

ATTACHMENT TO LICENSEE EVENT REPORT 77-047/01X-1
COMMONWEALTH EDISON COMPANY (CWE)
DRESDEN UNIT ILDRS-2
DOCKET #050-237

On 9/26/77 during a visual inspection of the Unit 2 reactor vessel internals an underwater TV camera visual examination was performed on the CRD return nozzle and vessel wall 8" below the nozzle.

After evaluation of the video tape it was decided that further investigation was required. A direct visual examination was then performed on 10/1/77 by a representative from Commonwealth Edison Company and from General Electric. The examination revealed that the thermal sleeve flange was cracked in three places as shown on the attached sheet. The crack at the 7 o'clock position which was observed earlier extended from the retainer ring pad, across the retainer and sleeve flange, then into the bore for a distance of 1 1/4 inches where it then made two branches. The crack at the 5 o'clock position extended across the sleeve flange only. The last crack, at the 2 o'clock position was also on the sleeve flange having a length of 1 inch.

The thermal sleeve material is 304 stainless steel, specifically: Sleeve-SA312, Sleeve Flange A240, retainer ring pad and retainer-SA240.

A metallurgical analysis conducted at the Battelle Columbus Laboratories concluded that the positions and extent of the cracks was different than originally believed. The crack at the 7 o'clock position did not extend across the retainer ring pad or retainer. Also, one of the two circumferential branch cracks was actually a continuation of the crack at the 5 o'clock position. It was also found that the crack at the 2 o'clock position extended into the sleeve circumferentially. This crack is 180° to the crack at the 7 o'clock position and does not penetrate the outside diameter surface. As a result, photo micrographs of these cracks showed that they were transgranular in nature. The cracks were then broken open at the fracture surface and examined in a scanning electron microscope. Striations were observed which are typical of fatigue failures. Thus, the cracks in the thermal sleeve were transgranular and appeared to have been caused by fatigue resulting from high stresses produced by large thermal gradients.

The thermal sleeve was exposed to reactor temperature while the water flowing in the CRD Return line was cool water. The constant flow of cool water over the sleeve at reactor temperature caused thermal stresses which may have led to cracking.

The CRD return line is now isolated during normal operation and is planned to be utilized during shutdown periods only. This will eliminate thermal stress to the CRD return nozzle. Since the thermal sleeve was for protection from thermal stresses only, it is no longer needed and was not replaced.

After the thermal sleeve was removed the nozzle interior and vessel wall for a distance of 4" below the nozzle were penetrant tested. The indications that developed were removed by grinding and the nozzle penetrant tested again. This was continued until the final penetrant test proved the nozzle free of indications. The extent of indications found were as follows:

Rounded indications in the blend radius and in the ring-to-vessel weld, groups of linear indications in the ring and in the blend radius, and linear indications in the ring-to-vessel weld and in one of the spacing pads. No indications appeared in the bore or in the vessel wall beneath the nozzle. The average length of an indication was 3/8". None of the indications penetrated the base metal.

The cracking of the thermal sleeve involved minimal safety implications because the indications in the nozzle found after the sleeve was removed did not penetrate the cladding to base metal.



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Reportable Occurrence Update Report 77-047/01X-1 is hereby submitted to your office in accordance with Dresden Nuclear Power Station Technical Specifications 6.6.B.1.i., performance of structures, systems or components that requires remedial action or corrective measures to prevent operation in a manner less conservative than assumed in the accident analyses in the safety analysis report or technical specifications bases; or discovery during plant life of conditions not specifically considered in the safety analysis report or technical specifications that require remedial action or corrective measures to prevent the existence or development of an unsafe condition.

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Station Superintendent
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Enclosure

cc: Director of Inspection & Enforcement
Director of Management Information & Program Control
File/NRC

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