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ILLINOIS POWER

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September 9, 1994

Docket No. 50-461

10CFR50.55a

Document Control Desk
Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Request for Authorization Pursuant to 10CFR50.55a to Utilize ASME Section XI Code Case N-416-1

Dear Sir:

To support expected activities during a planned maintenance outage for the Reactor Core Isolation Cooling (RCIC) system at Clinton Power Station (CPS), Illinois Power (IP) requests approval to use ASME Code Case N-416-1 for performing alternate testing and examination in lieu of a system pressure test following repair and/or replacement of the steam admission valve in the RCIC system. Pursuant to 10CFR50.55a(1)(3), the attachment to this letter provides detailed information supporting the acceptability of using this Code Case for this particular situation at CPS.

CPS is currently operating at or near 100% power. Power operation at or near 100% power is expected to continue through the RCIC maintenance outage that is planned to begin on September 12, 1994. The planned work scope for the upcoming RCIC outage includes replacing valve 1E51-F045. ASME Section XI (Article IWA 4400) requires a system pressure test to be conducted following any repairs by welding on the pressure retaining boundary. Although valve 1E51-F045 can be sufficiently isolated and replaced during power operation, performance of a system pressure test strictly in accordance with code requirements (following replacement of the valve) would be exceedingly difficult. Without authorization to utilize ASME Section XI Code Case N-416-1, additional plant and equipment evolutions would be required which could potentially impact plant safety. Additionally, RCIC unavailability would be unnecessarily increased. IP therefore requests authorization for the use of this code case during the RCIC September outage.

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Your prompt attention to this matter is appreciated.

Sincerely yours,

Richard F. Phares
Director, Licensing

AJP/csm

cc: NRC Clinton Licensing Project Manager
NRC Resident Office, V-690
Regional Administrator, Region III, USNRC
Illinois Department of Nuclear Safety

Request for Authorization Pursuant to 10CFR50.55a
to Utilize ASME Section XI Code Case N-416-1

References

- CPS Updated Safety Analysis Report (USAR) Figure 3.6-1, Sheet 72
- ASME Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 1980 Edition, Winter 1981 Addenda
  - Article IWA-4000, "Repair Procedures"
  - IWA-4400, "Pressure Tests"
  - Article IWA-5000, "System Pressure Tests"
  - IWA-5211, "Test Description," and IWA-5212, "Pressure and Temperature"
  - IWC-5222, "System Hydrostatic Test"
- ASME Section XI Code Case N-416-1, "Alternative Pressure Test Requirements for Welded Repairs or Installation of Replacement Items by Welding, Class 1, 2 and 3"

Background/Problem Description

During recent plant operation, reactor steam leakage into the Reactor Core Isolation Cooling (RCIC) system was discovered.. This leakage is suspected to be seat leakage through steam admission valve 1E51-F045. This valve is to be repaired during a planned RCIC maintenance outage scheduled to begin on September 12, 1994. Replacement of the valve will likely have to be performed to restore the valve to a leak-tight condition.

Valve 1E51-F045 is a normally-closed, four-inch, motor-operated globe valve used to admit/shut off steam flow to the RCIC turbine (Reference USAR Figure 3.6-1, Sheet 72). The valve is situated in the Class 2 portion of the reactor steam supply line for the RCIC system and is located in the RCIC turbine/pump room. (The RCIC turbine/pump room is located within the secondary containment just outside the primary containment.) The RCIC turbine governor valve is located downstream of 1E51-F045. Two normally-open motor-operated valves, 1E51-F063 and 1E51-F064 are located upstream of 1E51-F045. Valves 1E51-F063 and 1E51-F064 (which are the inboard and outboard containment isolation valves) are the only two valves located between valve 1E51-F045 and the reactor (i.e., main steam line "A"). 1E51-F045 is thus normally exposed to reactor pressure (upstream side).

