



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OF THE FIRST 10-YEAR INTERVAL INSERVICE INSPECTION PLAN

REVISION 1 TO REQUEST FOR RELIEF NO. I-00014

ENTERGY OPERATION, INC.

GRAND GULF NUCLEAR STATION, UNIT 1

DOCKET NO. 50-416

1.0 INTRODUCTION

By letters dated August 12 and September 26, 1996, Entergy Operations, Inc. (the licensee) requested relief for the Grand Gulf Nuclear Station, Unit 1 (GGNS) from the requirements of Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for the first 10-year inservice inspection (ISI) interval in accordance with Paragraphs 50.55a(g)(5)(iv) and (g)(6)(i) of 10 CFR Part 50.

The licensee requested that Relief Request I-00014 be revised to incorporate ASME Code Case N-498-1 as alternative testing in the pressure testing program for GGNS, such that the reactor pressure vessel may be pressure tested in accordance with the requirements of ASME Code Section XI or Code Case N-498-1. Code Case N-498-1 was previously approved by the staff's letter of April 11, 1995, for GGNS and the code case allows conducting a system leakage test in lieu of the system hydrostatic test.

The licensee also proposed increasing manual ultrasonic examination of the reactor pressure vessel (RPV) to nozzle welds for enhanced volumetric coverage of the weld and adjacent base metal in accessible areas to supplement the examinations previously conducted under the provisions of the original relief request.

The Relief Request I-00014 was previously approved in the staff's letter of December 30, 1987.

2.0 BACKGROUND

The Technical Specifications for GGNS state that the ISI and inservice testing of the ASME Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50.55a(g), except where specific written

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relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the Commission, if (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 10-year interval, subject to the limitations and modifications listed therein. The applicable edition of the ASME Code, Section XI, for GGNS, during the first 10-year ISI interval, is the 1977 edition, through summer 1979 addenda. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

3.0 EVALUATION

The licensee described the ASME Code Section XI requirements that it requested relief from and provided the basis that these requirements are impractical in Section IV of the attachments to its letters of August 12 and September 26, 1996.

3.1 Revision 1 to Relief Request No. I-00014

The licensee was granted relief from examining 100% of the Code-required volume of the nozzle-to-vessel welds that are examined utilizing automated methods. Also, relief was granted from examining those areas that are

inaccessible with manual techniques for the nozzles that require manual examinations. This relief was granted in the staff letter of December 30, 1987.

The licensee performed automated examination of 25 nozzle-to-vessel welds and manual examination of 10 welds during the first 10-year ISI interval. The revision to the above relief request however, proposes an increase of manual ultrasonic examination to 26 nozzle-to-vessel welds and automated examination of the remainder since manual examination is believed to provide enhanced volumetric coverage of the weld and adjoining base metal in comparison to automated examination of the subject welds.

The original relief request further stipulated a system hydrostatic test at the end of each 10-year inspection interval in accordance with the requirements of the applicable ASME Code, Section XI. Subsequent to the approval of the original relief request on December 30, 1987, the licensee was later approved to use the alternative rules of the ASME Section XI Code Case N-498-1 on April 11, 1995, which allows conducting a system leakage test in lieu of the 10-year system hydrostatic test.

Therefore, the revision to the Relief Request No. I-00014, would incorporate the provision for conducting a system leakage test or the Code-required system hydrostatic test at the end of the 10-year ISI interval.

