ENCLOSURE 2

TECHNICAL EVALUATION SUMMARY
OF THE FIRST 10-YEAR INSERVICE INSPECTION INTERVAL
ADDITIONAL REQUESTS FOR RELIEF
COMMONWEALTH EDISON
LASALLE COUNTY STATION, UNITS 1 AND 2
DOCKET NOS. 50-373 AND 50-374

1.0 INTRODUCTION

By letters dated August 4, 1993 and September 14, 1993, the licensee, Commonwealth Edison, submitted Relief Requests 25 through 30, for the first 10-year inservice inspection (ISI) interval that ends in January and October 1994, for Units 1 and 2 respectively. The Idaho National Engineering Laboratory (INEL), has evaluated the subject requests for relief in the following sections.

2.0 EVALUATION

The information provided by the licensee in support of the requests for relief has been evaluated below. The applicable Code for the first 10-year ISI interval is the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 1980 Edition through the Winter 1980 addenda.

A. Request for Relief No. 25: ASME Section XI, Subparagraph IWA-5211(a), Performing System Leakage Tests at Nominal Operating Pressure Following the Disassembly and Reassembly of Code Class 1 Mechanical Connections

Code Requirement: Section XI, Paragraph IWA-5211(a), states that a system leakage test is required following the opening and closing of components in systems. The test is to be performed while the system is at nominal operating pressure.

Licensee's Code Relief Request: The licensee requested relief from performing pressure testing of reassembled, nonisolable Class 1, mechanical connections at the system operating pressure.

Licensee's Basis for Requesting Relief: The licensee stated:

"The nominal operating pressure associated with 100% rated reactor power is 1,020 psig. Near the end of each refueling outage, a system pressure test of all Class 1 pressure retaining components is conducted at 1,020 psig.

"Subsequent to the system pressure test conducted during a refueling outage or during forced maintenance outages which can occur during an operating cycle, it may become necessary to disassemble and reassemble Class 1 mechanical connections that are located in the drywell and cannot be isolated from the reactor vessel. For these situations, the performance of a Class 1 system leakage test at 1,020 psig would have a

significant impact on the unit's critical path outage time and personnel exposure.

"The normal Class 1 system pressure test, which is performed with the vessel flooded, requires numerous equipment outages (e.g., 380 valves must be taken out of service). Performance of the equipment outages, coupled with the performance test, takes approximately 5 days (3 shifts per day) with a total personnel exposure of approximately 2.5 Man-Rem.

"Performance of a system leakage test during normal startup is possible, however the test can not be performed at 1,020 psig. During unit startup, the Electro-Hydraulic Control System precludes a reactor pressure above 950 psig without significant increases in reactor power. In order to achieve a pressure of 1,020 psig, the reactor would have to be at approximately 100% rated power. The radiation levels in the drywell at this power level are prohibitive, and prevent drywell entry by plant personnel.

"A drywell entry to inspect for leakage can be performed ≥920 psig, which is associated with approximately 15% reactor power. Performance of the leakage test in this manner would have an insignificant impact on the ability to detect leakage from a reassembled mechanical connection. It would also significantly reduce the personnel exposure and critical path outage time required for the test.

"Based on the above, LaSalle County Station requests relief from the ASME Section XI requirements for the system leakage test pressure when performing pressure testing of reassembled, unisolable Class 1 mechanical connections."

Licensee's Proposed Alternative Examination: The licensee has proposed as an alternative to perform a system leakage test at ≥920 psig during unit startup when an nonisolable, Class 1 mechanical connection in the drywell has been disassembled and reassembled either 1) subsequent to performance of the system pressure test conducted near the end of each refueling outage or 2) during a forced maintenance outage in the course of an operating cycle.

