



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO REQUESTS FOR RELIEF FROM INSERVICE
INSPECTION REQUIREMENTS
DUKE POWER COMPANY
OCONEE NUCLEAR STATION, UNITS NOS. 1, 2, AND 3
DOCKETS NOS. 50-269/50-270/50-287

I. INTRODUCTION

By letter dated August 15, 1983, Duke Power Company (the licensee) requested relief from specific requirements of Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition through Summer 1975 Addenda (the Code) that are mandated for the Oconee Nuclear Station pursuant to 10 CFR 50.55a. The licensee subsequently supplemented the initial requests for relief in letters dated November 18, 1983 and February 23, 1984. This report provides a safety evaluation of the licensee's requests and the staff's basis for approval or denial of each request pursuant to 10 CFR 50.55a(g).

II. BACKGROUND

In compliance with 10 CFR 50.55a(g), the licensee has committed to subject the pressure retaining components of the three Oconee Nuclear Station Units to the system pressure tests required by Articles IWC-5000 and IWD-5000 of Section XI of the Code. These tests, for ASME Code Class 2 and 3 components are defined in Article IWA-5000 of the Code. The licensee has determined that these requirements for specified (components) piping runs are not practical and has proposed alternate methods for examining piping leak integrity.

III. EVALUATION OF RELIEF REQUESTS

The licensee has requested written relief from a system test requirement (Hydrostatic) that has been determined to be impractical in accordance with paragraph 10 CFR 50.55a(g)(6)(i). We have evaluated the information in the referenced letters and have determined that imposing these requirements would result in hardships or unusual difficulties without a compensating increase in the level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), conclusions that these inservice requirements are impractical are justified as follows.

- A. Component: ASME Class 2 Feedwater piping from outlet check valve FDW-37 to the normal feedwater header at the "A" OTSG. Also the piping from outlet check valve FDW-46 to the normal feedwater ring header at the "B" OTSG. The number of welds and pipe dimensions are as follows:

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| <u>UNIT</u> | <u>NUMBER OF WELDS IN PIPING</u> | <u>SIZE</u> |
|---------------|--|---|
| Units 1 and 2 | 78 | 24" dia. x 1.219" wall 20" dia. x 1.131" wall 14" dia. x 0.75" wall |
| Unit 3 | 73 | 24" dia. x 1.219" wall 20" dia. x 1.131" wall 14" dia. x 0.75" wall |

Code Requirement: ASME Section XI, 1974 Edition through Summer 1975 Addenda, Subarticle IWC-5220(a) requires that the system be hydrostatically tested at 1.25 times the system design pressure, e.g., 1275 psig.

Reason for Relief Request: The licensee has determined that performing a hydrostatic test to the pressure required by the Code was impractical because of a limiting component in the system, the Once Through Steam Generator (OTSG). The OTSG(s) are designed to operate at 1050 psig. Paragraph IWC-5222(a) of ASME Section XI, 1980 Edition, states that the system hydrostatic test pressure shall be at least 1.25 times the system pressure PSV for systems with design temperature above 200°F (93°C). The system pressure PSV shall be the lowest pressure setting among the number of safety or relief valves provided for overpressure protection within the boundary of the system to be tested.

Alternate Examination: Because performing the Code required hydrostatic test was impractical, the licensee proposes the following:

Unit 1: There are 78 welds involved in the system and 13 were radiographed during construction. One weld was magnetic particle inspected as per ASME Section XI requirements.

Unit 2: There are 78 welds involved in the system and five were radiographed during construction. One weld was magnetic particle inspected as per ASME Section XI requirements.

Unit 3: There are 73 welds involved in the system and nine were radiographed during construction. Two welds were magnetic particle inspected as per ASME Section XI requirements.

In addition, the licensee hydrostatically tested the piping in Units 1 and 2 to a minimum pressure of 1315 psig and will do the same in Unit 3 during the next scheduled outage.

