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Subject: McGuire Nuclear Station, Units 1 and 2
Docket Nos. 50-369 and 50-370
Request For Relief (RFR) 01-003

Reference: (1) Letter addressed to NRC from Mr. K.A. Hoops ,Vice-President of Kewaunee Nuclear Power Plant, dated February 26, 2001, (2) NRC Safety Evaluation Report dated July 18, 2001, Principal Contributor: P. Patnaik (TAC No. MB1367)

Pursuant to 10CFR50.55a(a)(3)(i) and 10CFR50.55a(a)(3)(ii), Duke Energy Corporation (Duke) requests relief from the 1989 ASME Section XI Code requirement as stipulated in Paragraph IWB-5221(a) for certain Class 1 piping. This requirement mandates that system leakage tests performed on Class 1 piping in accordance with Code Case N498-1, at or near the end of each inspection interval, use a test pressure not less than the nominal operating pressure associated with 100 percent rated reactor power. As an alternative, Duke proposes to test the subject piping at pressures less than that associated with 100 percent rated reactor power.

Relief is requested for the remainder of the Second Ten-Year Interval of the Inservice Inspection (ISI) operating schedule, which expires December 1, 2002, for Unit 1 and March 1, 2004, for Unit 2, on the basis that the aforementioned code requirement imposes hardships without a compensating level of quality and safety. Each specific case for which relief is requested is described in the enclosed relief request, including a basis for why the proposed alternatives will provide an acceptable level of quality and safety. The proposed alternatives have already been implemented on Unit 1 and will be implemented on Unit 2 during the upcoming Unit 2 outage (2EOC15) which is scheduled to commence September 17, 2003.

Duke requests approval prior to the next Unit 1 outage (1EOC15) which is scheduled to commence September 13, 2002. This is the last Unit 1 outage during the Second Ten-Year Interval ISI plan. NRC approval by that time will obviate the need for possible

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burdensome outage work scope additions (under the hardships described in the RFR) and assure full compliance with the Second Ten-Year Interval ISI plan. A similar relief request was submitted for approval by the Kewanunee Nuclear Power Plant and approved by the NRC as addressed in references (1) and (2) above.

Please direct questions regarding this request to Norman T Simms of Regulatory Compliance at (704) 875-4685.

Sincerely,

for HBB

H. B. Barron

Enclosure

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Master File # 1.3.2.13

ENCLOSURE

RELIEF REQUEST NO. 01-003

Duke Energy Corporation

Request for Relief from Pressure Requirement at Certain Class 1 ISI Pressure Test Boundaries

Station: McGuire Nuclear Station **Unit(s):** 1 & 2

Second 10 Year Interval **Request for Relief No. 01-03**

Systems Designation Legend:
NC – Reactor Coolant System (or RCS)
NV – Chemical Volume and Control System
ND – Residual Heat Removal System
NI – Safety Injection System
WL – Liquid Waste Recycle System

I. System/Component(s) for which Relief is Requested:

Relief is requested for portions of ASME Code Class 1 piping and components connected to the Reactor Coolant System (RCS) that are normally isolated from direct RCS pressure (2235 psig) during their normal operation. They are isolated from the reactor coolant loop by their location, either upstream of a check valve, between 2 check valves or between 2 closed valves that must remain closed during the unit's operation (or Startup) in Modes 3, 2 or 1. The specific portions of piping for which relief is requested are described below.
Note: Valve/component numbers (even where unit numbers are listed) correspond for both units 1 and 2.

Portion 1: 2 inch NV Class 1 piping and components upstream of Auxiliary Spray inboard check valve NV-22 up to and including outboard RCS isolation valves NV-21A (globe valve) and NV-841 (check valve).

Portion 2: 14 inch and ¾ inch Class 1 piping and components on the ND Suction line between the RCS double isolation gate valves 1ND-01B and 1ND-02AC (up to and including their gates).

