UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUESTS FOR SECOND 10-YEAR INSERVICE INSPECTION INTERVAL

COMMONWEALTH EDISON

ZION NUCLEAR POWER STATION, UNIT 2

DOCKET NO. 50-304

1.0 INTRODUCTION

In a letter dated May 26, 1994, and supplemented on August 26, 1994, Commonwealth Edison Company (ComEd or the licensee) submitted a request for relief from examination requirements that were determined to be impractical or unusually difficult without a compensating increase in the level of plant quality and safety for the Zion Nuclear Power Station, Unit 2. The impractical requirement is the inside diameter surface examination of the pressurizer vessel-to-support skirt attachment weld, and the unusually difficult requirement is the VT-3 examination of the reactor coolant pump casings. The licensee proposed alternate examinations consisting of outside diameter surface and VT-3 examinations of the support skirt and an internal surface examination of the pumps when they are disassembled for maintenance.

ComEd also included in its original submittal a notification that it would use the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Case N-356 in its inservice inspection (ISI) program. Code Case N-356 was endorsed by the staff in Regulatory Guide 1.147 and is, therefore, approved for use by the licensee.

2.0 BACKGROUND

Pursuant to 10 CFR 50.55a(g)(1), for a pressurized water cooled nuclear power facility whose construction permit was issued prior to January 1, 1971, components (including supports) must meet the requirements of paragraphs (g)(4) and (5) of this section to the extent practical. The construction permit for Zion, Unit 2 was issued on December 26, 1968.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice inspection (ISI) of components and system pressure tests conducted during the second 10-year interval comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by the 10 CFR 50.55a(b) on the date 12 months prior to the start of the 120-month inspection interval, subject to the limitations and

modifications listed therein. The applicable edition of Section XI of the ASME Code for the Zion, Unit 2, second 10-year ISI program is the 1980 Edition through Winter 1981 Addenda. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein.

Pursuant to 10 CFR 50.55a(g)(5)(iii), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

As required by 10 CFR 50.55a(g)(5), the licensee included information in its May 26, 1994, submittal supporting its request. In a conference call on August 8, 1994, additional information was requested, and this was provided in a letter dated August 26, 1994.

3.0 DESCRIPTION AND EVALUATION OF RELIEF REQUESTS

3.1 Relief Request IWB-15

3.1.1 Code Requirements

ASME Code requirements for ISI of the Class 1 pressurizer vessel-to-support skirt attachment weld are specified in Table IWB-2500-1, Examination Category B-H, Item B8.20. The requirement is for 100 percent surface examination of the weld surface and adjacent surfaces identified as A-B and C-D in Figure IWB-2500-13.

3.1.2 Request for Relief

The licensee requested relief from inspecting the surface identified as C-D in Figure IWB-2500-13. Weld identification is COM-1-2100, Weld 10.

3.1.3 Basis for Relief

The examination of the area C-D in Figure IWB-2500-13 is impractical because of the tight clearances beneath the pressurizer. The limited clearances hinder the removal of insulation from the lower head of the pressurizer inner weld to perform the examination and make physical access for surface preparation and inspection difficult. In addition, the removal of the insulation cover will result in high radiation exposure to plant personnel.

A radiological survey performed in the area of the lower pressurizer head found dose rates of 2.25 rem/hour on contact with the surge nozzle,

1.2 rem/hour at 18 inches, and 0.7 rem/hour in the general area. The lower head of the pressurizer is covered by 4-inch thick multi-layered stainless steel mirror insulation which was not designed for removal. To remove the insulation, the 78 pressurizer heater cables would have to be disconnected and each of the convection stops which are riveted to the insulation would have to be cut and removed. The insulation is supported by structural steel that is attached to the support skirt and presents an additional barrier that prohibits access to surface area C-D. The radiation exposure to plant personnel for insulation removal, structural steel disassembly, surface preparation, and inspection is estimated to be 63 rem. The radiological conditions would result in significant individual and cumulative radiation exposure.

3.1.4 Proposed Alternate Examination

The ASME Code required surface examination will continue to be performed on surface area A-B shown in Figure IWB-2500-13. In addition, the support skirt will receive a VT-3 examination.

The licensee stated that the compressive loading on the support and the mild environment do not favor the initiation of service induced flaws in the weld.

3.1.5 Applicable Time Period for Relief

Relief is requested for the second 10-year ISI interval.

