

February 27, 2001

Mr. S. K. Gambhir
Division Manager - Nuclear Operations
Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm.
Post Office Box 399
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Fort Calhoun, NE 68023-0399

SUBJECT: FORT CALHOUN STATION, UNIT NO. 1 - EVALUATION OF RELIEF
REQUEST NOS. IWE-001 THROUGH IWE-007: IMPLEMENTATION OF
SUBSECTIONS IWE AND IWL OF ASME SECTION XI FOR CONTAINMENT
INSPECTION (TAC NO. MA8900)

Dear Mr. Gambhir:

By letter dated April 28, 2000, as supplemented by letter dated November 17, 2000, Omaha Public Power District (OPPD), submitted the seven requests for relief (Relief Requests IWE-001 through IWE-007) related to containment inservice inspection program at the Fort Calhoun Station. The relief requests propose alternatives to ASME Boiler and Pressure Vessel Code, Section XI, 1992 Edition, 1992 Addenda, Subsections IWE and IWL regarding containment inspection examination requirement.

The staff has reviewed Relief Requests IWE-001 through IWE-007. Based on the information provided in the relief requests, the staff concludes that for Relief Requests IWE-005 and -006, the licensee's proposed alternatives will provide an acceptable level of quality and safety. Therefore, the proposed alternatives are authorized pursuant to 10 CFR 50.55a(a)(3)(i). For Relief Requests IWE-001, -002, -003, -004 and -007, the staff concludes that compliance with the code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety, and that the licensee's proposed alternatives will provide reasonable assurance of containment pressure integrity. Therefore, these proposed alternatives are authorized pursuant to 10 CFR 50.55a(a)(3)(ii). All relief requests are authorized for the first inspection interval for containment inspections required by ASME Section XI, 1992 Edition, 1992 Addenda. The enclosure contains the staff's evaluation.

Sincerely,
/RA/

Stephen Dembek, Chief, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-285

Enclosure: Safety Evaluation

cc w/encl: See next page

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Stephen Dembek, Chief, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
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**For previous concurrences see attached ORC

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Enclosure: Safety Evaluation

cc w/encl: See next page

* EMEB Memo dated 12/20/00

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Ft. Calhoun Station, Unit 1

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUESTS FOR RELIEF ASSOCIATED WITH

ASME SECTION XI REQUIREMENTS FOR CONTAINMENT INSPECTION

OMAHA PUBLIC POWER DISTRICT

FORT CALHOUN STATION, UNIT NO.1

DOCKET NO. 50-285

1.0 INTRODUCTION

In the Federal Register dated August 8, 1996 (61 FR 41303), the Nuclear Regulatory Commission (NRC) amended its regulations to incorporate by reference the 1992 edition with 1992 addenda of Subsections IWE and IWL of Section XI of the ASME Boiler and Pressure Vessel Code (Code). Subsections IWE and IWL provide the requirements for inservice inspection (ISI) of Class CC (concrete containment) and Class MC (metallic containment) of light-water cooled power plants. The effective date for the amended rule was September 9, 1996, and it requires the licensees to incorporate the new requirements into their ISI plans and to complete the first containment inspection by September 9, 2001. However, a licensee may propose alternatives to or submit a request for relief from the requirements of the regulation pursuant to 10 CFR 50.55a(a)(3) and (g)(5).

By letter dated April 28, 2000, Omaha Public Power District (OPPD) proposed several alternatives to the requirements of Subsection IWE of Section XI of the ASME Code (Relief Requests IWE-001 through IWE-007) for Fort Calhoun Station (FCS), Unit 1. In response to the staff's concerns, OPPD revised Relief Requests IWE-002 and IWE-007 in a letter dated November 17, 2000. The staff's findings with respect to authorizing the alternative or denying the proposed request are discussed in this safety evaluation.

2.0 EVALUATION OF RELIEF REQUESTS

2.1 Relief Request IWE-001

2.1.1 Code Requirements

Table IWE-2500-1, "Examination Categories," Examination Category E-D, Items E5.10 and E5.20 of the 1992 Edition, 1992 Addenda of ASME Section XI, Subsection IWE requires a visual examination (VT-3) of 100 percent of the containment seals and gaskets for Class MC pressure retaining components and metallic shell and penetration liners of Class CC components.

2.1.2 Requirements from which Relief is Requested

Relief is requested from performing the Code-required visual examination (VT-3) on the containment seals and gaskets for Class MC pressure retaining components and metallic shell and penetration liners of Class CC components. Relief is requested for the first inspection interval for containment inspections required by ASME Section XI, 1992 Edition, 1992 Addenda at FCS.

2.1.3 Alternative Examinations

As an alternative to the requirements of the ASME Section XI, Subsection IWE, 1992 Edition, 1992 Addenda, the leak tightness of containment seals and gaskets will be verified by leak testing in accordance with 10 CFR Part 50, Appendix J, as required by the technical specifications. No additional alternatives to the VT-3 visual examinations required by Table IWE-2500-1, Examination Category E-D, for Items E5.10 and E5.20 will be performed.

2.1.4 Basis for Relief

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested for the FCS on the basis that compliance with the specified Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

FCS has determined that the following types of containment penetrations have seals and gaskets which may be subject to the requirements of IWE-2500, Table IWE2500-1, Examination Category E-D. A description of these penetrations and their associated seals and gaskets is provided below.