Staff Evaluation: The Code requirement for this inspection is the 74S75 edition of Section XI which requires that hydrostatic testing of Class 2 components be conducted at 1.25 times the design pressure which in this case would be 1.25 times 1275 psig or 1594 psig. All of the later editions of the Code which have been accepted by NRC (i.e., 77S78 edition

and 80W81 edition) only require that hydrostatic testing of Class 2 components, with service temperature above 200°F, be conducted at 1.25 times the service pressure which in this case would be 1.25 times 1050 psig or 1312 psig. The staff determined that performing the Code required hydrostatic test would impose undue hardship on the licensee without a compensating increase in the level of quality or safety. The licensee's proposed alternate test will provide an acceptable degree of assurance towards leak integrity which is commensurate with the latest accepted ASME Code requirements for this pipe system classification.

- B. Component: For Unit 1, the Purification Demineralizer and the spare purification demineralizer. Also, the piping from the demineralizers to the point where the piping penetrates the floor in the hatch room.

Code Requirement: Subarticle IWD-5200(a) requires that the system be hydrostatically tested at 1.1P(D), the system design pressure, e.g., 150 psig.

Reason for Relief Request: The licensee determined that performing the Code required hydrostatic test was impractical in that it would expose personnel to radiation levels of approximately 170R in the hatch at the demineralizer and between 1R to 1½R at the hatch opening.

Alternate Examination: Because performing the Code required hydrostatic test was impractical as an alternate test, the licensee pressurized the pipe section with one gpm hydrostatic pump to 169 psig and maintained it for four hours. All accessible piping was inspected and no leaks were found.

Staff Evaluation: The staff has determined that performing the Code required hydrostatic test would impose undue hardship, e.g., would require testing personnel to receive excessive radiation dosage, without a compensating increase in the level of quality or safety. The licensee's proposed alternative for verifying system leak integrity, e.g., pressurization to 169 psig for four hours, provides an acceptable level of assurance with respect to leak integrity which is commensurate with ASME Code requirements for this pipe system classification.

- C. Component: ASME Class 3 piping in the low pressure service water system (LPSW) which provides for a return to the component cooling water (CCW) header piping from gate valves 1LPSW-108, 1LPSW-254, 1LPSW-77, 1LPSW-78, 1LPSW-256, 2LPSW-256, 2LPSW-78 and 2LPSW-117, in Units 1 and 2.

Code Requirement: Subarticle IWD-5200(a) requires that the system be hydrostatically tested at 1.1P(D).

Reason for Relief Request: The licensee has determined that performing the Code required hydrostatic test is impractical in that it would require both units to be shutdown since the system is shared by both units.

Alternate Examination: Because performing the Code required hydrostatic test was impractical, the licensee proposed to perform a functional verification test (walkdown) following a four hour hold time under normal system operating conditions, e.g., discharge pressure 80 to 100 psig at ambient lake water temperature. This test was performed during the previous outage.

Staff Evaluation: The staff has determined that performing the Code required hydrostatic test would impose undue hardship on the licensee without a compensating increase in the level of quality or safety. The licensee's proposed alternative for verifying system leak integrity, e.g., system walkdown following a four hour hold time at operating conditions, provides an acceptable level of assurance towards system leak integrity which is commensurate with ASME Code requirements on this pipe system classification.

- D. Component: ASME Class 3 piping used to provide normal feedwater to the Once Through Steam Generators, OTSG(s) and to the emergency feedwater system in Units 1, 2, and 3. The pipe sections for which relief from the Code required hydrostatic test was being requested are between valves FDW-32, FDW-36, and FDW-37, and within FDW-41, FDW-45 and FDW-46.

Code Requirement: ASME Section XI, 1974 Edition, through Summer 1975 Addendum, subarticle IWC-5220(a) requires that the system be hydrostatically tested at 1.25 P(D) system design pressure, e.g., 1275 psig.

Reason for Relief Request: The licensee has determined that performing a hydrostatic test to the pressure required by the Code was impractical because of the existing check valve arrangement and a limiting component in the system, the OTSG. The OTSG(s) are designed to operate at 1050 psig. Paragraph IWC-5222(a) of ASME Section XI, 1980 Edition, states that the system hydrostatic test pressure shall be at least 1.25 times the system pressure PSV for systems with design temperature above 200°F (93°C). The system pressure PSV shall be the lowest pressure setting among the number of safety or relief valves provided for overpressure protection within the boundary of the system to be tested.

Alternate Examination: Because performing the Code required hydrostatic test was impractical, the licensee proposed the following alternate examination schedule.

