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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING RELIEF FROM REQUIREMENTS OF SECTION XI ASME CODE

DAIRYLAND POWER COOPERATIVE

LACROSSE BOILING WATER REACTOR

DOCKET NO. 50-409

1.0 INTRODUCTION AND DISCUSSION

By letters dated July 27, 1979, January 21, 1980, January 30, 1980, July 14, 1980, and November 19, 1980. Dairyland Power Cooperative (DPC) (the licensee) requested relief from certain requirements of American Society of Mechanical Engineers (ASME) Section XI. The latter two submittals represent the licensee's most recent update and our approval is based on the valve Inservice Testing Program (IST) described in these documents.

We have identified selected items, not related to the DPC relief request, that require licensee action. These items are discussed in Section 2.1.1, 2.1.6 and 2.1.8. The licensee should provide us their position and course of action regarding the latter two items within six months. For item 2.1.1, we require that the licensee commit to a schedule consistent with the actions requested in Attachment A to this Safety Evaluation.

Three of the relief requests are denied because the licensee has not provided sufficient justification for the relief requested. These items are discussed in Sections 2.2, 2.3 and 2.4. DPC must meet the ASME Code requirements or propose alternatives with sufficient justification. Commitments to resolve these items should be made prior to the next refueling outage.

We consider the following methods acceptable for resolving the open items:

- Following staff review and approval, make the necessary plant modifications so that testing can be performed to meet the ASME Code.

- Demonstrate by reliability analysis that when a valve (or several valves such as redundant valves) is partially stroked (not full stroke) the increase in the system unavailability is not significant. Being "significant" has to take into account: (1) the impact on unavailability of the valve within the system it is in; (2) how critical the system containing the valve is to overall plant safety; and (3) what the impact is to overall plant safety. As part of this analysis, there should be a study to identify the random, cyclic, common cause, or systematic failure types or modes which may occur to the valve(s) undetected by partial stroke tests. A study of data source such as LERs and actual recorded plant data should also be performed to establish the type of failure this valve(s) experienced and the frequency of these failures for the same or similar applications. This "experience" failure rate should be factored into the reliability analysis. The data source for which the valves' failure rates are derived should be justified. In the analysis, some use of reliability models or fault-tree methods may be used if deemed pertinent.

2.0 EVALUATION

2.1 General Considerations

2.1.1 Testing of Valves Which Perform a Pressure Isolation Function

Several safety systems connected to the reactor coolant pressure boundary have design pressures below the reactor coolant system operating pressure. Redundant isolation valves within the Class 1 boundary forming the interface between these high and low pressure systems prevent the low pressure systems from being subjected to pressures which exceed their design limit. In this role, the valves perform a pressure isolation function.

We view as important the redundant isolation provided by these valves. We consider it necessary to assure that the condition of each of these valves is adequate to maintain this redundant isolation and system integrity. For these reasons, we believe that some method, such as pressure monitoring, leak testing, radiography and ultrasonic testing, should be used to assure the condition of each valve is satisfactory in maintaining this pressure isolation function.

If leak testing is selected as the appropriate method for achieving this objective, the staff believes that the following valves should be categorized as A or AC and leak tested according to IWV-3420 of Section XI of the applicable edition of the ASME Code. These valves are:

53-26-001, 002, and 003
53-25-001
53-26-001 and 002
53-25-001

We have discussed this matter with the licensee and identified the valves listed above. The licensee agreed to consider testing and categorizing each of these valves with the appropriate designation depending on the testing method selected. Whatever method the licensee selects for determining the condition of each valve, the licensee will provide to the NRC for evaluation the details of the testing method which clearly demonstrate the condition of each valve.

DPC should be aware that two of the above listed valves are associated with the Event V configurations that resulted in Technical Specification changes authorized by Amendment No. 24 issued by the Commission on February 25, 1981. It is the staff position that all pressure isolation valves identified in this section must be considered for testing (Attachment B).

