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

July 12, 1988

Docket Nos.: 50-369
50-370

Mr. H. B. Tucker, Vice President
Nuclear Production Department
Duke Power Company
422 South Church Street
Charlotte, North Carolina 28242

Dear Mr Tucker:

SUBJECT: RELIEF FROM ASME CODE REQUIREMENTS FOR MODIFICATIONS TO THE NUCLEAR SERVICE WATER SYSTEM, MCGUIRE NUCLEAR STATION, UNITS 1 AND 2 (TACs 64644 AND 64645)

By letter dated February 9, 1987, as corrected February 16, 1987 and supplemented March 25, 1988, you requested and supported relief from the hydrostatic testing requirements of Section XI of the ASME Boiler and Pressure Vessel Code, 1980 Edition through Winter 1980 Addenda, Article IWA-4400 and IWD-5000. The requests are associated with modifications to the Nuclear Service Water (RN) System for the McGuire Nuclear Station, Units 1 and 2. Specifically, relief was requested from hydrostatic testing of welds associated with the following Duke modification (MG) numbers:

MG-1-1887 Rev. 2 and MG-2-0666 Rev. 2: These modifications would replace containment spray heat exchanger downstream isolation valves 1RN137A, 1RN238B, 2RN137A and 2RN238B on the RN system. The welds are associated with two new slip-on flanges which will be installed for each valve as part of these modifications. The valves are being replaced to support a wet-layup system for each heat exchanger to provide for chemistry control of the shell side (RN side) of the heat exchangers. The piping and flanges are carbon steel and welding will be carbon steel to carbon steel. In lieu of hydrostatic testing, you propose magnetic particle testing (MT) or liquid dye penetrant testing (PT) and an inservice leak inspection.

MG-1-0351 Rev. 0: This modification would add drains and bypass lines to the RN system to improve system draining capability. The welds are associated with final tie-in (i.e., the joining of new piping to the existing piping) to the process header on check valve bypass lines and final tie-in to the process header on the high point bypass loop. All other welds within the new piping will be hydrostatically tested. All piping is carbon steel and all welds will be carbon steel. In lieu of hydrostatic testing on the bypass lines around the check valves and at the high point, you propose MT or PT and an inservice leak inspection for the final tie-in to the header.

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MG-1-1886 Rev 0, MG-1-1888 Rev. 0, MG-1-1889 Rev. 0, MG-1-1890 Rev. 0, MG-1-1891 Rev.0, MG-1-1892 Rev. 0, MG-2-0067 Rev. 0, MG-2-0668 Rev.0, MG-2-0669 Rev. 0, MG-2-0670 Rev. 0, MG-2-0 0671 Rev. 0, MG-2-0672 Rev. 0: These modifications replace small diameter carbon steel piping going to various pump motor coolers or air handling units with stainless steel piping. The pump motor coolers are for the safety injection system and the chemical control system (MG-1-1888 and MG-2-0668), the RN system (MG-1-1890 and MG-2-0670), the auxiliary feedwater system (MG-1-1891 and MG-2-0671), and the component cooling water system (MG-1-1886 and MG-2-0067).

The air handling units are for the residual heat removal pumps and containment spray pumps (MG-1-1889 and MG-2-0669), and for the spent fuel cooling system (MG-1-1892 and MG-2-0672). All welding within the new piping (couplings, elbows, valves, etc.) will be stainless to stainless, while the welds at the junctions of the new and existing piping will be stainless to carbon welds. In lieu of hydrostatic testing, you propose that the welds between the supply/discharge header and the first isolation valve be tested by PT or MT and you proposed an inservice leak inspection. The welds between the isolation valves will be hydrostatically tested.

The RN system is a low-temperature, low pressure (135 psig) system. The associated hydrostatic test pressure on the system would be 110% of design pressure or about 150 psig. You have concluded that hydrostatic testing of certain welds is impractical because the sections of piping containing these welds cannot be adequately insolated for such testing. The isolation valves are large butterfly valves ranging from 10 to 36 inches in diameter. Such valves are not designed to be leak tight and have a history of leakage. You also noted that attempting a hydrostatic test of the RN supply and discharge header would cause a significant burden as it would involve significant planning, manpower and equipment (i.e., high capacity, high head pumps), and would add days to the outage schedule. Therefore, you have proposed alternate testing, discussed above, consisting of nondestructive examinations in excess of that required by code and an inservice leakage inspection.

The staff has evaluated the relief requests for the above modifications. Enclosed is our safety evaluation report. We conclude that the ASME Code requirement is impractial to perform at the McGuire Nuclear Station, and that the alternative tests provide an acceptable level of structural integrity. Compliance with the specific ASME Code requirements would result in hardship without a compensating increase in the level of quality and safety.