Electrical Penetrations:

Containment electrical penetrations are of the canister type furnished by the manufacturer (Conax) as fully assembled, factory tested units. A piece of carbon steel pipe called the barrel, with flat, stainless steel headers welded to each end comprise the canisters. Feed-throughs pass through both headers, to which they were sealed by means of compression sealing glands. Feed-throughs were fabricated of teflon-insulated, solid conductors bound in a matrix of insulating/sealing material, all held in compression within a swaged, stainless steel outer housing. A mounting gland was welded to the barrel. Field installation only requires welding the canisters into penetration pipe studs and attachment of cables.

On installation, the mounting gland was field welded to the inner end of the containment penetration pipe stub, and a welding ring was welded at one edge of the canister and at the other edge to the pipe stub. A port through the barrel and mounting gland connects the canister interior with spaces between welds provided under the mounting gland and welding rings, to allow pressure testing of the canister and all shop and field welds.

A second electrical penetration (Type B) utilizes a single header plate on the auxiliary building side of the pipe. Support plates are located on the pipe and on the containment end.

For pressure testing, a pressurizing connection with a pressure gage is provided on the outer header. This provision makes possible either periodic leak testing or monitoring by pressurizing the canister with dry gas, sealing off, and periodically checking gage indication.

Mechanical Penetrations with Bolted Connections:

The fuel transfer tube consists of a bolted flanged joint with gasket. The fuel transfer tube is designed to be leak rate tested in accordance with 10 CFR Part 50, Appendix J to verify the integrity of the gasketed connection.

Personnel Air Lock, Equipment Hatch, and Access Openings:

The personnel air lock utilizes an inner and outer door with double gaskets on each door to seal the airlock doors to the bulkhead on the containment penetration. The airlock also contains other gaskets and seals, such as those for sealing the handwheel shaft, electrical penetrations, and equalizing pressure connections. The sealed joints on the airlock are designed to permit testing in accordance with 10 CFR Part 50, Appendix J and the technical specifications.

The equipment hatch utilizes double gaskets to seal the hatch cover to the equipment hatch penetration. The sealed joint has been designed to permit testing in accordance with 10 CFR Part 50, Appendix J and the technical specifications.

Leak tightness of containment pressure retaining seals and gaskets is verified by Type B tests in accordance with Option A of 10 CFR Part 50, Appendix J, as required by the technical specifications. Overall containment leakage is verified by Type A tests in accordance with Option B of 10 CFR Part 50, Appendix J. Although the Type A test does not verify individual penetration leakage, it does provide additional assurance that there is no significant leakage through the containment pressure boundary, which includes all sealed penetrations. As noted in 10 CFR Part 50, Appendix J, the purpose of the test is to measure leakage of containment or penetrations whose design incorporates resilient seals, gaskets, sealant compounds, and electrical penetrations fitted with flexible metal seal assemblies.

Although not required by the Code, practical examination considerations of seals and gaskets require the joints, which are proven adequate through Appendix J testing, to be disassembled for electrical penetrations. This would involve a pre-maintenance Appendix J test, de-termination of cables at electrical penetrations if enough cable slack is not available, disassembly of the joint, removal and examination of the seals and gaskets, reassembly of the joint, re-termination of the cables if necessary, post-maintenance testing of the cables, and a post-maintenance Appendix J test of the penetration. The work required for mechanical penetrations, the equipment hatch, and airlock would be similar except for the de-termination, re-termination, and testing of cables. This imposes the risk that the equipment could be damaged during this process. The 1992 Edition, 1993 Addenda, of Section XI recognizes that disassembly of joints to perform these examinations is not warranted. Note 1 in Examination Category E-D was modified in the 1995 Edition of Section XI to state that sealed or gasket connections need not be disassembled solely for the performance of examinations. However, without disassembly, most of the surface of the seals and gaskets would be inaccessible.

For those penetrations that are routinely disassembled, a Type B test is required upon final assembly and prior to startup. Since the Type B test will assure the leak tight integrity of primary containment, the performance of the visual examination would not increase the level of quality and safety.

When the airlock and equipment hatch containing these materials are tested in accordance with 10 CFR Part 50, Appendix J, degradation of the seals and gaskets would be revealed by an increase in the leakage rate. Corrective measures would be applied and the component retested. Repair or replacement of seals and gaskets is not subject to Code (1992 Edition, 1992 Addenda) requirements in accordance with Paragraph IWA-4111(b)(5) of Section XI.

The VT-3 visual examinations required by Subsection IWE for some seals on penetrations, such as the fuel transfer tube, will increase personnel radiological exposure with no compensating increase in the level of quality and safety. Testing the seals and gaskets in accordance with 10 CFR Part 50, Appendix J will provide adequate assurance of the leak-tight, integrity of seals and gaskets.

2.1.5 Staff Evaluation of IWE-001

As an alternative to the requirements (VT-3 examinations) of the ASME Section XI, Subsection IWE, 1992 Edition, 1992 Addenda, OPPD proposed to use leak testing in accordance with 10 CFR Part 50, Appendix J to examine the leak tightness of containment seals and gaskets.