2.1.2 Stroke Testing Check Valves

The staff stated its position to the licensee that check valves whose safety function is to open are expected to be full-stroked. If only limited operation is possible (and it has been demonstrated by the licensee and agreed to by the staff), the check valve shall be partial-stroked. Since disk position is not always observable, the NRC staff stated that verification of the plant's safety analysis flow rate through the check valve would be an adequate demonstration of the full-stroke requirement. Any flow rate

less than design will be considered part-stroke exercising unless it can be shown that the check valve's disk position at the lower rate would be equivalent to or greater than the design flow rate through the valve. The licensee agreed to accept this position if they use flow as a means to exercise check valves.

2.1.3 Stroke Testing of Motor-Operated Valves

The licensee has requested relief from the part-stroke requirement of Section XI for all power-operated valves. The licensee has stated that none of the Category A or B power-operated valves identified below can be part-stroked because of the design logic of the operating circuits. These circuits are such that when an open or close signal is received the valve must complete a full stroke before the relay is released to allow the valve to stroke in the other direction. We find that the above relief request from part-stroking is warranted because it is impractical to part-stroke. Relief is granted because the required function of the valves involves only full-open or full-closed positions. Therefore, we conclude that granting this relief does not endanger public health and safety.

2.1.4 Test Frequency of Check Valves Tested at Cold Shutdowns

The Code states that, in the case of cold shutdowns, valve testing need not be performed more often than once every three months for Category A and B valves and once every nine months for Category C valves (check valves only). It is our position that Category C valves should be tested on the same schedule as Category A and B valves. This position is also in agreement with the current edition and addenda of the Code. The licensee has agreed to this position that valve testing will not be performed more often than once every three (3) months for Category A, B and C valves.

2.1.5 Licensee Request for Relief to Test Valves at Colt Shutdown

The Code permits valves to be tested at cold shutdown, and the Code conditions under which this is permitted is noted in Appendix A. The valves are specifically identified by the licensee and are full-stroke exercised during cold shutdowns. Therefore, the licensee meets the requirements of the ASME Code and it is not necessary to grant relief. However, during our review of the licensee's IST program, we verified that it is not practical to exercise these valves during power operation.

It should be noted that the staff differentiates for valve testing purposes between the cold shutdown mode and the refueling mode. That is, for testing purposes the refueling mode is not considered as a cold shutdown.

2.1.6 Changes to the Technical Specification

In a November 1976 letter to the licensee, we provided an attachment entitled "NRC Guildelines for Excluding Exercising (Cycling) Tests of Certain Valves During Plant Operation." The attachment stated that when one train of a redundant system such as in the Emergency Core Cooling System (ECCS) is inoperable, nonredundant valves in the remaining train should not be cycled if their failure in a non-safe position would cause a loss of total system function. For example, during power operation at some plants, there are stated minimum requirements for systems which allow certain limiting conditions for operation to exist at any one time and if the system is not restored to meet the requirements within the time period specified in a plant's Technical Specifications (T.S.), the reactor is required to be put in some other mode. Furthermore, prior to initiating repairs, all valves and interlocks in the system that provide a duplicate function are required to be tested to demonstrate operability immediately and periodically thereafter during power operation. For such plants this situation could be contrary to the NRC guidelines as stated in the document mentioned above. It should be noted that reduction in redundancy is not a basis for a T.S. change nor is it by itself a basis for relief from exercising in accordance with Section XI.

The licensee has agreed to review the plant's Technical Specifications and to consider the need to propose technical specification changes which would have the effect of precluding such testing.

After making this review, if the licensee determines that the Technical Specifications should be changed because the guidelines are applicable, the licensee will submit to the NRC in conjunction with such proposed changes the inoperable condition for each system that is affected which demonstrates that the valve's failure would cause a loss of system function. Conversely, if the licensee determines that the technical specifications should not be changed because the guidelines are not applicable or cannot be followed, the licensee will submit its basis for the determination for each potentially affected section of the technical specifications.

2.1.7 Safety-Related Valves

This review was limited to safety-related valves. Safety-related valves are defined as those valves that are needed to mitigate the consequences of an accident and/or to shut down the reactor and to maintain the reactor in a cold shutdown condition. Valves in this category would typically include certain ASME Code Class 1, 2, and 3 valves and could include some non-code Class valves.

It should be noted that the licensee may have included nonsafety-related valves in their Inservice Test Program as a decision on the licensee's part to expand the scope of their program.

