October 1, 2002

Mr. Michael Krupa
Director, Nuclear and Safety Engineering
Entergy Operations, Inc.
1340 Echelon Parkway
Jackson, MS 39213-8293

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 1 - RE: REQUEST FOR RELIEF FROM THE REQUIREMENTS OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) BOILER AND PRESSURE VESSEL CODE (CODE) CONCERNING AUTHORIZATION TO USE NEW DESIGN OF MECHANICAL NOZZLE SEAL ASSEMBLY (MNSA) (TAC NO. MB5861)

Dear Mr. Krupa:

By letter dated August 5, 2002, as supplemented by letter dated September 30, 2002, Entergy Operations, Inc. (Entergy), requested relief from ASME Code, Section XI, requirements for IWA-4170 required repairs. Entergy requested Nuclear Regulatory Commission (NRC) staff approval to use the new design of the MNSA in temporary applications on locations in the reactor coolant system (RCS) that exhibit leakage due to primary water stress corrosion cracking (PWSCC) at Arkansas Nuclear One, Unit 1 (ANO-1).

Specifically, pursuant to 10 CFR 50.55a(a)(3)(i), you requested NRC's authorization to use the improved design of the MNSA, designated as MNSA-2, in applications at seven pressurizer nozzles. The request was made in order to repair leaks attributed to PWSCC that may be detected while performing inspections during refueling outages. The typical repair of nozzles of this type uses a half-nozzle replacement with external weld repair. These repairs may extend RCS drain-down activities, and significantly increase worker radiation exposure to perform extensive field machining and temper bead welding activities. As an alternative, you proposed the use of MNSA-2s as a repair to restore nozzle integrity and prevent leakage for two operating cycles.

The staff evaluated the information provided in the submittal and determined that the proposed alternative would provide an acceptable level of quality and safety for the requested two cycles. Therefore, Entergy's proposed alternative is authorized, pursuant to 10 CFR 50.55a(a)(3)(i).

While Entergy has not indicated in its application that it may seek relief in the future to use the MNSA-2 design for permanent application at ANO-1, in the Arkansas Nuclear One, Unit 2 (ANO-2) and Waterford Steam Electric Station, Unit 3 (Waterford 3) applications, Entergy had stated that it may seek relief in the future to use the MNSA-2 for permanent application. The staff noted that the analysis for ANO-2 and Waterford 3 contained several aspects that would trigger questions and requests for additional clarifying information, if the relief request was intended for a period exceeding two operating cycles. These aspects, however, are less significant when the use of the MNSA-2 design is limited to two operating cycles. The staff did not review the design stress reports with respect to use of the MNSA-2s beyond a time period of two operating cycles. Therefore, similar to the position taken on the ANO-2 and Waterford 3 authorization, if an application for extended operation, i.e., beyond the approved two operating cycles, is submitted by Entergy for ANO-1, the staff will need to evaluate all current and any new data, including stress and fatigue calculations, that may pertain to long-term usage before approval is granted for extended operation.

This authorization is valid for two operating cycles of the current inspection interval, which ends on May 31, 2007.

The staff's safety evaluation is enclosed.

Sincerely,

/RA/

Robert A. Gramm, Chief, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-313

Enclosure: Safety Evaluation

cc: w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

AUTHORIZATION FOR TEMPORARY INSTALLATION OF

THE NEW DESIGN OF MECHANICAL NOZZLE SEAL ASSEMBLIES

REQUEST FOR RELIEF

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT 1

DOCKET NO. 50-313

1.0 INTRODUCTION

By letter dated August 5, 2002, as supplemented by letter dated September 30, 2002, Entergy Operations, Inc. (Entergy, licensee) submitted a request to install a new design of mechanical nozzle seal assembly (MNSA), designated as MNSA-2, on leaking pressurizer nozzles at Arkansas Nuclear One, Unit 1 (ANO-1). This new design is an improvement of an older model MNSA that had been previously installed on a temporary basis at certain other plants. Specifically, Entergy requested authorization to install MNSA-2s at ANO-1, for a period of two operating cycles, in the event that small bore pressurizer nozzles on the pressurizer were found to be leaking during refueling outage (RFO) 17. These leaks are typically attributed to primary water stress corrosion cracking (PWSCC) of the J-groove weld on the interior of the pressurizer shell.