ASME Section XI Article IWA-4000, "Repair Procedures," provides requirements for performing repairs on pressure retaining components and component supports. IWA-4400, "Pressure Test," requires, after performing repairs by welding on the pressure retaining boundary, a system pressure test to be performed in accordance with Article IWA-5000, "System Pressure Tests." For Class 2 pressure retaining components, conformance with the requirements of IWA-5000 (specifically, IWA-5211 and IWA-5212) requires that a system hydrostatic pressure test be performed in accordance with IWC-5000 (specifically, IWC-5222).

ASME Section XI Code Case N-416-1, "Alternative Pressure Test Requirements for Welded Repairs or Installation of Replacement Items by Welding, Class 1, 2 and 3," specifically provides for performance of an alternative pressure test in lieu of a hydrostatic pressure test required by IWA-4000 for welded repairs or installation of replacement items by welding. This code case was approved by the ASME Code Case Committee on February 15, 1994. Per Code Case N-416-1, in lieu of performing the hydrostatic pressure test, a system leakage test may be used provided the following requirements are met:

(a) NDE shall be performed in accordance with the methods and acceptance criteria of the applicable Subsection of the 1992 Edition of Section III.

(b) Prior to or immediately upon return to service, a visual examination (VT-2) shall be performed in conjunction with a system leakage test, using the 1992 Edition of Section XI, in accordance with paragraph IWA-5000, at nominal operating pressure and temperature.

(c) Use of this Case shall be documented on an NIS-2 Form.

As discussed above, ASME Section XI Code Case N-416-1 permits alternative testing and inspection to be performed in lieu of a system hydrostatic pressure test. For the testing required following replacement of valve 1E51-F045 in the upcoming RCIC system outage at CPS, use of Code Case N-416-1 provides an option for IP to consider in lieu of strictly conforming to applicable code requirements (i.e., performing a hydrostatic pressure test). As further discussed below, performing an "on-line" hydrostatic pressure test on the portion of the RCIC system affected by replacement of valve 1E51-F045 presents significant challenges, problems and risks which make use of Code Case N-416-1 an option to consider in this particular situation. Each of these two options (i.e., performing a hydrostatic pressure test in conformance with applicable code requirements or utilizing Code Case N-416-1 to perform alternate testing and inspection) is further discussed below.

Option 1: Hydrostatic Pressure Test

The first option would be to perform the hydrostatic pressure test in accordance with code requirements following replacement of valve 1E51-F045. There are several impacts of the hydrostatic pressure test which must be considered, as further discussed below.

(1) Although valve 1E51-F045 is isolable from the reactor/main steam line by using valves 1E51-F063 and 1E51-F064, these valves have a nominal (but acceptable per 10CFR50 Appendix J) associated leak rate. As the hydrostatic test pressure would be approximately 500 psi greater than reactor pressure, leakage through these

valves (in the reverse direction) could allow cold water from the hydrostatic pressure test to leak into the main steam line, causing thermal stresses and causing water to be entrained in the steam and possibly carried over into the main turbine.

(2) Although there are vents and drains on certain portions of the steam-supply piping for the RCIC system, there are none on the portion to be hydrostatically tested due to replacement of valve 1E51-F045. This condition would not preclude the presence of a compressible air volume that could hinder satisfactory, timely performance of the hydrostatic test.

(3) The elevated test pressure required for the hydrostatic test introduces a potential personnel hazard as well as an equipment hazard in the event of test fitting leakage and/or test hose breaking (hose whip).

(4) Movement, set-up and removal of the hydrostatic pressure test equipment into secondary containment is challenging with respect to ingress and egress, and dealing with limited clearances and physical constraints.

(5) Performance of the hydrostatic test requires more work to be performed (for test set up, test performance, equipment removal) in the area of the RCIC room. This increases the time of exposure for workers. The fact that workers will have to be at the equipment location during much of the test precludes the choice of a lower dose area. The hydrostatic pressure test thus has a negative impact on CPS ALARA efforts.

(6) The hydrostatic test volume would include piping with a diameter of greater than four inches. This necessitates "pinning" of such piping to avoid over-stressing supports and snubbers while such piping is filled with water. Pinning adds time to the system outage time, involves more resources, and can involve inaccessible areas. In fact, one of the supports for the piping affected by the hydrostatic test cannot be pinned as it is located in the inaccessible steam tunnel.

