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William F. Maguire
Site Vice President
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RBG-47895

August 15, 2018

Attn: Document Control Desk
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: Supplement to the Response to License Amendment Request (LAR) for Review and Approval Of Relocation Of The Reactor Core Isolation Cooling (RCIC) Injection Point NRC Request for Additional Information (RAI)
River Bend Station, Unit 1
Docket No. 50-458
License No. NPF-47

RBF1-18-0168

References: 1) Entergy Letter: License Amendment Request (LAR) (RBG-47823 dated January 29, 2018) (ADAMS Accession No. ML18029A187)

2) NRC email: River Bend Station, Unit 1, Request for Additional Information dated May 24, 2018 (ADAMS Accession No. ML18149A288)

3) Entergy Letter: RAI Response (RBG-47876 dated June 21, 2018) (ADAMS Accession No. ML18172A142)

Dear Sir or Madam:

In Reference 1, Entergy Operations, Inc (Entergy) submitted a request for the review and approval of relocation of the RCIC Injection Point from the Reactor Vessel Head Spray Nozzle to the 'A' Feedwater Line via the 'A' Residual Heat Removal (RHR) Shutdown Cooling Return Line. In an email dated May 24, 2018, (Reference 2) the NRC staff made a request for additional information, needed to complete the license amendment request. On June 21, 2018 Entergy submitted responses to the RAI (Reference 3). A clarification call for the RAI response was held with the NRC on July 17, 2018 where it was determined additional information was required by the NRC.

Enclosure 1 provides the additional information requested during the July 17, 2018 clarification call with the NRC. Attachment 1 contains the original load cases and thermal modes table from calculation AX-017D Revision 3. Attachment 2 contains the thermal transient table from AX-17D Addendum 3K. Attachment 3 contains Cumulative Usage Factor (CUF) Summaries for AX-17D Rev 3, Addendum 3J, and Addendum 3K. Attachment 4 contains the cover pages from AX-17D Addendum 3J and 3K. Attachment 5 contains Addendum 3J Stress/CUF comparison with Addendum 3B

This letter does not contain any new commitments.

If you require additional information, please contact Mr. Tim Schenk at (225) 381-4177 or tschenk@entergy.com.

In accordance with 10 CFR 50.91(b)(1), Entergy is notifying the State of Louisiana and the State of Texas by transmitting a copy of this letter to the designated State Official.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 15, 2018.

Sincerely,

WFM/BJ

Enclosure 1: Supplement to the Request for Additional Information (ML18172A142)
Attachment 1: Original Load Cases and Thermal Modes Table from AX-017D
Attachment 2: Thermal Transient Loss of Feed Water Pumps Aux Power Trip without Bypass and Reactor Core Isolation Cooling (RCIC) Injection AX-17D Rev 3K
Attachment 3: Cumulative Usage Factor (CUF) Summaries AX-17D Rev 3, Addendum 3J, and Addendum 3K
Attachment 4: Addendum 3J and 3K Cover Pages
Attachment 5: Addendum 3J Stress/ Cumulative Usage Factor (CUF) comparison with Addendum 3B

cc: U.S. Nuclear Regulatory Commission
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U.S. Nuclear Regulatory Commission
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Austin, TX 78711-3326

RBG-47895

Enclosure 1

Supplement to the Request for Additional Information (ML18172A142)

Supplement to the Request for Additional Information (ML18172A142)
RIVER BEND STATION, UNIT 1
DOCKET NO.: 50-458

Background

The NRC staff would like to have a clarification call with you concerning your RAI response dated June 21, 2018. Specifically, the staff would like to discuss the below topics to determine if a follow-up RAI is needed: In your response dated June 21, 2018, you explained that the Cumulative Usage Factors (CUF) reduced significantly from 0.35 to 0.16 at point 1W and from 0.59 to 0.23 at point 71W as indicated in Table 3.6A-9a of the Updated Safety Analysis Report (USAR), as a result of installing a nozzle check valve into the feedwater system instead of using a swing check valve. The staff notes that the CUF for the piping system is from thermal transients.

Question

What thermal modes or transient changes and loading condition changes occurred since the cumulative usage factors and stresses decreased?

The reason for this significant CUFs reduction should be explained in detail including:

- old/new transients curves/cycles,
- fatigue stresses/cycles (S-N) combination summary, and
- the method to combine the CUFs for:
  - before the change (from 1986 beginning of the operation to the modification) and
  - after the change (after the modification to end of the operating license period).

Response

MR 96-0069 rerouted the Reactor Core Isolation Cooling (RCIC) Injection point from the Reactor Head Spray connection to the "A" Loop of Feedwater via the "A" Reactor Heat Removal (RHR) Shutdown Cooling return. This modification issued addendum 3K to calculation AX-017D (Pipe Stress Calculation for Feedwater Piping in Reactor and Auxiliary Bldgs, West Loop, Normal/Upset Condition Class 1 Analysis) to analyze the changes made to the feedwater piping system with the RCIC injection connection. Addendum 3K also administratively incorporated the approved AX-017D addenda 3B, 3E, 3F, 3G, 3H, and 3J. The changes made by each of these addenda are summarized below:

Addendum 3B revised the temperature drop during the feedwater heater loss event from 322 deg F to 320 deg F. This change was associated with LAR 88-006 and analyzed operation with lower feedwater temperature associated with operation in Single Loop Operation with Feedwater Heaters Out of Service. This change increased the severity of this transient and increased stresses and CUF. A summary of the class 1 stresses and CUF values can be seen below on the Addendum 3J Stress/CUF comparison with Addendum 3B.

Addendum 3E evaluated a change in a 3' segment of pipe from Sch. 60 to Sch. 80 associated

with plant modification MR 91-0080. The resulting stresses, moments and loads due to the upgrade of the piping to schedule 80 from schedule 60 were determined to be within the allowable limits. The model changes associated with this addendum were incorporated into addendum 3K.

Addendum 3F evaluated the effects of smaller mass (500 lb to 275 lb) on a valve actuator/ valve center accelerations, pipe stress, usage factor, pipe support loads, penetration loads, and the potential impact on stress reports caused by a lighter weight motor installed on outboard feedwater valve FWS-MOV7A. Based on an assessment of relative reduction of mass and increase of valve natural frequency it was concluded that the deadweight and combined dynamic loads for the new configuration were bounded by the corresponding loads of the old configuration.

Addendum 3G evaluated the addition of a 12" sch 60 to 12" sch 60 field weld between nodes 108 and 109. The stresses and CUF for the new weld fall between those of the two previously analyzed adjacent nodes as they were both previously analyzed and qualified as weld points.

Addendum 3H reduced the total combined normal/upset and faulted accelerations computed for FWS-MOV065A by applying Code Case N-411 damping spectra. This change was superseded by addendum 3K because all of the seismic and hydraulic events were analyzed using N-411 damping curves in addendum 3K.

Addendum 3J reduced the dynamic loads for OBE, SRV 1V, SRV 2V, and SRV 16V load cases by using Code Case N-411 damping in the stress analysis. Attachment 4 contains the cover page to AX-017D Addendum 3J for reference. The analyzed Class 1 stresses and CUF were reduced as a result. The reduction of stresses and CUF due to the use of Code Case N-411 damping values are shown below on the Addendum 3J Stress/CUF comparison with Addendum 3B, see Attachment 5. As can be seen, stresses and CUF for most of the class 1 node points analyzed were reduced significantly.

3K incorporated the changes made by addenda 3B, 3E, 3F, 3G, 3H, and 3J. Addendum 3K evaluated the Feedwater piping for the new function of RCIC injection in addition to the existing Feedwater functions. Attachment 4 contains the cover page to AX-017D Addendum 3K for reference. The added check valve FWS-V3052 was added to the model and new thermal mode 36 was introduced for the injection of 40 deg F RCIC into the feedwater piping. This new thermal transient includes 10 postulated events with 3 injections per event (total of 30 cycles) with no feedwater flowing. In addition to these 10 injection sequences, there are 40 postulated spurious injections with feedwater flowing. The spurious injection of RCIC with feedwater flowing events were excluded from the analysis as the contribution to stress is minimal due to the low change in feedwater temperature. The thermal transient diagram for the new thermal transient is shown in Attachment 2.

Due to the changes made by MR 96-0069 (RCIC Reroute to Feedwater) and the aggregate of the incorporated addenda 3B, 3E, 3F, 3G, 3H, and 3J, there was a net decrease in stresses and CUF of the break points reported out on RBS USAR tables 3.6A-9a and 10a. However, this decrease is largely due to the use of Code Case N-411 damping on the dynamic transient cases. It can be seen from a comparison of the results of addendum 3J (re-evaluated dynamic load cases with N-411 damping curves) to addendum 3K (MR 96-0069 RCIC Reroute Modification) that the stresses and CUF values of break points 60AW, BW, CW (corresponds

with AX-017D Node Point 82), 70W (corresponds with AX-017D Node point 97), and 71W (corresponds with AX-017D Node Point 85) increased from the results of 3J. This increase is caused by the aggregate of the incorporated changes made by addenda 3B, 3E, 3F, and 3G and the change to the routing of the RCIC system.