2.0 DISCUSSION

Background

Pursuant to 10 CFR 50.55a(a)(3), licensees may use alternatives to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) when authorized by the Director of the Office of Nuclear Reactor Regulation. The licensee must demonstrate that, pursuant to the requirements of 10 CFR 50.55a(a)(3)(i), the alternatives will provide an acceptable level of quality and safety in lieu of meeting the requirements in Section XI of the Code, or that, pursuant to the requirements of 10 CFR 50.55a(a)(3)(ii), complying with the requirements of 10 CFR 50.55a would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

RFO 17 at ANO-1 is scheduled for October 2002. During this outage, Entergy plans to inspect three side shell level sensing nozzles, one side shell thermowell nozzle, one side shell sampling nozzle, one side shell capped nozzle, and one head vent nozzle for a total of 7 nozzles on the pressurizer. The Babcock and Wilcox heater assemblies consist of three large heater bundles and are, therefore, not candidates for the MNSA-2 application. The potential exists for leaks to occur in Alloy 600 pressurizer nozzles due to PWSCC. On evidence of a leak in any of these nozzles, Entergy proposes to install, under the provisions of 10 CFR 50.55a(a)(3)(i), a MNSA-2 on each nozzle found to be leaking as a repair method to restore the integrity of the pressure boundary and prevent leakage of the identified cracked nozzle. The use of MNSA-2s has been proposed as a temporary alternative repair method to the Code requirements to restore the integrity and prevent leakage of pressurizer nozzles for up to two cycles of operation.

The nozzles are welded to the pressurizer with internal J-groove welds. These welds have been found to be susceptible to PWSCC. The typical permanent repair of these nozzles consists of installing a half sleeve replacement with external weld repair, in accordance with ASME Section XI requirements.

The licensee has stated that a Section XI repair method would extend reactor coolant system (RCS) drain-down activities and significantly increase worker radiation exposure to perform extensive field machining and temper bead welding activities. MNSA-2s can be effectively installed under various plant conditions and, thus, provide outage schedule flexibility, as well as reduced worker radiation exposure, while restoring structural integrity and leak tightness to the RCS.

The staff has approved similar requests for temporary repair of pressurizer nozzles by MNSA (the original design) at Southern California Edison's San Onofre Nuclear Generating Station; Waterford Steam Electric Station, Unit 3 (Waterford 3); Arizona Public Service Company's Palo Verde Nuclear Generating Station; and at Dominion Nuclear Connecticut's Millstone Nuclear Power Station. More recently, the staff authorized temporary use of MNSA-2s at Arkansas Nuclear One, Unit 2 (ANO-2), and Waterford 3.

The MNSA-2 design utilizes the same materials of construction and the same seal material as the original MNSA. They are attached in a similar fashion. The primary seal is loaded by tensioning bolts or studs. The MNSA-2 design differs from the original MNSA design in three ways: (1) a counterbore provision contains the primary seal, (2) the method of live-loading the primary seal, and (3) a means to divert leakage, should it occur.

Licensing Basis

Paragraph (g) to 10 CFR 50.55a requires, in part, that all inservice examinations and system pressure tests conducted during the first 10-year interval and subsequent intervals on ASME Code Class 1, 2, and 3 components comply with the requirements in the latest edition and addenda of Section XI incorporated by reference in 10 CFR 50.55a(b), on the date 12 months prior to the start of the 10-year interval.

By reference to, and implementation of, ASME Code Section XI, paragraphs IWB-3132 or IWB-3142, 10 CFR 50.55a also requires that existing flaws in ASME Code Class components be removed by mechanical means, or the components be repaired or replaced to the extent necessary to meet the acceptance standards in ASME Code Section XI, Article IWB-3000. Detection of leaks in the structural portion of an ASME Code Class 1, 2, or 3 component is direct evidence of a flaw in the component.

Paragraph IWA-4170 of Section XI of the ASME Code requires that repairs and the installation of RCS pressure boundary be performed and reconciled in accordance with the Owner's Design Specifications and Original Code of Construction for the component or system. The

ANO-1 RCS pressurizer was designed and constructed to the rules of ASME Section III, Subsection NB, 1965 Edition, through and including Summer 1967 Addenda.

