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 PROGRAM PLAN, REVISION 7 AND ASSOCIATED REQUESTS FOR RELIEF VOGTLE ELECTRIC GENERATING PLANT, UNIT 1 GEORGIA POWER COMPANY DOCKET NO. 50-424

1.0 INTRODUCTION

The Technical Specifications for Vogtle Electric Generating Plant, Unit 1 (VEGP-1) state that the inservice inspection of the American Society of Mechanical Engineers (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 relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, 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 difficulties 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 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 Section XI of the ASME Code for the Vogtle Electric Generating station, Unit 1 first 10-year inservice inspection (ISI) interval is the 1983 Edition through the Summer 1983 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. In a letter dated November 17, 1995, Georgia Power Company submitted to the NRC its First Ten-Year Interval Inservice Inspection Program Plan, Revision 7 and associated requests for relief for VEGP-1.

2.0 EVALUATION AND CONCLUSIONS

Evaluation of Requests for Relief RR-22, RR-23, RR-24, RR-30 (Part C-C), RR-59, RR-60, RR-61, and RR-62

The staff, with technical assistance from its contractor, the Idaho National Engineering Laboratory (INEL), has evaluated the information provided by the licensee in support of its First 10-Year Interval Inservice Inspection Program Plan, Revision 7 and associated requests for relief for VEGP-1.

Based on the information submitted, the staff adopts the contractor's conclusions and recommendations presented in the attached Technical Letter Report for requests for relief RR-22, RR-23, RR-24, RR-30 (Part C-C), RR-59, RR-60, RR-61, and RR-62. The staff concluded that there are no deviations from regulatory requirements or commitments identified in the licensee's First 10-Year Interval Inservice Inspection Program Plan, Revision 7 for VEGP-1. Furthermore, the staff concludes that the Code examination requirements are impractical for the welds contained in request for relief RR-30 (Part C-C) and that the licensee's proposed testing provides reasonable assurance of operational readiness of the subject pump integrally welded attachments, therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

The staff concluded that revised request for relief RR-22 only corrected editorial changes that did not affect technical content. Relief remains granted as determined in NRC Safety Evaluation dated November 26, 1991, pursuant to 10 CFR 50.55a(g)(6)(i).

The staff concluded that, for revised request for relief RR-24, the requirements of the code are impractical for the two additional welds. The coverage achieved for the two additional welds is comparable to the limitations and coverages of those welds evaluated when relief was granted in the November 26, 1991, safety evaluation. Compliance with the code would require redesign or replacement of the affected component. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i).

For requests for relief RR-23, RR-61 and RR-62, the staff concluded that the licensee's proposed alternative will provide an acceptable level of quality and safety. The alternative proposed in RR-62 is sufficient to assure leak integrity. The alternatives contained in requests RR-23 and RR-62 are authorized pursuant to 10 CFR 50.55a(a)(3)(i) as requested. The alternative (use of ASME Code Case N-509) contained in request for relief RR-61 will provide an acceptable level of quality and safety and is authorized pursuant to 10 CFR 50.55a(a)(3)(i) provided that the licensee examines a minimum of 10% of the total number of integral attachments in Class 1, 2, and 3 systems. Code Case N-509 is acceptable for use for the VEGP-1 first 10-year interval, with the above condition, until such time as the Code Case is adopted for general use in Regulatory Guide (RG) 1.147. After that time, the licensee must follow the conditions, if any, specified in RG 1.147. The use of this Code Case, with the added provision to examine a minimum of 10% of the total number of Class 1, 2, and 3 components, provides an acceptable level of quality and safety in that it uses a sampling approach similar to the sampling plans for other Class 1, 2, and 3 systems. This sampling approach is satisfactory for the examination of Class 1, 2, and 3 pressure-retaining components, and should detect existing patterns of degradation for integral attachment welds.

The staff concluded that for requests for relief RR-59 and RR-60, the Code requirements would result in a burden without a compensating increase in quality and safety. Furthermore, the staff concluded that the licensee's alternatives will provide reasonable assurance of the operational readiness of the affected systems. Therefore, the licensee's proposed alternatives contained in requests for relief RR-59 and RR-60 are authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

For the relief granted pursuant to 10 CFR 50.55a(g)(6)(i), the staff has determined that the relief is authorized by law, will not endanger life, property, or the common defense and security, and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

Attachment: Technical Letter Report

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Date: March 8, 1996

TECHNICAL LETTER REPORT
ON THE FIRST TEN-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN, REVISION 7
FOR
GEORGIA POWER COMPANY
VOGTLE ELECTRIC GENERATING STATION, UNIT 1
DOCKET NUMBER: 50-424

1.0 INTRODUCTION

By letter dated November 17, 1995, the licensee, Georgia Power Company, submitted *Revision 7 To Inservice Inspection Program* for the Vogtle Electric Generating Station, Unit 1, first 10-year interval. Included in the submittal are four revised and four new requests for relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI. Revision 7 also included a number of minor editorial changes to the first 10-year inservice inspection (ISI) program. The Idaho National Engineering Laboratory (INEL) staff has evaluated the information provided by the licensee in Revision 7 in the following section.