2.1.8 Valve Testing at Cold Shutdown

Inservice valve testing at cold shutdown is acceptable when the following conditions are met: It is understood that the licensee is to commence testing within two hours after cold shutdown condition is achieved but not later than 48 hours after shutdown and continue until complete or plant is ready to return to power. Completion of all valve testing is not a prerequisite to return to power. Any testing not completed at one cold shutdown should be performed during any subsequent cold shutdowns that may occur before refueling to meet the Code specified testing frequency.

For planned cold shutdowns, where the licensee will complete all the valves identified in his IST program for testing in the cold shutdown mode, exceptions to the 48 hours may be taken. The licensee has agreed to consider testing in accordance with these requirements.

2.1.9 Category A Valve Leak Check Requirements for Containment Isolation Valves (CIV)

All CIVs shall be classified as Category A valves. The Category A valve leak rate test requirements of IWV-3420(a-e) have been superseded by Appendix J requirements for CIVs. The staff has concluded that the applicable leak test procedures and requirements for CIVs are determined by 10 CFR 50 Appendix J. Relief from paragraph IWV-3420 (a-e) for CIVs presents no safety problem since the intent of IWV-3420 (a-e), which is to demonstrate the leak tightness of the valves, is met by Appendix J requirements.

The licensee shall comply with Sections f and g of IWV-3420 until relief is requested from these paragraphs. It should be noted that these paragraphs are only applicable where a Type C Appendix J leak test is performed.

Based on the considerations discussed above, the staff concludes that the alternate testing proposed above will give the reasonable assurance of valve operability intended by the Code and that the relief thus granted will not endanger life or property or the common defense and security of the public.

2.1.10 Application of Appendix J Testing to the IST Program

The Appendix J review for this plant is a completely separate review from the IST program review. However, the determinations made by that review are directly applicable to the IST program. Our review has determined that the current IST program as submitted by the licensee correctly reflects our interpretation of Section XI vis-a-vis Appendix J. The licensee has agreed that, should the Appendix J program be amended, they will amend their IST program accordingly.

2.2 High and Low Pressure Emergency Core Spray

2.2.1 Category C Valves Relief Request

The licensee has requested relief from exercising Category C valve 53-26-004 (high pressure service water to core spray check) in accordance with the requirements of Section XI and proposed to partial-stroke exercise this valve during cold shutdown and refueling.

Code Requirement - Refer to Attachment A

DPC notes that full-stroke exercising this valve would introduce river water into the stainless steel Core Spray System supply line, which would require flushing to clean up the system to preclude conditions susceptible to stress corrosion. Also, mechanically full-stroking this valve by disassembly is impossible because this valve cannot be isolated from the overhead storage tank. Therefore, this valve will be part-stroked with demineralized water each cold shutdown and refueling outage, but no more often than every 3 months. We agree that with the present piping design only partial-stroke exercising is possible using the demineralized water system and conclude that testing in accordance with the ASME Code is impractical.. We cannot grant this relief, however, because of insufficient information provided by the licensee. We are unable to determine that performing other than the Code-specific test will not endanger health and safety.

2.3 Boron Injection and Purification

2.3.1 Category C Valves - Relief Request

The licensee has requested relief from exercising Category C valve 60-26-001 (boron to core spray pump suction) in accordance with the requirements of Section XI, and proposed to partial-stroke exercise this valve during cold shutdown and refueling outages.

Code Requirement - Refer to Attachment A

DPC reports that cycling this valve during plant operation would render both the Boron Inject and High Pressure Core Spray Systems inoperative. Furthermore, full-stroking this valve at any time would inject boron solution with the high pressure core spray pumps into the reactor coolant system. (The reactor coolant system does not contain boron during normal operation). Therefore, this valve will be part-stroked with demineralized water each cold shutdown and refueling outage, but not more often than every 3 months.

During power operation, injecting highly concentrated boron would cause a reactor shutdown. During cold shutdown, injecting highly concentrated boron would place primary water chemistry out of specification for reactor operation resulting in a delay of reactor startup due to the extensive cleanup requirement. We agree that with the present piping design only partial-stroke exercising is possible using demineralized water and, therefore, conclude that testing in accordance with the ASME Code is impractical.. We cannot grant this relief, however, because of insufficient information provided by the licensee. We are unable to determine that performing other than the Code-specific test will not endanger public health and safety.

