Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

August 17, 1983

Mr. James G. Keppler, Regional Administrator
- Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Dresden Station Unit 3
ECCS Suction Header
Snubber Removal
NRC Docket No. 50-249

Reference: A) Attachment to letter number COM-01-576, B.J. Whiteway to W.H. Koester, "Dresden Units 2 and 3, Torus Support Modifications, ECCS Suction Header Snubbers," dated January 4, 1980"

Dear Mr. Keppler:

During a meeting with the NRC to discuss the safety implication of the Dresden Unit 3 ECCS suction header snubber removal Mr. R. D. Walker of the NRC raised the concern of whether the analysis being presented included the SSE load condition. The analysis in question (Reference A), was that for the "no-snubber case". In response to this concern Nutech provided an assessment of that analysis and performed calculations to scale up the results to include the SSE load condition. As can be seen from their summary table the prior conclusion that the snubbers are not needed during the seismic event, does not change.

Please direct any questions you may have regarding this matter to this office.

Very truly yours,

B. Rybak

B. Rybak
Nuclear Licensing Administrator

lm

Attachment

cc: NRC Resident Inspector - Dresden
Mr. R. D. Walker - Region III

7151N

nutech ENGINEERS

225 NORTH MICHIGAN AVENUE, 16th FLOOR • CHICAGO, IL 60601 • PHONE (312) 565-2900

July 8, 1983
BJW-83-107

Mr. R. H. Mirochna
Station Nuclear Engineering Department
Commonwealth Edison Company
P.O. Box 767 - 35 FN W
Chicago, Illinois 60690

Subject: Dresden Units 2 & 3 ECCS Suction Header Seismic Analysis Calculations for SSE Case

Reference: Attachment to letter number COM-01-576, B. J. Whiteway to W. H. Koester, "Dresden Units 2 & 3, Torus Support Modifications, ECCS Suction Header Snubbers," dated January 4, 1980.

Dear Rick,

The reference letter presented calculations for the ECCS suction header seismic analysis for the OBE condition, for the case of no snubbers attached to the header. The attachment to this letter provides supplementary calculations for the SSE condition. Please add these to the referenced calculations.

The results for both conditions are listed below. As seen from the table, all stresses are below their respective code allowables.

	Percent of Allowable Stress	
Location	OBE	SSE
Header Pipe	53%	56%
Shell at Nozzles	83%	89%
Header Supports	68%	71%
Shell at Supports	81%	77%

If you need additional information, please call me.

Very truly yours,

B. J. Whiteway, P.E.
Senior Director

Attachment

cc: E. R. Zebus w/o attachment
R. H. Buchholz w/o attachment
W. V. Weber w/attachment
File 27.200.0004 w/attachment

Check Vertical Strap for SSE + W

(Ref Computer Runs FRS009T + FRS002Y dtd 10/12/79)

OBE Load: ± 8110 #
Weight: - 12,511 # } from p. 4

SSE = 2 × OBE = 2 × 8110 # = 16,220 #
Weight = 12,511
SSE+W = 28,731 #

f_t = tension stress = $\frac{28{,}731^{\#}}{2(1.5 - \frac{1}{2}(1\frac{1}{8}))}$ = 15,323 psi

F_t = 0.45 F_Y × 1.33 = 21,550 psi > f_t

(ref AISC 1.5.1.1
" " 1.5.1.6)

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Accuracy Chk By/Date	MMH 7/6/83					
Criteria Chk By/Date	MMH 7/6/83					

Checking torus shell Stresses for Service Level C :-

Membrane S.I. for Service Level B

= 23.926 Ksi

Service level C combination includes SSE instead of OBE.

∴ the level C load combination Stress can be conservatively assumed to be twice the above Stress

∴ Membrane Stress intensity for Service level C load combination

= 2 × 23.926 = 47.852 Ksi

Allowable stress = 1.5 S_y

= 1.5 (35.86) = 53.79 ksi (PVAR vol. 2)

∴ $\frac{\text{Actual Stress}}{\text{Allowable Stress}} = \frac{47.852}{53.79} = 0.89$

= 89 %

For Service Level C, range is not required to be checked. (SSE load can not cause fatigue)

Check Pipe Stress for SSE + W + P

Ref. Computer Run FRS009T dtd 10/12/79
" " " FRS002Y " "

For Pipe Critical Node 75:

W	=	2927 psi
P	=	1200 psi
W+P	=	4127 psi

OBE = 9589 (p26) − 4127 = 5462 psi

SSE = 2 × OBE = 2 × 5462 = 10,924 psi

SSE + W + P = 10,924 + 4,127 = 15,051 psi

15,051 psi < 27,000 psi Level C allowable*

* ASME III, 1977 incl Winter Addenda

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STRESSES FOR STRAP PAD PLATE-TO-SHELL JUNCTIONS (for ALL SNUBBERS REMOVED)

Reference: (1) Results of Torus Suction Ring Header Analysis for all snubbers attached; prepared for CECO by NUTECH; Doc No. COM-01-589, Attachment A, January 1980. File G4.311.0029.

Method of Calculation: Pages 24-34 of Reference 1 report the shell stresses due to 1000 lb vertical and horizontal load at the strap-pads. The actual stresses are calculated using the ratio of the maximum strap loads to 1000 lbs.

Maximum Strap Loads:

Vertical Strap: OBE + DW = 20 621 lb.

SSE + DW = 28 731 lb.

** Horizontal Strap OBE + DW = 5971 lb.

SSE + DW = 10 575 lb.