Evaluation: The Code requires that system pressure tests be performed at not less than the system operating pressure. The licensee states that near the end of each refueling outage, a system pressure test of all Class 1 pressure-retaining components is conducted at 1020 psig. The licensee has not provided an explanation of how the performance of the system pressure test following a refueling, would differ from a system pressure test at operating pressure following the reassembly of a Class 1 mechanical joint. This relief request is unique to the Commonwealth Edison boiling water reactors and does not appear to be warranted.

It appears that the licensee is requesting relief from a Code system pressure test requirement on a generic basis. Relief from pressure tests

associated with reassembled, nonisolable, Class 1 mechanical connections should be addressed on a case-by-case basis. The licensee has not provided sufficient justification to support the impracticality of the Code requirement. Furthermore, the proposed alternative examination does not provide the same level of assurance of system integrity demonstrated by a test pressure equivalent to the system operating pressure. Therefore, relief should be denied.

B. Request for Relief No. 26: ASME Section XI, Subarticle IWA-4400, Performing Elevated Pressure Hydrostatic Tests on Class 1 and 2 Repaired/Replaced Components

Code Requirement: Subarticle IWA-4400(a) states that a hydrostatic test shall be performed after welded repair and replacement of Code Class 1, 2, and 3 components, except as exempted by IWA-4400(b).

Licensee's Code Relief Request: The licensee has requested relief from the Code requirements for performing hydrostatic pressure tests on Class 1 and 2 repaired/replaced components.

Licensee's Basis for Requesting Relief: The licensee stated:

"Elevated pressure hydrostatic tests are difficult to perform and often represent a true hardship. Some of the difficulties associated with hydrostatic pressure testing include the following:

- Hydrostatic testing often requires complicated or abnormal valve line-ups in order to properly vent, fill, and isolate the component requiring testing.

- Relief valves with set-points lower than the hydrostatic test pressure must be gagged or removed and blind flanged. This process requires the draining and refilling of the system.

- Valves that are not normally used for isolation (e.g., normally open pump discharge valves) are often required to provide pressure isolation for an elevated pressure hydrostatic test. These valves frequently require time consuming seat maintenance in order to allow for pressurization.

- The radiation exposure required to perform a hydrostatic pressure test is high (in comparison to operational pressure testing) due to the large amount of time required to prepare the volume for testing (i.e., installing relief valve gags, performing appropriate valve line-ups, etc.).

"The difficulties encountered in performing a hydrostatic pressure test are prohibitive when weighed against the benefits. Industry experience, which is corroborated by LaSalle County Station's experience, shows that most through-wall leakage is detected during system operation as opposed

to during elevated pressure tests such as ten-year system hydrostatic tests.

"Little benefit gained from the added challenge to the piping system provided by an elevated pressure hydrostatic test (when compared to an operational test). The piping stress experienced during a hydrostatic test does not include the significant stresses affiliated with the thermal growth and dynamic loading associated with design basis events.

"These arguments are also supported by the adoption of Code Case N-498, 'Alternative Rules for 10 Year Hydrostatic Pressure Testing for Class 1 and 2 Systems, Section XI, Division 1'. This relief request is a logical extension of that Code Case.

"In addition to pressure tests, nondestructive examinations performed on repair/replacement welds and metal removal sites provide assurance of component integrity.

"Based on the above, LaSalle County Station requests relief from the ASME Section XI requirements for performing elevated pressure hydrostatic tests on Class 1 and 2 repaired/replaced components."

Licensee's Proposed Alternative Examination: The licensee has proposed as an alternative to perform nondestructive examination (NDE) in accordance with methods and acceptance criteria of the applicable subsection of the 1992 Edition of Section III.

A VT-2 visual examination will be performed with the Class 1 or 2 repaired/replaced component pressurized to nominal operating pressure. This visual examination will be performed after nominal operating pressure has been held for the following times:

- Uninsulated components shall be held at nominal operating pressure for 10 minutes prior to examination.

- Insulated components shall be held at nominal operating pressure for 4 hours prior to examination.