Paragraph NB-3671.7 to Section III of the ASME Code, “Sleeve Coupled and Other Patented Joints,” applies to MNSA-2, and requires that ASME Code Class 1 joints be designed to meet the following criteria:

1. provisions must be made to prevent separation of the joint under all service loading conditions,

2. the joint must be designed to be accessible for maintenance, removal, and replacement activities, and

3. the joint must either be designed in accordance with the rules of ASME Code, Section III, Subarticle NB-3200, or be evaluated using a prototype of the joint that will be subjected to additional performance tests in order to determine the safety of the joint under simulated service conditions.

These conditions also apply to the design, installation, inspection, and maintenance of MNSAs.

3.0 EVALUATION OF RELIEF REQUEST

Use of New Design of Mechanical Nozzle Seal Assemblies

The Items for which Relief is Requested:

Pressurizer side shell level sensing nozzles (3)
Pressurizer side shell thermowell nozzle (1)
Pressurizer side shell sampling nozzle (1)
Pressurizer side shell capped nozzle (1)
Pressurizer head vent nozzle (1)

(The figures within the parentheses indicate the number of components in each item).

Code Requirement:

ASME Code Section XI, IWA-4170, requires repairs and installation of replacements to be performed in accordance with the Owner's Design Specification and the original Construction Code of the component or system. The affected pressurizer instrument nozzles were designed and constructed to the rules of ASME Code Section III, Subsection NB, 1965 Edition, through and including the Summer 1967 Addenda. Rules for replacing ASME Code Section III, Class 1 welded nozzle integrity with mechanical clamping devices are not clearly defined by ASME Code, Section III.

Licensee's Proposed Alternative (as stated):

"Pursuant to 10 CFR 50.55a(a)(3)(i), Entergy Operations, Inc. (Entergy) requests NRC [U.S. Nuclear Regulatory Commission] authorization to use the improved design of the mechanical nozzle seal assembly, designated MNSA-2, in applications at those nozzle locations listed in

Section I, Components, above. Entergy makes this request in order to repair leaks attributed to primary water stress corrosion cracking (PWSCC) that may be detected while performing inspections during refueling outages.

The typical repair of nozzles of this type uses a half-nozzle replacement with external weld repair. These repairs may extend reactor coolant system (RCS) drain-down activities and significantly increase worker radiation exposure to perform extensive field machining and temper bead welding activities.

As an alternative, Entergy proposes to use the MNSA-2 as a repair to restore nozzle integrity and prevent leakage for two (2) operating cycles."

<u>Licensee's Basis for Relief</u> (as stated):

"...The Ni-Cr-Fe heat-affected zone of the J-weld has proven to be susceptible to PWSCC. Numerous instances of nozzle cracking have been identified in the industry in recent years. Studies performed by the Combustion Engineering (CE) Owner's Group (Report CE-NPSD-690-P) have found that the cracking growth is predominantly axial. The dominant conditions that promote axial growth rather than circumferential growth are high circumferential stress (hoop stresses) compared to the axial stress. The hoop stress is a residual stress caused by weld shrinkage that diminishes quickly as the distance from the J-weld increases. The susceptibility to cracking is based on several factors that deal with material, stress, and environment.

Inspections required by ASME [Code] Section XI, IWB-2500 for Examination Category B-P and consistent with the systematic measures discussed in NRC Generic Letter (GL) 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR [Pressuirized Water Reactor] Plants," are performed during each refueling outage...."

"...The MNSA-2 is a mechanical device designed to replace the function of partial penetration J-groove welds that attach Alloy 600 nozzles to the pressurizer. MNSA-2 provides a seal against leakage and positively captures the nozzle preventing ejection in the unlikely event of complete 360-degree weld failure...."

<u>Evaluation</u>:

The licensee requests the use of MNSA-2 pursuant to 10 CFR 50.55a(a)(3)(i), stating that this alternative provides an acceptable level of quality and safety. To determine if MNSA-2 provides an acceptable level of quality and safety, the staff compared the MNSA-2 design and operational characteristics with the applicable ASME requirements, reviewed the MNSA-2 resistance to corrosion for the intended service period, and evaluated the licensee's commitments associated with the use of MNSA-2. The staff's review is described below.

