

April 11, 2001

Mr. William A. Eaton
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P. O. Box 756
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SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 - REQUEST FOR RELIEF FROM
SECTION 50.55A OF TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS*
(10 CFR) EXAMINATION REQUIREMENTS, SECOND 10-YEAR INSERVICE
INSPECTION INTERVAL (TAC NO. MB0903)

Dear Mr. Eaton:

By letter dated December 19, 2000, as supplemented by letter dated March 2, 2001, you submitted a request for relief from certain requirements of the American Society of Mechanical Engineers Boiler & Pressure Vessel Code (ASME Code), Section XI, 1992 Edition. The Grand Gulf Nuclear Station (GGNS) Request for Relief No. GG-ISI-001, Revision 0, applicable to the second 10-year inservice inspection (ISI) interval, pertains to the performance of ASME Code-required surface or volumetric examination of certain circumferential piping welds inside containment penetrations that are inaccessible due to physical constraints caused by concentric guard pipe structures. The design configuration precludes examination of the welds identified in the relief request without significant modification to the guard pipe structure assemblies.

The staff has evaluated your request for relief from the applicable ASME Code, Section XI requirements, and has authorized relief pursuant to 10 CFR 50.55a(g)(6)(i) for the second 10-year ISI interval for GGNS. The staff's safety evaluation is enclosed with this letter.

Sincerely,

/RA/

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

Docket No. 50-416

Enclosure: Safety Evaluation

cc w/encl: See next page

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May 1999

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SECOND 10-YEAR INTERVAL INSERVICE INSPECTION

REQUEST FOR RELIEF GG-ISI-001, REVISION 0

GRAND GULF NUCLEAR STATION (GGNS), UNIT 1

DOCKET NO. 50-416

1.0 INTRODUCTION

The inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable addenda as required by Section 50.55a(g) of Title 10 of the *Code of Federal Regulations* (10 CFR), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i).

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 preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 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) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable edition of the ASME Code, Section XI, for the second 10-year ISI interval of Grand Gulf Nuclear Station (GGNS) is the 1992 Edition.

By letter dated December 19, 2000, as supplemented by letter dated March 2, 2001, Entergy Operations, Inc., the licensee for GGNS, submitted request for relief No. GG-ISI-001, Revision 0 from certain requirements of the ASME Code, Section XI, 1992 Edition during the second 10-year ISI interval for GGNS. The relief pertains to the performance of Code-required surface or volumetric examination of circumferential welds inside containment penetrations that are inaccessible due to physical constraints caused by concentric guard pipes. The design configuration precludes examination of the welds identified in the relief request without significant modification to the guard piping assemblies.

The staff has evaluated the licensee's request for relief pursuant to 10 CFR 50.55a(g)(6)(i) for the second 10-year ISI interval for GGNS.

2.0 DISCUSSION (RELIEF REQUEST NO. GG-ISI-001, REVISION 0)

Identification of Systems

Feedwater, Main Steam, Reactor Water Clean Up (RWCU), Reactor Core Isolation Cooling (RCIC), and Residual Heat Removal (RHR).

Component Identification

<u>System</u>	<u>Penetration Weld No.</u>
Feedwater A	1B21G026-W2
Feedwater B	1B21G026-W18
Main Steam A	1B21G12-A1-A
Main Steam B	1B21G12-B1-A
Main Steam C	1B21G12-C1-A
Main Steam D	1B21G12-D1-A
RWCU	1G33G002-W18
RCIC Steam Inlet	1E51G004-W7
RHR/RCIC Head Spray	1E51G001-W12
RHR Pump Suction	1E12G012-W47
Main Steam Drain	1B21G021-W9

Code Class, Examination Category, Item Numbers

Class 1, B-J, B9.11 and B9.21

Requirements

ASME Code, Section XI, 1992 Edition, Table IWB-2500-1, Examination Category B-J, Item number B9.11 requires a surface examination and a volumetric examination on all piping welds as defined by Figure IWB-2500-8. Item B9.21 requires a surface examination of the weld as defined by Figure IWB-2500-8.

Licensee's Requested Relief

Relief is requested from performing the Code-required surface and volumetric examinations of the circumferential welds listed in Table 1 of the licensee's request for relief.

Licensee's Proposed Alternative

None

Licensee's Basis for Relief

The high-energy piping that penetrates the containment was designed as a flued head-type penetration that includes a guard pipe similar in design to Figure 1 of the relief request. Additionally, these penetrations were designed such that the penetrations are anchored to the containment building. Fins are provided for cooling.

These lines are designed to 575 °F and a pressure ranging from 1060 to 1180 psig depending on application. The process pipe is either ASME SA 155 KCF 70, ASME 106 Grade B, or ASME SA 106 Grade C. Guard pipes are ASME SA 155 KCF 70, ASME SA 106 Grade B or ASME SA 105.

ASME Section III (1974 with Summer 1975 Addenda and 1980 Edition for General Electric piping, and 1974 Edition and Summer Addenda through Summer 1975 addenda for Bechtel-supplied piping) was used for the design of the flued head and guard pipe. The process pipe was also designed to ASME Section III, Subsection NB, 1974 Edition with Summer 1975 Addenda.

The circumferential welds for which relief is requested are composed of carbon steel. As such, in a typical boiling water reactor (BWR) environment they are not susceptible to stress corrosion cracking. Design fatigue cumulative usage factors (CUF) for the subject welds are less than 0.1. Therefore, the potential to develop fatigue cracks is extremely low. Other potential failure mechanisms (e.g., general corrosion, pitting, flow-accelerated corrosion, etc.) are also considered low probability events, based upon both the operating parameters of the systems and the fact that ISI of other welds in these systems has shown no evidence of service-related degradation to date. In addition, any leakage would return to the drywell, leading to an increase in the unidentified leak rate and an increase in the drywell temperature.