The reason for this significant CUFs reduction should be explained in detail including:

- ***old/new transients curves/cycles,***

The load cases and thermal modes from Revision 3 of AX-017D are located in Attachment 1. A new thermal transient was added with addendum 3K, the transient curve can be found in Attachment 2.

- ***fatigue stresses/cycles (S-N) combination summary***

Attachment 3 shows the original CUF values from AX-017D; the load combination summary and stress/CUF combinations for node points 82, 85, and 87 from AX-017D addendum 3J (implemented Code Case N-411 damping curves; and the load combination summary and stress/CUF combinations for node points 82, 85, and 87 from AX-017D addendum 3K (MR 96-0069 and addenda incorporation)

- ***the method to combine the CUFs for:***
  - ***before the change (from 1986 beginning of the operation to the modification) and***
  - ***after the change (after the modification to end of the operating license period).***

The piping model analyzes the cumulative effects of postulated transients and normal operating conditions on the piping system. The change associated with MR 96-0069 added a new transient to the feedwater piping system (spurious injection of RCIC). The new thermal transient was added with a postulated number of occurrences of 10. This new thermal transient was added to the model and was added to the calculated stresses and CUF. For this change it was not necessary to break out the stresses that would have occurred before and after this modification.

If a situation were to occur where a physical change to the plant reduced the severity of a postulated transient, but that transient had already occurred X number of times prior to the physical change then that transient would need to be broken out into two different transients. One would track or estimate the stress/usage caused by the transients that had occurred under the previous configuration and one would track the stress/fatigue due to the new postulated, but less severe transient.

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Attachment 1

Original Load Cases and Thermal Modes Table from AX-017D

Original Load Cases Table from AX-017D:

STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				
JO. OR WO. NO. 12210	DIVISION & GROUP NP(C)	CALCULATION NO. AX-17D-4	OPTIONAL TASK CODE	PAGE 163

REF.

5.0 LOADING CONDITIONS ANALYZED

5.1 DESCRIPTION FOR LOAD CASES

LOAD CASE NUMBER	DESCRIPTION
	Normal/upset condition (Run 004)
1	FT= FLUID TRANSIENT TIME HISTORY (3-PUMP-TRIP)
2	OBEI= OBE INERTIA.....GROUPING BY STD SRSS
3	SSEI= SSE INERTIA.....GROUPING BY STD SRSS
4	SRV (1V,2V,SRVCO2V).....GROUPING BY STD SRSS
5	SRV (16V,SRVCO16V).....GROUPING BY STD SRSS
6	COCH= CONDENS.OSCILL & CHUGGING.....GROUPING BY STD SRSS
7	PS= POOL SWELL.....GROUPING BY STD SRSS
8	APMSB= ANNULUS PRESSURIZATION M.S.B... GROUPING BY STD SRSS
9	APRCB= ANNULUS PRESSURIZATION R.C.B....GROUPING BY STD SRSS
10	APFWB= ANNULUS PRESSURIZATION F.W.B....GROUPING BY STD SRSS
11	DL= DEADWEIGHT ANALYSIS: TLOAD=3,(F@SH = COLDSET LOAD)
12	X-DIR OBE ANCHOR MVMTS
13	Y-DIR OBE ANCHOR MVMTS
14	Z-DIR OBE ANCHOR MVMTS
15	THERM 1= NORMAL OPERATING: (12) PPG @ 420/420/420 F RPV @ 552/528/528
16	THERM 2= TURB ROLL COLD: (4A-1..) PPG @ 70/70/70 F RPV @ 552/552/450
17	THERM 3= BOLT-UP,LEAK TEST: (3A-1..) 70-100
18	THERM 4= HYDROTEST: (2A) 100-180-100
19	THERM 5= START-UP:{UP} (3A-2..) 100-486
20	THERM 6= START-UP:{UP} (3B-2) 100-486
21	THERM 7= TURB ROLL: (4A-2..) 70-325
22	THERM 8= TURB ROLL: (4B-1+2) 180-70-325
23	THERM 9= TURB ROLL: (4A-3..) 325-420
24	THERM 10= DAILY PWR REDCTN : (5-1+2..) 420-354
25	THERM 11= DAILY PWR INCR : (5-3..) 354-420
26	THERM 12= WEEKLY PWR REDCTN : (6-1+2) 420-326
27	THERM 13= FW HTR LOSS: (9-1+2) 420-352
28	THERM 14= FW HTR RESTORTN: (9-3) 352-420
29	THERM 15= SCRAMS: (22-1+2..) 420-275
30	THERM 16= PWR REDUCTN: (13) 420-190
31	THERM 17= HOT STDBY: (14A) 190-70
32	THERM 18= HOT STDBY: (14B-1..) 190-435
33	THERM 19= HOT STDBY: (14B-2) 435-190
34	THERM 20= SHUT-DOWN INITIATN: (15B-1) 435-156
35	THERM 21= SHUT-DOWN INITITN:{UP} (15B-2) 156-395
36	THERM 22= VESSEL FLOODING: (16A-1) 70-157
37	THERM 23= VESSEL FLOODING: (16A-3..) 167-108
38	THERM 24= VESSEL FLOODING: (16A-4..) 108-167
39	THERM 25= VESSEL FLOODING: (16B-1+2) 149-66-152
40	THERM 26= SHUT-DOWN, UNBOLT: (17A..) 167-100

Original Load Cases Table from AX-017D, pg. 2:

STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				
JO. OR WO. NO. 12210	DIVISION & GROUP NP(C)	CALCULATION NO. AX-17D-4	OPTIONAL TASK CODE	PAGE 164

REF.

5.0 LOADING CONDITIONS ANALYZED (CONT'D)

5.1 DESCRIPTION FOR LOAD CASES

LOAD CASE NUMBER	DESCRIPTION
41	THERM 27= LOSS OF FW PUMP:{UP} (20-1..) 420-573-485
42	THERM 28= PIPE RUPTURE: (27-1+2) 420-259-70
43	THERM 29= START-UP:{DN} (3A-3..) 486-70
44	THERM 30= START-UP:{DN} (3B-3) 486-180
45	THERM 31= SHUT-DOWN INITITN:{DN} (15B-3) 395-149
46	THERM 32= LOSS OF FWP:{DN} (20-13+14) 485-70
47	THERM 33= TMODE 2 WITH P=0 PSI
48	THERM 34= TMODE 15 WITH P=1516 PSI
49	THERM 35= TMODE 15 WITH P=1175 PSI
50	X+Y DIR. OBE ANCHOR MVMTS.....CASES 12+13 BY SRSS
51	OBEA= X+Y+Z EARTHQUAKE ANCHOR MVMTS....CASES 12+13+14 BY SRSS
52	SRV= (SRV MAX).....CASES 4+5 BY MAXIMUM VALUE
53	SRSS(SRV,FT).....CASES 52+1 BY SRSS
54	SRSS(OBEI,OCCU)= SRSS(OBEI,SRV,FT)...CASES 2+52+1 BY SRSS
55	OBET= ABS(OBEI + OBEA).....CASES 2+51 BY ABS. SUM
56	SRSS(OBET,OCCU)= SRSS(ABS(OBEI+OBEA),SRV,FT)..CASES55+53 BY SRSS
57	SRSS(OBEI,FT).....CASES 1+2 BY SRSS (FOR 9CN CARD ONLY)
58	FT= FLUID TRANSIENT TIME HISTORY(3 PUMP-TRIP)....(FOR SUMMARY ONLY)
59	OBEI= OBE INERTIA (CASE REPEATED FOR SUMMARY ONLY)
60	SRV(1V,2V,SRVCO2V).....(CASE REPEATED FOR 9N CARD ONLY)
61	SRV(16V.SRVCO16V)..... (CASE REPEATED FOR 9N CARD ONLY)
	(RUN 007)
1	SETTLE 1 = BLDG. SETTLEMENT ... REACTOR BLDG. SETTLES DOWN BY .66".
2	SETTLE 2 = BLDG. SETTLEMENT ... AUX. BLDG. SETTLES DOWN BY .18".

Original Load Cases (Emergency/Faulted) Table from AX-017D

STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				PAGE 165
JO. OR WO. NO. 12210	DIVISION & GROUP NP(C)	CALCULATION NO. AX-17D-4	OPTIONAL TASK CODE	

REF.