Evaluation: The Code requires that a system hydrostatic pressure test be performed for welded repairs/replacements on a pressure-retaining boundary, except as exempted by IWA-4700(b). The licensee stated that the hydrostatic pressure test following a repair or replacement is a true hardship with little benefit. As an alternative, the licensee proposes to perform NDE in accordance with methods and acceptance criteria of the applicable subsection of the 1992 Edition of Section III and a VT-2 visual examination at nominal operating pressure.

Compliance with the Code required hydrostatic test requirements following a repair and replacement results in a hardship without a compensating increase in the level of quality and safety above that provided by the

licensee's proposed alternative NDE and VT-2 visual examination at operating pressure. The performance of the proposed alternatives will provide a reasonable assurance of operational readiness. Therefore, it is recommended that pursuant to 10 CFR 50.55a(a)(3)(ii), relief should be authorized.

C. Request for Relief No. 27: ASME Section XI, Paragraph IWA-5241(b), Direct VT-2 Visual Examinations During System Leakage and Hydrostatic Tests

Code Requirement: Paragraph IWA-5241(b) states that for components whose external surfaces are inaccessible for direct VT-2 visual examination, the surrounding area, including floor areas or equipment surfaces located underneath the components, shall be examined for evidence of leakage.

Licensee's Code Relief Request: The licensee has requested relief from the Section XI requirements for performing a VT-2 visual examination of the Residual Heat Removal (RHR) Heat Exchanger tubing during hydrostatic and operational pressure tests.

Licensee's Basis for Requesting Relief: The licensee stated:

"The tubing inside the Residual Heat Removal (RHR) Heat Exchanger is inaccessible. A visual examiner cannot enter the RHR Heat Exchanger to perform an examination of the tubes or their surrounding areas during operational or hydrostatic pressure testing of the tube side of the Heat Exchanger.

"The shell side of the heat exchanger could be pressurized with the tube side drained. Evidence of leakage could then be observed from the shell-to-tube side. However, this requires the removal of the Heat Exchanger Channel Cover flange. Access to the tube side of the vertically mounted Heat Exchanger is from the bottom. The channel cover flange weighs approximately 3500 pounds. Proper alignment of the relatively thin metallic gasket material is difficult to obtain, especially down the center of the channel partition plate. The torquing sequence requires the one complete application up to the final torque value while cold and another full pass once the Heat Exchanger comes up to normal operating pressure and temperature. Past history of this disassembly and reassembly process has proven to cause leaks in this flanged connection that are troublesome to repair, while trying to bring the Unit back on-line at the end of the outage. As this method can create more leaks than would be found by the inspection, it is considered to create an undo hardship.

"Based on the above, LaSalle County Station requests relief from the ASME Section XI requirements for performing a VT-2 visual examination of the RHR Heat Exchanger tubing during hydrostatic and operational pressure tests."

Licensee's Proposed Alternative Examination: The licensee has proposed as an alternative to monitor radiation levels in the tube-side cooling water during the shell side pressure test to verify tube integrity. Levels within Technical Specification limits will be considered acceptable.

When the Heat Exchanger Channel Cover flange is removed for other reasons (i.e., maintenance, repair, or modification work), a VT-2 visual examination will be performed while the Channel Cover flange is removed and the RHR (shell side) is at normal operating pressure. However, the heat exchanger channel cover flange will not be removed for the sole purpose of performing a VT-2 visual examination.

Evaluation: For those components whose external surfaces are inaccessible for direct VT-2 visual examination, the Code requires that the surrounding area be examined for evidence for leakage. The RHR Heat Exchanger tubes are contained within the vessel shell and inaccessible. The component design, therefore, makes this Code requirement impractical to perform. Imposition of the Code requirement would require redesign and fabrication of the subject component. The licensee proposes to monitor the radiation levels across the pressure boundary during shell-side pressure tests. Levels within Technical Specifications will be considered acceptable. In addition, the licensee proposes to perform a VT-2 visual examination at operating pressure at such time as the heat exchanger channel cover flange is removed for other reasons (i.e., maintenance, repair, or modification).