Collectively, the above impacts result in increased risk to the plant and personnel safety as well as increased unavailability of the RCIC system.

It should be noted that ASME Section XI allows for a pneumatic test to be performed in lieu of a hydrostatic test. This would avoid some of the negative impacts of the hydrostatic test, but a pneumatic test would still increase the impact on personnel and equipment safety because of the greater potential hazards of using a compressed gas. In addition, the amount of gas that would be required was estimated to be quite large, necessitating an unacceptably large number of compressed gas bottles to be brought into the area. Further, the use of compressed gas would still have an adverse ALARA impact in that more handling time is required with the gas test rig. In short, performance of a pneumatic test in lieu of hydrostatic test offers no significant savings in dose or test time and complexity. Therefore there would be no substantial risk reduction relative to the hydrostatic test.

Option 2: Alternative Pressure Test

As discussed previously, Code Case N-416-1 allows a system leakage test to be performed in lieu of a hydrostatic test following welded repairs or installation of replacement items by welding. Therefore, following replacement of valve 1E51-F045 and in accordance with the Code Case, the RCIC system would be pressurized to normal operating pressure and temperature (with steam instead of water), visually examined (VT-2) and checked for leakage. [A radiograph (NDE) of the welds at the site of the valve replacement would also be performed in accordance with Code Case N-416-1.] These testing, examination and inspection activities provide an acceptable level of assurance that system integrity is maintained without performance of a hydrostatic test.

By eliminating performance of the hydrostatic test, implementing Code Case N-416-1 would obviate the need for bringing test equipment into the area, would not require pressurizing a portion of the RCIC system with cold water at elevated pressure, and it would not require any pinning. By eliminating these activities, the risk and negative impacts associated with these activities as described in option 1 above are eliminated. Utilization of Code Case N-416-1 would eliminate possible thermal stresses due to water leakage through 1E51-F063 and 1E51-F064, and it would eliminate the personnel and equipment hazards associated with the temporary test equipment. Further, the negative impact on ALARA is eliminated when there is no need for such test equipment and there is no need for pinning. Finally, by eliminating all the noted activities associated with the hydrostatic test, the length of the RCIC outage is significantly reduced.

Based on an evaluation of the above two options, IP has determined that performing an alternative pressure test in accordance with Code Case N-416-1 is the best approach. Utilization of Code Case N-416-1, when compared to the option of performing a hydrostatic test per the requirements of IWA-4000, involves much less risk to personnel, equipment and plant safety, minimizes RCIC unavailability and eliminates the hardships inherent to the hydrostatic pressure test.

Request for Authorization to Utilize Code Case N-416-1 Pursuant to 10CFR50.55a

10CFR50.55a, "Codes and Standards," requires that systems and components of boiling and pressurized water-cooled nuclear power reactors meet the requirements of the ASME Boiler and Pressure Vessel Code as specified in certain paragraphs of 10CFR50.55a. 10CFR50.55a(a)(3) states that proposed alternatives to the requirements of those particular paragraphs of 10CFR50.55a may be used when authorized by the Director of the Office of Nuclear Reactor Regulation. This subsection further states the applicant shall demonstrate that (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements of 10CFR50.55a would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

On the basis that Code Case N-416-1 has been approved by the ASME Code Case Committee as providing an acceptable method for confirming pressure boundary integrity, IP believes that an alternative system pressure test of the RCIC system (in conjunction with the other requirements of Code Case N-416-1) is appropriate in lieu of a hydrostatic test and its associated risks. That is, use of the Code Case would provide an acceptable level of quality and safety pursuant to item (i) above. IP considered the option of performing a hydrostatic test on the affected portion of the RCIC system in accordance with code requirements, but as discussed above, performance of a hydrostatic test would be difficult and would present serious challenges and risk to personnel, equipment and plant safety. Thus, compliance with the specified requirements of 10CFR50.55a (in lieu of performing alternative pressure testing in accordance with Code Case N-416-1) would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety pursuant to item (ii) above. As a result, IP requests that approval of this request per 10CFR50.55a(a)(3) be granted.