5.0 LOADING CONDITIONS ANALYZED (CONT'D)

5.1 DESCRIPTION FOR LOAD CASES

LOAD CASE NUMBER	DESCRIPTION
	EMERGENCY & FAULTED CONDITIONS (Run 005)
1	FT= FLUID TRANSIENT TIME HISTORY (3-PUMP-TRIP)
2	OBEI= OBE INERTIA.....GROUPING BY STD SRSS
3	SSEI= SSE INERTIA.....GROUPING BY STD SRSS
4	SRV (1V,2V,SRVCO2V).....GROUPING BY STD SRSS
5	SRV (16V,SRVCO16V).....GROUPING BY STD SRSS
6	COCH= CONDENS.OSCILL & CHUGGING.....GROUPING BY STD SRSS
7	PS= POOL SHELL.....GROUPING BY STD SRSS
8	APMSB= ANNULUS PRESSURIZATION M.S.B... GROUPING BY STD SRSS
9	APRCB= ANNULUS PRESSURIZATION R.C.B....GROUPING BY STD SRSS
10	APFHB= ANNULUS PRESSURIZATION F.H.B....GROUPING BY STD SRSS
11	DL= DEADWEIGHT ANALYSIS: TLOAD=3,(FASH = COLDSET LOAD)
12	SRV= (SRV MAX).....CASES 4+5 BY MAXIMUM VALUE
13	SRSS(SRV,FT).....CASES 12+1 BY SRSS
14	SRSS(OBEI,SRV,FT).....CASES 2+12+1 BY SRSS
15	SRSS(OBEI,OCCE)=SRSS(OBEI,SRV,FT,COCH).....CASES 2+12+1+6 BY SRSS
16	SRSS(SSEI,SRV,FT).....CASES 3+12+1 BY SRSS
17	MAX(COCH,PS).....CASES 6+7 BY MAX VALUE
18	MAX(APMSB,APRCB).....CASES 8+9 BY MAX VALUE
19	AP= ANNULUS PRESS:MAX AP(MSB,RCB,FHB)...CASES 8+9+10 BY MAX VALUE
20	SRSS(SSEI,FT).....CASES 3+1 BY SRSS
21	SRSS(SSEI,OCCF1)=SRSS(SSEI,SRV,FT,MAX(COCH,PS))..CASES 3+12+1+17 BY SRSS
22	SRSS(SSEI,OCCF2)=SRSS(SSEI,FT,AP).....CASES 3+1+19 BY SRSS
23	SSEI= SSE INERTIA.....(CASE REPEATED FOR SUMMARY ONLY)
24	COCH= CONDENS.OSCILL & CHUGGING...(CASE REPEATED FOR SUMMARY ONLY)

Original Thermal Modes Table from AX-017D

STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				
JO. OR WO. NO. 12210	DIVISION & GROUP NP(C)	CALCULATION NO. AX-17D-4	OPTIONAL TASK CODE	PAGE 166

REF.

5.0 LOADING CONDITIONS ANALYZED (CONT'D)

5.2 DESCRIPTION FOR THERMAL MODES

MODE NUMBER	DESCRIPTION
1	THERM 1= NORMAL OPERATING: (12) PPG @ 420/420/420 F RPV @ 552/528/528
2	THERM 2= TURB ROLL COLD: (4A-1..) PPG @ 70/70/70 F RPV @ 552/552/450
3	THERM 3= BOLT-UP,LEAK TEST: (3A-1..) 70-100
4	THERM 4= HYDROTEST: (2A) 100-180-100
5	THERM 5= START-UP:{UP} (3A-2..) 100-486
6	THERM 6= START-UP:{UP} (3B-2) 100-486
7	THERM 7= TURB ROLL: (4A-2..) 70-325
8	THERM 8= TURB ROLL: (4B-1+2) 180-70-325
9	THERM 9= TURB ROLL: (4A-3..) 325-420
10	THERM 10= DAILY PWR REDCTN : (5-1+2..) 420-354
11	THERM 11= DAILY PWR INCR : (5-3..) 354-420
12	THERM 12= WEEKLY PWR REDCTN : (6-1+2) 420-326
13	THERM 13= FW HTR LOSS: (9-1+2) 420-352
14	THERM 14= FW HTR RESTORTN: (9-3) 352-420
15	THERM 15= SCRAMS: (22-1+2..) 420-275
16	THERM 16= PWR REDUCTN: (13) 420-190
17	THERM 17= HOT STDBY: (14A) 190-70
18	THERM 18= HOT STDBY: (14B-1..) 190-435
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21	THERM 21= SHUT-DOWN INITITN:{UP} (15B-2) 156-395
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23	THERM 23= VESSEL FLOODING: (16A-3..) 167-108
24	THERM 24= VESSEL FLOODING: (16A-4..) 108-167
25	THERM 25= VESSEL FLOODING: (16B-1+2) 149-66-152
26	THERM 26= SHUT-DOWN, UNBOLT: (17A..) 167-100
27	THERM 27= LOSS OF FW PUMP:{UP} (20-1..) 420-573-485
28	THERM 28= PIPE RUPTURE: (27-1+2) 420-259-70
29	THERM 29= START-UP:{DN} (3A-3..) 486-70
30	THERM 30= START-UP:{DN} (3B-3) 486-180
31	THERM 31= SHUT-DOWN INITITN:{DN} (15B-3) 395-149
32	THERM 32= LOSS OF FWP:{DN} (20-13+14) 485-70
33	THERM 33= TMODE 2 WITH P=0 PSI
34	THERM 34= TMODE 15 WITH P=1516 PSI
35	THERM 35= TMODE 15 WITH P=1175 PSI

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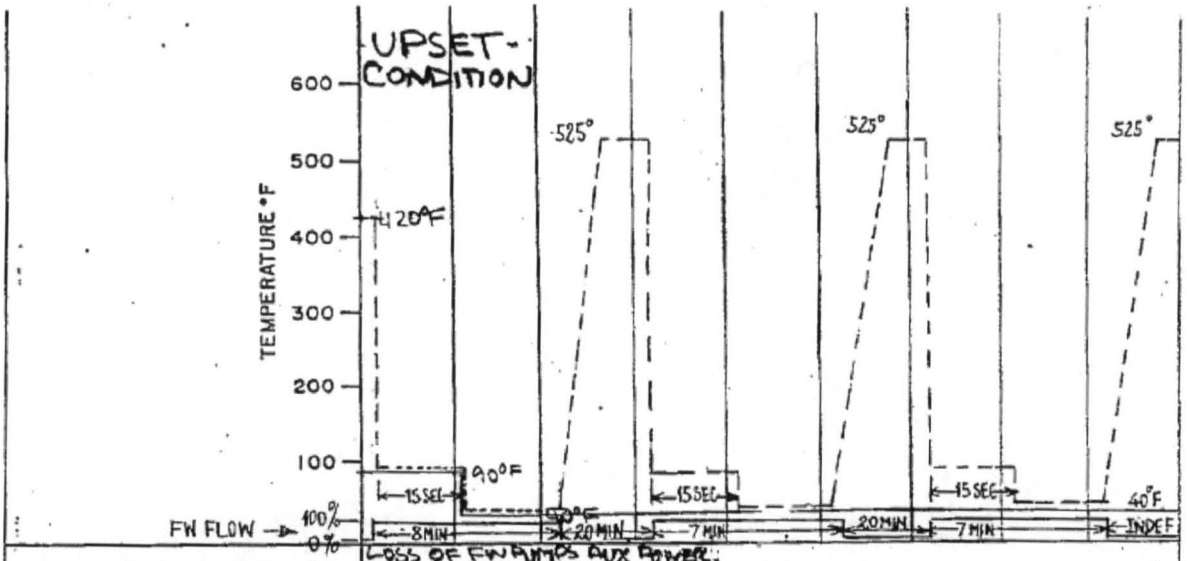
Attachment 2

Thermal Transient Loss of Feed Water Pumps Aux Power Trip without Bypass and Reactor Core Isolation Cooling (RCIC) Injection AX-17D Rev 3K

Thermal Transient Loss of FW Pumps Aux Power Trip without Bypass and RCIC injection.

AX-17D REV. 3K PAGE 10 PICLCN 17-01

PICL AP-17 ATTACHMENT A, PAGE 127a



EVENT DESCRIPTION (FWS)	LOSS OF FW PUMPS AUX POWER, TO TRIP W/O BYPASS AND RCIC INJECTION								
EVENT NUMBER	20-2-1	20-2-2	20-2-3	20-6-1	20-6-2	20-6-3	20-10-1	20-10-2	20-10-3
PRESSURE – PSIG	1100	1100	1100	1100	1100	1100	1100	1100	1100
DURATION OF FINAL TEMP. – HR.	0.004	0.129	0.333	0.004	0.113	0.333	0.004	0.113	INDEF.
NO. OF CYCLES	10	10	10	10	10	10	10	10	10
RATE OF TEMP. CHANGE – °F/HR	STEP	STEP	625	STEP	STEP	625	STEP	STEP	625
TIME – SEC. FOR Δ TEMP	—	—	—	—	—	—	—	—	—
[1] AVERAGE VELOCITY – FT./SEC. (12")	0.95	0.95	0	0.95	0.95	0	0.95	0.95	0
[2] AVERAGE VELOCITY – FT./SEC. (20")	0.80	0.80	0	0.80	0.80	0	0.80	0.80	0
VELOCITY – FT/SEC (14")	0.78	0.78	0	0.78	0.78	0	0.78	0.78	0

NOTE :
FLOW IS RCIC INJ. WATER AND EXISTS ONLY DOWNSTREAM OF LINE RHS-010-65-2 IN FEEDW. LOOP A.

