Commonwealth Edison Company
1400 Opus Place
Downers Grove, IL 60515

November 10, 1995

ComEd

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

Attn: Document Control Desk

Subject: Dresden Nuclear Power Station Unit 3,
Extension of the 15 Month Operating Period Stipulated for Dresden Unit 3 Due to the Core Shroud Cracking Issue
NRC Docket No. 50-249

ComEd requests an extension of the operating period stipulated in References (a) and (e) from 15 months to 18.5 months. The reasons for the request and its technical justification is contained below:

Background

In April of 1994 ComEd identified cracks in the circumferential welds of the core shroud at Dresden Unit 3. Throughout the Spring of 1994 ComEd performed various inspections, analyses and safety assessments of the identified weld flaws to determine that adequate margin existed to support the decision to restart the Unit and operate until a permanent repair could be installed at the next refueling outage. The NRC performed a review of the initial submittal documents and issued a Safety Evaluation (Reference a) on July 21, 1994 providing concurrence that the Unit could be returned to operation for 15 months. In this safety evaluation the NRC noted several areas where uncertainties existed in the previous submittals and requested ComEd to provide confirmatory analyses. ComEd performed several additional analyses and submitted several additional responses to the NRC throughout the summer and fall of 1994. A comprehensive summary report including the latest analysis results was submitted to the NRC on December 14, 1994 (References b, c and d). The NRC reviewed the revised submittal documents and issued a Safety Evaluation on January 31, 1995 indicating that the conclusions of the previous Safety Evaluation for Dresden Unit 3 remained valid (Reference e).

Changes that have occurred in the planning of the current refueling outages necessitate the rescheduling of the upcoming D3R14 refuelling outage to start on September 7, 1996. The rescheduled refuelling outage start date extends the current D3 cycle 14 duration from a maximum of 15 months of operation above cold shutdown to a maximum of 18.5 months of operation above cold shutdown. The unplanned outages that have occurred during cycle 14 operation of Dresden Unit 3 have slowed down the fuel usage such that the completion of the 15 month cycle would occur concurrent with the Quad Cities Unit 1 refueling outage. Since both units will be installing a core shroud repair during these outages, this will create a significant conflict for key resources. ComEd has learned from the previous two core shroud repair installations that the same trained and experienced team will need to be devoted full

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time to assure a safe and effective installation. The extension of the Dresden Unit 3 outage will allow the established core shroud repair team to fully prepare and complete the Quad Cities Unit 1 repair prior to starting the mobilization for the Dresden Unit 3 repair. To ensure ComEd's quality and safety objectives are met, ComEd plans to use the same key team members that successfully completed the previous two installations for the final two installations at Dresden and Quad Cities.

The attached report provides the latest results of the ongoing ComEd efforts to more clearly define the loadings and flaw evaluations associated with the evaluation of the indications identified as part of the core shroud inspections at Dresden Unit 3 in the Spring of 1994. This report also provides a resolution to the uncertainties that were identified during the previous reviews by the NRC staff and demonstrates that safe operation for a maximum period of 18.5 months can be achieved with the identified circumferential weld cracks. The results of the various BWR-VIP and independent ComEd activities have been incorporated into this assessment. This report specifically addresses the structural assessment of the H5 weld location as it was the location with the most significant amount of cracking discovered during the inspections. The results of the Dresden/Quad Cities plant specific TRACG analysis for a Main Steam Line Break and a Recirculation Suction Line Break have been utilized to determine the bounding loads at the H5 weld location. The results of the revised Reactor Pressure Vessel (RPV) Internals seismic analysis (Reference f) have been incorporated into the flaw evaluation calculations. The results of the ComEd efforts to validate and interpret the results of the Ultrasonic Test examination data is also included in this report. A separate safety assessment of horizontal welds H1-H7 was prepared for Dresden Unit 2 to demonstrate the ability of the plants' safety features to perform their intended functions considering the response to structural loadings and was previously submitted to the NRC (Reference e). The results of the systems consequences evaluation for Dresden Unit 2 are also applicable for Dresden Unit 3.

<u>Summary</u>

The attached report demonstrates that with a ligament excluding the fillet weld and including the bounding analysis parameters, significant operating margins will remain after a 18.5 month operating cycle. In the NRC Safety Evaluation (Reference a), it was noted that some uncertainty existed regarding the key design basis input parameters as well as the loadings and therefore, approval was provided for 15 months of operation. This revised assessment includes the Dresden plant specific revised loading and key design input parameters based on the results of an extensive effort to satisfactorily resolve the open items. Table 1 provides a summary of the resolution of uncertainties identified in the July 21, 1994 Safety Evaluation. Table 2 provides a comparison of the NRC bounding flaw evaluation parameters as defined in Reference (a) versus the revised Dresden Unit 3 flaw evaluation parameters. This table identifies the differences in the key analysis parameters which served as the basic analysis inputs for the two flaw evaluations. Note that the only significant difference is the size of the required structural ligament which is now based on verified plant specific analyses and calculations.

