Commonwealth Edison Company
1400 Opus Place
Downers Grove, IL 60515

ComEd

July 10, 1995

U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attn: Document Control Desk

Subject: Dresden Nuclear Station Units 2 and 3
Additional Information - Dresden Station Core Shroud Repair
NRC Docket Nos. 50-237 and 50-249

Reference: J.L. Schrage to USNRC letter, dated May 24, 1995.

In the referenced letter, Commonwealth Edison (ComEd) submitted the Design Documents for the proposed repair of the Dresden Station Unit 2 and 3 core shrouds. Upon further review, ComEd has identified a typographical error in Enclosure 16 of the referenced letter (GENE Letter, M. D. Potter - GE Shroud Project Engineer to Kenneth Hutko - ComEd Shroud Project Engineer, Subject - Performance impact of shroud repair leakage for Dresden Units 2 & 3, dated May 18, 1995).

The Enclosure to this letter transmits the corrected document (GENE Letter, M. D. Potter - GE Shroud Project Engineer to Kenneth Hutko - ComEd Shroud Project Engineer, Subject - Performance impact of shroud repair leakage for Dresden Units 2 & 3, dated June 21, 1995). The revised part of the document is marked by a vertical bar in the right hand margin. This revised document supercedes the original in its entirety. ComEd apologizes for any inconvenience that this typographical error may have caused.

To the best of my knowledge and belief, the statements contained in this response are true and correct. In some respects, these statements are not based on my personal knowledge, but obtained information furnished by other ComEd employees, contractor employees, and consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

Please direct any questions you may have concerning this response to this office.

Sincerely,

John L. Schrage
Nuclear Licensing Administrator

OFFICIAL SEAL
JACQUELINE T EVANS
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES: 12/16/97

Jacqueline T. Evans 7/10/95

Enclosure

cc: H.J. Miller, Regional Administrator - RIII
M. N. Leach, Senior Resident Inspector - Dresden
J. F. Stang, Project Manager - NRR
Office of Nuclear Facility Safety - IDNS

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Enclosure

GENE Letter, M. D. Potter - GE Shroud Project Engineer to Kenneth Hutko - ComEd Shroud Project Engineer, Subject - Performance impact of shroud repair leakage for Dresden Units 2 & 3, June 21, 1995

General Electric Company
175 Curtner Avenue, San Jose, CA 95125

June 21, 1995

cc: R. Svarney
E. R. Mohtashemi
B13-01749
MDP-9542

To: Kenneth Hutko
ComEd Shroud Project Engineer

From: M. D. Potter *M. D. Potter*
GE Shroud Project Engineer

SUBJECT: PERFORMANCE IMPACT OF SHROUD REPAIR LEAKAGE FOR DRESDEN UNITS 2 AND 3

Reference: DRF No. B13-01749.

1. Introduction

The hardware designed to repair the shroud with identified cracks for Dresden Units 2 and 3 requires the machining of eight holes through the shroud support plate. Each of these holes will have some clearance, which will allow leakage flow to bypass the steam separation system. In addition, potential leakage through the weld cracks (H1 through H8) and the replacement access hole cover is also considered. This letter reports the leakage flow for 100% rated power and core flow.

2. Evaluation

2.1 Leakage Flow Evaluation

The most restrictive flow area for leakage through the holes in the shroud support plate is based on a conservative gap between the adjacent surfaces of the shroud support plate and the lower support bracket. In addition, there are a total of eight circumferential shroud welds (H1 - H8) that are considered as potential leakage paths - two above the top guide support ring, three on the upper shroud between the core support ring and the top guide support ring, and three on the lower shroud below the core support ring. It is conservatively assumed that each of these welds develops a complete circumferential crack that opens to 0.001 inches.

The leakage flows for 100% rated power and core flow are summarized in Table 1. These leakage flows are based on applicable loss coefficients and reactor internal pressure differences (RIPD's) across the applicable shroud components. The replacement access hole cover leakage is based on information in the referenced DRF. Leakage from the weld cracks above the top guide support ring is assumed to be two-phase fluid at the core exit quality. Leakage from the remaining paths below the top guide support ring is considered single-phase liquid. All of the leakage flows bypass the steam separators and dryers. The leakage flows below the shroud support ring also bypass the core. The results show that the leakage flows from the repair holes, weld cracks and the access hole cover result in a combined leakage of about 0.44% of core flow.