THERMAL TRANSIENTS
FEEDWATER SYSTEM (FWS)

12210-SK-TRI7-A-2

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Attachment 3

Cumulative Usage Factor (CUF) Summaries AX-17D Rev 3, Addendum 3J, and Addendum 3K

Original CUF from Calc Rev. 3

STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				PAGE 226
JO. OR WO. NO. 12210	DIVISION & GROUP NP(C)	CALCULATION NO. AX-17D-4	OPTIONAL TASK CODE	

REF.

9.0 SUMMARY OF RESULTS (CONT'D)

9.5 CUMULATIVE USAGE FACTOR (CUF)

9.5.1 CUF FOR OTHER THAN BREAK EXCLUSION AREAS [Selected Points: ELB & CUF > .02]

Allowable CUF = 1.0 (Ref. 1 NB-3600)

Node Point	Type of Element	Equation 12 (Ref. 1)	Equation 13 (Ref. 1)	CUF	Remarks
4	ELB	30043	24156	.0212	
10	ELB	26592	22726	.0144	
45	ELB	27084	26309	.0185	
70	ELB	4271	21321	.0048	
80	GRUN	1953	20547	.0178	
83	GRUN	13062	19698	.0268	
85	GELB	46162	22499	.5908	
86	GELB	46620	21932	.5378	
87	GELB	43990	22566	.3598	
88	GRUN	18905	21862	.0370	
95	GRUN	11783	22970	.0216	
97	GRUN	18783	21000	.0390	
98	GRUN	46688	21895	.0641	
100	ELB	47850	19386	.0603	
105	ELB	40465	19118	.0342	
106	GRUN	38522	21718	.0336	
109	GRUN	25187	25151	.0173	

Original CUF from Calc Rev. 3 pg. 2

STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				PAGE 227
JO. OR WO. NO. 12210	DIVISION & GROUP NP(C)	CALCULATION NO. AX-17D-4	OPTIONAL TASK CODE	

REF.

9.0 SUMMARY OF RESULTS (CONT'D)

9.5 CUMULATIVE USAGE FACTOR (CUF)

9.5.1 CUF FOR OTHER THAN BREAK EXCLUSION AREAS

Allowable CUF = 1.0 (Ref. 1 NB-3600)

Node Point	Type of Element	Equation 12 (Ref. 1)	Equation 13 (Ref. 1)	CUF	Remarks
115	ELB	44761	22105	.0386	
116	GRUN	45450	24445	.0467	
117	GRUN	22832	22848	.0493	
119	GRUN (AHARD)	46486	32653	.4034	
122	GRUN	4768	22442	.0279	
125	GRUN (AHARD)	3908	32121	.0647	
140	GRUN (AHARD)	4611	21796	.0341	
145	ELB	9984	17497	.0073	
82	TEE	29393	31388	.3479	
286	GRUN	3985	17953	.0318	

NOTE : For Nodes 20,941 & 143 See attachment #7.

Original CUF from Calc Rev. 3 pg. 3

STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				PAGE 228
JO. OR WO. NO. 12210	DIVISION & GROUP NP(C)	CALCULATION NO. AX-17D-4	OPTIONAL TASK CODE	

REF.

9.0 SUMMARY OF RESULTS (CONT'D)

9.5 CUMULATIVE USAGE FACTOR (CUF)

9.5.2 CUF FOR BREAK EXCLUSION AREAS

Allowable CUF = 0.1 (Ref. 1 NB-3600)

Node Point	Type of Element	Equation 12 (Ref. 1)	Equation 13 (Ref. 1)	CUF	Remarks
150	ELB	13888	18042	.0095	
152	GRUN	8474	16886	.0213	
153	GRUN	8255	16503	.0202	
155	GRUN(AHAND)	8703	22108	.0418	
159	GRUN(AHAND)	6859	21232	.0752	
161	GRUN	6611	17146	.0572	
162	GRUN	6037	15432	.0374	
163	GRUN	3956	11738	.0294	
171	GRUN	1481	13385	.0386	
173	GRUN	899	9251	.0291	
202	GRUN	1312	18507	.0761	
205	GRUN(AHAND)	1307	27326	.0911	← See p. 271-272
215	GRUN(AHAND)	1250	24542	.0514	
280	RUN	1583	17525	.0040	

Load Combinations for location 82 Tee (Break Points 60AW, BW, and CW) Addendum 3J

CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 07/17/96 HT5513 PAGE 8

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

LOAD TABLE FOR EQ. 11 AT LOCATION 82 (TEE)

LOAD SET NO	LOAD SET DESCRIPTION	NO. OF CYCLES	P	LEG	X *	Y *	Z *	DT1	DT2	TA	TB
1	1 DNT,DYNTTL*2	45	.000	RUN:	.0	.0	.0	.0	.0	420.0	420.0
				RUN:	.0	.0	.0				
				BRA:	.0	.0	.0				
2	2 DNT,SRVFT*2	45	.000	RUN:	.0	.0	.0	.0	.0	420.0	420.0
				RUN:	.0	.0	.0				
				BRA:	.0	.0	.0				
3	3 DWT,SRV*2	7875	.000	RUN:	.0	.0	.0	.0	.0	420.0	420.0
				RUN:	.0	.0	.0				
				BRA:	.0	.0	.0				
4	4 P,THMD28,DYNTTL	1	.020	RUN:	.0	221.6	18.1	-66.0	-14.0	70.0	104.0
				RUN:	.0	.0	.0				
				BRA:	413.2	432.2	-131.8				
5	5 P,THMD15,DYNTTL	4	.020	RUN:	.0	530.0	50.0	-60.0	-9.0	70.0	88.0
				RUN:	.0	.0	.0				
				BRA:	897.8	1095.5	-306.2				
6	6 P,THMD15,SRVFT	5	.020	RUN:	.0	530.0	50.0	-60.0	-9.0	70.0	88.0
				RUN:	.0	.0	.0				
				BRA:	897.8	1095.5	-306.2				
7	7 P,THMD15,SRV16V	191	.020	RUN:	.0	530.0	50.0	-60.0	-9.0	70.0	88.0
				RUN:	.0	.0	.0				
				BRA:	897.8	1095.5	-306.2				
8	8 P,THMD34,SRV16V	1	1.516	RUN:	.0	530.0	50.0	-60.0	-9.0	70.0	88.0
				RUN:	.0	.0	.0				
				BRA:	897.8	1095.5	-306.2				
9	9 P,THMD35,SRV16V	98	1.175	RUN:	.0	530.0	50.0	-60.0	-9.0	70.0	88.0
				RUN:	.0	.0	.0				
				BRA:	897.8	1095.5	-306.2				
10	10 P,THMD35,SRV1V	92	1.175	RUN:	.0	530.0	50.0	-60.0	-9.0	70.0	88.0
				RUN:	.0	.0	.0				
				BRA:	897.8	1095.5	-306.2				
11	11 P,THMD32,SRV1V	10	.120	RUN:	.0	530.0	50.0	-16.0	-2.0	70.0	95.0
				RUN:	.0	.0	.0				
				BRA:	897.8	1095.5	-306.2				
12	12 P,THMD31,SRV1V	15	.200	RUN:	.0	418.7	39.5	-40.0	-6.0	70.0	90.0
				RUN:	.0	.0	.0				
				BRA:	709.3	865.4	-241.9				
13	13 P,THMD23,SRV1V	126	.050	RUN:	.0	113.6	9.3	-20.0	-3.0	70.0	77.0
				RUN:	.0	.0	.0				
				BRA:	211.9	221.6	-67.6				
14	14 P,THMD29,SRV1V	106	1.100	RUN:	.0	530.0	50.0	.0	.0	70.0	70.0
				RUN:	.0	.0	.0				
				BRA:	897.8	1095.5	-306.2				

TABLE CONTINUED

Load Combinations for location 82 Tee (Break Points 60AW, BW, and CW) Addendum 3J pg. 2

CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 07/17/96 HT5513 PAGE 9

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

LOAD TABLE FOR EQ. 11 AT LOCATION 82 (TEE)