Accordingly, based on the alternative tests proposed, relief from the hydrostatic test requirements is granted as requested, pursuant to 10 CFR 50.55a(g)(6)(i). 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 given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Sincerely,

Original signed by:
David B. Matthews, Director
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Enclosure:
As Stated

cc w/encl
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ENCLOSURE

SAFETY EVALUATION OF REQUEST FOR RELIEF FROM
REQUIREMENTS OF ASME SECTION XI
MCGUIRE, UNITS 1 AND 2
DUKE POWER COMPANY

Docket Nos. 50-369 and 50-370

1.0 INTRODUCTION

By letter dated February 9, 1987, as modified by letter dated February 16, 1987, Duke Power Company (the licensee) requested relief from the ASME Boiler and Pressure Vessel (B&PV) Code, Section XI, hydrostatic testing requirements for portions of modifications on the Nuclear Service Water (RN) System for McGuire Nuclear Station, Units 1 and 2. The reason for the request is that the licensee has determined that conformance with Code hydrostatic test requirements is impractical.

The licensee requested this relief because of the difficulty of performing the hydrostatic tests and the time constraints imposed by Technical Specifications for other systems that would be inoperable during modification to the RN system. The relief request, as modified, states that the alternate examinations are as good as testing required by the code for detecting weld defects and ensuring safe operation of the system.

2.0 EVALUATION

The staff has evaluated the licensee's written relief requests as detailed below.

a. ASME Code Section XI Requirement for which Relief is Requested.

The ASME B&PV Code, Section XI, 1980 Edition through Winter 1980 Addenda, IWA-4400 and IWA-5000, requires a hydrostatic test following repair or replacement by welding.

The relief request involves portions of modifications to the RN systems including changing small diameter carbon steel piping to stainless steel piping going to a number of coolers for safety-related pumps. The major modifications are to reduce problems associated with fouling in the RN system. The licensee requested relief from hydrostatic testing of welds performed as part of modifications to large diameter RN piping and for welds tying the small diameter pump cooling systems to the large diameter RN system piping. The welds in the small diameter pump cooling systems are to be hydrostatic tested between isolation valves in the cooling systems. Only the welds that cannot be isolated from the large diameter piping are covered by the relief requests.

The modifications were scheduled to be implemented during the 1987 and 1988 refueling outages.

NRC Inspection Report No. 50-369, 370/87-44 documented the review of weld records and observation of actual configurations for welds for which relief was requested. The licensee was requested to provide additional information relative to justification for alternate testing and support of impracticability of performing code required tests. Additional information was provided by licensee's letter dated March 25, 1988.

b. Components for Which Relief is Requested

(1) The various components for which relief is requested are identified by modification (MG) numbers as follows:

(a) MG-1-1887: All welds associated with the replacement of Valves 1RN137A and 1RN238B. Two new slip-on flanges per valve will be installed on this modification.

(b) MG-2-0666: All welds associated with the replacement of Valves 2RN137A and 2RN238B. Two new slip-on flanges per valve will be installed on this modification.

(c) MG-1-0351: Welds associated with final tie-in to process header on check valve bypass lines and welds associated with final tie-in to process header on high point bypass loop. The final tie-in weld are the welds that connect the new piping to the existing piping. All other welds within the new piping will be hydrostatically tested.

(d) MG-1-1886, MG-1-1888, MG-1-1889, MG-1-1890 , MG-1891, MG-1-1892, MG-2-0667, MG-2-0668,, MG-2-0669, MG-2-0670, MG-2-0671, MG-2-0672: All welds between the supply/ discharge header and the first isolation valve. All welds between the isolation valves will be hydrostatically tested.

(2) Materials (Base and Weld)

Carbon Steel Piping Materials - A-106, GR B or equivalent

Stainless Steel Piping Materials - SA-312, TP 304

Welding Materials
- Carbon Steel to Carbon Steel: E-7018 or E70S-2
- Stainless Steel to Stainless Steel: E308-16 or ER-308

- Stainless Steel to
  Carbon Steel: E309-16 or ER309

c. ASME Code Class: Equivalent to Section III Class 3

d. Function

The Nuclear Service Water System is a Nuclear Safety-Related open cooling system that provides cooling water from Lake Norman or the Standby Nuclear Service Water Pond (SNSWP) to various station heat exchangers during all modes of operation. In addition, the system acts as an assured source of makeup water for various requirements and is the normal supply water for the Containment Ventilation Cooling Water System (RV). In addition to these general functions, the following specific functions as related to the above listed modifications are applicable:

(1) MG-1-1887 and MG-2-0666 - Containment Spray (NS) heat exchanger downsteam isolation valves (1RN137A, 1RN238B, 2RN137A, and 2RN238B) on the RN system will be replaced. Valves are being replaced to support a wet-layup system for each heat exchanger. The purpose of the wet-layup system is to keep the shell side (RN side) of the heat exchangers in a chemically controlled environment.

(2) MG-1-1888 and MG-2-0668 - Replace small diameter carbon steel piping going to the NI (Safety Injection System) pump motor coolers and the NV (Chemical Volume Control System) pump motor coolers with stainless steel piping.