Based on the licensee's proposed alternative to monitor radiation levels across the tube boundary during shell-side pressure tests, it is reasonable to conclude that degradation, if present, would be detected. As a result, reasonable assurance of operational readiness has been confirmed. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), it is recommended that relief be granted as requested.

D. Relief Request 28: ASME Section XI, Paragraph IWD-5223(f), Performing Pressure Tests of Discharge Lines to Suppression Pools

Code Requirement: Paragraph IWD-5223(f) states that for safety or relief valve piping that discharges into the containment pressure suppression pool, a pneumatic test (at 90% of the pressure of the pipe submergence head of water) that demonstrates leakage integrity shall be performed in lieu of a system hydrostatic test.

Licensee's Code Relief Request: The licensee has requested relief from the requirements for 1) conducting a VT-2 visual examination under normal operating conditions and 2) performing a pneumatic test at 90% pipe submergence head pressure once every inspection interval.

Licensee's Basis for Requesting Relief: The licensee stated:

"LaSalle County Station has eighteen Main Steam Relief Valves with associated discharge lines and vacuum breakers. The discharge lines run through the drywell and discharge into the Suppression Pool.

"Normal plant operation calls for these lines to be pressurized only during periodic lift tests which verify the set point of each Main Steam Relief Valve. All discharge piping is contained inside the drywell. At the power level during these lift tests, the radiation levels in the drywell are prohibitive and prevent inspection personnel from entering the drywell and performing VT-2 visual examinations during the Relief Valve functional testing.

"The provisions of IWD-5223(f) call for a pneumatic test at a test pressure of 90% of the submergence head pressure be performed. The design of the Main Steam Relief Valves and associated discharge lines at LaSalle County Station does not allow for such a test to be performed that would demonstrate leakage integrity. Per 10 CFR 50.55a section (g)(4), Code Class components shall meet the requirements of ASME Section XI to the extent practical within the limitations of design, geometry, and materials of construction of the components.

"No test taps are currently available on these discharge lines to allow proper pressurization and depressurization of the system. The pressure associated with 90% submergence head in these lines relates to approximately 3-5 psig, while the design pressure of the discharge lines is 600 psi. The normal surveillance lift test is performed at a minimum vessel pressure of 600 psig, and is thus a more challenging test. Also, at the low test pressure of the submergence head test, the vacuum breakers are not designed to provide a leak tight seal and would provide another leak path that would prevent verification of component integrity.

"Based on the above, LaSalle County Station requests relief from the 1980 Edition, Winter 1980 Addenda ASME Section XI requirements for conducting a VT-2 examination under normal operating conditions and from the hydrostatic test requirements to perform a pneumatic test at 90% submergence head once every inspection interval."

Licensee's Proposed Alternative Examination: No alternative examinations were proposed.

Evaluation: The Code requires that for safety or relief valve piping that discharges into the containment pressure suppression pool, a pneumatic test (at 90% of the pressure of the pipe submergence head of water) that demonstrates leakage integrity shall be performed in lieu of a system hydrostatic test. The licensee stated that the subject lines are designed without test taps for pressurization of the lines. The system design, therefore, makes this Code requirement impractical to

perform. Imposition of the Code requirement would require redesign of the subject system.

When performed, the lift test subjects the discharge lines to a pressure higher than that associated with the submergence head. Verification of discharge line integrity in conjunction with the lift test provides an acceptable level of assurance of the system's integrity. Therefore, it is recommended that pursuant to 10 CFR 50.55a(g)(6)(i), relief be granted as requested.