In recognition of the importance of several of the key design inputs to the structural margin assessment ComEd has performed an analysis that provides a parametric bound of the primary input parameters. We have provided an assessment using the two methods as defined in the BWR-VIP Flaw Evaluation Guideline; 1) Crack Free Exclusion Zone approach and 2) UT Flaw Detection Approach. Table 3 provides a summary to illustrate the compliance of the revised flaw evaluations with the BWR-VIP Inspection and Acceptance Criteria.

Crack Free Exclusion Zone Approach

The results of the "Crack Free Exclusion Zone" approach with a bounding circumferential crack depth of 1.24" indicates that with the bounding conservative crack growth rate of 5 x 10^{-5} inches per hour without consideration of the fillet weld, a minimum of 18.8 months of operating margin exists considering all design basis and beyond design basis load combinations. Based on the justifications provided in this and the previously referenced evaluations, ComEd believes that the Crack Free Exclusion Zone Approach is conservative and represents a worst case scenario.

UT Flaw Detection Approach

This evaluation uses a limit load analysis of the portion of the weld that was demonstrated by UT to be free of flaws. This approach is conservative as all uninspected areas were assumed to have through-wall flaws. This UT Flaw Detection Approach is consistent with the BWR-VIP criteria and thus represents the most current information regarding flaw assessment. Using the bounding conservative crack growth rate of 5 x 10^{-5} inches per hour and without consideration of the fillet weld, a minimum of 24 months of operating margin exists considering all design basis and beyond design basis load combinations.

Conclusions

The methodology used to determine the remaining ligament size using the UT Flaw Detection Approach provides the most accurate assessment of the actual conditions. The conservative approach taken to account for near field limitations of the UT examination results and the inspection uncertainty provides a significant margin of safety on the sizing of the ligament. With consideration of this information, and the knowledge that a portion of the weld area was not inspected (i.e., assumed to be fully cracked), ComEd believes that the UT Flaw Detection Approach is the more accurate method to define the remaining structural margin. Table 4 provides a summary of the structural margin assessment for the governing loading cases.

For Design Basis Load combinations without the 0.75" fillet weld, a safety factor of 1.86 (versus the 1.4 ASME Code requirement) exists for a 18.5 month cycle. For beyond design basis loading conditions without the 0.75" fillet weld, a 1.80 safety factor exists. With the use of the appropriate representation of the fillet weld additional margin can be demonstrated. Considering these results for the conservative lower bound limits using the most limiting input parameters and analysis approaches, ComEd concludes that safe operation of Dresden Unit 3 for a maximum period of 18.5 months can be achieved while maintaining a significant margin of safety.

To the best of my knowledge and belief, the information contained in this document is true and correct. In some respects this document is not based on my personal knowledge, but on information furnished by other Commonwealth Edison employees, contractor employees, and/or consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

If there are any questions concerning this matter, or need for further clarification, please contact this office.

Sincerely,

Bob Rybak
Nuclear Licensing Administrator

Attachments:
- Table 1 - Resolution of Uncertainties Identified in July 21, 1995 NRC Safety Evaluation
- Table 2 - Comparison of NRC Bounding Flaw Evaluation Parameters Versus Revised Dresden Unit 3 Flaw Evaluation Parameters
- Table 3- Summary of Compliance With BWR-VIP Inspection and Assessment Criteria
- Table 4- Summary of Structural Margin For the Governing Loading Cases

Attachment 1 - Final Evaluation of the Core Shroud Flaws at the H5 Horizontal Weld for Dresden Unit 3, Revision 1, November 10, 1995

References: (a) J.F. Stang (NRR) to D.L. Farrar letter, Dated July 21, 1994, "Safety Evaluation by The Office of Nuclear Reactor Regulation Related to Core Shroud Cracking, Commonwealth Edison Company and Iowa-Illinois Gas and Electric Company, Dresden Nuclear Power Station, Unit 3, Quad Cities Nuclear Power Station, Unit 1"

(b) ComEd Letter, P. Piet to the U.S. NRC Document Control Desk, Subject - Response to NRC for request for additional information concerning Generic Letter 94-03, Dated December 14, 1994, Attachment D - "Final Evaluation of the Core Shroud Flaws at the H5 Horizontal Weld For Dresden Unit 3"

(c) ComEd Letter, P. Piet to the U.S. NRC Document Control Desk, Subject - Response to NRC for request for additional information concerning Generic

Letter 94-03, Dated December 14, 1994, Attachment B - "Safety Assessment of Horizontal Core Shroud Weld H1 through H7 for Cycle 14 Operation of for Dresden Unit 2".

(d) ComEd Letter, P. Piet to the U.S. NRC Document Control Desk, Subject - Response to NRC for request for additional information concerning Generic Letter 94-03, Dated December 14, 1994, Attachment A - "ComEd Response to the November 14, 1994 U.S. NRC Staff Request for Additional Information Concerning Core Shroud Cracking at Dresden Units 2 and 3 and Quad Cities Units 1 and 2".