2.0 EVALUATION

The applicable edition of Section XI of the ASME Code for the Vogtle Electric Generating Station, Unit 1, first 10-year ISI interval is the 1983 Edition through Summer 1983 Addenda (83S83). The changes and additions to the first 10-year program that are contained in Revision 7 of the Program, including information provided by the licensee in support of the requests for relief, have been evaluated as documented below. Request for Relief RR-43 is considered part of the Inservice Test (IST) Program and is therefore, not included in this evaluation. The snubber testing and related request for relief will be evaluated by the Mechanical Engineering Branch of the Nuclear Regulatory Commission (NRC).

A. The information provided by the licensee in Revision 7 of the first 10-year Program has been reviewed and no deviations from regulatory requirements or

commitments have been identified. Revision 7 of the Program contains a number of changes that are editorial in nature. These have been noted, but do not change the technical content of the Program.

B. Request for Relief No. RR-22, Appendix III, Articles III-4420, III-4430 and III-2430, Ultrasonic Techniques for Examination of Pressure-Retaining Welds in Cast Stainless Steel (Grade SA 351-CF8A) Components in the Reactor Coolant System

This request for relief was previously evaluated and granted in an NRC safety evaluation dated November 26, 1991, under impractical consideration. Changes made in Revision 7 are editorial in nature and do not affect the technical content of the request. Therefore, relief should remain granted, pursuant to 10 CFR 50.55a(g)(6)(i), for Request for Relief RR-22.

C. Request for Relief No. RR-23, Appendix III, Subparagraph III-3410, Basic Calibration Block Material

Code Requirement: Section XI, Appendix III, Subparagraph III-3410 requires that basic calibration blocks be made from material of the same nominal diameter and nominal wall thickness or pipe schedule as the pipe to be examined. More specific requirements for ultrasonic examinations are found in Section V, Article 5; Figure T-542.2.1 requires calibration block thickness to be either 3 inches or actual thickness for weld thicknesses greater than 2 inches and less than or equal to 4 inches.

Licensee's Code Relief Request: The licensee has requested relief from fabricating calibration blocks to meet the Code requirements for the three nominal pipe sizes listed below. In lieu of three blocks, the licensee has proposed to use a single block fabricated from piping 29 inches in diameter and 2.45 inches thick.

Table RR-23		
Component Size	Nominal Thickness	Measured Thickness
27-1/2" (Cold Leg)	2.32" to 2.69"	2.44" to 3.19"
29" and 31" (Hot Leg)	2.45" to 3.63"	2.48" to 3.54"
31" (Intermediate Leg)	2.60" to 3.63"	2.60" to 3.49"

Licensee's Basis for Requesting Relief (as stated):

"The single calibration block described above was fabricated from a dropout of actual piping installed at VEGP. Due to its compatibility with the materials being examined and the issues associated with examining cast stainless steel, it was determined during preservice and the first inservice inspection interval to use this one calibration block for multiple examinations. Relief Request RR-23 was therefore submitted as part of Revision 1 to the VEGP Inservice Inspection Program.

"The original version of RR-23 specified 27-1/2" diameter components with nominal thickness ranging from 2.32" to 2.35", 29" diameter components with a nominal thickness of 2.45" to 2.48", and 31" diameter components with a nominal thickness ranging from 2.60" to 2.62". Relief was subsequently granted for the three diameters and thickness ranges in an NRC letter dated November 26, 1991 from David J. Lange (NRC) to W. G. Hairston, III (GPC).

"Following completion of the Interval 1 ISI examination for these components, it was determined that the thicknesses of approximately 12 components (particularly elbows) exceeded those previously delineated in RR-23. After this determination, a review was performed by GPC to ensure that previous examinations were satisfactory. A sensitivity demonstration was performed in the presence of an NRC Region II representative using the 2.45" thick calibration block and a 3.00" thick calibration block. Results of the demonstration were acceptable and it was acknowledged that the examinations performed on these components were being conducted in a conservative manner. GPC has concluded that re-examination of these components during Interval 1 (using a thicker block) would not provide any appreciable increase in safety. Correspondingly, it is estimated that to build scaffolding, remove and subsequently replace insulation, and to examined these welds would result in and additional 3 to 4 Rem exposure were the affected components re-examined."

Licensee's Proposed Alternative Examination: The examinations performed during the first 10-year interval using the single block made from piping 29 inches in diameter and 2.45 inches thick will remain valid.

Reexamination using a calibration block or blocks meeting the Code thickness requirements will not be performed.

Evaluation: Section V, Article 5 requires calibration block thickness to be either 3 inches or actual thickness for welds greater than 2 inches but less than or equal to 4 inches thick. This requirement is applicable for the components cited by the licensee, who previously requested relief to use a 2.45-inch thick block to examine piping welds of three different thicknesses. That request was evaluated and granted in an NRC safety evaluation dated November 26, 1991, based on information contained in that earlier version of Request for Relief RR-23.