** Horizontal strap load at SE2B due to OBE_I (pg.4)

$F_x = \pm 3275$ $F_y = \pm 1687$ $F_z = \pm 3275$

due to DW (pg.4)

$F_x = 1888$ $F_y = -973$ $F_z = -1888$

					Resultant
$DW + OBE_I$	5163	714	1387		5393 lb.
	-1387	-2660	-5163		-5971 lb.
$DW + SSE_I$	8438	2401	4662		9934 lb.
	-4662	-4347	-8438		-10575 lb.

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STRESS CALCULATION DUE (DW + OBE$_I$)

Maximum Vertical Load = 20 261 lb.

MEMBRANE STRESS:

$$\sigma_\phi = \frac{20\,261\ lb}{1000\ lb}(136\ psi) + 19300^{*}\ psi = 22055\ psi$$

$$\sigma_x = \frac{20261\ lb}{1000\ lb}(183\ psi) + 19300^{*}\ psi = 23\,007\ psi$$

$$\tau = \frac{20261\ lb}{1000\ lb}(35\ psi) = 709\ psi$$

$$SI = \frac{1}{2}\left(22055 + 23007 + \sqrt{(22055-23007)^2 + 4(709)^2}\right)$$

$$= 23{,}385\ psi < 28\,950\ psi.$$

PRIMARY + SECONDARY STRESS RANGE:

$$\sigma_\phi' = \frac{20261\ lb}{1000\ lb}(800\ psi) = 16208.8\ psi$$

$$\sigma_x' = \frac{20261\ lb}{1000}(593\ psi) = 12015\ psi$$

$$\tau = \frac{20261\ lb}{1000\ lb}(35\ psi) = 709\ psi.$$

$$SI = 2 \times \frac{1}{2}\left(16208.8 + 12015 + \sqrt{(16208.8-12015)^2 + 4(709)^2}\right) + 19300$$

$$= 61950\ psi < 69\,300\ psi$$

* Assume applied general membrane stress = maximum service limit A or B allowable stress

Maximum Horizontal Load = 5971 lb.

MEMBRANE STRESS:

$$\sigma_\phi = \frac{5971\ lb}{1000\ lb}(222\ psi) + 19300^{*}\ psi = 20626\ psi$$

$$\sigma_x = \frac{5971\ lb}{1000}(278\ psi) + 19300^{*}\ psi = 20942\ psi$$

$$\tau = \frac{5971\ lb}{1000}(39\ psi) = 233\ psi$$

$$SI = \frac{1}{2}\left(20626 + 20942 + \sqrt{(20626-20942)^2 + 4(233)^2}\right)$$

$$= 21066\ psi < 28950\ psi.$$

PRIMARY + SECONDARY STRESS RANGE:

$$\sigma'_\phi = \frac{5971}{1000}(1384\ psi) = 8264\ psi$$

$$\sigma'_x = \frac{5971}{1000}(1030\ psi) = 6150\ psi$$

$$\tau = \frac{5971}{1000}(39\ psi) = 233\ psi.$$

$$SI = 2\times\frac{1}{2}\left(8264 + 6150 + \sqrt{(8264-6150)^2 + 4(233)^2}\right) + 19300$$

$$= 35879\ psi < 69,300\ psi.$$

* Assume applied general membrane stress = max. service limit A or B allowable

STRESS CALCULATION DUE TO (DW + SSE).

Maximum Vertical Load = 28731 lb.

MEMBRANE STRESS:

$$\sigma_\phi = \frac{28731\ lb}{1000\ lb}(136\ psi) + {}^{**}35860\ psi = 39767\ psi$$

$$\sigma_x = \frac{28731\ lb}{1000\ lb}(183\ psi) + {}^{**}35860\ psi = 41118\ psi$$

$$\tau = \frac{28731\ lb}{1000}(35\ psi) = 1006\ psi$$

$$SI = \frac{1}{2}\left(39767 + 41118 + \sqrt{(39767-41118)^2 + 4(1006)^2}\right)$$

$$= 41654\ psi < 53790\ psi \quad (1.5S_y = 53790\ psi)$$

Maximum Horizontal Load = 10757 lb.

MEMBRANE STRESS:

$$\sigma_\phi = \frac{10757\ lb}{1000\ lb}(222) + {}^{**}35860\ psi = 38248\ psi$$

$$\sigma_x = \frac{10757\ lb}{1000\ lb}(275\ psi) + {}^{**}35860\ psi = 38818\ psi$$

$$\tau = \frac{10757\ lb}{1000\ lb}(39\ psi) = 420\ psi$$

$$SI = \frac{1}{2}\left(38248 + 38818 + \sqrt{(38248-38818)^2 + 4(420)^2}\right)$$

$$= 39040 < 53790\ psi.$$

[Ref. ASME Sec Fig. NE-3221-3 & Table I-21

** Assuming General Membrane Stress = Max. Allowable = $1.0S_y$ (@ 165°F)

Project Dresden Nuclear Power Station File No.
Owner Commonwealth Edison Company
Client Commonwealth Edison Company

STRESS SUMMARY.

SHELL STRESS AT STRAP PAD PLATE JUNCTION (Maximum)

STRAP	LOAD	MEMBRANE P_m.			MEMBRANE + BENDING (P_L+P_B+Q)		
		S.I ksi	ALLOW. ksi	%	SI (ksi)	ALLOW. KSI	%
Vertical	DW+OBE$_I$	23.4	28.95	81%	51.95	69.3	75%
	DW+SSE$_I$	41.65	53.79	77%	NA	NA	NA
Horizontal	DW+OBE$_I$	21.06	28.95	73%	35.9	69.3	52%
	DW+SSE$_I$	39.04	53.79	73%	NA	NA	NA

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