

SAFETY EVALUATION REPORT RELATED TO
REQUESTS FOR RELIEF FROM INSERVICE PRESSURE TEST REQUIREMENTS
INDIANA AND MICHIGAN ELECTRIC COMPANY
DONALD C. COOK NUCLEAR POWER PLANT UNIT 2

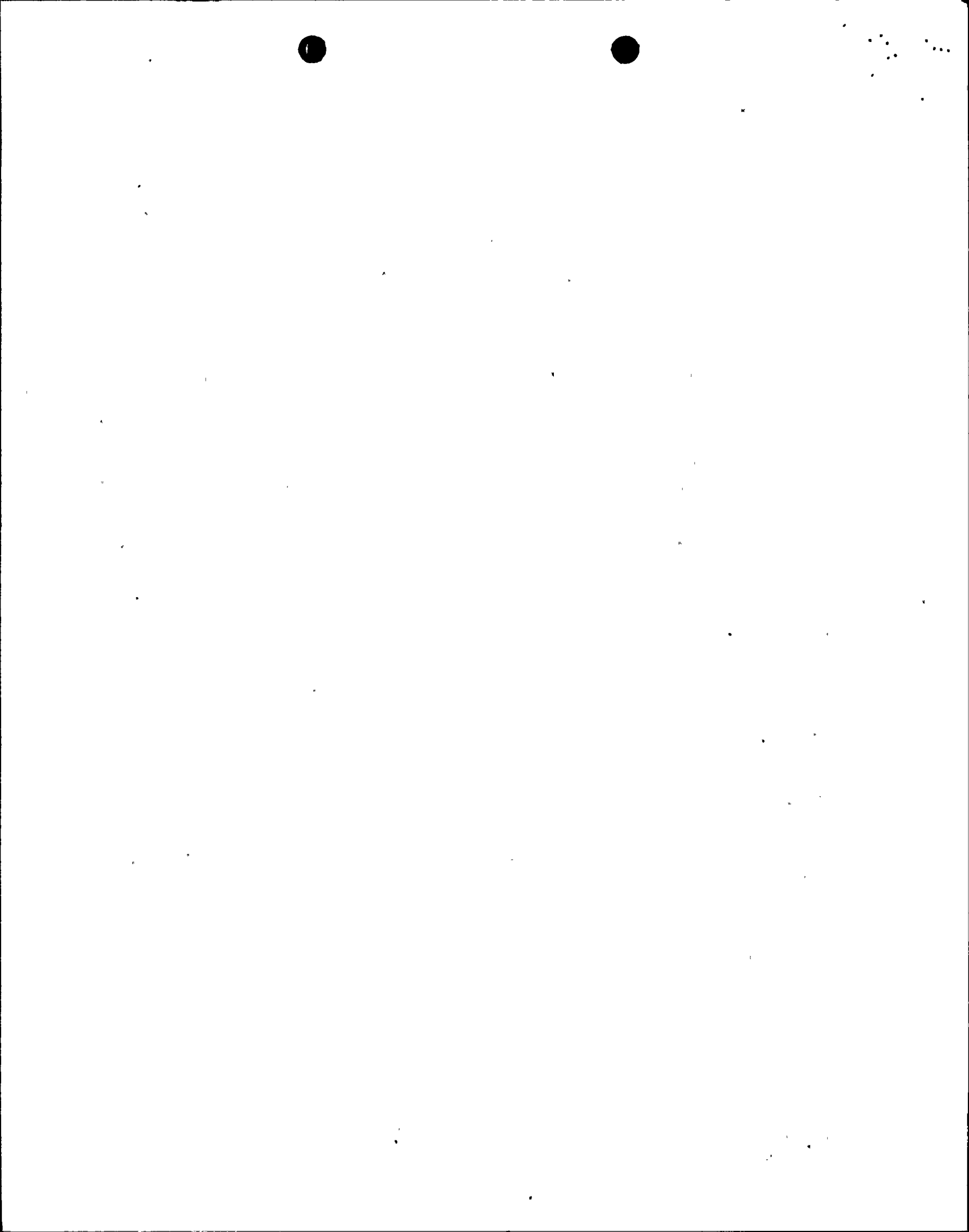
DOCKET NO. 50-316

I. INTRODUCTION

Technical Specification 4.0.5 for the Donald C. Cook Nuclear Power Plant Unit 2 states that inservice examinations and pressure tests of ASME Code Class 1, 2, and 3 components and systems shall be performed in accordance with the applicable edition and addenda of Section XI of the ASME Code as required by 10 CFR 50.55a(g) except where specific written relief has been granted by the Commission. The Inservice Inspection Program for D.C. Cook Unit 2 is based presently on the requirements of the 1974 Edition through Summer 1975 Addenda of Section XI. Certain requirements of this Edition and Addenda are impractical to perform on older plants because of their design, component geometry, materials of construction, or the need for extensive temporary modifications with concomitant exposure of plant personnel to relatively high levels of radiation.