The MNSA-2 is a mechanical device designed to replace the function of partial penetration J-groove welds that attach Alloy 600 nozzles to the pressurizer, moving the pressure boundary to the sub-surface of the pressurizer exterior wall. The MNSA-2 stainless steel components performing a RCS pressure boundary function are designed, fabricated, and constructed using approved ASME Code materials (except the Grafoil gasket, which is a non-Code material), in accordance with the applicable rules of ASME Code Section III, Subsection NB and Appendix I.

A MNSA-2 consists of two split-seal/flange assemblies placed around a leaking nozzle. The seals are made of Grafoil, a graphite compound that is compressively loaded within the assembly to prevent RCS leakage past the nozzle. The seal assembly is placed in a counterbore below the pressurizer surface and bolted with threaded rods into holes drilled and threaded on the outer surface of the RCS component wall. The primary seal is held under compression by a compression collar made of stainless steel. The compression collar with a collection area is utilized if there is leakage, to funnel the leakage along the annulus region between the nozzle and the compression collar. A second seal at the top of the compression collar blocks leakage from passing beyond the compression collar. A leakoff nozzle that penetrates through the collar allows for leakage to pass out to where it can be detected. This assembly acts as a complete replacement of the J-groove weld between the Alloy 600 sleeve and the pressurizer.

The MNSA-2 is designed to prevent separation of the joint under all service loadings. An anti-ejection clamp, which is installed and secured in place via the tie rods, Belleville spring washers, and hexagon nuts, serves as a structural restraint of the nozzle in case of total J-groove weld failure and potential ejection of the nozzle. This design is supported by technical analysis and tests that meet the design criteria specified in ASME Code Section III, Subsection NB, 1989 Edition, no Addenda. Enclosure 2 to the licensee’s letter of March 6, 2002, for Waterford 3, "Westinghouse Electric Corporation Design Report No. DAR-CI-02-1, “Addendum to CENC-1244 Analytical Report for Waterford Unit 3 Pressurizer,”" documents the required ASME Code Section XI, IWA-4170(b), reconciliation of the construction codes for a component built to a later edition of the Code, which the staff finds acceptable. Additionally, MNSA installations are accessible for maintenance, removal, and replacement. The provisions of NB-3671.7 are therefore nominally satisfied. It is also recognized that the MNSA is designed to prevent separation of the device from the wall under all service loadings, and thus acts as a complete replacement of the J-weld between the Alloy 600 sleeve and the pressurizer. It therefore replaces both the sealing and the structural integrity of the J-welds, and thus becomes part of the reactor pressure boundary.

In Appendix 1 to the letter dated August 5, 2002, Entergy also provided an evaluation to address potential corrosion issues of the nozzle bore holes, galvanic corrosion (Grafoil Seal to Low Alloy Steel), and stress corrosion cracking (SCC) of the MNSA components. The results of this evaluation are summarized as follows:

(1) A through-wall crack in the nozzle could be a source of corrosion. However, the borated water will stagnate and will not replenish, except perhaps during shutdown when the RCS is drained. The level of the boric acid will not exceed that of the primary coolant at the beginning of a fuel cycle. In addition, low primary side oxygen levels in PWRs will result in corrosion potentials below the critical cracking potentials for these materials in high temperature water.

(2) Boric acid corrosion of the materials of construction for the MNSA has been addressed by use of corrosion resistant materials, testing, and analysis.

(3) Corrosion of the bolts (SA 453 (A-286)), while susceptible to corrosion, is mitigated by use of the collection area and two seals, which diverts any leakage away from the bolts, and inspection of the bolts (addressed below).

(4) If leakage occurs beyond the primary seal into the area formed by the MNSA-2 and the pressurizer, it may wet the compression collar and low alloy steel. The leakoff nozzle may permit oxygen to ingress into the crevice area, resulting in an aerated environment. Release of steam through the leakoff nozzle will potentially limit the oxygen in the crevice region. Remaining oxygen will be consumed in the corrosion of the low alloy steel. Therefore, the environment will be similar to that resulting from primary coolant leakage into control element drive mechanism crevices. Minor amounts of corrosion (several mils maximum) of low alloy steel corrosion and no stainless steel corrosion will occur. Leakage will be observed via the leakoff nozzle and inspection of the counterbore hole during the next outage walkdown, and repaired or replaced.