Unit 1: Pipe size is 24" OD, 1.219" wall, 6" OD, .432 wall. 24 welds were inspected visually. Of these, 11 were radiographed and seven were liquid penetrant (P/T) examined.

Unit 2: Pipe size is 24" OD, 1.219" wall, 6" OD, .432 wall. 18 welds were inspected visually. Of these, 14 were radiographed and one was P/T examined.

Unit 3: Pipe size is 24" OD, 1.219" wall, 6" OD, .432 wall.

16 welds were inspected visually. Of these, 15 were radiographed and one was P/T examined.

Piping will be hydrostatically tested at a minimum of 1315 psig.

The licensee reported the alternate examination was completed for Units 1, 2, and 3.

Staff Evaluation: The staff has determined that performing the Code required hydrostatic test would impose undue hardship on the licensee without a compensating increase in the level of quality or safety. The licensee's proposed alternative test for verifying leak integrity, e.g., radiography, liquid penetrant and visual examinations augmented by a hydrostatic pressure test at 1315 psig minimum, provides an acceptable alternative to the Code required hydrostatic test.

- E. Component: ASME Class 3 piping between feedwater valves FDW-324, FDW-325, FDW-326 and FDW-327 in Units 1, 2, and 3. There are a total of four welds between these valves. The pipe section is made up of three inch and four inch diameter piping.

Code Requirement: Subarticle IWD-5200(a) requires that the system be hydrostatically tested at 1.10 P(D) system design pressure, e.g., 1275 psig.

Reason for Relief Request: The licensee has determined that performing the Code required hydrostatic test was impractical in that it would require the use of a valve on the opposite side of the line being tested which is rated 1050 psig. This would cause overpressurization of this line and the recirculation pump used as the connecting point for the pressure test gauge.

Alternate Examination: Because performing the required hydrostatic test on this pipe section is impractical, the licensee proposes to do a surface examination, e.g., magnetic particle (M/T) on the four welds. The submittal indicated that the proposed examination was performed on the Unit 1 welds and the licensee will do the same during the next scheduled outage for Units 2 and 3.

Staff Evaluation: The staff has determined that performing the Code required hydrostatic test would impose undue hardship on the licensee without a compensating increase in the level of quality or safety. The licensee's proposed alternative test for verifying system leak integrity, e.g., magnetic particle examination of the four welds in this pipe section, provides an acceptable degree of assurance towards leak integrity which is commensurate with ASME Code requirements on this pipe system classification.

- F. Component: ASME Class 3 piping between feedwater valves 1FDW-368 to 1FDW-311 in Unit 1. The pipe section for which relief is requested involves one weld with associated sections of six inch carbon steel pipe used to tie-in the turbine driven emergency feedwater pump to the 1A motor driven emergency feedwater discharge header.

Code Requirement: Subarticle IWD-5200(a), requires that the system be hydrostatically tested at 1.1P(D).

Reason for Relief Request: The licensee determined that performing the Code required hydrostatic test was impractical in that the pipe section between valves 1FDW-368 and 1FDW-311 cannot be isolated for the hydrostatic test without overpressurizing the turbine driven emergency feedwater pump.

Alternate Examination: Because performing the required hydrostatic test was impractical, the licensee proposed to do surface examination, M/T, on the weld. The licensee reported this weld passed a visual examination following fabrication.

Staff Evaluation: The staff has determined that performing the Code required hydrostatic test would impose undue hardship on the licensee without a compensating increase in the level of quality or safety. The licensee's proposed alternative for verifying system leak integrity, e.g., magnetic particle examination of the weld joints in this pipe section, provides an acceptable degree of assurance regarding leak integrity which is commensurate with ASME Code requirements on this pipe system classification.

- G. Component: ASME Class 3 piping between valves 2LPSW-356, 1LPSW-356, and LPSW-117. This piping section is shared by Units 1 and 2 and it is a part of the low pressure service water (LPSW) return line from the component cooling (CC) coolers to the component cooling water outlet. There are a total of 12 welds involved and the pipe sizes include 4", 6", 10" and 12" diameter piping.

Code Requirement: Subarticle IWD-5200(a) requires that the system be hydrostatically tested at 1.1P(D).

Reason for Relief Request: The licensee determined that performing the Code required hydrostatic test was impractical in that this pipe section common header cannot be isolated for hydrostatic testing because it is a shared system. To perform the test would require both Units to be at cold shutdown conditions.