In a letter dated October 18, 1994, NRC inspectors identified an unresolved issue (URI) regarding the examinations being performed using the 2.45-inch thick calibration block and incorrect information contained in granted Request for Relief RR-23. NRC inspectors determined that in some cases the nominal wall thicknesses of the components being inspected were as much as one inch greater than reported, and concluded that the values contained in the licensee's submittal were understated. As a result, the licensee compared the calibration results from the 2.45-inch calibration block and a 3-inch thick block of similar material containing a similar notch. The NRC inspectors determined that the calibration provided by the 2.45-inch thick block was as sensitive, if not more sensitive, than the calibration of the thicker block. Therefore, previous examinations were valid and would not have to be repeated. However, the licensee was also notified that additional action would be required to close out the URI regarding the incorrect information previously submitted in RR-23. As a result, the licensee revised Request for Relief RR-23 and submitted it with Revision 7 of the Program. In this revision of Request for Relief RR-23, the licensee stated that all examinations have been completed for the first 10-year interval, and that during the second interval the examinations would be conducted using the 2.45-inch block and the 3-inch block in conjunction with the provisions of Code Case N-461, which allows calibration blocks to be used that are within 25% of the actual thickness.

The INEL staff has evaluated RR-23, Revision 7, and the NRC's October 18, 1994, letter and concludes that the examinations performed during the first 10-year interval provide an acceptable level of quality and safety. In addition, future examinations will be conducted using a thicker block that conforms to the requirements of Code Case N-461, which should bring the licensee in full compliance with the Code for the subject cast stainless steel piping welds during the second and subsequent intervals. Therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i).

D. Request for Relief No. RR-24, Examination Category B-J, Item B9.11, Pressure-Retaining Welds in Class 1 Piping

This request for relief was previously evaluated and granted in an NRC SER dated November 26, 1991, under impractical consideration. In Revision 7, Welds 11201-005-8 and 11201-009-1 were added. However, the addition of these two welds does not affect the technical content of the request or the conclusions of the previous evaluation. Therefore, relief should remain granted, pursuant to 10 CFR 50.55a(g)(6)(i), for Request for Relief RR-24.

E. Request for Relief No. RR-30 (Part C-C), Examination Category C-C, Item C3.30, Integrally Welded Attachments to Pumps

Request for Relief RR-30 was previously evaluated and granted for Class 2 vessel welds, nozzle-to-vessel welds, and pump casing welds in an NRC SER dated November 26, 1991. However, in Revision 7, the licensee added two integral attachment welds to Request for Relief RR-30. Since these welds are in a completely different examination category, they will be evaluated here as stand-alone Request for Relief RR-30 (Part C-C).

Code Requirement: Table IWC-2500-1, Examination Category C-C, Item C3.30, requires 100% surface examination of integrally-welded attachments to pumps as defined by Figure IWC-2500-5. Examinations are limited to those

attachments required to be examined under Examination Categories C-F and C-G.

Licensee's Code Relief Request: The licensee requested relief from performing the surface examination to the extent required by the Code for the integral attachment welds listed below.

Table RR-30, Rev. 7		
Weld ID	**Coverage**	**Basis**
11208-P6-002-W03	70%	Pump supports prevent access to required area.
11208-P6-002-W05	70%	Pump supports prevent access to required area.

Licensee's Basis for Requesting Relief (as stated):

"Access limitations are due to geometric configuration of the welded areas. Flanges and supports restrict coverage of required examination volume and areas. The actual restriction for each weld is shown in Attachment 1[a]."

Licensee's Proposed Alternative Examination: The Code-required surface examinations will be performed to the maximum extent practical.

Evaluation: The Code requires a 100% surface examination for the subject integral attachment welds. However, the attached pump support restricts access to the area and prevents complete examination of the weld. Therefore, the 100% surface examinations are impractical for these integral attachment welds. To meet the Code examination coverage requirements, design modifications to the pump support bracket would be necessary to allow access for examination. Imposition of this requirement would create a considerable burden on the licensee.

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a. Not included in the Revision 7 submittal.

The significant portion of the required surface examination that has been completed would have detected any existing patterns of degradation. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), it is recommended that relief be granted as requested. The partial surface examinations provide reasonable assurance of the continued operational readiness of the subject integral attachment welds.

F. Request for Relief No. RR-59, Use of Code Case N-416-1, *Alternative Pressure Test Requirements for Welded Repairs or Installation of Replacement Items by Welding, Section XI, Division 1*

Code Requirement: Section XI, Paragraph IWA-4400, *Pressure Test*, requires a system hydrostatic test in accordance with IWA-5000 after repairs by welding on the pressure-retaining boundary.

Following welding, the Code requires volumetric examination and/or surface examination (depending on wall thickness) of repairs or replacements in Code Class 1 and 2 systems, but only requires a surface examination of the final weld pass in Code Class 3 piping components. There are no ongoing nondestructive examination (NDE) requirements for Code Class 3 components except for VT-2 visual examination for leaks in conjunction with the 10-year hydrostatic tests and the periodic pressure tests.

