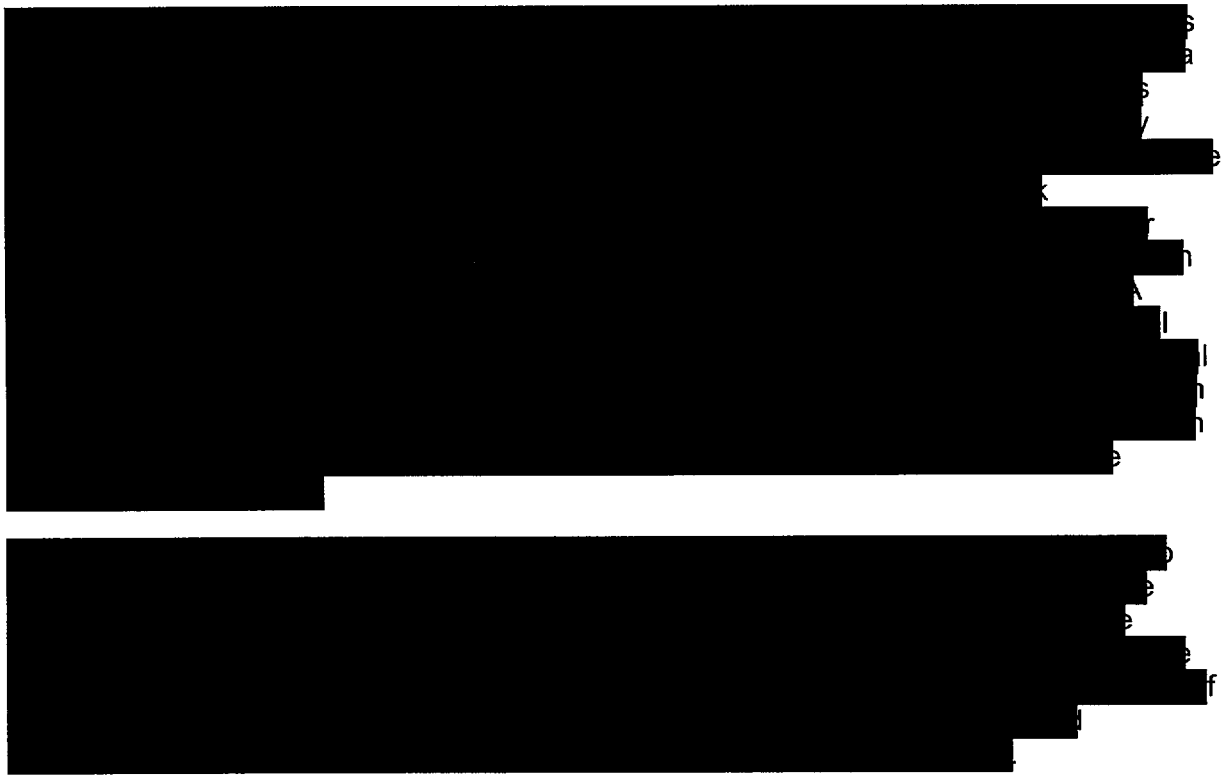
1. Corrosion/erosion of the carbon steel holes in the pipe or pressurizer - judged to be insignificant

2. Boric acid corrosion of the materials of construction for the MNSA - also found to be acceptable based on CEOG corrosion testing

3. Galvanic corrosion - there is no history of problems in similar applications with Grafoil contacting carbon steel

4. Potential for SCC failures of the A286 bolts – also found acceptable

With regard to the A286 bolts, the evaluation concluded that the bolts could be exposed to boric acid deposits or slurries, if the MNSA leaks. This evaluation was appropriate because the design did not include provisions for capturing or diverting seal leakage away from the bolting materials. Even so, at the stress levels that exist in the bolts, including a stress concentration factor of four, the bolts will function satisfactorily.



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3.4 Qualification of MNSA and MNSA-2

MNSA was originally qualified by a series of tests and analyses. With each specific new application, a Design Specification and a Design Report were prepared. For MNSA-2 applications on Entergy pressurizers, the same approach will be utilized.