(3) MG-1-1890 and MG-2-0670 - Replace small diameter carbon steel piping going to the RN (Nuclear Service Water) pump motor coolers with stainless steel piping.

(4) MG-1-1891 and MG-2-06671 - Replace small diameter carbon steel piping going to the CA (Aux. Feedwater) pump motor coolers with stainless steel piping.

(5) MG-1-1886 and MG-2-0667 - Replace small diameter carbon steel piping going to the KC (Component Cooling Water) pump motor coolers with stainless steel piping.

(6) MG-1-1889 and MG-2-0669 - Replace small diameter carbon steel piping going to the ND (Residual Heat Removal) air handling units, NS (containment spray) pump air handling unit with stainless steel piping.

(7) MG-1-1892 and MG-2-0672 - Replace small diameter carbon steel piping going to the KF (Spent Fuel Cooling) air handling unit with stainless steel piping.

(8) MG-1-0351 Rev. 0 - Add drains and bypass lines to the RN system to improve system draining capability.

(e) Basis for Requesting Relief

The modification work (see b. above), for which relief is requested, will be performed during refueling outages. During the refueling outages, there are certain periods of time each train of RN can be drained. RN System cools the ND (Residual Heat Removal System) and the KF System (Spent Fuel Pool Cooling System) both of which are needed for the majority of the outage. Based on a typical outage schedule, the RN supply and discharge header for either "A" or "B" Train can be drained and available for work for about ten days on Unit 2 and six days on Unit 1. Unit 1 is more restricted due to the fact that the VC/YC (Control Area Ventilation System/Chilled Water System) Chillers discharge to Unit 1 discharge header only; thus when Unit 1 discharge header is drained, it makes VC/YC inoperable which places Unit 2 in a seven-day Technical Specification operability constraint (per TS 3.7.6). These time periods allow barely enough time to accomplish the actual physical labor involved in implementing the modifications to the RN System.
Attempting a hydro on the entire RN supply and discharge header would involve significant planning, manpower and equipment (high capacity, high head pump). A hydro on this large of a section of piping would add days to the outage schedule even if the pump was staged ahead of time. Most of the time needed would be comprised of valve alignments to fill and vent the system.

Sections of piping containing subject welds cannot be adequately isolated for hydrostatic testing. Isolation valves are large butterfly valves ranging from 10" to 36" which are not designed to be leak tight and have a history of leakage. Even with a high capacity hydro pump, there is still a good possibility that pressure cannot be maintained due to leakage past valves. Repair of the large diameter valves would be a major undertaking since the valves are welded into the system rather than flanged.

The alternate testing identified in paragraph (f) below involves Nondestructive Examination (NDE) in excess of that required by Code and an inservice leakage inspection. The alternate testing is considered equivalent to hydro testing for detecting weld defects to ensure safe and consistent operational reliability of system without any undue risk to the health and safety of the public based on the following:

The RN System is a low temperature, low pressure (135 psig design pressure) system. Hydro pressure on the system would be 110% of design pressure or approximately 150 psig.

The additional MT or PT examination requirement compensates for the difference in hydro pressure and inservice leak inspection pressure (80-90 psig). The possibility of discovering additional weld defects by pressurizing to 150 psig is low to none.

(f) Alternate Testing

The applicable Code for the modifications, ASME B&PV Code, Section III, Class 3, requires that welds > 4" NPS receive a final weld liquid penetrant (PT) or magnetic particle (MT) examination. The welds for which relief from hydrostatic testing has been requested will receive the following tests and inspections:

Fitup
Root Pass PT or MT (Welds > 4" NPS)
Final Weld Visual (VT)
Final Weld PT or MT
VT-2 Inservice Leakage Test

3.0. CONCLUSION

The relief request are granted as requested based on the following considerations:

- The staff has determined that it is impractical to perform the required hydrostatic tests because, (1) sections of piping containing subject welds cannot be adequately isolated because either there are no isolation valves between the welds and a major component (heat exchanger) or the valves needed for isolation are large diameter butterfly valves not designed to be leak tight and having a history of leakage, (2) the short time period the RN system is available for modification work during an outage, and (3) the time and effort required to perform the hydro test considering the high probability of leakage past the isolation valves.

- The alternate examinations and tests proposed by the licensee will provide an acceptable level of structural integrity for the welds in question and provide reasonable assurance of opertional readiness.

Paragraph 10 CFR 50.55a(g)(4) requires that components (including supports) which are classified as ASME Code Classes 1, 2 and 3 meet the requirements, except design and access provisions and preservice requirements, set forth in applicable editions of ASME Section XI to the extent practical within the limitations of design, geometry and

materials of construction of the components. Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee determined that conformance with certain Code requirements are impractical for this facility and submitted supporting information. In accordance with 10 CFR 50.55a(g)(6)(i), the staff concludes that relief may be granted for the issues described in the Relief Request. This relief is authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest given due consideration to the burden upon the licensee that could result if the requirement were imposed.