Licensee's Code Relief Request: The licensee has requested to use Code Case N-416-1, *Alternative Pressure Test Requirements for Welded Repairs or Installation of Replacement Items by Welding, Section XI, Division 1.*

Licensee's Basis for Requesting Relief (as stated):

"Georgia Power Company (GPC) has determined that hydrostatically testing post-repair/installation welds represents a hardship with little benefit. Hardships are generally encountered with the performance of hydrostatic testing performed in accordance with the Code. For example, since hydrostatic test pressure would be higher than nominal operating pressure, hydrostatic testing frequently requires significant effort to set up and perform. The need to use special equipment and the need for individual valve lineups can cause the testing to impact maintenance/refueling outage schedules.

"Piping components are designed for a number of loadings that would be postulated to occur under the various modes of plant operation. Section XI hydrostatic testing only subjects the piping components to a small increase in pressure over design pressure and, therefore, does not present a significant change to pressure boundary conditions. Accordingly, hydrostatic pressure testing is primarily regarded as a means to enhance leakage detection during the examination of components under pressure, rather than solely as a measure to determine the structural integrity of the components.

"The ASME Subcommittee Working Group on Pressure Testing concluded that no additional benefit is gained by conducting the existing system hydrostatic tests in place of the alternate rules which require a leak test at nominal operating pressure. The conclusion of the group was that hydrostatic testing does not necessarily verify structural integrity and, in fact, the slightly higher test pressure currently called for in the Code could result in operational difficulties as well as extended outages and increased costs.

"Industry experience has demonstrated that leaks are not discovered as a result of hydrostatic test pressures propagating a pre-existing flaw through-wall. This experience indicates that leaks in most cases are being found when the system is at normal operating pressure. This is mainly due to the fact that hydrostatic pressure testing is infrequently performed, while system leakage tests at normal operating pressures are conducted a minimum of once each maintenance/refueling outage for Class 1 systems, and each 40-month inspection period for Class 2 and 3 systems. In addition, leaks may be identified during system walkdowns by plant operators.

"Georgia Power Company has determined that the nondestructive examinations and their associated acceptance criteria provide assurance of the structural integrity of the weld. The proposed alternative examinations will provide reasonable assurance that unallowable flaws are not present in the subject welds. Consequently, an acceptable level of quality and safety will be achieved and public health and safety will no be endangered by allowing the proposed alternative examination in lieu of the Code requirement."

Licensee's Proposed Alternative Examination (as stated):

"Georgia Power Company proposes to perform alternative examinations delineated in ASME Code Case N-416-1, with augmented exams for Class 3 piping and components, in lieu of Code-required hydrostatic tests. These alternative examinations are as follows:

1. "Perform nondestructive examinations in accordance with the methods and acceptance criteria of the applicable subsection of the 1992 Edition of ASME, Section III.

2. "Perform a VT-2 visual examination of the welds in conjunction with the system leakage test using the 1992 Edition of ASME Section XI.

3. "Perform surface examinations on the root pass layer of butt and socket welds on the pressure-retaining boundary of Class 3 piping and components.

4. "The nondestructive examinations and pressure tests shall be documented on an Owner's Report for Repairs or Replacements, Form NIS-2.

"Because of the benefits which can be derived from the use of ASME Code Case N-416-1, with augmented examinations as delineated above, GPC wishes to implement this relief request immediately. The actions, i.e., alternative examinations, proposed by GPC are consistent with those required of Beaver Valley as approved by the NRC."

Evaluation: Section XI of the Code requires a system hydrostatic test to be performed in accordance with IWA-5000 after repairs made by welding on the pressure-retaining boundary. The licensee has proposed the use of Code Case N-416-1 in lieu of the Code requirements. Code Case N-416-1 specifies that NDE of the welds be performed in accordance with the applicable subsection of the 1992 Edition of Section III. The Code Case also allows a VT-2 visual examination to be performed at nominal operating pressure and temperature in conjunction with a system leakage test, in accordance with Paragraph IWA-5000 of the 1992 Edition of Section XI.

The 1989 Editions of Sections III and XI are the latest Code editions referenced in 10 CFR 50.55a. The NRC staff previously compared the system pressure test requirements of the 1992 Edition of Section XI to those of the 1989 Edition. In summary:

1) The test frequencies and the pressure conditions associated with these tests have not changed;

2) The hold times have either remained unchanged or increased;

3) The terminology associated with the system pressure test requirements for all three Code classes has been clarified and streamlined; and

4) The NDE requirements for welded repairs remain the same.

Piping components are designed to withstand the loading mechanisms that are postulated to occur under the various modes of plant operation. Hydrostatic testing subjects the piping components to a small increase in pressure over the design pressure and, therefore, does not present a significant challenge to pressure boundary integrity. Accordingly, hydrostatic pressure testing is primarily regarded as a means to enhance leak detection during the examination of components under pressure rather than a measure of the structural integrity of the components.