In its request, OPPD stated that because the seals and gaskets associated with these penetrations are not accessible for examination when the penetration is assembled, containment penetrations seals and gaskets must be disassembled and re-assembled for the purpose of performing the VT-3 visual examination. These activities (a pre-maintenance Appendix J test, de-termination of cables at electrical penetrations if enough cable slack is not available, disassembly of the joints, removal and examination of the seals and gaskets, re-assembly of the joints, re-termination of the cables if necessary, post-maintenance testing of cables, and post-maintenance Appendix J testing of the penetration) associated with a VT-3 visual examination would introduce the possibility of component damage that would not otherwise occur. The periodical test in accordance with 10 CFR Part 50, Appendix J will detect and measure local leakage of containment or penetrations whose design incorporates resilient seals, gaskets, sealant compounds, and electrical penetrations fitted with flexible metal seal assemblies. If unacceptable leakage is identified during the test, corrective measures would be taken and the components would be re-tested.

Also, the staff finds that ASME Section XI, 1992 Edition, 1993 Addenda recognizes that disassembly of joints for the sole purpose of performing visual examination is unwarranted. Requiring OPPD to disassemble components for the sole purpose of inspecting seals and gaskets would place a significant hardship on OPPD without a compensating increase in the level of quality and safety.

On the basis discussed above, the staff concludes that the alternative proposed by OPPD will provide reasonable assurance of the functionality and integrity of the containment penetration seals and gaskets during the testing required by 10 CFR Part 50, Appendix J. The proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the first inspection interval for

containment inspections on the basis that compliance with the specific requirements of the Code would result in hardship without a compensating increase in the level of quality and safety.

2.2 Relief Request IWE-002

2.2.1 Code Requirement

Table IWE-2500-1, "Examination Categories," Examination Category E-G, Item E8.10 of the 1992 Edition, 1992 Addenda of ASME Section XI, Subsection IWE requires a VT-1 visual examination of bolted connections.

Table IWE-2500-1, "Examination Categories," Examination Category E-G, Item E8.20 of the 1992 Edition, 1992 Addenda of ASME Section XI, Subsection IWE requires a torque or tension test of bolted connections that have not been disassembled and reassembled during the inspection interval.

2.2.2 Requirements from which Relief is Requested

Relief is requested from performing (1) VT-1 visual examination of the pressure retaining bolting subject to examination in accordance with Table IWE-2500-1, Examination Category E-G, Item E8.10, and (2) the torque and tension test in accordance with Table IWE-2500-1, Examination Category E-G, Item E8.20. This relief is requested for the first inspection interval for containment inspections required by ASME Section XI, 1992 Edition, 1992 Addenda at FCS.

2.2.3 Alternative Examinations

In Reference 1, OPPD stated that the adequacy of Class MC containment pressure retaining bolted connections shall be verified by the following:

- (1) Exposed surfaces of bolted connections shall be VT-3 examined in accordance with the requirements of ASME Section XI, 1992 Edition, 1992 Addenda, Table IWE-2500-1, Examination Category E-A, Containment Surfaces. Also in Reference 2, OPPD committed that if an area is found to be suspect during the VT-3 examination, a VT-1 examination will be performed on the suspect area to determine the magnitude and extent of the degradation.
- (2) Bolted connections shall meet the pressure test requirements of 10 CFR Part 50, Appendix J.

2.2.4 Basis for Relief

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested for the FCS on the basis that compliance with the specified Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Section 50.55a was amended in the *Federal Register* to require the use of the 1992 Edition, 1992 Addenda, Section XI when performing containment inspections. Section XI requires a VT-1 visual examination of bolted connections which was reevaluated during subsequent rewrites of Subsection IWE. During the review of Examination Category E-G examination criteria, the following factors were considered:

- (1) Containment surfaces, including bolted connections, are already subject to visual examination in accordance with Table IWE-2500-1, Examination Category E-A.
- (2) Bolted connections in containment are subject to the performance of 10 CFR Part 50, Appendix J testing.
- (3) Containment bolting is not subject to a known degradation mechanism, primarily because it is not in contact with a corrosive environment. There have been no problems with containment bolting identified within the industry.

The conclusion reached by ASME Section XI was that Examination Category E-G examinations on bolted connections were not warranted. The commentary which accompanied the Subsection IWE rewrite stated:

"Pressure retaining bolting as a separate category has been deleted, and the examination requirements for pressure retaining bolting have been consolidated into Category E-A. Examination of pressure retaining bolting does not require removal or disassembly, and only those exposed surfaces of the bolting materials need be examined."

As a result, Examination Category E-G has been eliminated from Table IWE-2500-1 in the 1998 Edition of ASME Section XI.

The performance of VT-1 visual examinations on bolted connections in accordance with the 1992 Edition, 1992 Addenda represents a hardship with no compensating increase in the level of quality and safety. The re-examination of bolted connections that are already examined as part of Examination Category E-A, and tested in accordance with 10 CFR Part 50, Appendix J, unnecessarily increases the number of inservice examinations and the associated radiation exposure to personnel.