By letter dated February 3, 1986, the Indiana and Michigan Electric Company requested relief from the pressure test requirements of Section XI determined to be impractical to perform on sections of piping in various systems at D.C. Cook Unit 2. The letter also contained information supporting the requests. Pursuant to 10 CFR 50.55a(g)(6)(i), this information has been reviewed and evaluated with the necessary findings made to grant relief from the Code requirements as requested.

8604080465 860331
PDR ADDCK 05000316
P PDR



II. EVALUATION OF REQUESTS FOR RELIEF

1. Emergency Core Cooling System, Flow Diagram 2-5143 Piping Boundaries

- (a) Accumulator No. 1 Discharge Piping - Valves IMO-110, SI-166-1, IRV-155, SI-168-1
- (b) Accumulator No. 2 Discharge Piping - Valves IMO-120, SI-166-2, IRV-165, SI-168-2
- (c) Accumulator No. 3 Discharge Piping - Valves IMO-130, SI-166-3, IRV-175, SI-168-3
- (d) Accumulator No. 4 Discharge Piping - Valves IMO-140, SI-166-4, IRV-185, 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.

RELIEF REQUESTED

Relief is requested from performing the pressure test at the code required pressure of 3106 psig.

LICENSEE'S BASIS FOR REQUESTING RELIEF

The sections 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.

STAFF EVALUATION AND CONCLUSION

The system's design does not permit pressurizing the sections of piping to the Code required pressure without either extensive temporary valve modifications or overpressurizing the Class 1 sections of connected piping. In light of this, the staff finds the test pressure requirement to

be impractical to attain. The sections of piping will be subjected to a pressure slightly higher than normal operating at a temperature higher than that required by Code. The visual inspection of the piping during the pressure test as well as the volumetric examination requirements for selected welds in the systems will provide adequate assurance of the continued structural integrity of the piping.

Based upon the above evaluation, the Code requirements are impractical. The staff concludes that the alternative test proposed by the licensee in conjunction with the other NDE requirements will provide reasonable assurance of the integrity of the piping and of maintaining the margin of safety of the plant. Therefore, the relief requested from the Code requirements may be granted.

2. CVCS-REACTOR LETDOWN AND CHARGING, FLOW DIAGRAM 2-5129 PIPING BOUNDARIES

- (a) 2-Inch Aux. Spray Piping - Valves QRV-51, and CS-325
- (b) Normal Charging Loop 4 Cold Leg - QRV-62, CS-328-L4, CS-326, and CS-327
- (c) Alternative Charging Line to Loop 1 Cold Leg - Valves QRV-61 and 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-5000 of Section XI Code requires the piping to be tested at a pressure of 3418 psig and temperature not less than 100°F.

RELIEF REQUESTED

Relief is requested from performing the pressure test at the Code required pressures of 2458 psig and 3418 psig.

LICENSEE'S BASIS FOR REQUESTING RELIEF 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 RC 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.

STAFF EVALUATION AND CONCLUSION

The system's design does not permit pressurizing the sections of piping to the Code required pressure without either extensive temporary valve modifications or overpressurizing the Class 1 sections of connected piping. In light of this, the staff finds the Code required test pressure to be impractical to attain. The sections of piping will be subjected to a pressure slightly higher than normal operating at a temperature higher than that required by Code. The visual inspection of the piping during the pressure test as well as the volumetric examination requirements for selected welds in the systems will provide adequate assurance of the continued structural integrity of the piping.

Based upon the above evaluation, the Code requirements are impractical. The staff concludes that the alternative test proposed by the licensee in conjunction with the other NDE requirements will provide reasonable assurance of the integrity of the piping and of maintaining the margin of safety of the plant. Therefore, the relief requested from the Code requirements may be granted.

3. CVCS - REACTOR LETDOWN AND CHARGING, FLOW DIAGRAM 2-5129 PIPING BOUNDARIES

Letdown Lines:

Valves QRV-112, QRV-160, QRV-161, and 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.

RELIEF REQUESTED

Relief is requested from performing the pressure test at Code required pressure of 3106 psig.

LICENSEE'S BASIS FOR REQUESTING RELIEF

The above section of piping cannot be tested at a pressure of 3106 psig without modification since no test connection exists. This piping carries radioactive fluid during normal operation. Therefore, plant personnel would be subjected to substantial radiation exposure and contamination in order to add a test connection.

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 600-lb. 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. Valves QRV-111 and QRV-112 will be opened with QRV-160, QRV-161, and QRV-162 closed.