3.2 Licensee's Basis for the Request

The licensee stated in Section VI, "Reasons why relief should be granted," of the attachments to its letters, that relief from ASME Section XI should be granted for the following reasons:

1. The entire RPV was subjected to an ASME Section III hydrostatic test after fabrication.
2. The entire RPV will be subjected to pressure testing in accordance with the requirements of ASME Section XI.
3. The subject welds were volumetrically examined in accordance with ASME Section III during fabrication.
4. There is no history of service induced flaws in these areas of the RPV other than those of the feedwater nozzles discussed within this [the licensee's] request for relief.
5. The areas being examined are the limiting areas of the nozzle to vessel configuration.
6. The performance of supplemental manual examination to supplement the nine nozzles that received automated examinations would require significant expenditures of

6. [continued] personnel exposure for a small increase of examined volume.
7. The potential for initiation and propagation of cracking has been discussed [in the licensee's letters] assuming both fatigue and stress corrosion cracking mechanisms. It [the licensee] was concluded by the use of limiting analyses results performed for the feedwater nozzle blend radii, that cracking is unlikely at Grand Gulf nozzle/vessel weld locations. In fact, even if it was hypothesized that these postulated cracks went undetected, a crack length of 58 inches was required before rapid crack growth was to occur during normal operation. It is unlikely that cracks of this size would go undetected. Therefore, a significant leak before break margin exists.
8. Known techniques that examine the RPV welds from either the inside or outside surfaces will not provide any additional coverage beyond what is described in this [the licensee's] relief request for the manual techniques.

3.3 Licensee's Proposed Alternate Provision

The licensee stated the following in Section VII, "Alternative Testing," of the attachment to its letter of September 26, 1996:

As an alternative to examining the volumes required by ASME Section XI, the 35 nozzles subject to this relief request are examined within the limitations described in Tables 1 and 2 [of the attachment]. Nine nozzles are examined using automated techniques and 26 nozzles examined with manual techniques. In addition to the ultrasonic examinations described for each of the nozzles, the reactor pressure vessel is pressure tested each refuel outage to the requirements of ASME Section XI and inspected with VI-2 qualified personnel for leakage. During RFO8 [Refueling Outage No. 8], pressure testing of the reactor coolant pressure boundary, which will include the subject nozzles, will be conducted in accordance with Code Case N-498-1.

4.0 EVALUATION

The nozzle-to-vessel welds in a General Electric Boiling Water Reactor 6's (BWR 6), such as GGNS, do not allow for a full volumetric examination of the Code-required volume due to geometric configuration, which is discussed in detail in the original relief request and in Revision 1 of that request. The staff has already evaluated the examination volume of different nozzle-to-vessel welds in GGNS RPV and granted relief to the licensee, pursuant to 10 CFR 50.55a(g)(6)(i). This relief was granted in the staff's letter of December 30, 1987, for the original Relief Request I-00014.

The present revision (i.e., Revision 1) to the relief request proposed increasing manual examination to 26 out of 35 nozzle-to-vessel welds with the remainder being examined by automated technique as opposed to examining 10 welds by manual ultrasonic examination and 25 welds by automated technique performed during the first 10-year ISI interval. The rationale for performing manual examination of more nozzle-to-vessel welds is the enhanced volumetric coverage of the weld and adjoining base metal, in comparison to that of the automated examination. Therefore, the manual examination of more nozzle-to-vessel welds provides an increased level of quality and safety in comparison to that of the automated examination.

The relief request is also revised, in part, to incorporate changes as a result of staff's approval of the ASME Section XI Code Case N-498-1 for GGNS on April 11, 1995, which allows conducting a system leakage test in lieu of the 10-year system hydrostatic test for reactor pressure vessel. As stated, this code case has been approved for use at GGNS.

5.0 CONCLUSION

Therefore, based on the above evaluation, the staff concludes that the revision to Relief Request No. I-00014 to include the system leakage test in ASME Code Case N-498-1 for GGNS is an administrative change because the use of the code case has been approved for GGNS. The licensee, however, has the option to perform either the 10-year hydrostatic test or the system leakage test of the reactor pressure vessel as allowed by the code case. The alternative of the use of the code case provides an acceptable level of quality and safety. Also, the manual examination of more nozzle-to-vessel welds in the revision of the relief request provides an increased level of quality and safety in comparison to that of the automated examination. Based on this, the staff concludes that licensee's proposed changes in Revision 1 to Relief Request No. I-00014 are authorized pursuant to 10 CFR 50.55a(a)(3)(i).

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Date: October 22, 1996