E. Relief Request 29: ASME Section XI, Paragraph IWD-5223(a), Hydrostatic Pressure Test of Class 3 Systems

Code Requirement: ASME Section XI, Table IWD-2500-1 requires that Class 3 pressure-retaining components receive a VT-2 visual examination while the system is subjected to hydrostatic pressure tests, at or near the end of each inspection interval. ASME Section XI, IWD-5223(a) states that the system hydrostatic pressure shall be at least 1.10 times the system pressure, P_{sv}, for systems with a design temperature of 200°F or less. It also states that the system pressure, P_{sv}, shall be the lowest pressure setting among the number of safety or relief valves provided for over-pressure protection within the boundary to be tested (or, design pressure, P_d, if over-pressure protection is not provided).

Licensee's Code Relief Request: The licensee has requested relief from Section XI requirements for performing the ten-year hydrostatic pressure tests on Class 3 systems.

Licensee's Basis for Requesting Relief: The licensee stated:

"Elevated pressure tests are difficult to perform and often represent a true hardship. Some of the difficulties associated with elevated pressure testing include the following:

- Hydrostatic testing often requires complicated or abnormal valve line-ups in order to properly vent, fill, and isolate the component requiring testing.

- Relief valves with set-points lower than the hydrostatic test pressure must be gagged or removed and blind flanged. This process requires the draining and refilling of the system.

- Valves that are not normally used for isolation (e.g., normally open pump discharge valves) are often required to provide pressure isolation for an elevated pressure hydrostatic test. These valves frequently require time consuming seat maintenance in order to allow for pressurization.

- The radiation exposure required to perform a hydrostatic pressure test is high (in comparison to operational pressure testing) due to

the large amount of time required to prepare the volume for testing (i.e., installing relief valve gags, performing appropriate valve line-ups, etc.).

"The difficulties encountered in performing a hydrostatic pressure test are prohibitive when weighed against the benefits. Industry experience shows that most through-wall leakage is detected during system operation as opposed to during elevated pressure tests such as ten-year hydrostatic tests.

"Little benefit is gained from the added challenge to the piping system provided by an elevated pressure hydrostatic test (when compared to an operational test). The piping stress experienced during a hydrostatic test does not include the significant stresses associated with the thermal growth and dynamic loading associated with design basis events.

"These arguments are also supported by the adoption of Code Case N-498, 'Alternative Rules for 10 Year Hydrostatic Pressure Testing for Class 1 and 2 Systems, Section XI, Division 1'. This relief request is a logical extension of that Code Case.

"Based on the above, LaSalle County Station requests relief from the ASME Section XI requirements for performing elevated pressure hydrostatic tests on Class 1 and 2 repaired/replaced components."

Licensee's Proposed Alternative Examination: The licensee has proposed as an alternative to perform a VT-2 visual examination during either a system functional test or a system inservice test, in accordance with the requirements of IWA-5213(b) and (c), respectively, at or near the end of the inspection interval, prior to reactor startup.

Evaluation: Paragraph IWD-5223(a) requires that the system hydrostatic test pressure shall be at least 1.10 times the system pressure, P_{sv}, for systems with design temperatures of 200°F or less, and at least 1.25 times the system pressure, P_{sv}, for systems with design temperatures above 200°F. The licensee has requested relief from performing system hydrostatic tests for Code Class 3 systems on a general basis. The Code Class 3 system hydrostatic pressure test is the primary means for assuring Code Class 3 system integrity. Because the Class 3 systems only receive a Code-required hydrostatic test once during the 10-year interval, Class 3 systems have been excluded from Code Case N-498. Therefore, since Code Class 3 components and piping are not subjected to other examinations and tests to verify system integrity, as Code Class 1 and 2 components and piping receive, the INEL staff recommends that this relief request should be denied.

F. Relief Request 30: ASME Section XI, Paragraph IWC-5210(a)(2), Pressure Testing Class 2 System Piping

Code Requirement: ASME Section XI, Table IWC-5210(a)(2) states that pressure-retaining components within each system boundary shall be subjected to system pressure tests.

Licensee's Code Relief Request: The licensee has requested relief from Section XI requirements for performing static and operational pressure testing of the Reactor Vessel Flange Seal Leak Detection System.