In addition to the visual examination of bolted connections, the 1992 Edition, 1992 Addenda, Section XI, requires that bolt torque or tension testing be performed on bolted connections that have not been disassembled and reassembled during the inspection interval. Determination of the torque or tension value would require that the bolting be un-torqued and then re-torqued or re-tensioned. The performance of a 10 CFR Part 50, Appendix J test proves that the bolt torque or tension remains adequate to provide a leak rate that is within acceptable limits. The torque or tension value of bolting only becomes an issue if the leak rate is excessive. Once a bolt is torqued or tensioned, it is not subject to dynamic loading that could cause it to experience significant change. Furthermore, the IWE penetration components at FCS do not include any configuration considered as pressure unseating bolted connections. Appendix J testing and visual inspection is adequate to demonstrate that the design function is met.

Torque or tension testing is not required on any other ASME Section XI, Class 1, 2, or 3 bolted connections or their supports as part of the inservice inspection program.

2.2.5 Staff Evaluation of IWE-002

In this relief request, OPPD proposed an alternative examination as follows:

- (1) In lieu of performing the VT-1 examination of the pressure retaining bolting in accordance with Table IWE-2500-1, examination category E-G, E8.10, a VT-3 examination will be performed in accordance with Table IWE-2500-1, Examination Category E-A (VT-3 examination). If an area is found to be suspect during the VT-3 examination, a VT-1 examination will be performed on the suspect area to determine the magnitude and extent of the degradation.
- (2) In lieu of performing the torque or tension test (in accordance with Table IWE-2500-1, examination category E-G, E8.20), the leak-tight integrity will be verified in accordance with the applicable requirements of 10 CFR Part 50, Appendix J.

The staff finds that the performance of VT-1 visual examination on bolted connections in accordance with the 1992 Edition through 1992 Addenda of ASME Section XI represents a hardship (the re-examination of bolted connections unnecessarily increases the number of inservice examinations and the associated radiation exposure to personnel) with no compensating increase in the level of quality and safety. The staff also finds that the 10 CFR Part 50, Appendix J requirements together with the visual examination in accordance with Table IWE-2500-1, Examination Category E-A for evaluating inservice effects that could adversely impact the performance of the bolted connections will ensure the leak-tight integrity of the containment structure with bolted connections. In addition, OPPD committed, in Reference 2, that if an area is found to be suspect during the VT-3 examination, a VT-1 examination will be performed on the suspect area to determine the magnitude and extent of the degradation.

For the Code requirements related to bolt torque and tension tests, the staff finds that to perform a bolt torque or tension test on bolted connections that have not been disassembled and reassembled during the inspection interval will cause a hardship without a compensating increase in the level of quality and safety. Determination of the torque or tension value would require that the bolting be un-torqued and then re-torqued or re-tensioned. The staff also finds that OPPD's alternate approach (the Type B test required by 10 CFR 50, Appendix J to verify the leak-tight integrity of bolted connections for containment vessel leak-tight integrity) will verify the adequacy of the bolted connections to provide a leak rate that is within acceptable limits.

On this basis discussed above, the staff concludes that the examination approach proposed by OPPD will provide reasonable assurance of the functionality and integrity of containment pressure retaining bolted connections. Therefore, OPPD's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the first inspection interval for containment inspections on the basis that compliance with the specific code requirements would result in hardship without a compensating increase in the level of quality and safety.

2.3 Relief Request IWE-003

2.3.1 Code Requirement

Paragraphs IWE-2420(b) and IWE-2420(c) of the 1992 Edition, 1992 Addenda of ASME Section XI, Subsection IWE requires that when component examination results require evaluation of flaws, evaluation of areas of degradation, or repairs in accordance with Article IWE-3000, and the component is found acceptable for continued service, the areas containing such flaws, degradation, or repairs shall be reexamined during the next inspection period listed in the schedule of the inspection program of paragraph IWE-2411 or Paragraph IWE-2412, in accordance with Table IWE-2500-1, Examination Category E-C.

2.3.2 Requirements from which Relief is Requested

Relief is requested from the requirement of Paragraph IWE-2420(b) and IWE-2420(c) to perform successive examination of repairs. This relief is requested for the first inspection interval for containment inspections required by ASME Section XI, 1992 Edition, 1992 Addenda at FCS.

2.3.3 Alternative Examinations

Successive examinations in accordance with Paragraphs IWE-2420(b) and IWE-2420(c) are not required for repairs made in accordance with Section XI, 1992 Edition, 1992 Addenda, Article IWA-4000. In lieu of the successive examinations required by IWE-2420, an acceptable level of quality and safety will be provided by the Section XI, Article IWA-4000 repair process and subsequent examinations and evaluations.

2.3.4 Basis for Relief

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested on the basis that compliance with the specified Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The purpose of the repair in accordance with Section XI, Article IWA-4000, is to restore the component to an acceptable condition for continued service in accordance with the acceptance standards of Article IWE-3000. In addition, Paragraph IWA-4150 of Article IWA-4000 requires the owner to conduct an evaluation of the suitability of the repair including consideration of the cause of failure to preclude recurrence of the component degradation.

