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Dresden Nuclear Power Station
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June 13, 1994

Mr. William T. Russell, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

Subject: Dresden Nuclear Power Station Units 2 and 3
Quad Cities Nuclear Power Station Units 1 and 2
Supplemental Response to Request for Additional Information (RAI)
NRC Docket Nos. 50-237/249 and 50-254/265

References: (a) J. Stang letter to D. Farrar, dated May 6, 1994, Request for Additional Information Concerning Core Shroud Cracking at Dresden, Units 2 and 3, and Quad Cities, Units 1 and 2

(b) M. Lyster letter to W. Russell, dated June 6, 1994, Response to Request for Additional Information

(c) Teleconference between representatives of Commonwealth Edison (J. Williams, P. Piet et. al.,) and the NRC Staff (J. Strosnider, R. Assa, R. Hermann, et. al.), dated June 10, 1994.

Dear Mr. Russell:

In the Reference (a) letter, the NRC Staff requested additional information regarding the core shroud cracking at Dresden and Quad Cities Stations. Responses to those questions were provided by Commonwealth Edison in Reference (b).

As discussed in Reference (b), because of the ongoing core shroud examination result disposition process, some changes to our original submittal are necessary. The core shroud issue at Dresden and Quad Cities was discussed during the Reference (c) teleconference with members of your Staff. The purpose of this letter is to supplement Commonwealth Edison's Reference (b) response to the NRC RAI. Additional work regarding the core shroud is ongoing at Dresden and Quad Cities. If any additional changes are identified, Commonwealth Edison will update our RAI response appropriately.

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 Commonwealth Edison employees, contractor employees, and consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

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

Sincerely,

Michael D. Lyster
Site Vice-President
Dresden Station

Attachment: Supplemental Response to RAI

cc: J.B. Martin, Regional Administrator - RIII
C. Miller, Senior Resident Inspector - Quad Cities
M.N. Leach, Senior Resident Inspector - Dresden
J.F. Stang, Project Manager - NRR
C.P. Patel, Project Manager - NRR
Office of Nuclear Facility Safety - IDNS

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION CONCERNING CORE SHROUD CRACKING AT DRESDEN, UNITS 2 AND 3, AND QUAD CITIES, UNITS 1 AND 2

SUPPLEMENT NO. 1

Commonwealth Edison Company

June 13, 1994

Plant-Specific Questions Regarding Dresden Unit 3 and Quad Cities Unit 1

(5) Request:

Evaluate the safety significance of a 360 degree through wall failure at the H5 weld location in the core shroud during: (a) normal operation; (b) anticipated transients; and (c) postulated accident conditions. Include evaluation of the design basis loss-of-coolant accident combined with safe-shutdown earthquake loads (LOCA + SSE). This evaluation should address questions such as: (a) estimated potential shroud movement vertically or laterally; (b) control rod scram capability; (c) boron injection capability; (d) short & long term cooling capability, including core spray capability; and (e) ability to maintain 2/3 core coverage with bypass leakage flow at various elevations.

(5) Response Supplement:

Normal Operation and Anticipated Transients were discussed in the previous response to the RAI (dated June 6, 1994) and are not changed by this supplement. Several phases of a Technical Audit and additional evaluations have been completed since the initial submittal. The results of additional information are presented below. The Quad Cities evaluation will be discussed in detail since the results of the Dresden evaluation are bounded by the Quad Cities evaluation results. Dresden specific information can be found in the attached figure.

Postulated Accident Conditions:

Main Steamline Break: The main steamline break inside containment remains the bounding postulated accident condition for structural loading. This accident poses the largest potential lifting loads on the shroud. The design basis differential pressure is 20 psi applied for less than 2 seconds during the postulated lift. During a main steamline break, with a postulated through-wall crack at H5, the shroud could lift momentarily up to 4". If an SSE is postulated simultaneously, a lift potentially would occur up to a maximum of 8" vertically and a lateral shift potentially would occur up to a maximum of 3/4" [1]. The impact of the resulting lift on safe shutdown and ECCS capabilities is as follows:

- Scram will occur on High Drywell Pressure trip signal.
- Insertion of all control rods will occur (calculated lift has not exceeded the top guide thickness of 14", lateral movement is not significant, and core geometry is maintained for rod insertion).
- Upper shroud assembly could impact the core spray line connection. Deflection of the sparger or riser could affect the coolant flow to the core. However, under worst case conditions (failure of sparger or riser), the lift would not prevent entry of cooling water from the core spray into the reactor pressure vessel.

- The shroud is not required to maintain 2/3 core coverage (which is necessary for the Recirculation Line Break Event).