[redacted]

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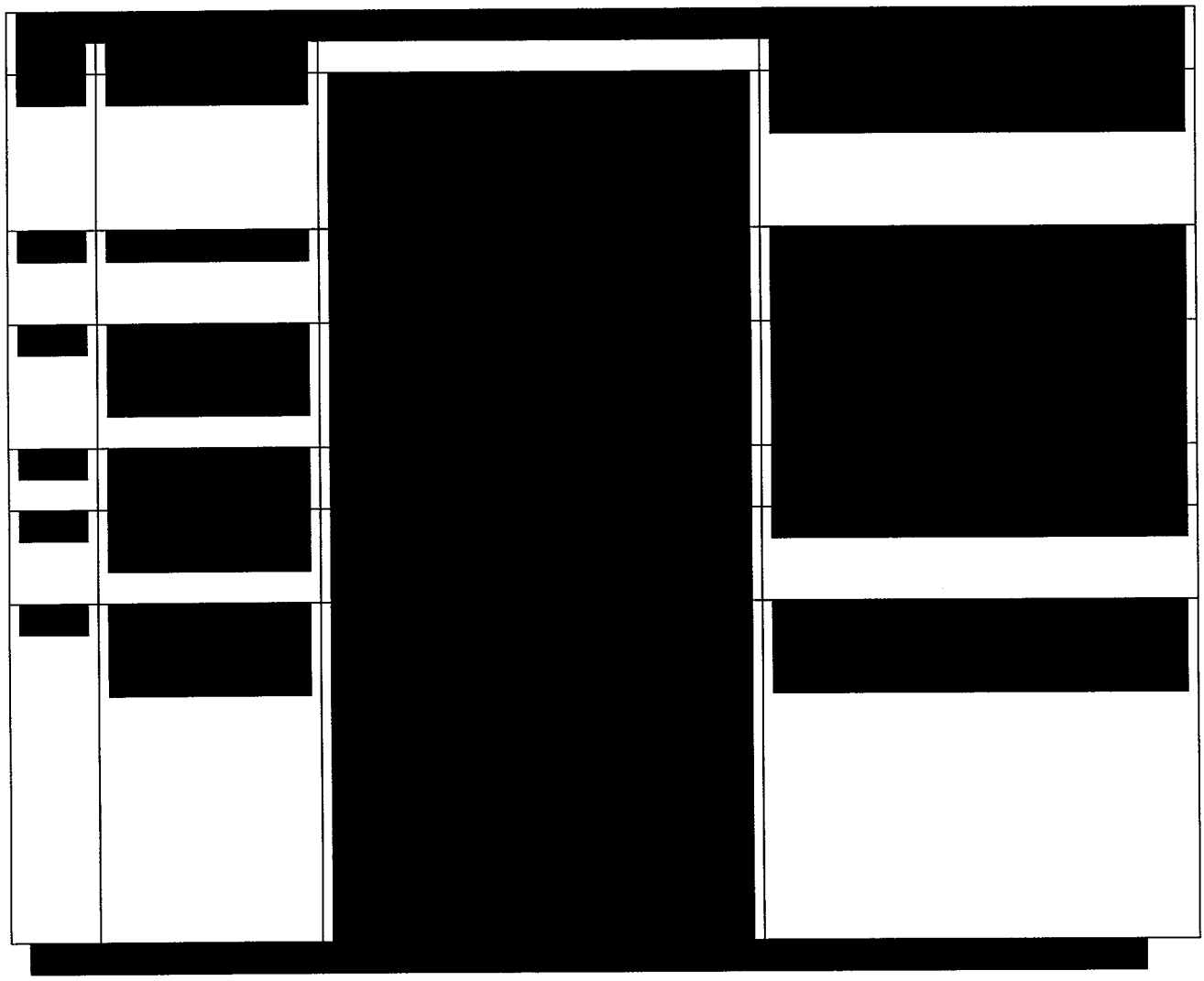

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[redacted]

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4.0 ACCEPTABILITY of MNSA-2 AS AN ALTERNATE DESIGN

In September 2001, ASME Code Subcommittee III voted affirmatively in response to Inquiry NI01-07, which inquired if the requirements for welded attachment of nozzles (NB-3337.1) can be waived provided the basic stress limits of NB-3200 (Design by Analysis) are met in an alternate design such as MNSA. MNSA and MNSA-2 are both acceptable alternatives designed in accordance with ASME NB-3200, the only difference being that MNSA-2 incorporates improvements over MNSA. These added features are designed to extend its operating life, in the form of a live-loaded seal and controlled leak-off diversion that reduces exposure of the carbon steel pipe or vessel, as well as the MNSA-2 fasteners, to RCS leakage in an oxygenated environment.

5.0 CONCLUSION

The knowledge acquired in the design, development, and deployment of the original MNSA has been applied to MNSA-2 and is being supplemented where required to validate the improvements.

All other process steps such as detailed design, manufacturing, installation, and QA / QC activities applicable to MNSA also control the deployment of MNSA-2.