LOAD SET NO	LOAD SET DESCRIPTION	NO. OF CYCLES	P	LEG	X *	Y *	Z *	DT1	DT2	TA	TB
15	15 P,THMD26,SRV1V	249	.000	RUN	.0	122.7	10.0	-1.0	.0	70.0	71.0
				RUN	.0	.0	.0				
				BRA	228.8	239.4	-73.0				
16	16 P,THMD20,SRV1V	15	.700	RUN	.0	445.2	42.0	-49.0	-7.0	70.0	97.0
				RUN	.0	.0	.0				
				BRA	754.2	920.2	-257.2				
17	17 P,THMD04,SRV1V	40	1.250	RUN	.0	74.1	22.3	.0	.0	180.0	180.0
				RUN	.0	.0	.0				
				BRA	29.6	162.6	-19.7				
18	18 P,THMD02,SRV1V	442	1.100	RUN	.0	530.0	50.0	.0	.0	70.0	70.0
				RUN	.0	.0	.0				
				BRA	897.8	1095.5	-306.2				
19	19 P,THMD07	307	1.100	RUN	.0	371.2	114.3	57.0	8.0	97.0	70.0
				RUN	.0	.0	.0				
				BRA	75.1	864.4	-92.2				
20	20 P,THMD22	96	.050	RUN	.0	109.1	8.9	28.0	4.0	80.0	70.0
				RUN	.0	.0	.0				
				BRA	203.4	212.8	-64.9				
21	21 P,THMD08	15	1.100	RUN	.0	371.2	114.3	55.0	8.0	90.0	70.0
				RUN	.0	.0	.0				
				BRA	75.1	864.4	-92.2				
22	22 P,THMD14	70	1.100	RUN	.0	31.6	140.9	27.0	4.0	81.0	70.0
				RUN	.0	.0	.0				
				BRA	-270.3	767.9	-2.7				
23	23 P,THMD11	9999	1.100	RUN	.0	31.6	140.9	2.0	.0	71.0	70.0
				RUN	.0	.0	.0				
				BRA	-270.3	767.9	-2.7				
24	24 P,THMD18	30	1.050	RUN	.0	30.7	136.6	22.0	3.0	91.0	70.0
				RUN	.0	.0	.0				
				BRA	-262.2	744.9	-2.6				
25	25 P,THMD21	15	.700	RUN	.0	28.5	126.8	26.0	4.0	92.0	70.0
				RUN	.0	.0	.0				
				BRA	-243.3	691.1	-2.5				
26	26 P,THMD27	10	1.335	RUN	.0	.0	.1	3.0	1.0	70.0	70.0
				RUN	.0	.0	.0				
				BRA	-312.1	800.4	-4.2				
27	27 P,THMD24	207	.050	RUN	.0	79.7	23.9	20.0	3.0	77.0	70.0
				RUN	.0	.0	.0				
				BRA	31.8	174.8	-21.2				

*NOTE: OBE AND SAM MOMENTS ARE INCLUDED IN RANGE VALUE CALCULATIONS NOT IN THESE SINGLE SET COMBINED MOMENTS.

CUF Summary for location 82 Tee (Break Points 60AW, BW, and CW) Addendum 3J

CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 07/17/96 HT5513 PAGE 13

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

SUMMARY OF CALCULATIONS OF CUMULATIVE USAGE FACTOR AT LOCATION 82 (TEE)

LOAD PAIR		EQ.11	K-E	EQ.14	OCCURENCE		N	SET ELIM-	CYCLES LEFT		ALLOW. CYCLES	FATIQUE USAGE
I	J	S-P		SP*KE/2	N-I	N-J		INATED	N-I	N-J	N-D	FACTOR
5	17	110.618	1.278	70.688	4	40	4	5, 5	0	36	1560	.0026
8	27	114.409	1.117	63.908	1	207	1	8, 8	0	206	2116	.0005
6	17	105.304	1.099	57.861	5	36	5	6, 6	0	31	2872	.0017
7	17	104.913	1.086	56.954	191	31	31	17,17	160	0	3015	.0103
4	19	102.164	1.055	53.886	1	307	1	4, 4	0	306	3575	.0003
7	26	103.322	1.000	51.661	160	10	10	26,26	150	0	4070	.0025
9	27	99.310	1.000	49.655	98	206	98	9, 9	0	108	4589	.0214
7	22	97.888	1.000	48.944	150	70	70	22,22	80	0	4782	.0146
10	27	97.096	1.000	48.548	92	108	92	10,10	0	16	4894	.0188
7	19	96.828	1.000	48.414	80	306	80	7, 7	0	226	4932	.0162
11	19	84.396	1.000	42.198	10	226	10	11,11	0	216	7297	.0014
13	18	83.494	1.000	41.747	126	442	126	13,13	0	316	7524	.0167
18	27	81.278	1.000	40.639	316	16	16	27,27	300	0	8124	.0020
15	18	81.176	1.000	40.588	249	300	249	15,15	0	51	8153	.0305
18	20	80.354	1.000	40.177	51	96	51	18,18	0	45	8393	.0061
14	20	80.354	1.000	40.177	106	45	45	20,20	61	0	8393	.0054
12	19	78.891	1.000	39.445	15	216	15	12,12	0	201	8860	.0017
16	19	60.394	1.000	30.197	15	201	15	16,16	0	186	19614	.0008
14	25	54.973	1.000	27.487	61	15	15	25,25	46	0	28304	.0005
14	24	38.532	1.000	19.266	46	30	30	24,24	16	0	118363	.0003
14	19	34.341	1.000	17.171	16	186	16	14,14	0	170	198889	.0001
1	1	27.725	1.000	13.863	45	45	45	1, 1	0	0	521826	.0001
19	23	21.741	1.000	10.870	170	9999	170	19,19	0	9829	>1.E6	0
21	23	20.312	1.000	10.156	15	9829	15	21,21	0	9814	>1.E6	0
2	2	16.195	1.000	8.097	45	45	45	2, 2	0	0	>1.E6	0
3	3	15.242	1.000	7.621	7875	7875	7875	3, 3	0	0	>1.E6	0

TOTAL USAGE FACTOR= .1543

Load Combinations for location 85 (Break Point 71W) Addendum 3J

CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 07/17/96 HT5513 PAGE 14

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

LOAD TABLE FOR EQ.11 AT LOCATION 85 (CURB)

LOAD SET NO	LOAD SET DESCRIPTION	NO. OF CYCLES	P	X *	Y *	Z *	DT1	DT2	TA	TB
1	1 DNT,DYNTTL*2	45	.000	.0	.0	.0	.0	.0	420.0	420.0
2	2 DNT,SRVFT*2	45	.000	.0	.0	.0	.0	.0	420.0	420.0
3	3 DNT,SRV*2	7875	.000	.0	.0	.0	.0	.0	420.0	420.0
4	4 P,THMD28,DYNTTL	1	.020	413.2	-48.0	-139.8	-57.0	-10.0	70.0	70.0
5	5 P,THMD15,DYNTTL	4	.020	897.8	-118.4	-411.6	-36.0	-5.0	70.0	70.0
6	6 P,THMD15,SRVFT	5	.020	897.8	-118.4	-411.6	-36.0	-5.0	70.0	70.0
7	7 P,THMD15,SRV16V	191	.020	897.8	-118.4	-411.6	-36.0	-5.0	70.0	70.0
8	8 P,THMD34,SRV16V	1	1.516	897.8	-118.4	-411.6	-36.0	-5.0	70.0	70.0
9	9 P,THMD35,SRV16V	98	1.175	897.8	-118.4	-411.6	-36.0	-5.0	70.0	70.0
10	10 P,THMD35,SRV1V	92	1.175	897.8	-118.4	-411.6	-36.0	-5.0	70.0	70.0
11	11 P,THMD32,SRV1V	10	.120	897.8	-118.4	-411.6	-12.0	-2.0	70.0	70.0
12	12 P,THMD31,SRV1V	15	.200	709.3	-93.6	-325.2	-30.0	-4.0	70.0	70.0
13	13 P,THMD23,SRV1V	126	.050	211.9	-24.6	-71.7	-13.0	-2.0	70.0	70.0
14	14 P,THMD29,SRV1V	106	1.100	897.8	-118.4	-411.6	.0	.0	70.0	70.0
15	15 P,THMD26,SRV1V	249	.000	228.8	-26.6	-77.4	-3.0	.0	70.0	70.0
16	16 P,THMD20,SRV1V	15	.700	754.2	-99.5	-345.8	-36.0	-5.0	70.0	70.0
17	17 P,THMD04,SRV1V	40	1.250	29.6	-8.6	-88.8	.0	.0	180.0	180.0
18	18 P,THMD02,SRV1V	442	1.100	897.8	-118.4	-411.6	.0	.0	70.0	70.0
19	19 P,THMD07	307	1.100	75.1	-46.3	-505.0	31.0	4.0	70.0	70.0
20	20 P,THMD22	96	.050	203.4	-23.7	-68.8	19.0	3.0	70.0	70.0
21	21 P,THMD08	15	1.100	75.1	-46.3	-505.0	31.0	4.0	70.0	70.0
22	22 P,THMD14	70	1.100	-270.3	-16.6	-546.5	15.0	2.0	70.0	70.0
23	23 P,THMD11	9999	1.100	-270.3	-16.6	-546.5	1.0	.0	70.0	70.0
24	24 P,THMD18	30	1.050	-262.2	-16.1	-530.1	16.0	2.0	70.0	70.0
25	25 P,THMD21	15	.700	-243.3	-14.9	-491.9	17.0	3.0	70.0	70.0
26	26 P,THMD27	10	1.335	-312.1	-25.8	-597.5	3.0	.0	70.0	70.0
27	27 P,THMD24	207	.050	31.8	-9.3	-95.5	13.0	2.0	70.0	70.0

*NOTE: OBE AND SAM MOMENTS ARE INCLUDED IN RANGE VALUE CALCULATIONS NOT IN THESE SINGLE SET COMBINED MOMENTS.