(5) Machining of the outside diameter (OD) of the nozzle during the counterbore machining will not lead to SCC for several reasons:

a. The OD of the nozzle was machined during original fabrication and the additional machining should not significantly alter the residual stresses present;
b. The nozzle will not be welded, eliminating the residual stresses associated with the partial penetration weld at the pressurizer inside diameter (ID);
c. The temperature at the OD is lower than the ID. Since PWSCC is a thermally-activated process, time to initiate and propagate cracks at the OD will be longer.

(6) A history of galvanic corrosion problems in applications where low alloy steel is in contact with a Grafoil seal in an environment of an electrically conductive fluid (water) exists. This particular combination is used in other applications where the low alloy (or carbon steel) is frequently inspected (for example, steam generator secondary side manway and hand hole applications). The Grafoil seal, grade GTJ, is chemically resistant to attack from nearly all organic and inorganic fluids, and is very resistant to borated water. The MNSA-2 application is similar (i.e., Grafoil material is in contact with low-alloy steel and visual inspections will be conducted at each refueling outage to identify signs of leakage), and for these reasons, significant galvanic corrosion is not expected. The licensee also noted that, in the absence of leakage past the Grafoil seal, the boric acid solution in the annulus region below the seal will become stagnant and will not allow replenishment of oxygen, thereby limiting the corrosion potential.

(7) ASME Code Section XI Preservice requirements, applicable to the MNSA-2 during each 10-year inservice inspection (ISI) interval, include a system leak test at the end of each refueling outage and bolting examination, based on the schedule of percentages required. For the MNSA-2 installed on the pressurizer nozzles, the Bolting B-G-2 examination requirements would allow the VT-1 examination to be performed as follows: (a) in place under tension, and (b) when the connection is disassembled or when the bolting is removed. This examination is required once each 10-year interval.

(8) The requirements of ASME Code Section XI Pressure Tests and alternatives of Code Case N-416, on the pressure testing of mechanical joints made in the installation of pressure retaining replacements, are applicable to the MNSA-2. The tests and a VT-2 inspection, at temperatures and pressures appropriate to ANO-1 Pressure-Temperature (P-T) limits, will be performed as a part of plant restart.

Stress Evaluation

The MNSA-2 design will be supported by the manufacturer technical analysis and tests that meet the design criteria specified in ASME Code Section III, Subsection NB, 1989 Edition, no Addenda. The technical analysis will include the required ASME Code Section XI, IWA-4170(b), reconciliation of the construction codes for the use of a component built to a later edition of the Code, which the staff finds acceptable. Additionally, MNSA installations are accessible for maintenance, removal, and replacement. The provisions of NB-3671.7 are, therefore, satisfied.

The acceptance of the original MNSAs was based on industry experience, which demonstrated that the structural integrity and leak tightness of the MNSAs, and the structural integrity of the components to which the MNSAs are attached, was maintained at least through one or two cycles. The staff has also reviewed qualifying seismic and other structural tests performed by the manufacturer that demonstrate the structural integrity of the MNSA-2s.

In ANO-2 and Waterford 3 applications, Entergy provided revised ASME Code Section III Class 1 fatigue analysis of the pressurizer, modified to account for the presence of the MNSA-2 counterbore and bolt holes, and demonstrated that the fatigue requirement of NB-3222.4(e), namely, the cumulative usage factor (CUF), did not exceed 1.0 under the licensing design conditions, and is met for the life of the plant. Based on a preliminary assessment, the staff considers the probability of exceeding the ASME Code Section III Class 1 CUF limit in the short-term operation of the two cycles requested by the licensee as low. As a part of the approvals to use MNSA-2s at ANO-2 and Waterford 3, NRC staff approved the methodology that was used to determine acceptable application of the MNSA-2 in conformance with ASME Code requirements. Entergy has committed to use the same methodology at ANO-1 to evaluate installation of MNSA-2s and the evaluation, done prior to installation of the MNSA-2s, must indicate that Code-allowable stress values and CUFs are maintained.