Portion 3: On each of the 4 RCS Loops, 1½ inch NI Class 1 piping and components between double isolation check valves (and including the second isolation check valves) for NC Cold Leg Boron Injection. Double isolation check valve pairs are:
NI-15 and NI-354 for Loop 1,
NI-17 and NI-347 for Loop 2,
NI-19 and NI-348 for Loop 3,
NI-21 and NI-349 for Loop 4

Portion 4: On each of the 4 RCS loops, 10 inch, 6 inch, 2 inch and ¾ inch NI Class 1Cold Leg Injection piping and components upstream of the 10 inch RCS isolation check valves, and going back to and including the following:

a.) Cold Leg Accumulator (CLA) isolation "block valve" (gate valve), the ¾ inch piping flow element and vent valves AND
b.) NI pump and ND pump discharge isolation check valves (and associated ¾ inch piping):
NI-171 and NI-175 for Loop 1,
NI-169 and NI-176 for Loop 2,

NI-167 and NI-180 for Loop 3,
NI-165 and NI-181 for Loop 4

Portion 5: 8 inch, 6 inch, 2 inch, 1 inch and ¾ inch Class 1 piping and components in the Safety Injection (NI) System up stream of the Hot Leg Injection isolation check valves 1NI-157, 1NI-134, 1NI-126 and 1NI-160 (for Loops 1,2,3 and 4 respectively) and back to and including the following:

a.) NI Pump 1B discharge isolation check valve 1NI-156 and associated ¾ inch line with flow restrictor (for Loop 1).
b.) NI Pump 1A discharge isolation check valve 1NI-128 and ND Pump(s) discharge isolation check valve 1NI-129 and associated ¾ inch line with flow restrictor (for Loop 2).
c.) NI Pump 1A discharge isolation check valve 1NI-124 and ND Pump(s) discharge isolation check valve 1NI-125 and associated ¾ inch line with flow restrictor (for Loop 3).
d.) NI Pump 1B discharge isolation check valve 1NI-159 and associated ¾ inch line with flow restrictor (for Loop 4).

Portion 6: 2 inch and 1 inch NC Class 1 piping and components between (and including) double isolation globe valves isolating NC Loop from WL system piping routed to Reactor Coolant Drain Tank Pump. (One segment is on each of 4 Loops). Segment boundaries are:

NC-4, NC-5 and test drain NC-224 for Loop 1,
NC-94, NC-95 and test drain NC-113 for Loop 2,
NC-13, NC-106 and test drain NC-115 for Loop 3,
NC-19, NC-20, 1NC-253 and test drain NC-111 for Loop 4.

Portion 7: The Class 1 piping and components between (and including) valves on double vent and/or double drain valve assemblies installed on Class 1 piping headers. Also, the 1 inch NC piping between (and including) the following RCS double isolation valve pairs on the Reactor Vessel Head vent line:

NC-272 and NC-273,
NC-274 and NC-275,
NC-22 and NC-238.

II. Code Requirement:

The 1989 Edition of the ASME B&PV Code, Section XI, TABLE IWB-2500-1, Examination Category B-P; Item No. B15.51, Class 1 piping system hydrostatic test, to be conducted once either at or near the end of each Inspection Interval. (Reference TABLE NOTE (6)).

Code Case N-498-1: Alternative Rules for 10-year System Hydrostatic Testing for Class 1, 2 and 3 Systems. Section XI, Division 1

(a) It is the opinion of the Committee that as an alternative to the 10 year system Hydrostatic test required by Table IWB-2500-1, Category B-P, the following rules shall be used.

(1) A system leakage test (IWB-5221)* shall be conducted at or near the end of each inspection interval, prior to reactor startup.
(2) The boundary subject to test pressurization during the system leakage test shall extend to all Class 1 pressure retaining components within the system boundary.

(3) Prior to performing the VT-2 visual examination, the system shall be pressurized *to nominal operating pressure* for at least 4 hours for insulated systems and 10 minutes for non-insulated systems. The system shall be *maintained at nominal operating pressure* during performance of the VT-2 visual examination.

(5) The VT-2 visual examination shall include all components within the boundary identified in (a)(2) above.

*IWB-5221 System Leakage Test
(a) The system leakage test shall be conducted at a test pressure not less than the nominal operating pressure associated with 100% rated reactor power.

The application of the above ASME Code requirements along with those of Code Case N-498-1, would require for Class 1 piping, that either at or near the end of each 10 year ISI Interval, a system leakage test be performed that would extend a test pressure equal to the nominal operating pressure associated with 100% rated reactor power (i.e.2235 psig) to all Class 1 pressure retaining components connected to the Reactor Coolant System (RCS).