(e) J.F. Stang (NRR) to D.L. Farrar letter, Dated January 31, 1995, "Safety Evaluation by The Office of Nuclear Reactor Regulation Related To Generic Letter 94-03, Dresden Nuclear Power Station Unit 2, Quad Cities Nuclear Power Station Unit 2".

(f) ComEd Letter, B. Rybak to U.S. NRC Document Control Desk, Subject - Transmittal of the "Evaluation of the Seismic Discrepancy in the RPV Internals Seismic Analysis Dresden Units 2 and 3 and Quad Cities Units 1 and 2", Dated October 31, 1995.

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

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TABLE 1

RESOLUTION OF UNCERTAINTIES IDENTIFIED IN JULY 21, 1995 NRC SAFETY EVALUATION

Uncertainty Identified By NRC	ComEd Resolution
Magnitude of RRLB Blowdown Loads	New TRACG Analysis with Independent Corroboration of Results, Loads Increased Significantly
Magnitude of MSLB Differential Pressures	New TRACG Analysis with Independent Corroboration of Results, Minor Change in Pressures
Confirmation of Existence and Size of H5 Fillet Reinforcing Weld	Performed UT Interrogation with Independent Corroboration By EPRI NDE Staff
Corroborating Evidence to Support Lower Crack Growth Rate Estimates	Used NUREG-0313 Criteria of 5×10^{-5} Inches/Hour
Capability of Core Spray to Function with Postulated Core Shroud Movements	Prepared Detailed Sensitivity Study to Demonstrate Core Spray Functionality Under Postulated Core Shroud Movements
Lack of a Comprehensive Safety Consequences Assessment of Postulated Core Shroud Movements	Prepared a Comprehensive Safety Assessment Addressing the Consequences of Postulated Core Shroud Movements at Each Horizontal Weld Location

TABLE 2

COMPARISON OF NRC BOUNDING FLAW EVALUATION PARAMETERS VERSUS REVISED DRESDEN UNIT 3 FLAW EVALUATION PARAMETERS

Analysis Issue/Parameter	NRC Bounding Assessment Criteria	ComEd Dresden 3 Plant Specific Assessment Criteria
Bounding Crack Depth	1.30 Inches	1.24 Inches
Crack Growth Rate	5×10^{-5} Inches/Hour	5×10^{-5} Inches/Hour
Required Structural Ligament	0.12 Inches	0.0722 Inches
Hot Operating Hours per Month	730 Hours/Month	730 Hours/Month
Months of Operating Margin	15.8 Months	18.8 Months

TABLE 3

SUMMARY OF COMPLIANCE WITH BWR-VIP INSPECTION AND ASSESSMENT CRITERIA

Inspection and Flaw Assessment Criteria	**BWR-VIP Approach**	**Crack Free Exclusion Zone Approach**	**UT Flaw Detection Approach**
Analysis Method	Use Limit Load, LEFM or EPFM Where Appropriate	Satisfied, Used Limit Load Based on Low Fluence Levels	Satisfied, Used Limit Load Based on Low Fluence Levels
Inspection Uncertainty • Depth • Length	Use Factors to Reduce Ligament Based on Uncertainty	Satisfied, Used Bounding Crack Depth With an Assumed 360^0 Flaw	Satisfied, Deducted 0.3" for near surface flaw depth and 0.4" from each end for Inspection Uncertainty
Flaw Separation	Account for Potential Overlap of Adjacent Flaws	Satisfied, Assumed a Continuous Flaw	Satisfied, Neglected Any Areas With Detected Flaws and Included Proximity Rules
Qualified Inspection Techniques	Use Qualified UT or VT Techniques	Satisfied, Used Both Qualified UT and VT	Satisfied, Used Both Qualified UT and VT

TABLE 4

SUMMARY OF STRUCTURAL MARGIN FOR THE GOVERNING LOADING CASES

Governing Loading Case	Crack Growth Rate (In./Hr.)	Initial Ligament Size (Inches)	Months of Operation Using a 1.24" Bounding Crack Depth	Safety Factor for 18.5 Months of Operation Using the UT Data [1]	Months of Operation Using the UT Data
SSE	5.0×10^{-5}	2.00"	19.0	1.86	25
SSE	5.0×10^{-5}	2.75"	41.1	2.34	37
MSLOCA & SSE	5.0×10^{-5}	2.00"	18.8	1.83	24
MSLOCA & SSE	5.0×10^{-5}	2.75"	38.7	2.29	38
RRLOCA & SSE	5.0×10^{-5}	2.00"	18.9	1.80	24
RRLOCA & SSE	5.0×10^{-5}	2.75"	38.7	2.26	36

(1) To be compared to the ASME defined Factor of Safety of 1.4.