Alternate Examination: Because performing the required hydrostatic test was impractical, the licensee proposed the following alternate examination schedule.

1. Perform visual examination of the welds at normal system operating conditions.
2. Radiograph one of two welds in the 4" diameter section, and the one weld in the 10" diameter pipe section.
3. Perform a magnetic particle examination on one of the four welds in the 12" diameter pipe section.

4. Perform a visual examination on 12 welds.

The licensee reported that this examination has been completed.

Staff Evaluation: The staff has determined that performing the Code required hydrostatic test would impose undue hardship on the licensee without a compensating increase in the level of quality or safety. The licensee's proposed alternative for verifying system leak integrity, e.g., radiography, magnetic particle inspection, visual examination of welds following fabrication and under operating conditions, provides an acceptable degree of assurance regarding leak integrity which is commensurate with ASME Code requirements for this pipe system classification.

- H. Component: ASME Class 3 piping between the purification demineralizers 2A, 3A, and 3B, and continuing to the point where it (pipe) penetrates the floor in the hatch area of Units 2 and 3. Pipe size and number of welds involved are as follows:

Unit 2 - 2½" diameter pipe with 17 welds
1" diameter pipe with 2 welds

Unit 3 - 2½" diameter pipe with 51 welds
3" diameter pipe with 8 welds

All welds were visually inspected per Code requirements following fabrication and found acceptable.

Code Requirement: Subarticle IWD-5200(a) requires that the system be hydrostatically tested at 1.1P(D).

Reason for Relief Request: The licensee determined that performing the Code required hydrostatic test was impractical in that radiation levels in the hatch at the demineralizers were approximately 500R for Unit 2 and 150R for Unit 3. Hatch openings were 1.5R while piping in the hatch is not accessible for inspection.

Alternate Examination: Because performing the required hydrostatic test was impractical, the licensee proposed the following alternate examination.

Units 2 and 3 - Pressurize to 176 psig and inspect all accessible piping. This test was performed on Unit 2 piping and no leaks were observed. Units 3 piping will be pressurized during next outage.

Staff Evaluation: The staff has determined that performing the Code required hydrostatic test would impose undue hardship on the licensee without a compensating increase in the level of quality or safety. The licensee's proposed alternative for verifying system leak integrity, e.g., pressurization to 176 psig, provides an acceptable level of assurance regarding leak integrity. This conclusion is based on the fact that the test pressure exceeds 1.25 times the 150 psig operating

pressure which is the test requirement of later editions of the Code.

- I. Component: ASME Class 3 piping in the low pressure service water system (LPSW), Units 1 and 2. Specifically, the piping sections involved in this request are between valves LPSW-206, 1LPSW-349, 2LPSW-350, 1LPSW-109, LPSW-113, and 2LPSW-109. Following is a compilation of welds and associated pipe sizes.

| <u>Welds</u> | <u>Diameter x Wall Thickness</u> |
|--------------|----------------------------------|
| 7 | 3" x 0.216" |
| 2 | 2½" x 0.203" |
| 2 | 2" x 0.154" |
| 33 | 12" x 0.375" |

All welds were found acceptable by Code required visual examination following fabrication. Three of the 12" diameter pipe welds, selected at random, were liquid penetrant (P/T) examined following fabrication and found acceptable.

Code Requirement: Subarticle IWD-5200(a) requires that the system be hydrostatically tested at 1.1 times system design pressure.

Reason for Relief Request: The licensee determined that performing the Code required hydrostatic test was impractical in that this pipe section cannot be isolated for hydrostatic testing because it is a shared system by Units 1 and 2. To perform the hydrostatic test would require both units to be simultaneously at cold shutdown conditions.

Alternate Examination: Because performing the Code required hydrostatic test was impractical, the licensee has proposed the following alternate examination schedule.

Visually inspect all welds for leak integrity under normal system operating conditions.

The licensee reported this inspection had been completed.

Staff Evaluation: The staff has determined that performing the Code required hydrostatic test would impose undue hardship on the licensee without a compensating increase in the level of quality or safety. The licensee's proposed test for verifying leak integrity provides an acceptable level of assurance regarding leak integrity which is commensurate with ASME Code requirements for this pipe system classification.

