ENCLOSURE 1

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

Docket No. 50-369

1.0 INTRODUCTION

By letter dated October 26, 1987, Duke Power Company (the licensee) requested relief from certain ASME Boiler and Pressure Vessel (B&PV) Code requirements. The relief requests are detailed in five attachments to the letter. Attachment 1 covers request for relief from hydrostatic testing of repairs to groundwater monitoring piping. Attachments 2, 4, and 5 cover request for relief from hydrostatic testing of modifications to the Nuclear Service Water (RN) system. Attachment 3 covers request for relief from Liquid Penetrant (PT) testing of RN system weld RNIF-427. The reason for the requests is that the licensee has determined that conformance with code requirements for hydrostatic testing of the groundwater monitoring system, hydrostatic testing of RN system piping and PT inspection of the root side of weld RNIF-427 is impractical.

NRC inspection documented by Report No. 50-369, 370/87-44 was performed to review weld records and observe actual configurations for welds for which relief was requested. Also, 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 letters dated January 19, and May 4, 1988.

2.0 STAFF EVALUATION

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

a. Attachment 1 - Groundwater Monitoring Penetration

(1) 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 IWC-5000, require a hydrostatic test following repair or replacement by welding.

(2) Component For Which Relief Is Requested

(a) Component Name

Penetration piping in the Reactor Building Incore Instrumentation Room floor was modified to secure leakage of groundwater into the room which resulted from sampling groundwater beneath the Reactor Building liner plate. The modification encloses the leaking sample plug in a capped 1-1/2" diameter pipe. The relief request is for the full penetration weld attaching the 1-1/2" diameter pipe to the penetration and the seal weld between the pipe and screwed pipe cap.

(b) Materials and Welds

Materials - 1-1/2" C.S. Pipe, SA106, Gr.B, Sch. 80
- 1-1/2" C.S. Pipe Cap, SA105, Gr.B, 3000#
Welds - One full penetration and one seal weld - E70S-2

(c) ASME Code Class

The groundwater monitoring penetration is part of the containment and is ASME Class MC.

(d) Function

The penetration is a 4" diameter pipe installed vertically through the floor of the Reactor Building and is attached to the liner plate. The liner plate has a 2-1/2" diameter hole drilled through it to allow installation of a cathodic protection electrode. Since the electrode is inoperable, sampling of the groundwater beneath the liner plate was required to determine the corrosiveness of the groundwater on the liner plate. To obtain the water sample, a 1/2" plug was removed from a 1/2" half coupling on the 4" penetration pipe. Once the sample was obtained, the plug was to be reinstalled, seal-welded, and a leak rate test performed. However, groundwater leakage by the plug and coupling threads prevented obtaining an acceptable weld. To qualify the penetration, a 1-1/2" diameter pipe was placed over the existing coupling and plug and welded to the 4" pipe. A 1-1/2" pipe cap was then installed on the end of the 1-1/2" pipe and seal-welded.

(3) Basis For Requesting Relief

After re-installing the 1/2" plug, an acceptable weld could not be obtained due to groundwater leakage through the plug-coupling connection. It is physically impossible to perform a hydrostatic test on the 1-1/2" pipe and cap (covering the 1/2" plug) because isolation of the volume within the pipe is not possible due to the leakage occurring around the 1/2" coupling and plug. The inside of the pipe and welds experience groundwater pressure through the leaking 1/2" pipe coupling to plug weld. Therefore, the design does not lend itself to hydrostatic testing. An acceptable level of structural integrity is ensured based on:

- Alternate Testing (See Paragraph (4) below)
- The welds in question have not exhibited any groundwater leakage from the bypass occurring at the 1/2" coupling and plug.
- The welds attaching the 1-1/2" pipe and cap are pressure boundary welds but are not structural load carrying welds except to prevent leakage from the containment. In the event of pressurization of the Incore Instrumentation Room, the pressure load to the 1-1/2" pipe and cap will be external. Thus, the welds in question will be subjected to stresses that are compressive rather than tensile.

(4) Alternate Testing

The welds for which relief is requested received the following tests and inspections:

Fitup
Root Pass Liquid Penetrant (PT)
Final Weld Visual (VT)
Final Weld PT
VT-2 Inservice Leakage Test
Pneumatic Leak Test

(5) Evaluation

The licensee requested relief from the ASME B&PV Code, Section XI, 1980 Edition, IWA-4400 and IWC-5000, which require a hydrostatic test following repair or replacement by welding. The original licensee submittal indicated that the groundwater monitoring penetration was equivalent to ASME Class 2. The supplemental information provided on May 4, 1988, correctly identifies the penetration as part of the containment or ASME Class MC. Since class MC components are not required to be hydrostatically tested, the requested relief is not required. The alternate testing specified above provided an acceptable level of structural integrity and leak tightness of the containment.

b. Attachments 2, 4, and 5 - Nuclear Service Water System (RN) Welds

(1) 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.