III. Code Requirement from which Relief is Requested:

IWB-5221 System Leakage Test
(a) The system leakage test shall be conducted at a test pressure not less than the nominal operating pressure associated with 100% rated reactor power.

In accordance with the requirements of 10 CFR50.55a(a)(3)(ii), relief is requested from the '89 ASME Section XI Code requirement of Par. IWB-5221(a) that mandates performance of a system leakage test at a test pressure equivalent to the nominal operating pressure associated with 100% rated reactor power (i.e. 2235 psig) for certain Class 1 piping connected to the RCS.

Specifically, relief is requested from the requirement to extend 2235 psig as a test pressure (for holding time and VT-2 examination) to certain portions of ASME Code Class 1 piping and components connected to the RCS, that are normally isolated from receiving direct RCS pressure (2235 psig) during their normal operation for the unit. These portions of piping are isolated from the reactor coolant loop piping by their location either upstream of a check valve, between 2 check valves or between 2 closed valves that must remain closed during the unit's operation (or Startup) in Modes 3, 2 or 1, when RCS pressure is either at or approaching 2235 psig.

IV. Basis for Requesting Relief

The following discussion provides the basis for the requested relief and approval of the proposed alternative testing in accordance with the provisions in 10 CFR 50.55a(a)(3)(ii) due to the hardship that would be imposed by complying with the Code requirement.

Applying RCS operating pressure (2235 psig) to Portions 1, 2, 3, 6 and 7 of the Class 1 piping listed in Section I of this document would result in a **hardship** by exposing station personnel to:

- personal safety hazards ranging from immediate physical exposure to *temporary connections* whose medium is pressurized to 2235 psig (and in some cases at 557° F. temperature) to their being "stationed" at opened manual valves in Lower Containment at or near vent/drain valves serving as RCS single isolation pressure **and temperature** barriers in order to maintain the RCS boundary redundant valve protection requirement of 10CFR50.55a(c)(ii) during the test.
- additional radiation exposure from activities in Lower Containment such as transporting, connecting, performing testing activities with, and removing hydro pump or temporary jumper materials; scaffold erection and tear down where needed; insulation removal and replacement where needed; valve internals removed and replaced where needed; and valve gags installed and removed where needed. Unknown delays in any of these activities could occur in Lower Containment, which would increase the additional radiation exposure.

Introducing NC system operating pressure (2235 psig) to the Portion 1 piping upstream of the Pressurizer Isolation Check Valve NV-22 during Unit Start-up with NC system at normal operating pressure and temperature would pose a **hardship** for the station because of the *high risk of an Inadvertent Pressurizer Auxiliary Spray Initiation to the pressurizer* at normal NC system operating temperature and pressure. This "Upset Condition" design transient (defined in UFSAR Section 5.2.1.5) is undesirable for two reasons.

1.) It would force static piping "cold water" contents into the pressurizer spray line and result in an additional thermal design cycle. The plant design only allows for 10 of these over the plant design life (ref. UFSAR Table 5.2 "Summary of Reactor Coolant System Design Transients").

2.) It would violate the maximum differential between spray water injected and the pressurizer water temperature allowed by the Selected Licensee Commitment Manual (UFSAR Chapter 16). Section 16.5.8.c, requires an engineering evaluation to determine the effects of the cold water on the structural integrity of the pressurizer.

Opening ND-1 during RCS pressurization to pressurize the Portion 2 piping would pose a **hardship** for the station because it would breach the 10CFR50.55a(c)(ii) required double isolation valve barrier of the RCS boundary from the ND system. This would create an inability to mitigate a Loss Of Coolant Accident (LOCA) if a break was to occur in the 14 inch piping between valves ND-1 and ND-2, reducing the plant's margin of safety. Valve ND-1 could not be counted on to close against the postulated flow from the RCS through a 14" line break. It would also subject ND system components to risk of damage with only a single valve isolation from RCS pressure.