Pre-service inspection of these welds has detected no relevant surface indications and no recordable volumetric indications. The ISI performed on these welds to date has also detected no relevant and no recordable indications. Should the conditions in the systems change, examination of the remaining welds in the systems will likely detect the onset of service-related degradation.

Each of the lines identified in Table 1 of the relief request has a pressure-retaining circumferential weld that was previously accessible for partial examination via an inspection port included in the penetration guard pipe structure. The original design of these access ports included bolted gasketed covers that required the performance of periodic local leak rate tests (LLRT). These had a history of LLRT failures (approximately 25% failure rate). Therefore, the access ports were welded closed to provide assurance of minimal leakage. Thus, the Code-required examinations would require removing the access port welds to gain access to the process pipe welds and re-welding the covers following the examinations. A personnel exposure of approximately 24 rem would be expected to complete the limited Code-required examinations of these welds over the interval. Even after this level of effort of opening the access ports, the extent of weld examination is limited because of space restrictions between the guard pipe and the process pipe, as listed in Table 1 of the relief request.

Furthermore, nine of these welds are in the MEB 3-1 (Attachment to Standard Review Plan 3.6.2) High-Energy Line population. The High-Energy Line population consists of 365 welds, of which 301 are represented in the systems affected by this relief request. Therefore, nine of the subject examinations are being eliminated from a population where 100% of the welds in the high-energy pipe boundary are examined unless specific relief has been granted by the NRC. The other two welds for which relief is requested are contained in portions of piping systems that are examined at a Code-required sample size of 25% of the total nonexempt population. This request for relief does not reduce the examination population below 25%.

In addition, leakage was postulated to occur from cracks (non-mechanistic) initiated in these lines originating from a crack size assumed equal to the process pipe cross section. The guard pipe design provides for leakage return to the drywell, which is designed for such an event. Additionally, the guard pipes are designed for the process pipe design conditions, as stated above.

The process pipes were tested to the required ASME Code hydrostatic test pressure and the guard pipes were tested to the process pipe operating pressure conditions.

3.0 EVALUATION

The staff notes that each of the lines identified in Table 1 of the relief request has a pressure-retaining circumferential weld that was previously accessible for partial examination through an inspection port included in the penetration. The original design of these access ports included bolted gasket covers that required the performance of periodic LLRT. Since these access ports were subject to failures of LLRT, the licensee closed the access ports by welding to provide assurance of minimal leakage.

Nine of the pipe segments are designated as a "break exclusion zone" and assumes no break in the segment of piping between the pipe-break restraints located inside and outside of the containment, beyond the inboard and the outboard containment isolation valves. In order for piping to be eligible for "break exclusion" designation, it must meet certain design stress and fatigue requirements, and the welds within such a zone must receive ISI examination. The licensee has applied the inservice examination requirement of the applicable ASME Code, Section XI, for Class 1 piping addressed in Page 3.6A-15 of the GGNS Updated Final Safety Analysis Report (UFSAR), and has implemented an augmented ISI for Class 2 high-energy piping as stated in Paragraph 6.6.8 of the UFSAR for protection against postulated piping failure, excluding the nine high-energy piping welds for which GGNS requested relief.

The staff further notes that each process pipe weld identified in the relief request is located in the containment penetration which has a concentric guard pipe that obstructs access to the weld for inservice examination. In order to perform the Code-required examinations, the licensee would have to modify the design by making new access provisions in the guard pipe for the examinations, and subsequently close the openings by welding, and provide assurance of structural integrity of the weld in conjunction with leak-tightness of the penetration assembly. The staff believes that a significant burden would be imposed on the licensee if performance of Code-required inservice examination of these inaccessible piping welds were to be required. The Code-required volumetric and/or surface examination is, therefore, deemed impractical.

In assessing the structural integrity of the welds in the piping affected by this relief request, the staff focused on the issues of active degradation mechanisms, the likelihood of a flaw existing in the subject welds, and the growth of an existing flaw necessary to cause a failure during the current inspection interval. The factors considered were:

- The design stresses are within the limits of ASME Code, Section III and the cumulative usage factors are less than 0.1.
- The circumferential welds for which relief from inservice examination is requested are composed of carbon steel, which is not susceptible to stress corrosion cracking in a typical BWR environment. There is no information which would suggest that there is a degradation mechanism active in the subject welds, which would cause a failure in the second inspection interval. Furthermore, should the conditions in the systems change, examination of the remaining welds in the systems will likely detect the onset of service-related degradation.
- The preservice and the limited ISI of the welds conducted in the first 10-year interval for the welds identified in the relief request detected no relevant or recordable indication.
- In an unlikely event of a flaw being present that escaped detection during the first 10-year ISI interval, assuming reasonable crack growth between consecutive inspection intervals, it is highly unlikely that the flaw would grow to a critical size to cause a failure of the weld. Further, the system pressure test routinely conducted at the end of the refueling outage prior to operation will likely result in a detection of a leak before any significant failure occurs.

The staff, therefore, has determined that there is reasonable assurance of structural integrity of these welds, and that the criteria for piping segments designated as a "break-exclusion zone" will continue to be maintained.

4.0 CONCLUSION

Based on the above, the staff concludes that reasonable assurance of structural integrity of the welds addressed by this relief request has been provided, and that compliance with the Code-required examinations are impractical. Therefore, Relief Request GG-ISI-001, Revision 0, is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the GGNS second 10-year ISI interval. This grant of relief is authorized by law and will not endanger life, property, or the common defense and security and is otherwise in the public interest given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Principal contributor: P. Patnaik

Date: April 11, 2001