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July 12, 1983

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2
Modification of Vacuum Breakers on
Mark I Containment - Generic Letter 83-08
NRC Docket Nos. 50-237/249, 50-254/265

- References a): NRC Generic Letter 83-08 from D.G.
Eisenhut to all Mark I Utilities,
Same Subject, dated February 2, 1983.
- b): Continuum Dynamics, Inc. (CDI) Tech.
Note No. 82-31, Mark I Vacuum Breaker
Improved Valve Dynamic Model - Model
Development and Validation, Revision 0,
September 1982 (submitted to the NRC via
GE letter MFN-159-82 dated 10-28-82 on
behalf of the Mark I Owners Group).

Dear Mr. Denton:

The purpose of this submittal is to document the Commonwealth Edison assessment of the subject drywell/wetwell vacuum breakers in response to the NRC generic letter 83-08 (reference 1). The wetwell/drywell vacuum breaker valves both at Dresden and Quad Cities, have been evaluated in accordance with the ASME Boiler and Pressure Vessel Code, Section III, Subsection NC for Class 2 components, 1977 edition including the Summer 1977 addenda as required by the Mark I Program Structural Acceptance Criteria (NEDO-24583-1). The evaluation results are presented in the enclosed certified stress reports (attachments 2 & 3), prepared by NUTECH in 1981. During the Short Term Program the valves on both Quad Cities and Dresden were modified to have wrought aluminum discs with stainless steel posts. The old valve had cast aluminum discs. These changes were incorporated in the above mentioned evaluations.

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Based on the results of the analyses (attachment 2) modifications have been made to the 18" Atwood & Morrill (A&M) internally mounted vacuum breaker valves at Quad Cities Units 1 & 2. These modifications consisted of replacing the shaft and the weight lever with those made of higher strength components obtained from the valve manufacturer (A&M) during the Fall 1981 outage at Quad Cities Unit 2 and Fall 1982 outage at Quad Cities Unit 1.

The analyses results (attachment 3) demonstrate that the as-built 18" externally mounted A&M vacuum breaker valves at Dresden Units 2 & 3 meet the ASME codes criteria. Hence, no modifications are necessary.

Attachment I provides an overview of the analyses methodology used in the evaluation presented in Attachments 2 & 3. The wetwell to drywell pressure differential (ΔP) across the valve pallet (disc) was developed by Containuum Dynamics, Inc. (CDI) and used for the structural evaluation of the vacuum breakers. Subsequent to issuance of the certified stress reports, CDI refined their dynamic model to reduce conservatism in load prediction and also provided plant-unique impact velocities due to the pressure differential (ΔP) across the valve pallet. A report documenting the valve dynamic modeling and model validation is currently under review by the NRC staff (attachment 2). The impact velocities for Quad Cities and Dresden vacuum breakers using this approach are presented in the enclosed CDI reports (attachments 5 and 6). As shown in Attachment I, the impact velocities calculated and used by NUTECH for stress evaluations presented in the certified stress reports (attachments 2 & 3) are more conservative than those calculated by CDI. Therefore, it is concluded that the assessment of the subject vacuum breakers is conservative.

In summary, the Dresden and Quad Cities wetwell to drywell vacuum breaker valves have been analyzed in a conservative manner and required modifications have been completed. The attachments to this letter provide complete documentation for the plant unique calculations which formed the basis for modifications to the Quad Cities vacuum breakers, and justification for the acceptability of the as-built Dresden vacuum breakers. Therefore, it is hoped that review and acceptance of this transmittal by the NRC will close this issue for Commonwealth Edison's Dresden and Quad Cities Stations.

If you have any questions concerning this submittal, please contact this office.

July 12, 1983

One signed original and sixty (60) copies of this transmittal are provided for your use. Due to the nature and size of the reports only two (2) copies of Attachments 2 through 5 are provided.

Very truly yours,



B. Rybak
Nuclear Licensing Administrator

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- Attachment 1): Overview of the Analyses Methodology
- 2): NUTECH Report COM-08-023, Dynamic Analysis of Wetwell-to-Drywell Vacuum Breakers for Quad Cities Station Units 1 & 2, Rev. 0, September 1981.
 - 3): NUTECH Report COM-28-026, Dynamic Analysis of Wetwell-to-Drywell Vacuum Breakers for Dresden Nuclear Station Units 2 & 3, Rev. 0, December 1981.
 - 4): CDI Tech. Note No. 82-7, Improved Dynamic Vacuum Breaker Valve Response for Quad Cities 1 & 2, Revision 1, September 1982.
 - 5): CDI Tech. Note No. 82-4, Improved Dynamic Vacuum Breaker Valve Response for Dresden 2 & 3, Revision 0, September 1982.