Considering the NDE performed on Code Class 1 and 2 systems and that the hydrostatic pressure tests rarely result in pressure boundary leaks that would not have occurred during system leakage tests, the INEL staff believes that the added assurance of integrity provided by the hydrostatic test is not commensurate with the associated burden, which typically includes the installation of blanks, cutting and removing supports for access, and removing insulation to prepare and restore the systems, all of which increase radiation exposure for plant personnel.

For Class 3 components, there are no ongoing NDE requirements except for the visual examination for leaks in conjunction with the 10-year hydrostatic test and periodic pressure tests. Therefore, eliminating the hydrostatic test and only performing the system pressure test for Class 3 components is only considered acceptable if an additional surface examination is performed on the root pass layer of butt and socket welds on the pressure-retaining boundary during repair and replacement activities. The licensee has included this condition in their alternative which is, therefore, acceptable.

In summary, compliance with the Code-required hydrostatic testing for welded repairs or replacements of Code Class 1, 2, and 3 components would result in a hardship without a compensating increase in the level of quality and safety. Therefore, it is recommended that the proposed alternative, use of Code Case N-416-1, be authorized pursuant to 10 CFR 50.55a(a)(3)(ii). The use of this Code Case should be authorized until the Code Case is approved for general use by reference in Regulatory

Guide 1.147. After that time, the licensee may continue to use Code Case N-416-1 with the limitations, if any, listed in Regulatory Guide 1.147.

G. Request for Relief No. RR-60, Request for Authorization to Use Code Case N-498-1, *Alternate Rules for 10 Year Hydrostatic Pressure Testing for Class 1, 2, and 3 Systems, Section XI, Division 1*

Code Requirement: Table IWB-2500-1, Examination Category B-P, Table IWC-2500-1, Examination Category C-H, and Table IWD-2500-1, Examination Categories D-A, D-B and D-C, require system hydrostatic testing of pressure-retaining components in accordance with IWA-5000 once each 10-year interval.

Licensee's Code Relief Request: The licensee has requested authorization to use Code Case N-498-1, *Alternate Rules for 10-Year Hydrostatic Pressure Testing for Class 1, 2, and 3 Systems, Section XI, Division 1.*

Licensee's Basis for Requesting Relief (as stated):

"Georgia Power Company (GPC) has determined that hydrostatically testing represents a hardship with little benefit. Hardships are generally encountered with the performance of hydrostatic testing performed in accordance with the Code. For example, since hydrostatic test pressure would be higher than nominal operating pressure, hydrostatic testing frequently requires significant effort to set up and perform. The need to use special equipment and the need for individual valve lineups can cause the testing to impact maintenance/refueling outage schedules.

"Piping components are designed for a number of loadings that would be postulated to occur under the various modes of plant operation. Section XI hydrostatic testing only subjects the piping components to a small increase in pressure over design pressure and, therefore, does not present a significant change to pressure boundary conditions. Accordingly, hydrostatic pressure testing is primarily regarded as a means to enhance leakage detection during the examination of components under pressure, rather than solely as a measure to determine the structural integrity of the components.

"The ASME Subcommittee Working Group on Pressure Testing concluded that no additional benefit is gained by conducting the existing system hydrostatic tests in place of the alternate rules which require a leak test at nominal operating pressure. The conclusion of the group was that hydrostatic

testing does not necessarily verify structural integrity and, in fact, the slightly higher test pressure currently called for in the Code could result in operational difficulties as well as extended outages and increased costs.

"Industry experience has demonstrated that leaks are not discovered as a result of hydrostatic test pressures propagating a pre-existing flaw through-wall. This experience indicates that leaks in most cases are being found when the system is at normal operating pressure. This is mainly due to the fact that hydrostatic pressure testing is infrequently performed, while system leakage tests at normal operating pressures are conducted a minimum of once each maintenance/refueling outage for Class 1 systems, and each 40-month inspection period for Class 2 and 3 systems. In addition, leaks may be identified during system walkdowns by plant operators.

"The use of Code Case N-498, "Alternative Rules for 10-Year System Hydrostatic Testing for Class 1 and 2 Systems", was previously approved by the NRC in Regulatory Guide 1.147, Revision 11. The alternative rules for Code Class 1 and 2 in Code Case N-498-1 are unchanged from N-498. Code Case N-498-1 added an alternative to the 10-year system hydrostatic tests required for Class 3 systems by Table IWD-2500-1, Categories D-A, D-B, or D-C to the Class 1 and 2 alternatives included in Code Case N-498. Code Case N-498 was found to be acceptable because the alternative provided adequate assurance and because compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety.

"Georgia Power Company has determined that the alternative rules of ASME Code Case N-498-1 provide reasonable assurance of the structural integrity of the Code system. Consequently, an acceptable level of quality and safety will be maintained by allowing the proposed alternative examination as an option to the Code requirement.

Licensee's Proposed Alternative Examination (as stated):

"Georgia Power Company proposes to perform an alternative examination delineated in Code Case N-498-1 as an option to performing Code-required hydrostatic tests. Code Case N-498-1 requires that a VT-2 visual examination be performed in conjunction with system pressure test at nominal operating pressure."