Also, with valve ND-1 open, the ¾ inch vent line and test header branch line (through valve ND-91) would be required to serve as part of the double isolation valve RCS boundary. While the ¾" piping between valves ND-54, ND-90 and ND-91 is designed for RCS pressure and temperature, two issues of concern are:

1. A breach or break in either of the ¾ inch lines between valves ND-54, ND-90 and ND-91 in this alignment would challenge the unit's stability and result in an unplanned unit shutdown for piping/component repair.

2. Any pre-existing minor leakage (non-problematic in the "normal" Startup valve alignment) past valve 1ND-54 would likely be intensified by direct, unobstructed RCS pressure applied to the valve's seat, and pressurize the short section of non-ASME Code (Duke Piping Class E) ¾" piping between the three valves to RCS pressure. This would charge valves 1ND-90 and 1ND-91 (and their seats) with RCS pressure, risking an RCS pressure boundary leak as well as possible valve seat damage.

On the Portion 3 piping, no intermediate test connection exists on the 3 inch segment of pipe between these check valve pairs to measure the test pressure locally. Aligning an NV Pump to the Boron Injection flow path in Mode 3 (at startup) and cracking open valve NI-3 would constitute a Manual Safety Injection, counting against the allowed Cold Leg Thermal Design Transients (design limit is 50 for the life of the plant). Such action would pose a **hardship** for the plant. This is also counter-productive to long term piping/weld health. Risking degradation of piping/weld health for the sake of verifying the safety and integrity of that piping is unreasonable.

Installing temporary jumpers on Portion 4 or Portion 5 piping to transfer RCS pressure between the PIV check valves during startup with NC system at RCS pressure would be done in Mode 3. At this point, the RCS Pressure Isolation Valves (PIVs) have already undergone PIV Leak Rate Testing per Tech. Spec SR 3.4.14.1 to verify their leakage is within Tech Spec limits. (UFSAR Table 5-50 lists the PIVs for McGuire's Tech Spec Leakage Limits that must be maintained for Modes 3, 2 and 1.).

Introducing RCS pressure between the PIV check valves at this time would likely **cause the inboard PIV check valve to unseat,** placing the station in Tech Spec 3.4.14 LCO Action Condition. The previously completed PIV Leak Rate Test would be voided and Tech Spec Action would be required to 1.) isolate the high pressure portion of the affected system from the low pressure portion within 4 hours, AND 2.) perform the PIV Leak Rate Test again within 24 hours AND 3.) restore the RCS PIV to within the leakage limits within 72 hours. It would be ill-advised to expose the unit to such a risk that would likely result in the **hardships** for the station described above.

The PIV's serve as the RCS pressure boundary (ref. 10CFR50.2 and 10CFR50.55a(c)). The limit on allowable PIV leakage rate (discussed above) prevents over pressurization to the low pressure portions of the connecting NI System piping as well as the loss of integrity of a fission product barrier. Failure consequences could be a loss of coolant accident (LOCA) outside of containment, an unanalyzed accident that could degrade the ability of low pressure injection. Note that the 1975 NRC "Reactor Safety Study" (ref. WASH-1400 (NUREG-75/014), Appendix V, October 1975) identified potential intersystem LOCAs as a significant contributor to the risk of core melt.

Using a hydro pump to pressurize Portion 4 or Portion 5 piping during No Mode would in either case, require all 4 of the inboard NI check valves interfacing the NC system (10" for Portion 4 and 6" for Portion 5) be temporarily gagged closed to provide a pressurization boundary. Gagging closed these check valves to hold 2235 psig would pose a *substantial risk of damage to the component* from the loads that would be transferred to the valve body by a gagging apparatus to hold the valve seat shut for the test. The seat is approximately 6 inches in diameter for both the 10 " and the 6" valves. The load force against the valve seat at RCS pressure would exceed 63,000 lbs. The geometry of these valve bodies make it difficult to transfer such loads to appropriate areas of the valve body via a gag apparatus. It would be prohibitive to attempt to use such an apparatus on an ASME Class 1 valve serving as part of the RCS pressure boundary (due to the high risk of damaging the components) without following up with volumetric examination of the valve body. UT would not suffice (surface contours and unparallel valve walls), leaving only RT to employ. Even if each valve tested OK, the extra radiation exposure alone from gagging, testing, reassembling and performing RT on each valve would constitute a considerable **hardship** for the station.