Radiological consequences do not change for MSL Break event (whether inside or outside of containment.

Recirculation Line Break: The loads discussed in the following sections are obtained from UFSAR Section 3.9.5.3.1.2 . During the Recirculation Line break, differential pressure across the upper shroud does not increase from the initial value as the reactor depressurizes. The shroud will not lift, and therefore, a floodable region is preserved. Calculated leakage flow is very small compared to the emergency core cooling system flow capacity. There would be no significant decrease in core cooling. Lateral loading due to the acoustical phenomena of the event will not significantly move the shroud. See discussion below on acoustical loading. If SSE is postulated simultaneously, SSE loading will result in a displacement of 0" vertically and less than 3/4" laterally [1]. The impact on safe shutdown and ECCS capabilities is as follows:

- Scram will occur on High Drywell Pressure trip signal.
- Insertion of all control rods will occur with minimal effect on scram time.
- No displacement will occur without combined DBA + DBE Loadings.

RLB Blowdown Load Evaluation: This load is confined to the recirculation line area. The magnitude of this load is 20,000 lbf. Blowdown during a recirculation line break has no significant affect on the loading above shroud weld H5.

RLB Acoustic Loads and Shroud Motion: The model used to derive the acoustical load was based on the following conservative assumptions: a uniform load across the vessel is applied 107 inches above the H5 weld. Per the UFSAR this loading is applied for 5 milliseconds.

Sufficient gravitational forces exist to prevent vertical shroud movement. Lateral motion at the H5 weld would be resisted by the jagged edges of the postulated H5 through-wall crack, and the gravitational forces from the shroud. The most likely motion of the shroud from the postulated loadings would be tipping. The resultant displacement due to tipping would be approximately one thousandth of an inch (0.001"). Because the loading applied is small and of a short duration, loading does not result in plastic deformation.

Control Rod Insertion During Postulated Accidents: The above listed accidents have been reviewed with the following conclusions. During all the postulated accidents including the accidents not listed in the UFSAR, the control rods will insert. The postulated tipping displacement of 3/4" will not adversely impact the vessel internals or affect the ability to insert control rods. The radiological consequences do not change.

Note (1)- Based upon review of the UFSAR for both Dresden and Quad Cities Station, and the Technical Audit results, Design Basis Accident and Design Basis Earthquake Loads were not combined as a part of the Design or Plant License Loadings. These loads were evaluated separately.

CORE SHROUD LOSS OF H5 WELD

Design Basis Accidents	Anticpated Movement			Rod Insertion	Core Reflood	Core Spray	SBLC
	Lateral	Vertical	Moment(Tip)				
Design Basis Earthquake (SSE)	None at the H5 weld location. 3/4" at the top of the shroud.	None	3/4" maximum displacement (laterally)	Rods Insert After Tipping Timing Not Signifcantly Affected	Floodable Volume Maintained, ECCS Systems Available	System Function Not Affected	No Boron Density Change
Main Steam Line Break	None	4" Quad Cities 0" Dresden	None	Insertion Completed After Shroud Comes Down, Timing Not Significantly Affected	Floodable Volume Maintained	Dre. CS not Affected, QC Potential Failure OF CS Riser Or Sparger, Injection Into RPV Allows Long Term Cooling	No Boron Density Change
Recirculation Line Break	None	None	None	Rods Insert, Timing Not Affected	Very Small Gap 1-2 Mils, 40GPM Bypass Analysis Unaffected	Core Spray Not Affected	N/A

Additional Scenarios Considered	Anticpated Movement			Rod Insertion	Core Reflood	Core Spray	SBLC
	Lateral	Vertical	Moment(Tip)				
Main Steam Line Break Plus DBE	None at the H5 weld location. 3/4" at the top of the shroud.	8" Quad Cities 2" Dresden	3/4" maximum displacement (laterally)	Rod Insertion Complete After and While Shroud Comes Down, Oscillitory Velocity Profile Timing Affected	Floodable Volume Maintained	Dresden CS Function Not Affected, QC Potential Failure Of CS Riser Or Sparger, Injection Into RPV Will Allow Long Term Cooling	No Boron Density Change
Recirc. Line Break Plus DBE (Low PRA Without Adding Single Failure Criteria)	Aprox. 0 at the H5 weld location. 3/4" at the top of the shroud.	None	3/4" maximum displacement (laterally)	Rods Insert After Tipping Timing Not Significanly Affected	Bounded By Calc. Assuming 1/4" Open All Around (Bypass Flow Small)	Core Spray Function Not Affected	N/A