"Because of the benefits which can be derived from the use of ASME Code Case N-498-1, GPC wishes to implement this relief request immediately. The actions, i.e., alternative examinations, proposed by GPC are consistent with those required of the Beaver Valley and Farley plants as approved by the NRC."

Evaluation: The Code requires the performance of a system hydrostatic test once per interval in accordance with the requirements of IWA-5000 for Class 1, 2, and 3 pressure-retaining systems. In lieu of the Code-required

hydrostatic testing requirements, the licensee has requested authorization to use Code Case N-498-1, *Alternative Rules for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems*, dated May 11, 1994.

The system hydrostatic test, as stipulated in Section XI, is not a test of the structural integrity of the system but rather an enhanced leakage test.[b] Hydrostatic testing only subjects the piping components to a small increase in pressure over the design pressure; therefore, piping dead weight, thermal expansion, and seismic loads present far greater challenges to the structural integrity of a system. Consequently, the Section XI hydrostatic pressure test is primarily regarded as a means to enhance leak detection during the examination of components under pressure, rather than as a method to determine the structural integrity of the components. In addition, the industry experience indicates that leaks are not being discovered as a result of hydrostatic test pressures propagating a preexisting flaw through the wall—in most cases leaks are being found when the system is at normal operating pressure.

Code Case N-498, *Alternative Rules for 10-Year System Hydrostatic Testing for Class 1 and 2 Systems*, was previously approved for general use on Class 1 and 2 systems in Regulatory Guide 1.147, Rev. 9. For Class 3 systems, Revision N-498-1 specifies requirements identical to those for Class 2 components (for Class 1 and 2 systems, the alternative requirements in N-498-1 are unchanged from N-498). In lieu of 10-year hydrostatic pressure testing at or near the end of the 10-year interval, Code Case N-498-1 requires a VT-2 visual examination at nominal operating pressure and temperature in conjunction with a system leakage test performed in accordance with paragraph IWA-5000 of the 1992 Edition of Section XI.

Class 3 systems do not normally receive the amount and/or type of nondestructive examinations that Class 1 and 2 systems receive. While Class 1 and 2 system failures are relatively uncommon, Class 3 leaks occur

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b. S. H. Bush and R. R. Maccary, *"Development of In-Service Inspection Safety Philosophy for U.S.A. Nuclear Power Plants,"* ASME, 1971

more frequently and are caused by different failure mechanisms. Based on a review of Class 3 system failures requiring repair during the last 5 years,[c] the most common causes of failures are erosion-corrosion (EC), microbiologically-induced corrosion (MIC), and general corrosion. In general, licensees have implemented programs for the prevention, detection, and evaluation of EC and MIC; therefore, Class 3 systems receive inspection commensurate with their functions and expected failure mechanisms.

System hydrostatic testing entails considerable time, radiation dose, and dollar resources. The safety assurance provided by the enhanced leakage gained from a slight increase in system pressure during a hydrostatic test may be offset or negated by the necessity to gag or remove Code safety and/or relief valves (placing the system, and thus the plant, in an off-normal state), erect temporary supports in steam lines, and expend resources to set up testing with special equipment and gages. Therefore, performance of system hydrostatic testing represents a considerable burden without a compensating increase in quality and safety. Giving consideration to the minimal amount of increased assurance provided by the increased pressure associated with a hydrostatic test versus the pressure for the system leakage test and the hardship associated with performing the hydrostatic test, the INEL staff finds that compliance with the Section XI hydrostatic testing requirements results in hardship and/or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, it is recommended that the use of Code Case N-498-1 for Code Class 1, 2, and 3 systems be authorized pursuant to 10 CFR 50.55a(a)(3)(ii) until such time as the Code Case is published in a future revision of Regulatory Guide 1.147. After that time, the licensee must follow the conditions, if any, specified in the regulatory guide.

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c. Documented in Licensee Event Reports and the Nuclear Plant Reliability Data System databases.

H. Request for Relief No. RR-61, Use of Code Case N-509, *Alternative Rules for the Selection and Examination of Class 1, 2, and 3 Integrally-Welded Attachments, Section XI, Division 1*

Code Requirement: The Code requires examination of integrally-welded attachments as specified for Examination Categories B-H, B-K, C-C, D-A, D-B, and D-C. The Code stipulates volumetric or surface examinations, as appropriate, and the extent of examinations.

Licensee's Code Relief Request: Relief is requested from performing the Code-required volumetric, surface, or visual examinations of Class 1, 2, and 3 integrally-welded attachments as required by the Code.

