SAFETY EVALUATION RELATED TO
REQUEST FOR RELIEF FROM INSERVICE PRESSURE TEST REQUIREMENTS
INDIANA AND MICHIGAN ELECTRIC COMPANY
DONALD C. COOK NUCLEAR POWER PLANT UNIT 1
DOCKET NO. 50-315

Introduction

Technical Specification 4.4.10 for the Donald C. Cook Power Plant Unit 1 states that inservice examination of ASME B&PV Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the Code and applicable addenda as required by 10 CFR 50.55a(g) except where specific written relief has been granted by the Commission. The Examination Program for Unit 1 is based upon the requirements of the 1974 Edition with the addenda through the Summer of 1975. Certain requirements of this Edition and Addenda of Section XI are impractical to perform on older plants because of the plants' design, component geometry, materials of construction or the need for extensive temporary modifications and the resultant substantial radiation exposure to plant personnel.

By letter dated May 17, 1985, the Indiana and Michigan Electric Company requested relief from the pressure test inspection requirements of the Code for sections of pipes determined to be impractical to perform these tests.

Evaluation of Requests for Relief

1. Emergency Core Cooling System, Flow Diagram 1-5143 Piping Boundaries:

   (a) Accumulator No. 1 Discharge Piping - Valves IMO-110, SI-166-1, IRV-115, SI-168-1

(b) Accumulator No. 2 Discharge Piping - Valves IMO-120, SI-166-2, IRV-125, SI-168-2

(c) Accumulator No. 3 Discharge Piping - Valves IMO-130, SI-166-3, IRV-135, SI-168-3

(d) Accumulator No. 4 Discharge Piping - Valves IMO-140, SI-166-4, IRV-145, SI-168-4

ISI Code Class 2 Requirements:

For a system design pressure of 2485 psig, Article IWC-5000 of Section XI Code requires the piping to be tested at a pressure of 3106 psig and temperature not less than 100°F.

Basis for Relief Request:

The section of piping upstream of check valves SI-166-1 thru 4 cannot be tested at a pressure of 3106 psig without making extensive temporary modifications to keep the valves closed. The modifications would require: (1) disassembly of the valves, (2) welding of temporary blocks (on the downstream side) inside the valve bodies to hold a "jack screw" type arrangement to keep the valve closed, (3) removal of the temporary blocking devices from the valves after testing and (4) performing necessary nondestructive testing to assure the integrity of the valve bodies before returning them to service. The piping downstream of these valves is part of the RHR System and carries radioactive fluid during normal operation. Therefore, plant personnel will be subjected to substantial radiation exposure and radioactive contamination in order to carry out any modifications for the test.

Licensee's Proposed Alternative Test

The licensee proposes as an alternative to pressurize the above sections of pipe to a pressure of 2280 psig at a temperature above 100°F. The test can be performed during Mode 3 with the Reactor Coolant System (RCS) pressure at 2280 psig and temperature greater than or equal to 500°F. The RCS pressure will be used to block the check valves (SI-166-1, SI-166-2, SI-166-3, SI-166-4) closed, therefore, limiting maximum pressure to 2280 psig.

Evaluation and Conclusion

The proposed alternative test is higher than the 2235 psig nominal operating pressure in the short sections (less than 5 feet) of the piping systems for which relief is requested. The IWC-5000 pressure test values are developed for ferritic steels. The materials in the piping systems for which relief is requested are austenitic stainless steels and are tougher and more ductile than the ferritic steels. Therefore relief from the Code pressure test requirement can be granted as requested.

2. CVCS - Reactor Letdown and Charging, Flow Diagram 1-5129 Piping Boundaries:

(a) 2-Inch Aux. Spray Piping - Valves QRV-51, CS-325

(b) Normal Charging Loop 4 Cold Leg - QRV-62, CS-328-L4, CS-326 and CS-327

(c) Alternate Charging Line to Loop 1 Cold Leg - Valves QRV-61, CS-328-L1

ISI Code Class 1 Requirement for Item (a):

For operating pressure of 2235 psig, Article IWB-5000 of Section XI Code requires the piping to be tested at a pressure of 2458 psig and temperature not less than 100°F.

ISI Code Class 2 Requirement for Items (b) and (c):

For a design pressure of 2735 psig, Article IWC-500 of Section XI Code requires the piping to be tested at a pressure of 3418 psig and temperature not less than 100°F.

Basis for Relief Request for Items 2(a), 2(b), and 2(c):

This is a similar situation to Relief Request No. 1. Check Valves CS-328L1, CS-328L4 and CS-325 are located on the charging lines to the RCS System. These valves must be disassembled and temporarily modified to block them closed in order to perform the required hydrostatic tests and plant personnel will be exposed to high radiation and radioactive contamination during the modification.