STAFF EVALUATION AND CONCLUSION

The system's design did not include a test connection to allow pressurizing to Code test pressure or piping and valves rated appropriately to accommodate the required pressure at other points of isolation in the system. In order to comply with the Code requirement, the licensee would

have to install a test connection or overpressurize lower rated piping and components. The staff therefore finds the requirement to be impractical. The licensee's proposed alternative test will subject the piping to a pressure slightly higher than normal operating pressure. The required visual inspection of the piping at the test pressure and other required NDE of the welds in the system will provide adequate assurance of the continued structural integrity of the piping.

The staff concludes that the alternative test proposed by the licensee in conjunction with the other NDE requirements will provide reasonable assurance of the integrity of the piping and of maintaining the margin of safety of the plant. Therefore, the relief requested from the Code requirement may be granted.

4. EMERGENCY CORE COOLING SYSTEM (SIS), DRAWING 2-5142 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.

RELIEF REQUESTED

Relief is requested from performing the pressure test at the Code required pressure of 2458 psig.

LICENSEE'S BASIS FOR REQUESTING RELIEF

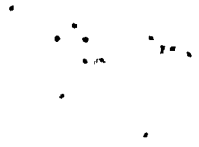
This is a similar situation to Relief Request No. 1. The sections of the piping system upstream of check valves SI-142L1 thru L4 cannot be tested at a pressure of 2458 psig without making temporary modifications (blocking the valve disc) to keep the check valves closed. Since the piping sections are 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 at a 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 system's design does not permit pressurizing the sections of piping to the Code required pressure without temporary valve modifications. The Code test pressure requirement is impractical when one considers the modifications required, the licensee's proposed test at 2280 psig at or greater than 100°F, the required visual inspection during the test, and the



volumetric examination of welds in the system required by the Code. The difference in the required test pressure and that proposed by the licensee at the higher temperature does not warrant imposition of the Code requirement.

The staff concludes that the alternative test proposed by the licensee will provide reasonable assurance of the integrity of the piping and of maintaining the margin of safety of the plant. Therefore, the relief requested from the Code requirement may be granted.

5. AUXILIARY SPRAY TO REACTOR COOLANT SYSTEM AND PRESSURIZER, CVCS-REACTOR LETDOWN AND CHARGING SYSTEM, FLOW DIAGRAM 2-5129 PIPING BOUNDARIES

Valves QRV-51	CS-326
Valves QRV-61	CS-322
Valves QRV-62	

ISI CODE CLASS-2 REQUIREMENTS:

For a system design pressure of 2735 psig, Article IWC-5000 of the ASME Code, Section XI, requires that the piping be tested at a pressure of 3418 psig, and a temperature not less than 100°F.

RELIEF REQUESTED

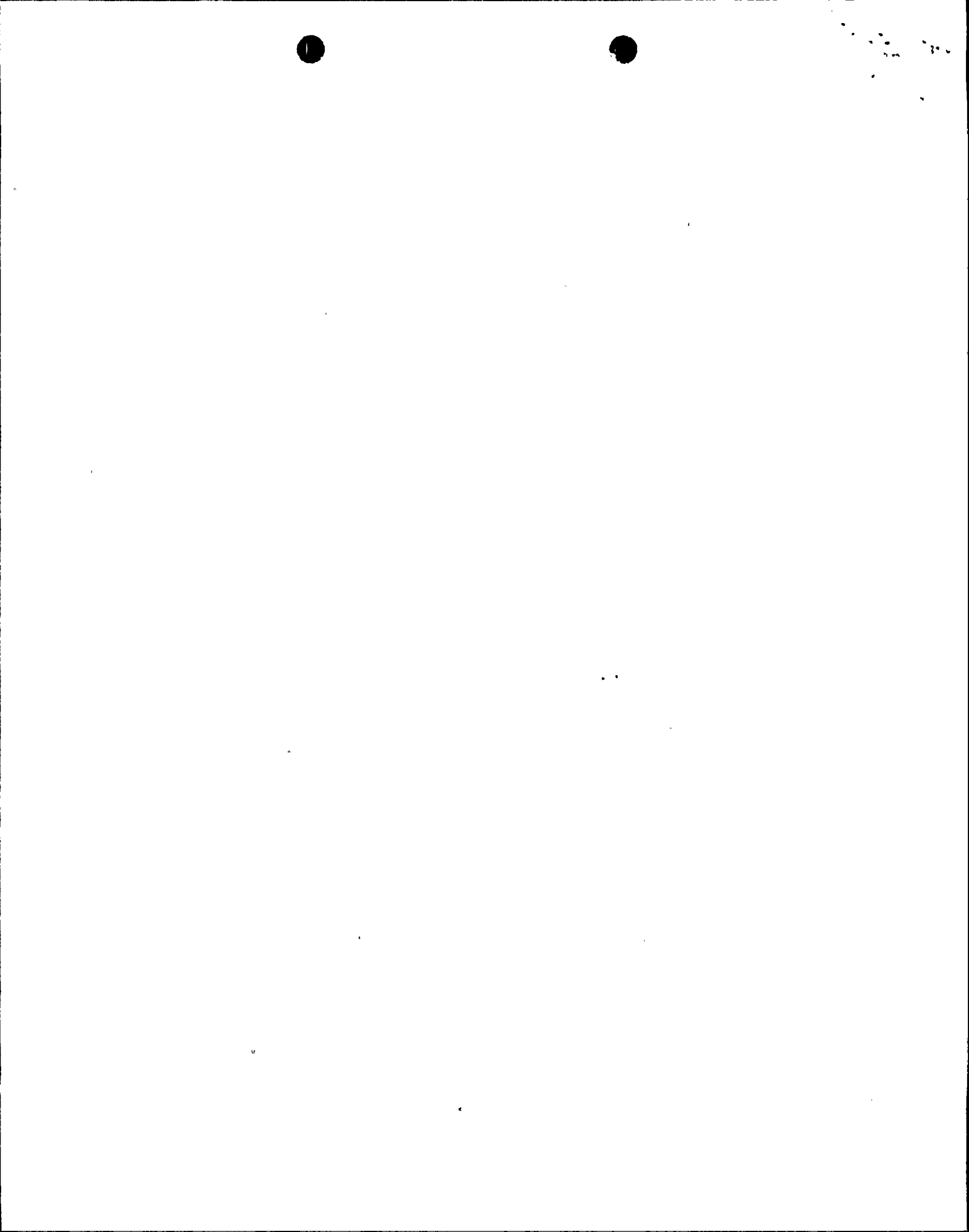
Relief is requested from the test pressure requirement of 3418 psig and temperature of 100°F.