Licensee's Basis for Requesting Relief (as stated):

"On November 25, 1992, ASME issued Code Case N-509 which approved a set of alternative rules for the selection and examination of Class 1, 2, and 3 Integrally Welded Attachments, Section XI, Division 1. The Code Case provides an alternative sampling which will retain an acceptable level of quality and safety for Class 1, 2, and 3 integrally welded attachments. Since approval was granted by ASME, the alternative requirements should be technically acceptable for determining flaws. By implementing the alternative examinations, cost savings, personal radiation dose, and outage time can be realized by Georgia Power Company (GPC) at Vogtle Electric Generating Plant, Unit 1. A VEGP-1 study was performed by Southern Nuclear Operating Company (SNC) on behalf of GPC that compared the number of integrally welded attachment examinations required under ASME Code Case N-509. That study is shown in Attachment 1 [shown below] to this relief request and shows that at least 10% of the present ASME Section XI integrally welded attachment scope for piping will be examined when the subject code case is implemented."

Attachment 1
VOGTLE ELECTRIC GENERATING PLANT, UNIT 1
ASME CODE CASE N-509 STUDY

Scope	Class 1	Class 2	Class 3	Total
Present	0	103	329	432
N-509	0	9	37	46
Exams Saved	0	94	292	386

Licensee's Proposed Alternative Examination (as stated):

"GPC proposes that the following examinations be performed in lieu of the Code-required volumetric, surface, or visual examination on those integrally welded attachments required by Table IWB-2500-1, IWC-2500-1, or IWD-2500-1 in the 1983 Edition, Summer 1983 Addenda of ASME Section XI:

"Surface Examinations:

"Those integrally welded attachments as specifically noted in ASME Code Case N-509,

"ASME Examination Category B-K, Integral Attachments for Class 1 Vessels, Piping, Pumps and Valves, and

"ASME Examination Category C-C, Integral Attachments for Class 2 Vessels, Piping, Pumps, and Valves.

"Visual Examinations:

"ASME Examination Category D-A, Integral Attachments for Class 3 Vessels, Piping, Pumps and Valves."

The licensee also stated that component supports shall be selected for examination in accordance with IWF of the 1989 Edition with the 1990 Addenda.

Evaluation: The licensee has proposed, as an alternative to the Code requirements, to apply the requirements of Code Case N-509 for the examination of integrally-welded attachments on Class 1, 2, and 3 piping and components. Code Case N-509 provides alternative sampling requirements for the examination of Class 1, 2, and 3 integral attachments.

Review of this Code Case indicates that there is an ambiguity in the notes of the examination tables that would allow the selection of a 10% sample of the integrally-welded attachments from the percentage of component supports selected for examination under the rules of the Code (specifically, Subsection IWF of the 1990 Addenda). This could potentially reduce the examination sample to an insignificant amount, or to no integral attachments at all. The INEL staff believes that Code Case N-509 should be augmented to ensure that this does not occur. Therefore, it is concluded that the use of Code Case N-509 provides an acceptable level of quality and

safety provided that the licensee examines a minimum of 10% of the total number of integral attachments in Class 1, 2, and 3 systems. It is recommended that this alternative be authorized, pursuant to 10 CFR 50.55 a(a)(3)(i), provided that this condition is met. Code Case N-509 should be considered acceptable for use for the Vogtle Unit 1, with the above condition, until such time as the Code Case is adopted for general use in Regulatory Guide 1.147. After that time, the licensee must follow the conditions, if any, specified in the regulatory guide.

I. Request for Relief No. RR-62, IWC-1220, Class 2 Components Exempt from Examination

Code Requirement: IWC-1220, *Components Exempt from Examination*, contains the exemption criteria for the examination of Class 2 components. IWC-1222 contains the requirements for components within systems other than the Residual Heat Removal (RHR), Emergency Core Cooling (ECC), and Containment Heat Removal (CHR) systems. In accordance with IWC-1222, components exempt from the surface and volumetric examination requirements of IWC-2500 are as follows:

(a) Vessels, piping, pumps, valves, and other components NPS 4 and smaller.

(b) Component connections NPS 4 and smaller (including nozzles, socket fittings, and other connections) in vessels, piping, pumps, valves, and other components of any size.

(c) Vessels, piping, pumps, valves, and other components of any size in systems or portions of systems that operate (when the system function is required) at a pressure equal to or less than 275 psig and at a temperature equal to or less than 200°F.

(d) Piping and other components of any size beyond the last shutoff valve in open ended portions of systems that do not contain water during normal plant operating conditions.

Licensee's Code Relief Request: The licensee has requested to use the exemption criteria found in IWC-1222 of the 1989 Addenda of the 1989 Edition of ASME Section XI for components within systems other than the

RHR, ECC, and CHR systems. This Addenda does not require surface and volumetric examinations of vessels and their connections in piping 4-inch nominal pipe size (NPS) and smaller for Examination Category C-A, Items C1.10, C1.20, and C1.30 (Pressure-Retaining Welds in Vessels) and Examination Category C-C, Item C3.10 (Integrally Welded Attachments to Pressure Vessels). Relief is specifically requested for the following components:

Regenerative Heat Exchanger (Tag No. 1-1208-E6-001)
Excess Letdown Heat Exchanger (Tag No. 1-1208-E6-002)
Letdown Heat Exchanger (Tag No. 1-1208-E6-003)
Letdown Reheat Heat Exchanger (Tag No. 1-1208-E6-007)
Discharge Dampener (Tag No. 1-1208-V4-002)

