Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

December 26, 1990

Dr. Thomas E. Murley, Director
Ofc. Of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attn: Document Control Desk

Subject: Zion Station Units 1 and 2
Second Interval Inservice Inspection
Program Relief Request
NRC Docket Nos. 50-295 and 50-304

Reference: a): June 27, 1983 letter from F.G. Lentine
to H.R. Denton

b): June 26, 1984 letter from R.N. Cascarano
to H.R. Denton

c): August 14, 1984 letter from R.N. Cascarano
to H.R. Denton

d): February 11, 1986 letter from S.A. Varga
to D.L. Farrar

Dear Dr. Murley:

References (a), (b) and (c) provided the Inservice Inspection (ISI) Plan and additional information for the second ten year interval. These submittals included requests for relief from certain requirements of the ASME code. Reference (d) provided the NRC staff's review of the ISI relief requests.

The purpose of this letter is to forward an additional relief request regarding the ASME code requirement to perform volumetric examinations of the pump casing welds of the reactor coolant pumps. Relief Request Number IWB #12, attached to this letter, provides Commonwealth Edison's proposal to perform alternative examinations along with the basis for seeking relief. The expected content of the relief request was discussed during a teleconference with Messrs. R.M. Pulsifer and G. Johnson of your staff on December 19, 1990.

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If there are any questions or comments regarding this matter, please direct them to this office.

Very truly yours,

S.F. Stimac
Nuclear Licensing Administrator

Attachment

cc: Resident Inspector-Zion
Chandu Patel-NRR
George Johnson-NRR
Regional Administrator-RIII

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COMPONENT IDENTIFICATION

Code Class: 1

Code Reference: Table IWB-2500-1

Examination Category: B-L-1, Pressure Retaining Welds in Pump Casings

Item Number: B12.10, Pump Casing Welds

Components: Reactor Coolant Pumps	1RC110	2RC110
	1RC210	2RC210
	1RC310	2RC310
	1RC410	2RC410

CODE REQUIREMENT

The pump casing welds in at least one (1) pump in each group of pumps performing similar functions in the system shall have essentially 100% of the weld length volumetrically examined during each inspection interval.

RELIEF REQUEST

Relief is requested from performing a volumetric examination on the pump casing welds each inspection interval.

PROPOSED ALTERNATIVE EXAMINATIONS

The following alternative examinations will be implemented:

1. Perform VT-3 examination of accessible internal pump casing surfaces whenever a pump is disassembled for maintenance.
2. Perform VT-2 examination of all pump exteriors during the system leakage test required by Table IWB-2500-1, Category B-P, Item B15.60.
3. Perform VT-2 examination of all pump exteriors during the hydrostatic test required by Table IWB-2500-1, Category B-P, Item B15.61. **Note**: The hydro test is to be performed during one of the next three refueling outages, for each unit.
4. Perform a PT examination, as a supplemental NDE method, on areas of relevant indications of cracking identified by the VT-3 examination of the casing interior.

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BASIS FOR RELIEF

Zion's Reactor Coolant Pumps are Westinghouse Model 93A and constructed of cast stainless steel material (ASTM A-351, Grade CF8) nominally 4.5" in thickness. The top and bottom portions of the casing are joined by a single circumferential weld. The volumetric examination methods permitted are ultrasonic examination (UT) or radiographic examination (RT).

Both of these methods of examination are considered impractical as discussed below. In addition, the operating history of these pumps and an abbreviated materials evaluation are also provided.

The preferred method of UT from the pump exterior involves extensive weld preparation for examination. Consequently, the radiation worker exposures are very significant. The estimated radiation exposures for the examination and support activities are indicated below (Note: The exposure estimates are based on surveys taken during loop stop valve work on Unit 1 in 1990).

Scaffolding:	3-4 person-Rem
Insulation work:	15-20 person-Rem
Weld preparation:	5-7 person-Rem
Weld examination:	3-5 person-Rem
Health Physics:	1-3 person-Rem
Total exposure:	27-39 person-Rem

It should be noted that the radiation exposure associated with the insulation work is most significant. This is a result of the insulation configuration relative to the location of the casing weld. The casing weld is located in the bottom most ring of insulation panels. Since the insulation for the entire casing is supported by the lowest panel, the entire pump casing must be deinsulated to access the exterior surface of this weld. Additionally, the plant configuration in the area below the casing does not provide accessibility for the installation of temporary bracing for the casing insulation above the lowest panel. In light of this, no external examinations have been included as proposed alternatives.

Ultrasonic examination of cast stainless steel material, particularly of this thickness, does not produce reliable or meaningful results. The ineffectiveness of the ultrasonic examination is caused by sound beam attenuation and beam scattering inherent to coarse grained stainless steel materials of this type. These examination limitations are well documented in the industry. However, Zion did attempt similar ultrasonic examinations for the electroslag welds on the cast stainless steel main loop piping elbows. Custom calibration blocks were fabricated for the piping exam. Dual focused transducers contoured to the calibration block profiles were also specially fabricated and an examination specific procedure was written. Upon comparison of techniques and interviews with cognizant personnel, it was determined that this technique was no more sensitive or accurate in identifying flaws than the previous best effort methodology using a stationary water column transducer with a flexible diaphragm.

There are two available techniques for performing radiography of the pump casing welds, conventional gamma source and the miniature linear accelerator (MINAC) developed through EPRI. The use of a conventional gamma source has had questionable success in meeting Code acceptability for radiograph quality. Typically, more than one radiograph is required to obtain the best image. Poor radiograph quality primarily results from a "fog" effect created by the radiation from the pump casing and the background radiation in the vicinity of the film. Although the support and examination activities for the RT method differ slightly from those activities associated with the UT method, the total radiation exposure is estimated to be similar for both methods (27-39 person-rem).

The use of the MINAC also requires extensive support. Although no weld preparation is required, the scaffolding erection/removal and insulation removal/reinstallation must still be performed. The estimated radiation exposures indicated above (27-39 person-rem) would apply.

The industrial performance of these pump casings has proven their excellent ability to resist service induced flawing or degradation. There is no history (over 400 reactor-years) of service induced cracking failure on the interior or exterior of these components. The potential for stress corrosion cracking (SCC) is minimized through proper material selection immune to SCC and preventing the occurrence of a corrosive environment. The operating history of this material has proven its immunity to SCC. Strict control of chemicals used on these casings as well as careful water chemistry control during operation prevent the occurrence of a corrosive environment. Thus, the potential for SCC of the casing interior is minimized. The exterior of the casing weld is not exposed to a corrosive environment and there is no potential for SCC on the casing exterior.

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Several studies have shown that the casing material demonstrates adequate fracture toughness over the service life of this component. Therefore, the potential for non-ductile fracture due to thermal aging is negligible. Service induced flaws would more likely be initiated from cyclical loading mechanisms such as water hammer or fatigue. Because the reactor coolant system (RCS) is designed and operated to preclude a voiding condition in normally filled lines, there is a very low potential for water hammer. Fatigue considerations are al addressed through design and limits on operating parameters, such as pump vibration.

The combination of the very low potential for flaw detection and the excessive radiation exposures associated with performing the weld examination make the Code required examination impractical. Performing the Code required examination would not provide an increase in pump casing weld safety, reliability or integrity commensurate with the radiation exposure to be expended. The implementation of the proposed alternative examinations in lieu of the volumetric examination will provide continued assurance of pump casing integrity. These conclusions are further supported by the excellent operating history of these pumps and the minimization of flaw initiation/propagation mechanisms on the casing interior and exterior through design and operating controls.

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