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ATTACHMENT I

WETWELL/DRYWELL VACUUM BREAKER VALVES

DRESDEN UNITS 2 & 3, AND QUAD CITIES UNITS 1 & 2

OVERVIEW OF THE ANALYSES METHODOLOGY

A. ANALYSES SEQUENCE:

1. CDI provided NUTECH with pressure differential (ΔP) across the Vacuum Breaker Disc (pallet) in May 1980 for QC 1&2 and October 1981 for D 2&3.
2. NUTECH calculated the pallet impact velocity using NUTECH's proprietary computer program DISCO (rigid body dynamics).
3. Based on the impact velocities calculated in step 2, NUTECH performed a structural evaluation of the valve components using ANSYS finite element code and issued certified stress reports in September 1981 for QC 1&2 and December 1981 for D 2&3 (references 2 & 3).
4. Based on the results of the analyses in step 3, CECO replaced the shaft and weight lever for internally mounted vacuum breakers at QC 1&2. However, no modifications are needed for the externally mounted vacuum breakers at D 2&3.
5. CDI refined the dynamic model and reduced conservatism in load prediction as well as impact velocity calculations and came up with much lower impact velocities, in September of 1982 (References 4, 5 and 6).

- B. Comparison of NUTECH calculated impact velocities vs. CDI calculated impact velocities due to design loading during chugging:

Parameter	Quad Cities Units 1 & 2	Dresden Units 2 & 3
Valve Type	18" A&M Internal	18" A&M External
Maximum Valve Opening (radians)		
NUTECH	0.13 ⁽¹⁾	0.01 ⁽²⁾
CDI { No Flow Effects	0.060	0.0
{ Flow Effects	0.046	0.0
	(3)	(4)
Maximum Impact ⁽⁵⁾ Velocity (radians/sec)		
NUTECH	4.631 ⁽¹⁾	0.8224 ⁽²⁾
CDI { No Flow Effects	3.09	0.0
{ Flow Effects	2.45	0.0
	(3)	(4)

- (1) Group 1 Forcing Function applies to Browns Ferry 1,2,3, Monticello, Pilgrim, and Quad Cities 1&2, transmitted by GE letter MI-G-64 dated May 15, 1980 from D. L. Butcher to K. B. Ramsden (CECo); Results presented are from NUTECH report COM-08-023, Rev. 0, dated September 1981 (enclosed).
- (2) Plant Unique Design Forcing Function transmitted by GE letter MI-G-72 of October 19, 1981 from D. L. Butcher to R. H. Mirochna; Results presented are from NUTECH report COM-28-026, Rev. 0, dated December 1981 (enclosed).
- (3) CDI Tech. Note No. 82-7, Improved Dynamic Vacuum Breaker Valve Response for Quad Cities 1&2, Rev. 1, September 1982 (enclosed).

- (4) CDI Tech. Note No. 82-4, Improved Dynamic Vacuum Breaker Valve Response for Dresden 2&3, Rev. 0, September 1982 (enclosed).
- (5) Only closing impacts (i.e. between the pallet and the valve seat) occurred. There were no opening impacts (i.e. between the pallet and the valve body).

C. CONCLUSION

Since NUTECH's stress analyses are based on higher impact velocities and the stresses in valve components are proportional to impact velocity, it can be concluded that the stress evaluation is conservative.

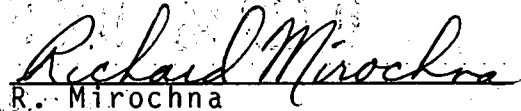
July 7, 1983

Subject: Modification of WW/DW Vacuum Breakers
Mark I Containment Program
Dresden, Units 2 and 3
Quad Cities, Units 1 and 2

Mr. B. Rybak:

Attached is a draft of a letter that we propose be sent to the NRC in response to NRC generic letter 83-08. This letter requested information on the subject modifications. If there are any questions on the information presented please contact us.

Prepared by:


R. Mirochna

Approved by:


E. R. Zebus

RHM/mct
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Attachment
cc: W.L. Eck
D.L. Sanderson