If the repair has restored the component to an acceptable condition, successive examinations are not warranted. If the repair was not suitable, then the repair does not meet Code requirements and the component is not suitable for continued service. Neither Paragraphs IWB-2420(B) and IWC-2420(b), nor Paragraph IWD-2420(b) require a repair to be subject to successive examination requirements. Furthermore, if the repaired component is subject to accelerated degradation, it would require augmented examination in accordance with Paragraph IWE-1240 and Table IWE-2500-1, Examination Category E-C. The purpose of IWE-2420(b) is to manage components found to be acceptable for continued service (i.e., no repair or replacement at this time) as an Examination Category E-C component. If the

component has been repaired or replaced, then the more frequent examination would not be needed. The successive examination of repairs in accordance with Paragraphs IWE-2420(b) and IWE-2420(c) constitutes a burden without a compensating increase in quality or safety.

Further, the ASME Main Committee has determined that the requirement to perform successive examinations of repaired areas per Examination Category E-C is no longer warranted. The ASME Main Committee has approved the revision to Subsection IWE that eliminated this requirement. This revision of Subsection IWE was published in the ASME Code, Section XI, 1998 Edition.

2.3.5 Staff Evaluation of IWE-003

The staff agrees with OPPD's justification that when repairs are complete, IWA-4150 requires licensees to evaluate the suitability of the repair. When a repair is required because of failure of an item, the evaluation shall consider the cause of failure to ensure that the repair is suitable. Considering that the failure mechanism is identified and corrected as required and the repair receives preservice examinations, as required, the proposed alternative will provide reasonable assurance of structural integrity. In doing this, the hardship associated with the requirements of successive examinations can be eliminated. Furthermore, IWB-2420(b), IWC-2420(b), and IWD-2420(b) do not require the successive inspection of repairs for ASME Code Class 1, 2, and 3 components as required in IWE-2420(b) for ASME Code Class MC components. On this basis, OPPD's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the first inspection interval for containment inspections that compliance with the specific code requirements would result in hardship without a compensating increase in the level of quality and safety.

2.4 Relief Request IWE-004

2.4.1 Code Requirement

ASME Section XI, 1992 Edition, 1992 Addenda, Subsection IWE, Subarticle IWE-2500(b) requires that when paint or coatings are to be removed, the paint or coatings shall be visually examined in accordance with Table IWE-2500-1 prior to removal.

2.4.2 Requirements from which Relief is Requested

Relief is requested from the requirements to perform a visual examination of painted or coated containment components prior to removal of paint or coatings. This relief is requested for the first inspection interval for containment inspections required by ASME Section XI, 1992 Edition, 1992 Addenda at FCS.

2.4.3 Alternative Examinations

The paint and coatings in the containment will be examined in accordance with the FCS Coatings Program. If degradation of the coating is identified, additional measures will be applied to determine if the containment pressure boundary is affected. Although repairs to paint or coatings are not subject to the repair/replacement requirements of ASME Section XI

(Inquiry 97-22), repairs to the primary containment boundary, not including coatings, if required, would be conducted in accordance with ASME Section XI Code requirements.

2.4.4 Basis for Relief

Pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested for the FCS on the basis that the proposed alternative provisions to the ASME Section XI Code requirements would provide an acceptable level of quality and safety.

Section 50.55a was amended in the *Federal Register* to require the use of the 1992 Edition, 1992 Addenda, Section XI, when performing containment inspections. Subarticle IWE-2500(b) requires that when paint or coatings are to be removed, a visual examination of the paint or coatings shall be performed in accordance with Table IWE-2550-1. Neither paint nor coatings contribute to the structural integrity or leak tightness of the containment. The interiors of containment are painted or coated primarily to prevent rusting. Furthermore, the paint or coatings on the containment pressure boundary were not subject to Code requirements when they were originally applied and are not subject to ASME Section XI requirements for repair and replacement in accordance with IWA-4111(b)(5). Deterioration or discoloration of the paint or coating materials on containment could be an indicator of potential degradation of the containment pressure boundary. Additional measures would have to be employed to determine the nature and extent of any degradation, if present. The application of ASME Section XI requirements for removal of paint or coatings, when unrelated to a Section XI repair or replacement activity, is a burden without a compensating increase in quality and safety.

2.4.5 Staff Evaluation of IWE-004

In lieu of meeting the ASME Section XI, 1992 Edition, 1992 Addenda, Subsection IWE-2500(b) requirements to perform a visual examination of the existing paint or coatings in accordance with Table IWE-2500-1 prior to removal, OPPD proposed to examine the paint or coatings in accordance with the FCS Coatings Program. OPPD committed that if degradation of the coating is identified, additional measures will be applied to determine if the containment pressure boundary is affected.

As stated in the "Alternative Examinations" section of this relief request, OPPD used the FCS Coatings Program for the response to NRC Generic Letter 98-04 (Reference 3). In Reference 3, OPPD demonstrated that the program procedures and implementation meet the requirements of Regulatory Guide 1.54, Revision 0, "Quality Assurance Requirements for Protective Coatings Applied to Water Cooled Nuclear Power Plants," and ANSI N101.4-1972, "Quality Assurance for Protective Coatings Applied to Nuclear Facilities." Through the NRC close-out letter for Generic Letter 98-04 (Reference 4), this program was approved by the staff.

Based on the discussion above, the staff concludes that the FCS coatings program is adequate for monitoring the proper removal of the old paint and application of new coatings. To perform additional examinations prior to removal of the old paint and to document the condition of the old paint or coatings would result in hardship to OPPD without a compensating increase in the level of quality and safety. On this basis, the staff concludes that the alternative examination program proposed by OPPD is acceptable and OPPD's proposed alternative to the requirement

of Subsection IWE-2500(b) is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the first inspection interval for containment inspections.