CUF Summary for location 85 (Break Point 71 W) Addendum 3J

CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 07/17/96 HT5513 PAGE 17

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

SUMMARY OF CALCULATIONS OF CUMULATIVE USAGE FACTOR AT LOCATION 85 (CURB)

LOAD PAIR		EQ.11			EQ.14	OCCURENCE		N	SET	CYCLES LEFT		ALLOW.	FATIQUE
I	J	S-P	K-E		SP*KE/2	N-I	N-J		ELIM-INATED	N-I	N-J	CYCLES N-D	USAGE FACTOR
5	26	122.449	1.138		69.654	4	10	4	5, 5	0	6	1624	.0025
6	26	106.705	1.000		53.353	5	6	5	6, 6	0	1	3686	.0014
7	26	106.629	1.000		53.314	191	1	1	26,26	190	0	3694	.0003
7	22	103.506	1.000		51.753	190	70	70	22,22	120	0	4047	.0173
7	24	102.375	1.000		51.188	120	30	30	24,24	90	0	4186	.0072
7	23	99.903	1.000		49.952	90	9999	90	7, 7	0	9909	4512	.0199
4	23	99.293	1.000		49.646	1	9909	1	4, 4	0	9908	4591	.0002
8	25	98.410	1.000		49.205	1	15	1	8, 8	0	14	4710	.0002
9	25	93.735	1.000		46.868	98	14	14	25,25	84	0	5411	.0026
11	23	91.062	1.000		45.531	10	9908	10	11,11	0	9898	5876	.0017
9	27	89.750	1.000		44.875	84	207	84	9, 9	0	123	6124	.0137
10	27	87.926	1.000		43.963	92	123	92	10,10	0	31	6493	.0142
12	23	84.395	1.000		42.197	15	9898	15	12,12	0	9883	7298	.0021
16	23	81.435	1.000		40.717	15	9883	15	16,16	0	9868	8080	.0019
18	27	77.671	1.000		38.835	442	31	31	27,27	411	0	9280	.0033
18	23	74.465	1.000		37.233	411	9868	411	18,18	0	9457	10520	.0391
14	23	74.465	1.000		37.233	106	9457	106	14,14	0	9351	10520	.0101
13	23	63.650	1.000		31.825	126	9351	126	13,13	0	9225	16778	.0075
15	23	62.078	1.000		31.039	249	9225	249	15,15	0	8976	18073	.0138
20	23	59.884	1.000		29.942	96	8976	96	20,20	0	8880	20154	.0048
1	1	43.433	1.000		21.716	45	45	45	1, 1	0	0	72123	.0006
17	23	40.325	1.000		20.162	40	8880	40	17,17	0	8840	96840	.0004
21	23	28.791	1.000		14.396	15	8840	15	21,21	0	8825	440221	.0000
19	23	28.791	1.000		14.396	307	8825	307	19,19	0	8518	440221	.0007
2	2	15.333	1.000		7.667	45	45	45	2, 2	0	0	>1.E6	0
3	3	14.855	1.000		7.427	7875	7875	7875	3, 3	0	0	>1.E6	0

TOTAL USAGE FACTOR= .1653

Load Combinations for location 87 (Break Point 70W) Addendum 3J

CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 07/17/96 HT5513 PAGE 18

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

LOAD TABLE FOR EQ.11 AT LOCATION 87 (CURE)

LOAD SET NO	LOAD SET DESCRIPTION	NO. OF CYCLES	P	X *	Y *	Z *	DT1	DT2	TA	TB
1	1 DWT,DYNTTL*2	45	.000	.0	.0	.0	.0	.0	420.0	420.0
2	2 DWT,SRVFT*2	45	.000	.0	.0	.0	.0	.0	420.0	420.0
3	3 DWT,SRV*2	7875	.000	.0	.0	.0	.0	.0	420.0	420.0
4	4 P,THMD28,DYNTTL	1	.020	34.3	-317.9	-150.1	-46.0	-8.0	70.0	103.0
5	5 P,THMD15,DYNTTL	4	.020	66.1	-649.7	-359.0	-21.0	-3.0	70.0	80.0
6	6 P,THMD15,SRVFT	5	.020	66.1	-649.7	-359.0	-21.0	-3.0	70.0	80.0
7	7 P,THMD15,SRV16V	191	.020	66.1	-649.7	-359.0	-21.0	-3.0	70.0	80.0
8	8 P,THMD34,SRV16V	1	1.516	66.1	-649.7	-359.0	-21.0	-3.0	70.0	80.0
9	9 P,THMD35,SRV16V	98	1.175	66.1	-649.7	-359.0	-21.0	-3.0	70.0	80.0
10	10 P,THMD35,SRV1V	92	1.175	66.1	-649.7	-359.0	-21.0	-3.0	70.0	80.0
11	11 P,THMD32,SRV1V	10	.120	66.1	-649.7	-359.0	-9.0	-1.0	70.0	94.0
12	12 P,THMD31,SRV1V	15	.200	52.2	-513.3	-283.6	-21.0	-3.0	70.0	91.0
13	13 P,THMD23,SRV1V	126	.050	17.6	-163.0	-77.0	-8.0	-1.0	70.0	75.0
14	14 P,THMD29,SRV1V	106	1.100	66.1	-649.7	-359.0	.0	.0	70.0	70.0
15	15 P,THMD26,SRV1V	249	.000	19.0	-176.0	-83.1	.0	.0	70.0	70.0
16	16 P,THMD20,SRV1V	15	.700	55.5	-545.7	-301.6	-25.0	-4.0	70.0	94.0
17	17 P,THMD04,SRV1V	40	1.250	2.3	-2.0	-24.5	.0	.0	180.0	180.0
18	18 P,THMD02,SRV1V	442	1.100	66.1	-649.7	-359.0	.0	.0	70.0	70.0
19	19 P,THMD07	307	1.100	-1.3	76.7	-119.2	17.0	3.0	81.0	70.0
20	20 P,THMD22	96	.050	16.9	-156.5	-73.9	12.0	2.0	78.0	70.0
21	21 P,THMD08	15	1.100	-1.3	76.7	-119.2	17.0	3.0	81.0	70.0
22	22 P,THMD14	70	1.100	-30.2	383.9	-21.0	8.0	1.0	75.0	70.0
23	23 P,THMD11	9999	1.100	-30.2	383.9	-21.0	1.0	.0	70.0	70.0
24	24 P,THMD18	30	1.050	-29.3	372.4	-20.3	11.0	2.0	90.0	70.0
25	25 P,THMD21	15	.700	-27.2	345.5	-18.9	12.0	2.0	90.0	70.0
26	26 P,THMD27	10	1.335	-47.1	449.7	-38.4	2.0	.0	72.0	70.0
27	27 P,THMD24	207	.050	2.5	-2.1	-26.3	8.0	1.0	75.0	70.0

*NOTE: OBE AND SAM MOMENTS ARE INCLUDED IN RANGE VALUE CALCULATIONS NOT IN THESE SINGLE SET COMBINED MOMENTS.