Table 1. Summary of Leakage Flows at Rated Power and Flow

Leakage flow (gpm)	
Shroud head flange pockets	1600
Weld cracks	140
Repair holes in support plate	325
Access hole covers	180
Leakage-to-core Mass flow (%)	
Shroud head flange pockets	0.21
Weld cracks	0.04
Repair holes in support plate	0.12
Access hole covers	0.07

The steam portion of the leakage flows will contribute to increasing the total carryunder from the steam separators. The impacts of the total leakage on the steam separation system performance, jet pump performance, core monitoring, fuel thermal margin, emergency core cooling system (ECCS) performance and fuel cycle length are evaluated as summarized in the following subsections.

2.2 Steam Separation System

The leakage flow through weld cracks H1 and H2 occurs above the top guide support ring and includes steam flow, which effectively increases the total carryunder in the downcomer by about 0.03% at rated conditions. The carryunder from the separators is based on the applicable separator test data at the lower limit of the operating water level range. The combined effective carryunder from the separators and the shroud head leakage is about 0.18% and is bounded by the design value.

2.3 Jet Pumps

The increased total carryunder will decrease the subcooling of the flow in the downcomer. This in turn reduces the margin to jet pump cavitation. However, because the total carryunder meets the design-condition carryunder value, there is no impact on jet pump performance compared with the design condition.

2.4 Core Monitoring

The impact of the leakage results in an overprediction of core flow by about 0.21% of core flow. This overprediction is small compared with the core flow measurement uncertainty of 2.5% for jet pump plants used in the MCPR Safety Limit evaluations. Additionally, the decrease in core flow resulting from the overprediction results in only a 0.1% decrease in calculated MCPR. Therefore, it is concluded that the impact is not significant.

2.5 Anticipated Abnormal Transients

The code used to evaluate performance under anticipated abnormal transients and determine fuel thermal margin includes carryunder as one of the inputs. The effect of the increased carryunder due to leakage results in greater compressibility of the downcomer region and, hence, a reduced maximum vessel pressure. Since this is a favorable effect, the thermal limits are not impacted.

2.6 Emergency Core Cooling System

Leakage through weld cracks H1 and H2 results in slightly increased carryunder that causes the initial core inlet enthalpy to increase slightly, with a corresponding decrease in the core inlet subcooling. However, because the total downcomer carryunder still meets the design value, there is no impact on the emergency core cooling system (ECCS) performance from this effect compared with the design conditions. Another effect of the leakage flows from the repair holes and the weld cracks is to decrease the time to core uncovery slightly and, also to increase the time that the core is uncovered. The combined effect has been assessed to increase the peak cladding temperature (PCT) for the limiting LOCA event by less than 30°F. The current analysis basis yields a LOCA PCT of about 2045°F for the design basis LOCA with LPCI injection failure. The 10CFR50.46 regulatory limit PCT is 2200°F. Because the maximum potential effect on the design basis LOCA PCT is very small, there is no adverse effect on the margin of safety. This impact is sufficiently small to be judged insignificant, and hence, the licensing basis PCT for the normal condition with no shroud leakage is applicable. The sequence of events remains essentially unchanged for the LOCA events with the shroud head leakage.

2.7 Fuel Cycle Length

The increased carryunder due to leakage flow above the top guide support ring results in a slight increase in the core inlet enthalpy, compared with the no-leakage condition. The combined impact of the reduced core inlet subcooling and the reduced core flow due to the leakage results in a minor effect (~0.8 days) on fuel cycle length and is considered negligible.

3. Conclusions

The impact of the leakage flows through the shroud repair holes and the potential weld cracks in the shroud have been evaluated. The results show that at rated power and core flow, the leakage flows from the repair holes and the weld cracks are predicted equal to a combined leakage of about 0.44% of core flow (including potential replacement access hole cover leakage). These leakage flows are sufficiently small so that the steam separation system performance, jet pump performance, core monitoring, fuel thermal margin and fuel cycle length remain adequate. Also, the impact on ECCS performance is sufficiently small to be judged insignificant, and hence, the licensing basis PCT for the normal condition with no shroud leakage is applicable.

M. D. Potter