RCS pressure could be applied to the Portion 6 and/or Portion 7 piping by opening the "inside" NC Loop isolation valves (including "in series" valves NC-19 and NC-20 for Loop 4) at the onset of NC system pressurization. Each of these valves is the first of a series of two valves maintaining double isolation of the RCS pressure boundary either from other piping or from the containment atmosphere.

Opening these valves to pressure test this piping at RCS pressure would **eliminate the double valve protection** required by 10CFR50.55a(c)(ii) for the RCS boundary, creating a "single valve barrier" between the RCS pressure boundary and non-code piping, some of which is vented to the Reactor Containment atmosphere. The piping on the discharge side of these "single valve barriers" is non-code piping, and not designed to serve as part of the RCS double isolation pressure boundary.

10CFR50.55a(c)(ii) requires the Reactor Coolant pressure boundary components be either isolated, or capable of being isolated from the reactor coolant system by two valves in series. Each open valve must be capable of automatic actuation, and assuming the other valve is open, its closure time must be such that, in the event of postulated failure of the component during normal reactor operation, each valve remains operable and the reactor can be shutdown and cooled down in an orderly manner, assuming makeup is provided by the reactor makeup system only.

To maintain the RCS pressure boundary to the 10CFR50.55a(c)(ii) requirements on these piping segments during such a test would require *maintaining* the following condition during the course of RCS pressurization during unit startup.

> "Because the RCS pressure isolation valves are manually operated and are not automatic or remote, opening one of the two isolation valves in series would require a dedicated operator be stationed at each of the "opened" valves to immediately shut them in the event of a postulated failure."

This would constitute a **hardship** since station personnel would have to be stationed continually at or near the "opened" valve(s) in Lower Containment during Startup and RCS pressurization up to it's normal operating pressure. They would continuously receive radiation exposure and exposure to the personal hazards of occupying a close proximity to the tested piping/components subjected to RCS pressure and temperature (2235 psig at 557° F.), with a near by drain valve serving as a single valve RCS pressure isolation barrier to the Containment atmosphere.

Additionally, SLC 16.5.10 prohibits opening one of the Portion 7 Reactor Head vent valves with the unit in Modes 1 through 4.

Since no isolation is possible from either the Reactor Vessel or the Pressurizer Relief Tank without significant modification, and no connections exist between the valve pairs for test connection, testing of the piping between the Reactor Head vent pipe double isolation valves by hydro pump or temporary jumper is not possible.

Duke Power Company (MNS) believes that any increase in confidence of the Portions 1 through 7 piping integrity attained by pressurizing the piping to 2235 psig would not be commensurate with the increase in radiation exposure and/or safety hazards that station personnel would be subjected to, as well as the risk imposed on both the unit's safe operation and the structural integrity of the nuclear safety related piping and components.

V. Alternative Testing

Discussion:

Discussions with Civil/Structural Engineers and Systems Engineers concerning Reduced Pressure Testing of piping for visible "through wall" leakage agreed that through wall leakage that would occur at higher pressures such as RCS pressure would also reveal itself at lower pressures when a significant "reduced pressure ratio" exists for the reduced pressure used . It may take longer for some leaks to propagate through the piping wall at lower pressures, but generally, during reduced pressure testing, the resulting leak rates would be reduced, but the leakage would still be visible to VT-2 examination.

In support of this, Engineering revealed that leakage through a fixed area orifice varies proportional to the square root of the ratio of the differential pressures (ref. CRANE Technical Paper #410). For example, if a leak L were projected to be present at 2235 psig, that same leak would be present at 327 psig, but with a magnitude of

$$\sqrt{\frac{327}{2235}} \times L = .38L$$

Inspections that reveal no leakage at 327 psig (where 38% of the leakage produced by 2235 psig pressures would be present for detection during VT-2 examination) therefore give high confidence that no leakage would be present at 2235 psig.

The pressure values used in the reduced pressure testing performed as alternative pressure tests for unit 1 that are covered in this request for relief, range from 327 psig to $\geq$ 800 psig. Pressures that range from approximately 300 psig to $\geq$ 800psig are sufficient to provide for the detection of any through wall leakage in the tested piping and components during the performance of the alternative tests.