2.4 Alternate Core Spray

2.4.1 Category A/C Valves - Relief Relief

The licensee has requested relief from exercising Category A/C valves 38-26-001 and 002 (alternate core spray supply header checks) from the exercising requirements of Section XI and proposed to partial-stroke exercise these valves during cold shutdown and refueling.

Code Requirement - Refer to Attachment A

DPC reports that any exercising of these valves would require isolating the primary system from the Alternate Core Spray System, thus placing the Alternate Core Spray System in an inoperative condition. Full-stroking these valves can only be performed by injecting river water into the stainless steel clad reactor vessel causing possible corrosion and chemical problems requiring extensive cleanup. Disassembly for mechanical testing does not justify breaching a reactor coolant pressure boundary on a routine basis when the valve can be periodically partial-stroked with demineralized water. Therefore, these valves will be part-stroke exercised with demineralized water for operability each cold shutdown and refueling outage, but not more often than every 3 months. During cold shutdown, injecting river water would place primary chemistry out of specification for startup and could cause stress corrosion problems. This could result in a delay of reactor startup due to chemistry operating specifications. We agree that with the present plant piping design only partial-stroke exercising is possible using demineralized water and isolating the system and conclude that testing in accordance with the ASME Code is impractical. We cannot grant this relief, however, because of insufficient information provided by the licensee. We are unable to determine that performing other than the Code-specific test will not endanger public health and safety.

2.5 Manual Depressurization

2.5.1 Category A/E Valves - Relief Request

The licensee has requested relief from exercising Category A/E valve 62-24-005 (bypass valve for 52-25-003) in accordance with the requirements of Section XI.

Code Requirement - Refer to Attachment A

DPC reports that this valve is normally locked in the closed position and is a passive valve not requiring a change in position for any plant conditions. This valve will be leak tested and verified locked in accordance with the ASME Code requirements for Categories A and E.

We agree that this valve is in its safety-related position and is not required to open or close to mitigate the consequences of an accident or safely shut down the plant. Therefore, the operability of this valve is inconsequential with regard to the safety function which it performs and we conclude that stroke testing and stroke time measurements are meaningless for these valves and the relief should be granted. This relief does not endanger public health and safety.

2.6 Containment Isolation

2.6.1 Category A/C Valves - Relief Requests

2.6.1.1 The licensee has requested relief from exercising Category A/C valve 52-26-009 (seal inject makeup from condensate demineralizer containment isolation) in accordance with the requirements of Section XI and proposed to verify valve closure during refueling outages.

Code Requirement - Refer to Attachment A

DPC notes that the only-safety-related position for this valve is shut, and the only way to verify valve closure is during leak rate testing at refueling outages.

This valve will be verified shut (its safety-related position) during leak rate testing performed at refueling outages.

2.6.1.2 The licensee has requested specific relief from exercising Category A/C valve 65-26-001 (feedwater containment isolation) in accordance with the requirements of Section XI and proposed to verify valve closure during refueling outages.

Code Requirement - Refer to Attachment A

DPC notes that exercising this valve during plant operations would require stopping feedwater flow to the reactor, thus placing the plant in an unstable condition resulting in a plant shutdown. The safety-related function of this valve is shut, and the only way to verify closure is by leak testing, which is beyond the scope of normal cold shutdown testing.

This valve will be verified shut during leak rate testing at refueling outages.

Neither of these valves is equipped with valve position indicators and some of the required test connections are located inside the containment. We agree that the proposed alternate testing frequency of verifying valve closure during the performance of leak rate testing at refueling outages should demonstrate proper valve operability.

Check valves are found to be low in failure rate. "Low in failure rate" has been defined as any component whose unavailability upon demand is less than or equal to 10^{-4} per demand.

The optimum test interval for operability testing "low in failure rate" valves was determined by the staff using actual valve failure rate data and standard probabilistic techniques to be in the range of 3 months to 27 months.