Licensee's Basis for Requesting Relief: The licensee stated:

"The Reactor Vessel Head Flange Leak Detection Line is separated from the reactor pressure boundary by one passive membrane, a silver plated O-ring located on the vessel flange. A second O-ring is located on the opposite side of the tap in the vessel flange (See Figure RI-30.1). This line is required during plant operation in order to indicate failure of the inner flange seal O-ring. Failure of the O-ring would result in a High Level Alarm in the control room. On this annunciation, control room operators would quantify the leakage rate from the O-ring and then isolate the leak detection line from the drywell sump by closing the 1(2)E31-F013 valve. This action is taken to prevent steam cutting of the O-ring and the vessel flange. Failure of the inner O-ring is the only condition under which this line is pressurized.

"The configuration of the system precludes hydrostatic testing while the vessel head is removed. As Figure RI-30.1 portrays, the odd configuration of the vessel tap, combined with the small size of the tap and the high test pressure requirement (1000 psig minimum), prevents the tap in the flange from being temporarily plugged. Also, when the head is installed, an adequate pressure test cannot be performed due to the fact that the inner O-ring is designed to withstand pressure in one direction only. Resulting from the groove that the O-ring sits in and the pin/wire clip assembly (See Figure RI-30.2), pressurization in the opposite direction could damage the O-ring and thus result in further damage to the O-ring and vessel flange itself from steam cutting.

"Pressure testing of this line during the Class 1 System Leakage and/or Hydrostatic Test is precluded because the line will only be pressurized in the event of a failure of the inner O-ring. Purposely failing the inner O-ring in order to perform a test would require purchasing a new set of O-rings, additional time and dose to de-tension the reactor vessel head, install the new O-rings and reset and re-tension the reactor vessel head. This creates an unwarranted hardship.

"Based on the above, LaSalle County Station requests relief from the ASME Section XI requirements for static and operational pressure testing of the Reactor Head Flange Seal Leak Detection System."

Licensee's Proposed Alternative Examination: The licensee has proposed as an alternate to perform a VT-2 visual examination on-line during a refueling outage. The hydrostatic head developed when the leak detection line is filled with water during refueling will allow for the detection of any gross indications in the line. This examination will be performed with the frequency specified by Table IWC-2500-1 for an IWC-5221 test (i.e., once each inspection period).

Evaluation: The Code requires that system pressure tests be conducted for those systems required to operate during normal plant operation. The RPV head flange leak detection line is pressurized only when the inner O-ring fails. To subject these O-rings to a pressure test would require pressurization in a direction opposite that intended by design; such a pressure test would likely be damaging to the O-ring. The component design, therefore, makes this Code requirement impractical. Imposition of the Code requirement would require redesign and fabrication of the subject component.

The licensee's proposed VT-2 visual examination of the RPV head flange leak detection line during vessel flood-up will provide adequate assurance of the integrity of the subject line. Should leakage develop, it will be detected and repaired prior to the return of this line to service.

The system pressure test required by Section XI for the subject Class 2 line is impractical because of the system design and the possibility of damage to the O-ring seals. Therefore, the INEL staff recommends that pursuant to 10 CFR 50.55a(g)(6)(i), relief should be granted as requested.

3.0 CONCLUSION

For Relief Request Nos. 27, 28, and 30, the licensee's proposed tests provide reasonable assurance of continued component/system integrity and, therefore, the INEL staff recommends that, pursuant to 10 CFR 50.55a(g)(6)(i), relief should be granted. In Relief Request No. 26, the licensee is requesting relief from performing hydrostatic tests on Class 1 and 2 repaired/replacement components. The licensee has proposed an alternative to the Code requirements which provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), it is recommended that relief be authorized. In Relief Request No. 29, the licensee requests a relaxation of the pressure test requirement for Class 3 systems. It is the opinion of the INEL staff that the integrity of Class 3 systems should be verified at a test pressure greater than operating pressure. Therefore, relief should be denied.