2.5 Relief Request IWE-005

2.5.1 Code Requirement

The ASME Section XI, 1992 Edition, 1992 Addenda, Subsection IWE, Subarticle IWE-2200(g) requires that when paint or coatings are reapplied, the condition of the new paint or coating shall be documented in the preservice examination records.

2.5.2 Requirements from which Relief is Requested

Relief is requested from the requirement to perform a preservice inspection of new paint or coatings. This relief is requested for the first inspection interval for containment inspections required by ASME Section XI, 1992 Edition, 1992 Addenda at FCS.

2.5.3 Alternative Examinations

The paint and coatings in the containment will be examined in accordance with the FCS Coatings Program. If degradation of the coating is identified, additional measures will be applied to determine if the containment pressure boundary is affected. Although repairs to paint or coatings are not subject to the repair/replacement requirements of Section XI (Inquiry 97-22), repairs to the primary containment boundary, not including coatings, if required, would be conducted in accordance with ASME Section XI Code requirements.

2.5.4 Basis for Relief

Pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested for the FCS on the basis that the proposed alternative provisions to the ASME Section XI Code requirements would provide an acceptable level of quality and safety.

Section 50.55a was amended in the *Federal Register* to require the use of the 1992 Edition, 1992 Addenda, Section XI when performing containment inspections. Subarticle IWE-2500(g) requires that when paint or coatings are reapplied, a preservice inspection is performed and documented in the preservice inspection records.

Paint and coatings are not part of the containment pressure boundary under current Code requirements because they are not associated with the pressure retaining function of the component (Paragraph NE-2110(b) of ASME Section III). Neither paint nor coatings contribute to the structural integrity or leak tightness of the containment, although degradation of the coating could be symptomatic of liner plate deterioration. Furthermore, the paint and coatings on the containment pressure boundary were not subject to Code requirements when they were originally applied and are not subject to ASME Section XI requirements for repair or replacement in accordance with IWA-4111(b)(5). The adequacy of applied coatings is verified through the Fort Calhoun Unit 1 Coatings Program. Recording the condition of reapplied coating in the preservice record does not substantiate the containment structural integrity. Should deterioration of the coating in the reapplied area occur, the area will require additional

evaluation regardless of the preservice record. Recording the condition of new paint or coating in the preservice records is a burden without a compensating increase in the level of quality and safety of the containment.

2.5.5 Staff Evaluation of IWE-005

In lieu of meeting the ASME Section XI, 1992 Edition, 1992 Addenda, Subsection WE-2200(g) requirements to perform a preservice inspection of new paint or coatings, OPPD proposed to examine the paint and coatings in accordance with the FCS Coatings Program. According to OPPD (Reference 3), this program ensures the adequacy of the reapplied paint or coatings. OPPD also committed that if degradation of the coating is identified, additional measures will be applied to determine if the containment pressure boundary is affected.

As discussed in the evaluation of Relief Request IWE-04 and Reference 4, the staff finds that the FCS Coatings Program is adequate for the examination of reapplied new coatings and will provide an acceptable level of quality and safety for protecting containment components. On this basis, the staff concludes that OPPD's alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the first inspection interval for containment inspections.

2.6 Relief Request IWE-006

2.6.1 Code Requirement

ASME Section XI, 1992 Edition, 1992 Addenda, Subsection IWE, Table IWE-2500-1, Examination Category E-A, "Containment Surfaces," Item E1.12, requires a 100 percent VT-3 examination of accessible surface areas of the containment vessel at the end of the 10-year inservice inspection interval.

2.6.2 Requirements from which Relief is Requested

Relief is requested from the Code requirements to perform VT-3 examination of accessible surface areas of the containment vessel at the end of the 10-year inservice inspection interval. This relief is requested for the first inspection interval for containment inspections required by ASME Section XI, 1992 Edition, 1992 Addenda at FCS.

2.6.3 Alternative Examinations

As an alternative to the ASME Section XI, 1992 Edition, 1992 Addenda, requirements for a VT-3 examination, a general visual examination in accordance with paragraph IWE-3510.1 of the accessible surface areas of the containment will be performed. When evidence of degradation is detected, a detailed visual examination will be performed of the suspect area. If a detailed visual examination cannot be performed, the suspect area will be evaluated and dispositioned by a responsible engineer. The general and/or detailed visual examinations will be performed by personnel certified in accordance with CP-189.

2.6.4 Basis for Relief

Pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested for FCS on the basis that the proposed alternative provisions to the ASME Section XI Code requirements would provide an acceptable level of quality and safety.

Section 50.55a was amended in the *Federal Register* to require the use of the 1992 Edition, 1992 Addenda, Section XI, when performing containment inspections. Table IWE-2500-1, Examination Category E-A, Item E1.12 requires a 100 percent VT-3 examination of accessible surface areas of the containment vessel at the end of the 10-year interval.

The Section XI (VT-3) requirements were developed for detecting flaws in metal components and are more stringent than those that would be required for the detection of degradation of containment surface areas due to corrosion. Corrosion of the base metal is the primary issue of concern for containment surface areas, and controls will be established for the performance of a general visual examination to detect age-related degradation mechanisms that may affect the structural integrity and/or leak-tightness of the containment. The alternative examination proposes a general visual examination performed of accessible areas by examiners qualified in accordance with CP-189. If an area is determined to be suspect during the general visual examination, additional actions will be taken.