However, for operation beyond the requested two cycles, the staff will need to complete the assessment of the stress, fatigue, and other related information that may pertain to long-term usage, before approval can be granted for extended operation of the installed MNSA-2s.

Summary

Based on the above evaluation of potential corrosion effects, the staff concludes that there are no significant corrosion issues associated with the application of MNSA-2 to pressurizer nozzles. The data indicates that corrosion of the nozzle hole will also be acceptable over the requested two-cycle period of use.

While Entergy has not indicated in its application that it may seek relief in the future to use the MNSA-2 for permanent application at ANO-1, in the ANO-2 and Waterford 3 applications, Entergy had stated that it may seek relief in the future to use the MNSA-2 for permanent application. The staff noted that the analysis for ANO-2 and Waterford 3 contained several aspects that would trigger questions and requests for additional clarifying information, if the relief request was intended for a period exceeding two operating cycles. These aspects, however, are less significant when the use of the MNSA-2s is limited to two operating cycles. The staff did not review the design stress reports with respect to use of the MNSAs beyond a time period of two operating cycles. Therefore, similar to the position taken on ANO-2 and

Waterford 3, if an application for extended operation, i.e., beyond the approved two operating cycles, is submitted by Entergy for ANO-1, the staff will need to evaluate all current and any new data, including stress and fatigue calculations, that may pertain to long-term usage before approval is granted for extended operation.

The licensee will adhere to the following limitations regarding the MNSA-2 that will be installed on any leaking pressurizer nozzles at ANO-1 as a result of this relief request.

1. This request for alternative repair of pressurizer nozzles is only requested and approved for up to two cycles of operation.

2. Entergy has used minimum wall thickness in its reinforcement calculations to assure that the pressurizer shell thickness is adequate.

3. Entergy will evaluate the area surrounding the leaking nozzles during the counterbore machining process to verify that no significant degradation of the pressurizer wall annulus region has occurred.

4. If the MNSA-2 device leaks, the bolts may be exposed to borated water or steam under conditions in which deposits or slurries develop. Under these conditions and at stress levels present in the MNSA-2 application, the bolts will operate satisfactorily for at least one fuel cycle. Should a leaking MNSA-2 be discovered, it shall be repaired/replaced as part of the walkdown inspections performed in response to GL 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants." These walkdown inspections are performed prior to entering unit outages. Therefore, the existence of leaking MNSA conditions would be limited to one cycle.

5. As required by IWA-4820, a VT-1 preservice inspection will be performed on all MNSA-2 installations in accordance with IWB-2200.

6. During plant startup (Mode 3) after initial MNSA-2 installation and during subsequent plant restarts following scheduled outages, the MNSA-2 will be pressure tested and inspected for leakage. To ensure quality of installation and continued operation with the absence of leakage, a pressure test with visual inspection will be performed on each of the installed MNSA-2s with any insulation removed. The test will be performed as part of plant restart and will be conducted at normal operating pressure, with the test temperature determined in accordance with the ANO-1 P-T Limits, as stated in the ANO-1 Technical Specifications. Additionally, VT-2 examination of the external edge of the counterbore region will be performed to verify no leakage is present that would not be detected by the leakoff nozzle.

The NRC staff has reviewed the proposed licensee actions and limitations noted above, and concludes that they are sufficient to assure proper installation and operation of the MNSA-2 for their intended use and duration.

3.1 Commitments

The NRC staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to the commitments, provided by the licensee in the September 30, 2002, supplemental letter, are best provided by the licensee's administrative processes, including its commitment management program. The above commitments do not warrant the creation of regulatory requirements (items requiring prior NRC approval of subsequent changes).

4.0 CONCLUSION

The NRC staff concludes that, pursuant to 10 CFR 50.55a(a)(3)(i), the use of MNSA-2s as an alternative to an ASME Code Section XI repair on any leaking nozzles of the type described above, may be authorized for a period not to exceed two operating cycles, since it is found to provide an acceptable level of quality and safety. This authorization is valid for two operating cycles of the current ISI interval for ANO-1, which ends on May 31, 2007.

Principle Contributor: N. Kalyanam

Date: October 1, 2002

cc:

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