(2) Components For Which Relief is Requested

(a) Component Names

Attachment 2	-	18" diameter, .375" thick groove weld numbers 58-1 and 58-2 at valve IRN135
	-	18" diameter, .375" thick groove weld numbers 60-1 and 60-2 at valve IRN235
	-	2" diameter, .154" thick socket weld numbers RN1FW-3312, 3313, and 3314 at valve 1RN130A
Attachment 4	-	20" diameter slip-on flange welds 1RN673-1 and IRN673-2
Attachment 5	-	20" diameter, .375" thick groove weld 1RN666-4 and 20" diameter slip-flange fillet welds 1RN666-2 and 1RN666-3 at valve 1RN190

(b) Materials

Attachment 2	-	Piping material: SA-106 Gr. B
	-	Welding material: E7018 or E70S-2
Attachment 4	-	Piping material: SA-182, type 304 stainless steel and SA-106, Gr. B carbon steel
	-	Welding material: E309-16 or ER 309
Attachment 5	-	Piping material: SA-182, Type 304 stainless steel and SA-106, Gr. B carbon steel

- Welding material: Carbon steel to Carbon Steel - E7018 or E70S-2; Stainless to Stainless - E308-16 or ER-308; Carbon to Stainless - E309-16 or ER309

(c) ASME Code Class

Equivalent to Section III, Class 3

(d) Function

The Nuclear Service Water (RN) 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).

(3) Basis for Requesting Relief:

The valves used for isolation of the RN system are a butterfly type design and range in size from 18 inches up to 36 inches. Historically, these valves have not held design hydro pressure without significant leakage. These valves are welded into the system and cannot be easily removed without causing the same hydro problems that presently exist. The use of flanges in the RN system is limited, thereby limiting the use of blanks or blank flanges to enhance hydro capabilities.

Additional hydro pump capacity is not available nor is it considered usable in this situation because hydro pump leakage past the butterfly valve seats could potentially over pressurize other vital equipment such as heat exchangers and critical instrumentation. System pressures range from 135 psig to 35 psig. The required design changes to install isolation valves and/or the installation of blanks into the system to achieve hydro capability would place an additional burden of time, manpower, planning, and execution expense on Duke, without a commensurate increase in operational quality of the system.

The section of the RN system in question operates at a low design pressure and temperature of 135 psig and 95°F respectively. Duke Power considers the alternate and additional examinations (See paragraph (4) below) more than adequate to ensure safe and consistent operational reliability of the system. The basis for the alternate testing is that the examinations will detect any defects that would have otherwise

been exposed by the pressure differential between the operating pressure and hydrostatic testing pressure.

Thus, the probability of detecting any additional weld defects by hydrostatic testing is low.

(4) Alternate Testing

The applicable Code for the modifications, ASME B&PV Code, Section III, Class 3, requires that welds greater than 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

(5) Evaluation

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

- The staff has determined that it is impractical to perform the required hydrostatic tests because the section of piping containing the subject welds cannot be adequately isolated because the valves needed for isolation are large diameter butterfly valves not designed to be leak tight and having a history of leakage. In addition, the time and effort required to perform the hydro test would be burdensome 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 operational readiness.

c. Attachment 3 - Nuclear Service Water (RN) System Weld - Liquid Penetrant (PT) Test

(1) ASME Code Section XI Requirement for which Relief is Requested

ASME B&PV Code, Section XI, IWA 4000, 1980 edition through winter 1980 addenda, and Section III, ND-5000, 1971 edition require liquid penetrant (PT) or magnetic particle (MT) inspection of final weld surfaces.

(2) Component For Which Relief is Requested

(a) Component Name

RN system weld RN-1F427 - Valve 1RN134A was removed from service in order to perform extensive welding and machining repairs to the disc seating area. Internal inspection revealed that an adjacent weld, RN-1F427, had lack of penetration and lack of fusion in the root of the weld. The root of this weld was machined out and rewelded by a qualified welder using qualified materials. This weld was very near the valve seat area which required extensive welding repairs. Welding material applied to the valve seat area eventually overlapped weld RN 1F427. Machining of this weld area was then performed to facilitate the valve seat replacement. After reseating of the valve and reassembly, the valve was then rewelded into the system. After rewelding into the system, it was discovered that the required PT test was not performed on the weld repair to the root.

(b) Materials and Welds

Materials - 18" dia Carbon Steel Pipe, SA-106 Grade B, .375" wall thickness

Weld - Repair to full penetration butt weld using E-7018 or E70S-2

(c) ASME Code Class

Equivalent to ASME Section III, Class 3

(d) Function

The RN 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 the normal supply of water for the Containment Ventilation Cooling Water System (RV). The portion of the system containing the weld in question provides cooling water to the containment spray heat exchanger 1A.

(3) Basis for Requesting Relief

The missed PT inspection was on the root side of a pipe to valve weld. The valve has been rewelded into the system and therefore, the root side of the weld is no longer accessible for

inspection. Also, the root of the weld was covered over by another weld in repair of the valve seat. Therefore, if the valve were disassembled or cut out of the system, the original repair surface would not be accessible for inspection.

In lieu of the required PT examination, the weld received a final visual examination, a 45° and 60° ultrasonic examination, and an inservice leak test.

(4) Alternate Testing

Final Weld Visual (VT)
Limited Ultrasonic (UT) inspection using 45° and 60° angle inspection - limited due to valve to weld configuration
VT-2 Inservice Leakage Test

(5) Evaluation

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

- The staff has determined that it is impractical to perform the required PT inspection since the root side of the weld is no longer accessible and the surface of the weld was covered over by another weld. It would also be an unneccessary burden to require the licensee to replace the weld.

- The alternate examinations proposed by the licensee will provide on acceptable level of structural integrity for the welds in question.

3.0 CONCLUSION

Paragraph 10 CFR 50.55a(g)(4) requires that components (including supports) which are classified as ASME Code Classes 1, 2, and 3 meet 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 McGuire Unit 1 and submitted supporting information. In accordance with 10 CFR 50.55a(g)(6)(i), the staff concludes that, based on the alternatives proposed, relief may be granted for the issues described in the Relief Requests covered by licensee Attachments 2, 3, 4, and 5. Such 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. The staff determined that relief was not required for the issue covered by licensee's Attachment 1.