BASIS FOR RELIEF REQUEST:

In order to perform the pressure test in this ISI Class 2 section of piping, valve QRV-51 has to be used as an isolation valve. The valve is between Class 1 and Class 2 sections of pipe. This 1,500 lb. class, air-operated, control valve is designed to withstand a test pressure of 3418 psig in the open position, i.e, with the stem withdrawn and pressurizing only the valve body. However, it cannot be used as an isolation valve for this test because it was designed for a differential pressure of 1200 psig in the closed position. At higher differential pressure, the valve must be maintained closed by additional, rigid mechanical means to prevent valve lifting and leakage.

In a telephone conversation on February 25, 1986, the licensee informed the staff that the valve can be maintained closed by means of a "stem block", which is available at the site, to be tight against a differential pressure of 2800 psig. Installation of the "stem block" can be done without extensive rigging and with plant personnel exposed to relatively small amounts of radiation.

The valve cannot be kept closed during pressure testing at 3418 psig without extensive, temporary rigging. The modification would require: (1) removal of the air operator and installation of a "strong back" to keep the valve closed during the testing, (2) removal of the "strong back" after the testing, and (3) re-installation of the air operator on the valve and restoring the valve to operable condition before returning to service. The valve is located inside the regenerative heat exchanger room which is a very high radiation area and plant personnel would be subjected to radiation exposure of 5 to 7 man rems.



LICENSEE'S PROPOSED ALTERNATIVE TEST

The licensee proposes as an alternative to pressurize the above sections of pipe to a pressure of 2800 psig with valve QRV-51 closed. The valve will be held closed with a "stem block" and the Class 1 side of the valve at ambient pressure.

EVALUATION AND CONCLUSION

The above piping system cannot be tested to ASME Code requirements without modifying the system and/or exposing personnel to unnecessary radiation hazards. The materials used in the construction of Class 2 systems in D.C. Cook Unit 2 were specified to have a ductile to brittle transition temperature far below 100°F. Relief from the Code requirement to conduct the test at a temperature not less than 100°F has been previously granted by NRC letter dated January 10, 1985 from S. A. Varga to J. Dolan.

The proposed test pressure is higher than the normal operating pressure of 2235 psig in the approximately 30 foot long section of piping for which Code relief is requested. The proposed test pressure is 2800 psig, or 25%, above the normal operating pressure, thus the test provides reasonable assurance of the integrity of the piping.

Based upon the above, the staff concludes that the Code requirements are impractical and if imposed upon the licensee would result in hardship or difficulties without a compensating increase in the safety margins of the D.C. Cook Unit 2. The alternative test proposed by the licensee will provide reasonable assurance of the integrity of the section of pipe and of maintaining the margin of safety of the plant. We therefore conclude that relief from the Code requirements may be granted as requested.