CUF Summary for location 87 (Break Point 70W) Addendum 3J

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RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

SUMMARY OF CALCULATIONS OF CUMULATIVE USAGE FACTOR AT LOCATION 87 (CURE)

LOAD PAIR: I	J	EQ.11 S-P	K-E	EQ.14 SP*KE/2	OCCURENCE N-I	N-J	N	SET ELIM-INATED:	CYCLES LEFT N-I	N-J	ALLOW. CYCLES N-D	FATIQUE USAGE FACTOR
5	26	116.448	1.032	60.069	4	10	4	5, 5	0	6	2560	.0016
6	24	107.363	1.000	53.681	5	30	5	6, 6	0	25	3617	.0014
7	24	107.052	1.000	53.526	191	25	25	24,24	166	0	3649	.0068
7	26	106.937	1.000	53.469	166	6	6	26,26	160	0	3661	.0016
8	25	103.054	1.000	51.527	1	15	1	8, 8	0	14	4102	.0002
7	22	102.808	1.000	51.404	160	70	70	22,22	90	0	4132	.0169
7	25	101.398	1.000	50.699	90	14	14	25,25	76	0	4312	.0032
7	23	99.464	1.000	49.732	76	9999	76	7, 7	0	9923	4569	.0166
4	23	97.942	1.000	48.971	1	9923	1	4, 4	0	9922	4774	.0002
11	23	97.159	1.000	48.580	10	9922	10	11,11	0	9912	4885	.0020
12	23	88.400	1.000	44.200	15	9912	15	12,12	0	9897	6394	.0023
9	23	87.226	1.000	43.613	98	9897	98	9, 9	0	9799	6643	.0148
16	23	86.759	1.000	43.379	15	9799	15	16,16	0	9784	6745	.0022
10	23	84.983	1.000	42.492	92	9784	92	10,10	0	9692	7155	.0129
18	23	75.581	1.000	37.791	442	9692	442	18,18	0	9250	10064	.0439
14	23	75.581	1.000	37.791	106	9250	106	14,14	0	9144	10064	.0105
13	23	56.410	1.000	28.205	126	9144	126	13,13	0	9018	25549	.0049
15	23	54.364	1.000	27.182	249	9018	249	15,15	0	8769	29585	.0084
20	23	53.661	1.000	26.831	96	8769	96	20,20	0	8673	31153	.0031
23	27	41.342	1.000	20.671	8673	207	207	27,27	8466	0	87718	.0024
1	1	34.312	1.000	17.156	45	45	45	1, 1	0	0	199658	.0002
17	23	30.989	1.000	15.495	40	8466	40	17,17	0	8426	315988	.0001
21	23	28.768	1.000	14.384	15	8426	15	21,21	0	8411	441844	.0000
19	23	28.768	1.000	14.384	307	8411	307	19,19	0	8104	441844	.0007
2	2	14.504	1.000	7.252	45	45	45	2, 2	0	0	>1.E6	0
3	3	13.928	1.000	6.964	7875	7875	7875	3, 3	0	0	>1.E6	0

TOTAL USAGE FACTOR= .1572

Load Combinations for location 82 Tee (Break Points 60AW, BW, and CW) Addendum 3K (M96-0069)

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CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 06/18/97 IP2010 PAGE 8

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

LOAD TABLE FOR EQ. 11 AT LOCATION 82 (TEE)

LOAD SET NO	LOAD SET DESCRIPTION	NO. OF CYCLES	P	LEG	X *	Y *	Z *	DT1	DT2	TA	TB
1	1 DWT,DYNTTL*2	45	.000	RUN:	.0	.0	.0	.0	.0	420.0	420.0
				RUN:	.0	.0	.0				
				BRA:	.0	.0	.0				
2	2 DWT,SRVFT*2	45	.000	RUN:	.0	.0	.0	.0	.0	420.0	420.0
				RUN:	.0	.0	.0				
				BRA:	.0	.0	.0				
3	3 DWT,SRV*2	7545	.000	RUN:	.0	.0	.0	.0	.0	420.0	420.0
				RUN:	.0	.0	.0				
				BRA:	.0	.0	.0				
4	4 P,THMD36,DYNTTL	5	1.050	RUN:	.0	664.7	60.2	-75.0	-12.0	70.0	94.0
				RUN:	.0	.0	.0				
				BRA:	965.3	1081.8	-306.5				
5	5 P,THMD36,SRVFT	5	1.050	RUN:	.0	664.7	60.2	-75.0	-12.0	70.0	94.0
				RUN:	.0	.0	.0				
				BRA:	965.3	1081.8	-306.5				
6	6 P,THMD15,SRV16V	200	.020	RUN:	.0	644.8	58.4	-60.0	-9.0	70.0	88.0
				RUN:	.0	.0	.0				
				BRA:	936.4	1049.3	-297.3				
7	7 P,THMD17,SRV16V	96	1.050	RUN:	.0	644.8	58.4	-60.0	-9.0	70.0	88.0
				RUN:	.0	.0	.0				
				BRA:	936.4	1049.3	-297.3				
8	8 P,THMD29,SRV16V	106	1.100	RUN:	.0	644.8	58.4	.0	.0	70.0	70.0
				RUN:	.0	.0	.0				
				BRA:	936.4	1049.3	-297.3				
9	9 P,THMD32,SRV1V	10	.120	RUN:	.0	644.8	58.4	-16.0	-2.0	70.0	95.0
				RUN:	.0	.0	.0				
				BRA:	936.4	1049.3	-297.3				
10	10 P,THMD33,SRV1V	632	1.100	RUN:	.0	644.8	58.4	.0	.0	190.0	190.0
				RUN:	.0	.0	.0				
				BRA:	936.4	1049.3	-297.3				
11	11 P,THMD34,SRV1V	1	1.516	RUN:	.0	644.8	58.4	-60.0	-9.0	70.0	88.0
				RUN:	.0	.0	.0				
				BRA:	936.4	1049.3	-297.3				
12	12 P,THMD35,SRV1V	190	1.175	RUN:	.0	644.8	58.4	-60.0	-9.0	70.0	88.0
				RUN:	.0	.0	.0				
				BRA:	936.4	1049.3	-297.3				
13	13 P,THMD26,SRV1V	249	.000	RUN:	.0	624.8	56.6	-1.0	.0	70.0	71.0
				RUN:	.0	.0	.0				
				BRA:	907.4	1016.9	-288.1				
14	14 P,THMD29,SRV1V	15	1.050	RUN:	.0	555.2	69.8	3.0	1.0	70.0	70.0
				RUN:	.0	.0	.0				
				BRA:	621.0	963.1	-216.3				

TABLE CONTINUED

Load Combinations for location 82 Tee (Break Points 60AW, BW, and CW) Addendum 3K (M96-0069) pg. 2

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CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 06/18/97 IP2010 PAGE 9

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

LOAD TABLE FOR EQ. 11 AT LOCATION 82 (TEE)

LOAD SET NO	LOAD SET DESCRIPTION	NO. OF CYCLES	P	LEG	X *	Y *	Z *	DT1	DT2	TA	TB
15	15 P,THMD29,SRV1V	15	.700	RUN:	.0	578.4	72.7	-49.0	-7.0	70.0	97.0
				RUN:	.0	.0	.0				
				BRA:	646.8	1003.3	-225.4				
16	16 P,THMD28,SRV1V	1	.020	RUN:	.0	323.9	40.7	-66.0	-14.0	70.0	104.0
				RUN:	.0	.0	.0				
				BRA:	362.2	561.8	-126.2				
17	17 P,THMD31,SRV1V	15	.200	RUN:	.0	537.9	67.7	-46.0	-6.0	70.0	90.0
				RUN:	.0	.0	.0				
				BRA:	601.5	933.0	-209.5				
18	18 P,THMD06	15	1.100	RUN:	.0	113.6	137.1	26.0	4.0	92.0	70.0
				RUN:	.0	.0	.0				
				BRA:	-245.7	777.0	-2.7				
19	19 P,THMD07	307	1.100	RUN:	.0	439.0	109.1	57.0	8.0	97.0	70.0
				RUN:	.0	.0	.0				
				BRA:	110.6	851.7	-90.4				
20	20 P,THMD08	15	1.100	RUN:	.0	439.0	109.1	55.0	8.0	90.0	70.0
				RUN:	.0	.0	.0				
				BRA:	110.6	851.7	-90.4				
21	21 P,THMD11	9999	1.100	RUN:	.0	109.2	131.8	2.0	.0	71.0	70.0
				RUN:	.0	.0	.0				
				BRA:	-236.2	747.1	-2.6				
22	22 P,THMD14	70	1.100	RUN:	.0	109.2	131.8	27.0	4.0	91.0	70.0
				RUN:	.0	.0	.0				
				BRA:	-236.2	747.1	-2.6				
23	23 P,THMD18	30	1.050	RUN:	.0	108.1	130.5	22.0	3.0	91.0	70.0
				RUN:	.0	.0	.0				
				BRA:	-233.9	739.6	-2.6				
24	24 P,THMD21	15	.700	RUN:	.0	102.7	123.9	26.0	4.0	92.0	70.0
				RUN:	.0	.0	.0				
				BRA:	-222.1	702.3	-2.5				
25	25 P,THMD22	96	.050	RUN:	.0	159.8	26.7	28.0	4.0	80.0	70.0
				RUN:	.0	.0	.0				
				BRA:	143.7	281.8	-53.3				
26	26 P,THMD23	126	.050	RUN:	.0	137.2	10.7	-20.0	-3.0	70.0	77.0
				RUN:	.0	.0	.0				
				BRA:	213.8	223.6	-65.0				
27	27 P,THMD24	207	.050	RUN:	.0	65.5	79.1	20.0	3.0	77.0	70.0
				RUN:	.0	.0	.0				
				BRA:	-141.7	448.3	-1.6				
28	28 P,THMD27	10	1.335	RUN:	.0	111.4	134.4	3.0	1.0	70.0	70.0
				RUN:	.0	.0	.0				
				BRA:	-241.0	762.1	-2.7				

TABLE CONTINUED

Load Combinations for location 82 Tee (Break Points 60AW, BW, and CW) Addendum 3K (M96-0069) pg. 3

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RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

LOAD TABLE FOR EQ. 11 AT LOCATION 82 (TEE)

LOAD SET NO	LOAD SET DESCRIPTION	NO. OF CYCLES	P	LEG	X *	Y *	Z *	DT1	DT2	TA	TB
29	29 P,THMD36,SRV16V	20	1.050	RUN:	.0	664.7	60.2	-75.0	-12.0	70.0	94.0
				RUN:	.0	.0	.0				
				BRA:	965.3	1081.8	-306.5				

*NOTE: OBE AND SAM MOMENTS ARE INCLUDED IN RANGE VALUE CALCULATIONS NOT IN THESE SINGLE SET COMBINED MOMENTS.