3.1.6 Evaluation

Prior to the 1980 Edition through Winter 1981 Addenda of Section XI of the ASME Code, the surface inspection of the area identified as C-D in Figure IWB-2500-13 was not required. Zion Unit 2 was already operating when the subject surface inspection requirement was added to Section XI of the ASME Code. The licensee states that the insulation covering the lower head of the pressurizer was not designed to be removed and that adequate weld inspection is not physically possible due to the tight clearances beneath the pressurizer. The level of effort necessary to conduct a surface examination would require removal of the multi-layered stainless steel mirror insulation, the disconnection of the pressurizer heater cables, the removal of rivets that hold the convection stops to the insulation, and the removal of structural steel supports attached to the skirt. In addition, the personnel involved in preparation for examination and the performance of the surface examination would be subject to radiological conditions that would result in significant individual and cumulative radiation exposure.

The outside diameter (surface A-B in Figure IWB-2500-13) surface examination of the pressurizer support skirt weld and surrounding area along with a VT-3 examination of the support skirt will provide sufficient assurance that any service induced flaw would be detected. Historically, the subject examination areas have not exhibited flaws. Therefore, the surface examination proposed by the licensee would not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to

the burden upon the licensee that could result if the ASME Code requirements were imposed on Zion Unit 2.

3.1.7 Conclusion

Based on the above evaluation, the surface examination of the pressurizer vessel-to-support skirt integral attachment weld is impractical to perform at Zion Unit 2 to the extent required by the 1980 Edition through Winter 1981 Addenda of Section XI of the ASME Code. In accordance with 10 CFR 50.55a(g)(6)(i), the relief request, IWB-15, is granted.

3.2 Relief Request IWB-16

3.2.1 Code Requirements

ASME Code requirements for ISI of Class 1 reactor coolant pump casings are specified in Table IWB-2500-1, Examination Category B-L-2, Item B12.20. The Code requires VT-3 examinations on the internal surfaces at each inspection interval. The examinations are limited to welds in at least one pump in each group of pumps performing similar functions in the system. The group of pumps consists of reactor coolant pumps 2RC11O, 2RC21O, 2RC31O, and 2RC41O.

3.2.2 Request for Relief

The licensee requested relief from inspecting the internal surface of the reactor coolant pump casings as specified in Table IWB-2500-1, Examination Category B-L-2, Item B12.20 unless the pump is disassembled.

3.2.3 Basis for Relief

The licensee states that compliance with the Code requirement would result in hardship or unusual difficulty without a compensating increase in the level of plant quality and safety. To gain access to the internal surface of the reactor coolant pump, the pump must be disassembled. Based upon the data acquired during the 1D reactor coolant pump replacement performed in January 1991, the tasks associated with the examination of the inside surface of a reactor coolant pump would result in an estimated 32 rem of radiation exposure.

The reactor coolant pump is made to the standards specified in the American Society for Testing and Materials A-351, Grade CF8, which is high quality cast stainless steel with an excellent history of erosion and corrosion resistance. Excessive erosion of the pump casing would be evidenced by a reduction in the reactor coolant system flowrate. Such a reduction has not been observed.

ASME VT-3 examinations were conducted on the 1D reactor coolant pump when it was disassembled for maintenance in January 1991. Aside from light rub marks that were noted on the inside surface, no other indications of degradation were observed.

The licensee notes that the 1989 Edition of Section XI of the ASME Code requires an examination only when a pump or valve is disassembled for maintenance, repair, or volumetric examination. Examination of the internal pressure boundary shall be performed to the extent practicable. Examination is required only once during the inspection interval and the disassembly of a reactor coolant pump for the sole purpose of performing an internal surface examination is not required.

3.2.4 Proposed Alternate Examination

The licensee proposed that a VT-3 examination be performed on the internal surface when the pump is disassembled for maintenance. The proposed alternative examination is consistent with the 1989 Edition of Section XI which requires the examination only if the pump is disassembled.

3.2.5 Applicable Time Period for Relief

Relief is requested for the second 10-year ISI interval.

3.2.6 Evaluation

10 CFR 50.55a(b) incorporates by reference the addenda through the 1988 Addenda and editions through the 1989 Edition of Section XI of the ASME Code (with some limitations). The proposed alternate examination is contained in the 1989 Edition of Section XI of the ASME Code. In addition, the knowledge acquired from the disassembly and examination of the 1D reactor coolant pump in January 1991 supports the soundness of the examination requirements contained in the 1989 Edition of Section XI.

The licensee identified the high radiation exposure to personnel that occurs when the reactor coolant pump is disassembled to provide access to the internal surface. By satisfying the ASME requirements of the 1989 Edition of Section XI and with the experience gained from the disassembly of a similar pump in Unit 1, the licensee has demonstrated the adequacy of the alternative approach.

3.2.7 Conclusion

Based on the above evaluation, the licensee has demonstrated that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. In accordance with 10 CFR 50.55a(a)(3)(ii), the relief request, IWB-16, is authorized.

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Date: November 9, 1994