Licensee's Basis for Requesting Relief (as stated):

"Subarticle IWC-1220 of the 1989 Addenda of ASME Section XI allowed the exemption of selected components from the surface and volumetric examination requirements of IWC-1220 [Table IWC-2500-1]. The 1992 Edition of ASME Section XI also includes these exemptions in IWC-1220. These exemptions will be allowed when the newer Addenda and Editions of the Code are authorized in 10 CFR 50.55a. Georgia Power Company (GPC) sees no benefit in performing examinations on components which the Code has determined can be exempted. The other requirements in the Code are therefore acceptable to assure an acceptable level of safety or quality. It is impractical to perform examinations which do not provide a compensating increase in the level of safety or quality.

"These added exemptions would apply to several components which are in high dose rate areas. The most significant of these components is the regenerative heat exchanger. A conservative whole body dose in the range of one to two Rem is a reasonable estimate for examining the regenerative heat exchanger. The dose rate surveys for the regenerative heat exchanger indicate a contact dose rate of two to three Rem/hour and a dose rate at eighteen inches away from the heat exchanger of one to one-and-one-half (1 to 1-1/2) Rem/hour. The estimated stay time to perform the Code-required examinations on the regenerative heat exchanger is one hour. Such exposure is contrary to the principles of ALARA to perform examinations on components without a compensating increase in safety or quality. For the reasons discussed above, GPC has determined that implementation of the Code requirements is impractical.

Licensee's Proposed Alternative Examination (as stated):

"These exemptions exclude the applicable vessels from the surface and volumetric examinations required by IWC-2500. The remainder of the Code-required examinations (i.e., pressure tests) would be performed to assure that an acceptable level of safety and quality is maintained for the applicable components."

Evaluation: The licensee has requested to use the exemption criteria of IWC-1222 of the 1989 Addenda in lieu of the exemption requirements of the Code of record. In accordance with the 83S83 Code, piping NPS 4 and smaller is exempt from examination, but connected components are not. In the 1989 Addenda of Section XI, IWC-1222 was revised to exempt vessels, pumps and valves, and their connections in piping NPS 4 and smaller, with the following note. "*In piping* is defined as having a cumulative inlet and a cumulative outlet pipe cross-sectional area neither of which exceeds the nominal OD cross-sectional area of the designated size." In other words, a component connected to exempt piping is exempt if, upon failure, it would not produce a leak greater than the volume flowing through the exempt piping. This exemption is also contained in Code Case N-408-2, *Alternative Rules for Examination of Class 2 Piping, Section XI, Division 1*, which has been approved for general use in Revision 9 of Regulatory Guide 1.147, *Inservice Inspection Code Case Acceptability -- ASME Section XI, Division 1.*

The change in the Code described above parallels the logic used for the exemption of Class 1 systems. Specifically, IWB-1220(b)(2) exempts "components and their connections in piping in 1-inch nominal pipe size and smaller", where "in piping" is defined as having one inlet and one outlet pipe, each of which is 1-inch NPS or smaller. The discrepancy between Class 1 and 2 systems was recognized by the Code committee, which patterned the exemption criteria for Class 2 in the 1989 Addenda after existing exemption requirements for Class 1 systems.

The INEL staff has reviewed this request and concludes that the licensee's alternative, to use the exemption criteria of the 1989 Addenda, will provide an acceptable level of quality and safety. The logic used for the Class 2 exemption criteria found in the 1989 Addenda is similar to that

used for exemption of Class 1 systems. In addition, the criteria has been approved by the NRC as part of Code Case N-408-2. Therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i).

3.0 CONCLUSION

The INEL staff has reviewed the information provided by the licensee in Revision 7 of the first 10-year Program and has identified no deviations from regulatory requirements or commitments. Furthermore, the INEL staff concludes that the Code examination requirements are impractical for the welds contained in Request for Relief RR-30 (Part C-C) and, therefore, recommends that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

For Requests for Relief RR-22 and RR-24, it was determined that the technical content had not changed and that relief should remain granted as determined in the previous evaluations, pursuant to 10 CFR 50.55a(g)(6)(i).

For Requests for Relief RR-23, RR-61 and RR-62, it was concluded that the licensee's proposed alternative would provide an acceptable level of quality and safety. Therefore, it is recommended that the alternatives contained within those requests be authorized pursuant to 10 CFR 50.55a(a)(3)(i). However, for Request for Relief RR-61, the alternative is authorized only with the conditions specified in Section H of this report.

For Requests for Relief RR-59 and RR-60, it was determined that the Code requirements would result in a burden without a compensating increase in quality and safety. Furthermore, it was determined that the licensee's alternatives would provide reasonable assurance of the operational readiness of the affected systems. Therefore, it is recommended that the alternatives be authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

Request for Relief RR-43 is considered part of the Inservice Test (IST) Program and is therefore, not included in this evaluation.