Therefore, pursuant to the 10 CFR50.55a(a)(3)(i) requirement, the pressure tests and VT-2 examinations performed at the lower pressures indicated in the following alternative pressure tests are determined to provide an acceptable level of assurance of the quality, safety and structural integrity of the tested piping.

The Unit 2 piping for all Portions will undergo the same alternative testing as was performed for the Unit 1 piping as described above.

Portion 1 - Alternative testing:

During Unit 1 Startup in Outage 1EOC14, an alternative test was performed on the Portion 2 piping in accordance with the requirements of Code Case N-498-1 for ISI Pressure Testing of Class 1 piping, except that the alternate (lower) pressure was used as opposed to RCS operating pressure of 2235 psig., for both the 4 hour hold time and the VT-2 examination. Alternate test pressure was recorded at 491 psig. No leakage was observed.

Later in the Start-up process, the piping was VT-2 examined again with the RCS in its normal alignment and at full temperature and pressure (after a 4 hr hold time) during the 10 year Class 1 Leakage Test performed per Code Case N-498-1 during Startup. Again, no leakage was observed.

Portion 2 - Alternative Testing:

ND suction piping operating pressure is subject to the following restrictions:

a.) ND suction is not aligned until LTOP is in service (< 380 psig NC system).
b.) The open permissive for ND-1 and 2 is 385.5 psig.
c.) Relief valve ND-3 has a nominal lift setpoint of 450 psig.

As a practical operating pressure, ND suction is nominally maintained at 325 psig when NC is pressurized.

Since 325 psig is considered to be the typical operating pressure, an alternative test pressure of 325 psig (for hold time and VT-2 examination for leakage) fulfills the same purpose as the test pressure required by '89

ASME Section XI, Paragraph IWB-5221 by checking for component leakage at pressures equaling the typical operating pressure of the tested piping.

During the Unit 1 Startup in Outage 1EOC14, an alternative test was performed on Portion 2 piping in accordance with the requirements of Code Case N-498-1 for ISI Pressure Testing of Class 1 piping, except that the practical operating pressure of the tested piping was used instead of 2235 psig, for both the hold time and the VT-2 examination. The test piping pressure was verified during PIV Testing operations by the PIV Testing engineer. Alternate test pressure was 330 psig.

This piping was also VT-2 examined again during the Class 1 piping pressure test performed per Code Case N-498-1 with the RCS at its normal operating pressure and temperature (with 4 hour hold time). No leakage was observed.

Portion 3 - Alternate Testing:

During a refueling outage, this piping can be pressurized and VT-2 examined running an ND pump "piggy back" to the Centrifugal Charging (NV) Pump aligned to all four cold legs, which provides a minimum pressure of 800 psig at the NV pump discharge. The piping between the check valves would see pressure <800psig due to piping losses and throttle valve pressure drop.

However, pressures greater than 800 psig can be (and have been) applied to this piping using other sources for the test pressure. For example, residual leakage past any one of the pairs of check valves can result in pressures >800 psig on the back side of all 4 of the check valve pairs. However, such "other sources" are not always repeatable.

This method was used as a pressure source for the alternate pressure test performed on this piping in outage 1EOC14. The piping was later VT-2 examined <u>again</u> with the RCS in its normal alignment and at full temperature and pressure for a 4 hr hold time prior to its examination, during the Class 1 Pressure Test that was performed per Code Case N-498-1 during startup, ending outage 1EOC14. No leakage was found in either test.

This alternate testing uses pressures for hold times and VT-2 examinations ≥800 psig, which are sufficient to provide for detection of any through wall leakage and provides an acceptable level of assurance in structural integrity of the piping.

Portion 4 - Alternative testing:

During unit startup, the Portion 4 piping is expected to see pressures in the range of 600 psig for > 4 hours. These pressures reflect those seen by this piping during it's normal operation.

585 psig is the minimum pressure each Portion 4 segment of piping will see when the CLAs are required to be operable per the Tech Spec 3.5.1 requirement.

During Unit 1 Start-up in Outage 1EOC14, an alternative pressure test and VT-2 examination was performed on the Portion 4 piping in accordance with the requirements of Code Case N-498-1 for ISI Pressure Testing of Class 1 piping, except that the alternate (lower) pressure of 585 psig was used for both the 4 hour hold time and the VT-2 examination. No leakage was found.