- J. Component: ASME Class 3 piping in the liquid waste drain (LWD) system of Units 1, 2, and 3 between valves LWD-99 and LWD-103. The system is used as the drain line for Reactor Building Emergency Sump to the High Activity waste. The pipe section for which relief from hydrostatic testing is being requested is two inches in diameter and has a total of six welds. All six welds were visually examined and found acceptable following fabrication.

Code Requirement: Subarticle IWD-5200(a) requires that the system be hydrostatically tested at 1.1P(D).

Reason for Relief Request: The licensee has determined that performing the Code required hydrostatic test was impractical in that there are no test connections between valves LWD-99 and LWD-103, which precludes access to the line for hydrostatic testing purposes.

Alternate Examination: Because performing the required hydrostatic test was impractical, the licensee has proposed to perform liquid penetrant examination on the six welds during the next scheduled refueling outage. The licensee reported these examinations have been completed.

Staff Evaluation: The staff has determined that performing the Code required hydrostatic test would impose undue hardship on the licensee without a compensating increase in the level of quality or safety. The licensee's proposed alternate test for verifying leak integrity, e.g., liquid penetrant examination, provides an acceptable level of assurance regarding leak integrity which is commensurate with ASME Code requirements for this pipe system classification.

- K. Component: ASME Class 3 piping in the low pressure service water (LPSW) system of Unit 3. The piping runs from the outlets of valves 3LPSW-108, 3LPSW-77, 3LPSW-78 and 3LPSW-117 to the inlet of valve 2LPSW-133. The pipe provides discharge flow from the component cooling system's coolers, LPI cooler "3A", LPI cooler "3B," and low pressure service water return from Unit 3 Reactor Building. Following is a compilation of welds and associated pipe sizes.

| <u>WELDS</u> | <u>DIAMETER x WALL THICKNESS</u> |
|--------------|----------------------------------|
| 4 | 18" x 0.375" |
| 12 | 3/4" x 0.113" |
| 12 | 16" x 0.375" |
| 2 | 2" x 0.154" |
| 5 | 12" x 0.375" |
| 2 | 20" x 0.375" |

Code Requirement: Subarticle IWD-5200(a) requires that the system be hydrostatically tested at 1.1P(D).

Reason for Relief Request: The licensee has determined that performing the Code required hydrostatic test was impractical in that this pipe section cannot be isolated for hydrostatic testing because valve 2LPSW-133 above cannot be closed because of the potential for not reopening. Valves of the same type have not reopened after closing because of sheared hinge pins. Loss of valve operability will degrade decay heat removal capability.

Alternate Examination: Because performing the required hydrostatic test is impractical, the license has proposed to visually inspect the piping under normal system operating conditions. The licensee reported the inspection had been completed.

Staff Evaluation: The staff has determined that performing the Code required hydrostatic test would impose undue hardship on the licensee without a compensating increase in the level of quality or safety. The licensee's proposed alternate test for verifying leak integrity provides an acceptable degree of assurance regarding leak integrity which is commensurate with ASME Code requirements for this pipe system classification.

IV. CONCLUSIONS

The staff has determined that relief from the hydrostatic tests required by Section XI of the ASME Code is justifiable. The alternative program, as proposed by Duke Power Company, of nondestructive volumetric and surface examinations, system leak tests at operating pressure and hydrostatic testing will provide an acceptable level of structural integrity. Relief may be granted pursuant to paragraph 10 CFR 50.55a(g)(6)(i) based on our finding that certain specific requirements of Section XI of the ASME Boiler and Pressure Vessel Code, 1974 Edition through Summer 1975 Addenda, are impractical. Implementation of the requirements would result in hardships or unusual difficulties without a compensating increase in the level of quality or safety. The staff concluded, based on the considerations discussed above, that the granting of this relief is authorized by law and will not endanger life or 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 on the facility.

V. REFERENCES

- a. Letter - H. B. Tucker, Duke Power Company to H. R. Denton, NRC/NRR dated August 15, 1983,
- b. Letter - H. B. Tucker, Duke Power Company to H. R. Denton, NRC/NRR dated November 18, 1983.
- c. Letter - H. B. Tucker, Duke Power Company to H. R. Denton, NRC/NRR dated February 23, 1984,

Dated:

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