The general visual examination will be performed in accordance with paragraph IWE-3510.1. When evidence of degradation is detected by the examiner, a detailed visual examination will be performed to determine the magnitude and extent of any deterioration and distress of suspect containment surfaces. If a detailed visual examination cannot be performed, the acceptability of the suspect area will be evaluated. The evaluation will address the requirements outlined in 10 CFR 50.55a(b)(2)(x)(A).

The general and/or detailed examination will be performed by personnel certified in accordance with CP-189. This level of certification will verify that the capability and visual acuity of the examiners are sufficient to detect evidence of potential degradation of the containment accessible surface areas.

2.6.5 Staff Evaluation of IWE-006

In lieu of meeting the Code requirements to perform a 100 percent VT-3 examination of accessible surface areas of the containment vessel at the end of the 10-year inservice inspection interval, OPPD proposed to use a general visual examination in accordance with paragraph IWE-3510.1 of the accessible surface areas of the containment.

The staff finds that the visual examination (VT-3) specified in Examination Category E-A, Item E1.12 requires that the visual examination meet the requirements of Subarticle IWA-2200. The requirements specified in Subarticle IWA-2200 were developed for detecting flaws in metal components and, as a result, are more stringent than requirements for detecting degradation such as corrosion. The staff also finds that OPPD has committed that when evidence of degradation is detected, a detailed visual examination will be performed of the suspect area. If a detailed visual examination cannot be performed, the suspect area will be evaluated and

dispositioned by a responsible engineer. The general and/or detailed visual examinations will be performed by personnel certified in accordance with CP-189.

As discussed above, the staff concludes that the alternative examination proposed by OPPD will provide an acceptable level of quality and safety for protecting the containment pressure boundary integrity. On this basis, OPPD's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the first inspection interval for containment inspections.

2.7 Relief Request IWE-007

2.7.1 Code Requirement

ASME Section XI, 1992 Edition, 1992 Addenda, Subsection IWL, Paragraph IWL-2310, Visual Examination and Personnel Qualification, and IWA-2210, Visual Examinations, requires specific minimum illumination and maximum direct examination distance for all concrete surfaces.

2.7.2 Requirements from which Relief is Requested

Relief is requested from the Code requirements of minimum illumination and maximum direct examination distance for all concrete surfaces for the visual examinations. This relief is requested for the first inspection interval for containment inspections required by ASME Section XI, 1992 Edition, 1992 Addenda at FCS.

2.7.3 Alternative Examinations

When performing remotely the visual examinations required by Subsection IWL, Paragraph IWL-2510, the maximum direct examination distance specified in Table IWA-2210-1 may be extended, and the minimum illumination requirements specified in Table IWA-2210-1 may be decreased provided that the conditions or indications for which the visual examination is performed can be detected at the chosen distance and illumination. Inspection personnel will be certified in accordance with ASME Section XI, 1992 Edition, 1992 Addenda, IWA-2313.

2.7.4 Basis for Relief

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested for FCS on the basis that compliance with the specified Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Section 50.55a was amended in the *Federal Register* to require the use of the 1992 Edition, 1992 Addenda, Subsections IWE and IWL, Section XI when performing containment inspections. Subsection IWL, Paragraph IWL-2310 specifies that the minimum illumination, maximum direct examination distance, and maximum procedure demonstration lower case character height shall be as specified in IWA-2210 for VT-1C and VT-3C visual examinations. IWA-2210 allows remote visual examination in lieu of direct visual examination, but requires that the remote examination procedure be demonstrated to resolve the selected test chart characters at minimum illumination levels as specified in Table IWA-2210-1. Section 50.55a(b)(2)(ix)(B) allows an alternative to the minimum illumination and maximum examination

distance requirements of Table IWA-2210-1 for remote visual examinations performed in accordance with IWE only. As a result, remote visual examinations of concrete containments under IWL must be demonstrated to meet the requirements of IWA-2210 and Table IWA-2210-1.

The VT-3C visual examinations required by Section XI are conducted to determine the general structural condition of concrete surfaces by identifying areas of concrete deterioration and distress, such as defined in American Concrete Institute (ACI) Standard 201.1, "Guide for Making a Condition Survey of Concrete in Service." Selected areas, such as those that indicate suspect conditions, shall receive a VT-1C examination in accordance with IWL-2310.

OPPD has determined that accessibility to higher portions of the FCS containment building make it a hardship to obtain the maximum direct examination distance and minimum illumination requirements. The installation of extensive temporary scaffold systems or a climbing scaffold system to access these portions of containment would be necessary. These scaffolds would provide limited access due to containment geometry restrictions as well as structural and equipment interference. The installation and removal of these scaffolds would increase both worker radiation exposure and personnel safety in order to meet Paragraph IWA-2210 requirements. Remote visual examinations are the only practical method for inspecting much of the concrete containment surface area. However, compliance with this requirement to resolve the specified test chart characters at typical examination distances and illumination requirements needed for remote concrete examinations would be difficult and unwarranted for the types of deterioration and distress defined in ACI-201.1. The purpose of IWL-2310 and IWA-2210 is to ensure that visual examinations are performed in a consistent manner that is capable of detecting the conditions for which the examination is performed. The Responsible Engineer will identify minimum size of indications of interest. For remote visual examination, the procedure and equipment to be used will be demonstrated capable of resolving these minimum indications to the satisfaction of the Responsible Engineer and the Authorized Nuclear Inservice Inspector (ANII), as allowed in IWA-2240, "Alternative Examinations." The record of demonstration will be available to regulatory authorities. The proposed alternative provisions for FCS satisfies this purpose while eliminating requirements that are inappropriate or unnecessary for visual examination of Class CC components.