Portion 5 – Alternative testing:

The alternative pressure test of the Portion 5 piping can be performed in the unit startup process during the Pressure Isolation Valve (PIV) Testing performed per Tech. Spec Surveillance Requirements.

The Portion 5 piping is not insulated, so both the hold time requirement of 10 minutes and the VT-2 examination can be performed at the alternate test pressure while the testing engineer "holds" the back side check valve "set" pressure for the time required for hold time and VT-2 examination.

Testing of the Unit 1 Portion 5 piping was performed in this manner during unit Start-up at the end of outage 1EOC14. Hold time and VT-2 examination pressure was 327 psig. No leaks were found.

Portions 6 & 7- Alternate Testing:

The Portion 7 NC piping between valves on double isolation vent and drain assemblies, as well as the Rx Head Vent Line valves (listed above) could be pressurized to RCS pressure by opening the inside valve during startup. However, this would be a **hardship**, encountering similar problems as described in the Method 6A Discussion. Stationing individuals at these open "inside" RCS isolation valves inside Lower Containment would pose a significant safety hazard and considerably increase radiation exposure to station personnel.

Additionally, SLC 16.5.10 prohibits opening one of the Reactor Head vent valves in Modes 1 through 4.

Regarding use of a hydro pump in No Mode, there are no less than 7 additional double isolation vent and/or drain valve assemblies that would have to be tested individually (by hydro pump) during No Mode due to their diverse locations inside Lower Containment. This would result in a substantial increase in radiation exposure to station personnel as well as the personal safety issue regarding temporary connections pressurized to 2235 psig.

Since no isolation is possible from either the Reactor Vessel or the Pressurizer Relief Tank without significant modification, and no connections exist between the valve pairs for connection, testing of the Reactor Head vent pipe by hydro pump or temporary jumper is not possible.

Duke Power Company (MNS) proposes as an acceptable alternative test, the VT-2 examination of the Portion 6 and 7 piping by VT-2 qualified QC Inspectors after the piping has undergone a 4 hour hold time with the NC system at RCS pressure and temperature (2235 psig @ 557 ° F.) with all affected double isolation valves and test/drain valves in their normal operating position (closed). Duke believes the through-wall integrity of the Portions 6 and 7 piping under its normal operating conditions is adequately tested/verified by this VT-2 examination after a 4 hour hold time at RCS pressure, and that incurring the previously listed dosage, personnel hazards and risks in order to apply and verify RCS pressure (2235 psig) on this piping for 4 hours prior to VT-2 examination, would pose a **hardship** for the station.

VI. Justification for Granting Relief:

If a leak were to develop at any of the piping locations discussed in this relief request, the instrumentation available to the operators for detection and monitoring of RCS leakage would provide prompt qualitative information to permit them to take immediate corrective action. If any through wall leakage should develop in any of the locations covered in this relief request, the following systems are in place with indications and/or alarms in the Control Room for prompt detection and general location of the leakage:

- EMF monitors 38 and 39 - Containment Atmosphere Gaseous and Particulate Radioactivity Monitoring System.
- EMF monitor 40 - Containment Atmosphere Iodine Monitor.
- Containment Floor and Equipment Sump Level and Flow Monitoring Subsystem where unidentified accumulated water on the containment floor would be monitored and evaluated as sump level changes;
- Containment Ventilation Unit Condensate Drain Tank Level Monitoring Subsystem which collects and measures (as unidentified leakage) the moisture removed from the containment atmosphere.

Plant Technical Specifications require that a reactor coolant system water inventory balance be performed on a regular basis. This computer based mass balance is performed at a minimum every 72 hr. as required by the Tech. Specs. or whenever the operators suspect any leakage. Plant Technical Specification 3.4.13 requires that the unidentified leak rate be returned within the 1 gpm limit in 4 hours, or the plant be put in Hot Standby (Mode 3) within 6 hours and in Cold Shutdown within 36 hours. Through wall leakage as discussed in this request for relief would show up as unidentified leakage and be subject to the 1gpm limit.