Licensee's Proposed Alternative Test

The licensee proposes to pressurize the above sections of pipe to a pressure of 2280 psig at a temperature above 100°F. The test will be performed during Mode 3 with the RCS pressure at 2280 psig and the temperature greater than or equal to 500°F. The RCS pressure will be used to block the check valves CS-329L1, CS-329L4 and CS-325 closed therefore limiting maximum pressure to 2280 psig.

Evaluation and Conclusion

The proposed alternative test pressure is higher than 2235 psig nominal operating pressure in the sections of piping between 23 to 115 feet long for which the relief is requested.

The IWB-5000 and the IWC-5000 test values were developed for ferritic steels. The materials in the piping systems for which relief is requested are austenitic stainless steels and are tougher and more ductile than the ferritic steels. Therefore relief from the Code pressure test requirements can be granted as requested.

3. CVCS - Reactor Letdown and Charging, Flow Diagram 1-5129 Piping Boundaries:

Letdown Lines:

Valves QRV-112, QRV-160, QRV-161, QRV-162

ISI Code Class 2 Requirement:

For a design pressure of 2485 psig, Article IWC-5000 of Section XI Code requires the above piping to be tested at a pressure of 3106 psig and temperature not less than 100°F.

Basis for Relief Request:

The above section of piping cannot be tested at a pressure of 3106 psig without using a spare 1-inch plugged connection located downstream of instrument QTA-160. This section of piping is located inside the regenerative heat exchanger room which is normally a high radiation area. Therefore, plant personnel will be subject to substantial radiation exposure in order to perform the test.

As an alternative, extending the test boundary to QCR-301 was considered. This would involve using QPX-301 located on the downstream piping outside the regenerative heat exchanger room as a test connection. This consideration was also rejected because valve QCR-301 and the flange bolted to the inlet flange of safety valve SV-51 are 600lb. class which cannot withstand the above test pressure.

Licensee's Proposed Alternative Test

The licensee proposes to pressure test the above section of pipe to a pressure of 2280 psig at a temperature above 100°F during Mode 3 operation using RCS pressure and at a temperature greater than or equal to 500°F. Valves QRV-111 and QRV-112 will be opened with QRV-160, QRV-161 and QRV-162 closed.

Evaluation and Conclusion

The proposed test pressure is higher than 2235 psig nominal operating pressure in the sections of piping approximately 65 feet long for which relief is requested.

The IWC-5000 pressure test values were developed for ferritic steels. The materials in the piping systems for which relief is requested are austenitic stainless steels and are tougher and more ductile than the ferritic steels. Therefore relief from the Code pressure test requirements for these sections of pipe can be granted as requested.

4. Emergency Core Cooling System (SIS), Drawing 1-5142 Piping Boundaries:

Valves IMO-51, SI-142L1 - Boron Injection Loop No. 1
Valves IMO-52, SI-142L2 - Boron Injection Loop No. 2

Valves IMO-53, SI-142L3 - Boron Injection Loop No. 3
Valves IMO-54, SI-142L4 - Boron Injection Loop No. 4

ISI Code Class 1 Requirement:

For an operating pressure of 2235 psig, Article IWB-5000 of the ASME Code, Section XI, requires that the piping be tested at a pressure of 2458 psig and a temperature not less than 100°F.

Basis for Relief Request:

This is a similar situation to code relief request no. 1. The sections of the piping system upstream of check valves SI-142L1 thru L4 cannot be tested at a pressure of 2458 psig without making temporary modifications (blocking the valve disc) to keep the check valves closed. Since the piping sections are part of the primary system, plant personnel will be subjected to substantial radiation exposure and contamination in order to carry out such modifications for the test.

Licensee's Proposed Alternative Test

The licensee proposes as an alternative test to pressurize the above sections of pipe to a pressure of 2280 psig and a temperature above 100°F. The test will be performed during Mode 3 with the RCS pressure at 2280 psig and temperature greater than or equal to 500°F. The RCS pressure will be used to block check valves SI-142L1 thru L4 closed, therefore limiting maximum pressure to 2280 psig.

Evaluation and Conclusion

The proposed test pressure is higher than the 2235 psig nominal operating pressure in the sections of piping, each approximately 44 to 55 feet long, for which Code relief is requested.

The IWB-5000 pressure test values were developed for ferritic steels. The materials in the piping systems for which relief is requested are austenitic stainless steels and are tougher and more ductile than the ferritic steels. Therefore the relief from the Code pressure test requirements for these section of pipe can be granted as requested.

Principal Contributors:

B. Turovlin