2.7.5 Staff Evaluation of IWE-007

As described in the "Basis for Relief" section above, because the accessibility to higher portions of the dome and the containment building itself will make it a hardship to obtain the maximum direct examination distance and minimum illumination requirements, OPPD proposed an alternative to the requirements for the measurement of illumination and examination distance for visual examinations specified in ASME Section XI, 1992 Edition, 1992 Addenda, IWL-2310, "Visual Examination and Personnel Qualification," and IWA-2210, "Visual Examination." The alternate examinations state that the code required maximum direct examination distance may be increased and the minimum illumination may be decreased provided that the conditions or indications for which the visual examination is performed can be detected at the chosen distance and illumination.

The staff finds that visual examinations on the containment are performed to determine if damage or degradation (cracks, corrosion or other physical damage) warrant additional evaluation or repair of the structure. In order for the visual examinations to be performed in such a way as to detect critical flaws, proper lighting is essential. IWA-2210 allows for remote examination as long as the remote examination procedure is demonstrated to resolve the selected test chart characters. OPPD, when the alternative approach is taken, committed that the Responsible Engineer will identify minimum size of indications of interest. For remote visual examination, the procedure and equipment to be used will be demonstrated capable of resolving these minimum indications to the satisfaction of the Responsible Engineer and the Authorized Nuclear Inservice Inspector, as allowed in IWA-2240, "Alternative Examinations." The record of demonstration will be available to regulatory authorities.

On the basis discussed above, the staff concludes that the examination requirements proposed by OPPD will provide reasonable assurance of the functionality and integrity of the concrete containment. Therefore, OPPD's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the first inspection interval for containment inspections on the basis that compliance with the specific requirements of the Code would result in hardship without a compensating increase in the level of quality and safety.

3.0 CONCLUSION

Based on our review of the information provided in the requests for relief (Relief Requests IWE-001 through IWE-007), the staff concludes that for Relief Requests IWE-005 and -006, OPPD's proposed alternatives will provide an acceptable level of quality and safety. On this basis, the proposed alternatives are authorized pursuant to 10 CFR 50.55a(a)(3)(i). For Relief Requests IWE-001 through -004, and -007, the staff concludes that compliance with the code requirements would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety, and that licensee's proposed alternatives will provide reasonable assurance of containment pressure integrity. Therefore, these proposed alternatives are authorized pursuant to 10 CFR 50.55a(a)(3)(ii). All relief requests are authorized for the first inspection interval for containment inspections required by ASME Section XI, 1992 Edition, 1992 Addenda.

4.0 REFERENCES

1. Letter from S. K. Gambhir, OPPD to NRC, "Request for Relief from ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWE and IWL Requirements for Containment Inspections," dated April 28, 2000.
2. Letter from S. K. Gambhir, OPPD to NRC, "Revision of Request for Relief from ASME Code, Section XI, Subsections IWE and IWL Requirements for Containment Inspection," dated November 17, 2000.
3. Letter from M. T. Frans, OPPD to NRC, "Response to Generic Letter 98-04, Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment," dated November 11, 1998.

4. Letter from L. Raynard Wharton, NRC to S. K. Gambhir, OPPD, "Completion of Licensing Activity for Generic Letter 98-04, 'Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment,' Dated July 14, 1998," dated December 10, 1999.

Attachment: Summary of Relief Requests

Principal Contributor: T. Cheng

Date: February 27, 2001

SUMMARY OF RELIEF REQUESTS
FORT CALHOUN STATION, UNIT 1

Relief Request No.	10CFR 50.55a - ASME Code IWE/IWL Section	Issue Identification	Recommended NRC Action	Remarks
IWE-001	IWE-2500, Table IWE-2500-1 E-D	Examination of Seals and Gaskets	(a)(3)(ii)	authorized
IWE-002	IWE-2500, Table IWE-2500-1, E-G	Qualification and Verification of NDE Personnel	(a)(3)(ii)	authorized
IWE-003	IWE-2420(b) and (c)	Successive Examinations of Repaired or Replaced Areas	(a)(3)(ii)	authorized
IWE-004	IWE-2500(b)	Visual Examination of Paint or Coating Prior to Removal	(a)(3)(ii)	authorized
IWE-005	IWE-2200(g)	Preservice Examinations of Reapplied Paint or Coatings	(a)(3)(i)	authorized
IWE-006	Table IWE-2500-1, E-A	VT-3 Examination of Successive Areas of the Containment Vessel	(a)(3)(i)	authorized
IWE-007	IWL-2310, IWA-2210	Remote Visual Examination of Concrete Containment Surfaces	(a)(3)(ii)	authorized