There are other leakage detection methods available to the operator which include:

- Volume Control Tank (VCT) level changes.
- VCT make-up frequencies
- Cold Leg Accumulator level changes

At the beginning of a refueling outage, plant personnel enter the Reactor Building in Mode 3 with the RCS still at high energy and inspect for any anomalies that would require re-work, repair or further examination. This includes any evidence of leakage or of boron residues that would indicate RCS pressure boundary leakage. Through wall leakage in the RCS pressure boundary would be evidenced by the existence of boron or boron residues on the piping components and/or insulation.

Reduced Pressure Testing of piping for visible "through wall" leakage, reveals that through wall leakage that would occur at higher pressures such as RCS pressure would also reveal itself at lower pressures when a significant "reduced pressure ratio" exists for the reduced pressure used. It may take longer for some leaks to propagate through the piping wall at lower pressures, but generally, during reduced pressure testing, the resulting leak rates would be reduced, but the leakage would still be visible to VT-2 examination. (See Alternative Testing Discussion.)

Inspections that reveal no leakage at lower testing pressures of a significant ratio to 2235 psig (where a leak rate percentage of $\geq$ 30% of the leakage rate produced by 2235 psig pressures would be present for visual detection during VT-2 examination) therefore give high confidence that no leakage would be present at 2235 psig.

The pressure values used in the reduced pressure testing performed as alternative pressure tests for the piping covered in this request for relief, range from approximately 300 psig to ≥800 psig. Pressures that range from approximately 300 psig to ≥ 800 psig are sufficient to provide for the detection of through wall leakage in the tested piping and components during the performance of the alternative test. Therefore, the pressure tests and VT-2 examinations at the lower pressures indicated, provide an acceptable level of assurance of the quality, safety and structural integrity of the piping.

Each alternate test indicated in this RFR was performed using quantified, reduced pressures for hold times and VT-2 examinations to detect the existence of any through wall leakage on the tested piping. The tested piping boundaries included all the piping segments listed in Section I as part of this Request for Relief.

Each portion of piping listed in this request for relief was VT-2 examined again later in the Startup process with the RCS at full temperature and pressure and in its normal alignment (after a 4 hr hold time) during the 10 year Class 1 Leakage Test performed per Code Case N-498-1 during startup at the end of outage 1EOC14. No through wall leakage was found in any of the VT-2 examinations.

Also, these segments of piping are within the scope of the Inservice Inspection Program and thus undergo both volumetric and surface examinations as required on a periodic basis.

Finally, The Nuclear Regulatory Commission granted similar relief to Kewaunee Nuclear Power Station in the commission's Safety Evaluation Report of July 18, 2001, sent in response to that station's request for relief from certain ASME Code, Section XI Class 1 pressure testing requirements.

Unit 2 piping will undergo testing in the same manner as the Unit 1 piping tests as described above.

Based on the hardships without a compensating increase in quality and safety discussed above, the proposed alternatives and other inservice inspections for the applicable piping systems covered by this request will provide an acceptable level of assurance of the piping integrity in lieu of fully complying with the ASME Code requirement, pursuant to the provisions in 10 CFR50.55a(a)(3)(i) and10CFR50.55a(a)(3)(ii).

VII. Implementation Schedule

Relief is requested for the remainder of Second Ten-Year Interval of the ISI operating schedule, which expires on 12/01/02 for Unit 1 and 3/1/04 for Unit 2. Implementation would begin upon approval. The Unit 1 Second Ten-Year Interval has been extended for 1 year (from 11/30/01 to 11/30/02) as allowed by the '89 ASME Code Section XI, Paragraph IWA-2430(d).

VIII. Attachments

The Portions of Class 1 piping discussed in this request for relief are indicated on the marked-up drawings listed below and included as an attachment to this RFR 01-03. Unit 2 Portions and drawing numbers (e.g. MCFD-2554-1.2, etc.) correlate with the unit 1 drawings listed below.

Portion 1	MCFD-1554-1.2
Portion 2	MCFD-1561-1.0
Portion 3	MCFD-1562-1.0

Portion 4	MCFD-1562-2.0 MCFD-1562-2.1 MCFD-1562-3.1
Portion 5	MCFD-1562-3.0
Portion 6	MCFD-1553-1.0
Portion 7	MCFD-1553-1.0 MCFD-1553-2.1 MCFD-1562-2.0 MCFD-1562-3.0

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