Refueling intervals, which have been proposed as the test intervals for this valve, occur every 12 to 24 months which is within the optimum range for operability testing of this valve.

The ASME Code, which requires testing be done quarterly and which has been adopted in 10 CFR 50.55a, also allows testing at cold shutdowns if quarterly testing is impractical. Cold shutdowns can occur at intervals up to refueling outages. Therefore, changing the test interval from quarterly to refueling does not differ significantly from the Code permitted change from quarterly to cold shutdown testing.

Based on the above the staff concluded that the alternate testing frequency proposed will give the reasonable assurance of valve operability intended by the Code and that the relief thus granted will not endanger public health and safety.

3.0 SUMMARY

We have reviewed and evaluated the basis of the requests for relief from certain valve testing requirements of Section XI ASME Code submitted by DPC. We conclude that the Section XI ASME Code requirements are impractical to complete and that relief in selected cases is justified. We denied three of the relief requests because of insufficient justification. We have reviewed the alternate methods of testing proposed in lieu of the impractical testing requirements, and conclude that they will ensure an adequate margin of component integrity. Pursuant to 10 CFR Section 50.55a(g)(6)(i) we hereby grant relief from certain valve testing requirements. We have also determined that granting such 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 considering the burdens imposed on the licensee if the relief is not granted.

4.0 CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) because the relief does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the relief does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and with the issuance of this relief will not be inimical to the common defense and security or to the health and safety of the public.

Date: April 23, 1981

Attached:
Attachments A and B

Attachment A

Code Requirements

Subsection IWV-3410(a) of the 1974 Edition of the Section XI ASME Code (which discusses full-stroke and partial-stroke requirements) requires that Code Category A and B valves be exercised once every three months, with exceptions as defined in IWV-3410(b) (1), (e) and (f). IWV-3520(a) (which discusses full-stroke and partial-stroke requirements) requires that Code Category C valves be exercised once every three months, with exceptions as defined in IWV-3520(b). In the above cases of exceptions, the Code permits the valves to be tested at cold shutdown where:

(a) It is not practical to exercise the valves to the position required to fulfill their function or to the partial position during power operation.

(b) It is not practical to observe the operation of the valves (with failsafe actuators) upon loss of actuator power.

Subsection IWV-3410(c) requires all Category A and B power-operated valves to be stroke time tested to the nearest second or 10% of the maximum allowable owner-specified stroke time.

Attachment B

STAFF POSITION

VERIFICATION OF LEAK TIGHT INTEGRITY

OF PRESSURE ISOLATION VALVES

All holders of an operating license for BWR and PWR power reactors shall comply with the following provisions:

1. For system lines connected to the RCS which penetrate containment and are greater than or equal to 1½ inches nominal pipe size for which the systems are rated at 50% or less of the RCS design pressure:
   a. The leak tight integrity of at least each of two closed valves in system lines within the ASME Class 1 boundary shall be verified by leak testing or some other method, or
   b. In those cases where the licensee is unable to verify the leak tight integrity of each of the valves within the ASME Class 1 boundary as required by 1a above, for an interim basis, a MOV outside the ASME Class 1 boundary may be used as a pressure isolation barrier provided the MOV can be demonstrated that:
      1) it is rated at least to RCS pressure,
      2) a hydrostatic test has been performed on the valve with the disk closed and tested in accordance with ASME Section III, NC 3514, B-16.5 or equivalent.
      3) an inservice leak tightness test (eg. an Appendix J Type C test) has been performed within a refueling cycle.
2. The leak testing of all valves that perform a pressure isolation function in systems connected to the RCS on lines greater than or equal to 1½ inches nominal pipe size shall comply with the provisions of Attachment 3.

Implementation

Items 1a or 1b are to be completed within 30 days. Item 2 shall be completed before returning to power after the next refueling outage. The results of all pressure boundary tests conducted in accordance with items 1a and 2 along with test procedures shall be provided to NRR within 30 days of completion of the testing. Justification provided under item 1b to verify leak tight integrity on an interim basis shall be provided to NRR within 60 days of receipt of this position. Item 1b is an acceptable interim position until the next cold shutdown; however, prior to a return to power, all valves justifed under 1b shall be verified by leak testing.