CUF Summary for location 82 Tee (Break Points 60AW, BW, and CW) Addendum 3K

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CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 06/18/97 IP2010 PAGE 15

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

SUMMARY OF CALCULATIONS OF CUMULATIVE USAGE FACTOR AT LOCATION 82 (TEE)

LOAD PAIR I	J	EQ.11 S-P	K-E	EQ.14 SP*KE/2	OCCURENCE N-I	N-J	N	SET ELIM-INATED	CYCLES LEFT N-I	N-J	ALLOW. CYCLES N-D	FATIQUE USAGE FACTOR
4	27	103.823:	1.257:	65.278:	5:	207:	5:	4, 4	0:	202:	1983	.0025:
11	27	112.568:	1.055:	59.387:	1:	202:	1:	11,11	0:	201:	2651	.0004:
5	27	98.534:	1.079:	53.171:	5:	201:	5:	5, 5	0:	196:	3725	.0013:
27	29	98.504:	1.078:	53.104:	196:	20:	20:	29,29	176:	0:	3739	.0053:
6	18	99.099:	1.052:	52.548:	200:	15:	15:	18,18	185:	0:	3862	.0039:
6	28	103.086:	1.000:	51.543:	185:	10:	10:	28,28	175:	0:	4098	.0024:
6	22	98.205:	1.000:	49.102:	175:	70:	70:	22,22	105:	0:	4738	.0148:
6	23	96.852:	1.013:	49.078:	105:	30:	30:	23,23	75:	0:	4745	.0063:
12	27	97.469:	1.000:	48.734:	190:	176:	176:	27,27	14:	0:	4841	.0364:
6	19	97.222:	1.000:	48.611:	75:	307:	75:	6, 6	0:	232:	4876	.0154:
12	25	96.701:	1.000:	48.351:	14:	96:	14:	12,12	0:	82:	4951	.0028:
8	16	94.192:	1.000:	47.096:	106:	1:	1:	16,16	105:	0:	5336	.0002:
7	25	93.420:	1.000:	46.710:	96:	82:	82:	25,25	14:	0:	5463	.0150:
9	19	84.855:	1.000:	42.428:	10:	232:	10:	9, 9	0:	222:	7186	.0014:
7	26	83.197:	1.000:	41.599:	14:	126:	14:	7, 7	0:	112:	7601	.0018:
13	19	83.005:	1.000:	41.502:	249:	222:	222:	19,19	27:	0:	7652	.0290:
8	26	81.585:	1.000:	40.792:	105:	112:	105:	8, 8	0:	7:	8037	.0131:
13	20	81.576:	1.000:	40.788:	27:	15:	15:	20,20	12:	0:	8040	.0019:
10	26	79.310:	1.000:	39.655:	632:	7:	7:	26,26	625:	0:	8721	.0008:
13	21	78.348:	1.000:	39.174:	12:	9999:	12:	13,13	0:	9987:	9044	.0013:
17	21	72.651:	1.000:	36.325:	15:	9987:	15:	17,17	0:	9972:	11321	.0013:
10	24	55.382:	1.000:	27.691:	625:	15:	15:	24,24	610:	0:	27485	.0005:
15	21	54.490:	1.000:	27.245:	15:	9972:	15:	15,15	0:	9957:	29315	.0005:
10	21	30.154:	1.000:	15.077:	610:	9957:	610:	10,10	0:	9347:	357409	.0017:
1	1	26.979:	1.000:	13.489:	45:	45:	45:	1, 1	0:	0:	590146	.0001:
14	21	26.066:	1.000:	13.033:	15:	9347:	15:	14,14	0:	9332:	689158	.0000:
2	2	17.585:	1.000:	8.792:	45:	45:	45:	2, 2	0:	0:	>1.E6	0
3	3	17.511:	1.000:	8.756:	7545:	7545:	7545:	3, 3	0:	0:	>1.E6	0

TOTAL USAGE FACTOR= .1603

Load Combinations for location 85 (Break Point 71W) Addendum 3K

AX-17D REV. 3K ATTACHMENT "D" PAGE 72 OF 156

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CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 06/18/97 IP2010 PAGE 16

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

LOAD TABLE FOR EQ.11 AT LOCATION 85 (CURB)

LOAD SET NO	LOAD SET DESCRIPTION	NO. OF CYCLES	P	X *	Y *	Z *	DT1	DT2	TA	TB
1	1 DWT,DYNTTL*2	45	.000	.0	.0	.0	.0	.0	420.0	420.0
2	2 DWT,SRVFT*2	45	.000	.0	.0	.0	.0	.0	420.0	420.0
3	3 DWT,SRV*2	7545	.000	.0	.0	.0	.0	.0	420.0	420.0
4	4 P,THMD36,DYNTTL	5	1.050	965.3	-117.3	-374.9	-50.0	-8.0	70.0	96.0
5	5 P,THMD36,SRVFT	5	1.050	965.3	-117.3	-374.9	-50.0	-8.0	70.0	96.0
6	6 P,THMD15,SRV16V	200	.020	936.4	-113.8	-363.6	-36.0	-5.0	70.0	70.0
7	7 P,THMD17,SRV16V	96	1.050	936.4	-113.8	-363.6	-36.0	-5.0	70.0	70.0
8	8 P,THMD29,SRV16V	106	1.100	936.4	-113.8	-363.6	.0	.0	70.0	70.0
9	9 P,THMD32,SRV1V	10	.120	936.4	-113.8	-363.6	-12.0	-2.0	70.0	70.0
10	10 P,THMD33,SRV1V	632	1.100	936.4	-113.8	-363.6	.0	.0	190.0	190.0
11	11 P,THMD34,SRV1V	1	1.516	936.4	-113.8	-363.6	-36.0	-5.0	70.0	70.0
12	12 P,THMD35,SRV1V	190	1.175	936.4	-113.8	-363.6	-36.0	-5.0	70.0	70.0
13	13 P,THMD26,SRV1V	249	.000	907.4	-110.3	-352.4	-3.0	.0	70.0	70.0
14	14 P,THMD19,SRV1V	15	1.050	621.0	-85.2	-401.7	-22.0	-4.0	70.0	70.0
15	15 P,THMD20,SRV1V	15	.700	646.8	-88.8	-418.4	-36.0	-5.0	70.0	70.0
16	16 P,THMD28,SRV1V	1	.020	362.2	-49.7	-234.3	-57.0	-10.0	70.0	70.0
17	17 P,THMD31,SRV1V	15	.200	601.5	-82.5	-389.1	-30.0	-4.0	70.0	70.0
18	18 P,THMD06	15	1.100	-245.7	-13.4	-540.6	.3	.1	70.0	70.0
19	19 P,THMD07	307	1.100	110.6	-42.8	-482.1	31.0	4.0	70.0	70.0
20	20 P,THMD08	15	1.100	110.6	-42.8	-482.1	31.0	4.0	70.0	70.0
21	21 P,THMD11	9999	1.100	-236.2	-12.9	-519.8	1.0	.0	70.0	70.0
22	22 P,THMD14	70	1.100	-236.2	-12.9	-519.8	15.0	2.0	70.0	70.0
23	23 P,THMD18	30	1.050	-233.9	-12.8	-514.6	16.0	2.0	70.0	70.0
24	24 P,THMD21	15	.700	-222.1	-12.1	-488.6	17.0	3.0	70.0	70.0
25	25 P,THMD22	96	.050	143.7	-20.8	-126.4	19.0	3.0	70.0	70.0
26	26 P,THMD23	126	.050	213.8	-23.7	-71.4	-13.0	-2.0	70.0	70.0
27	27 P,THMD24	207	.050	-141.7	-7.7	-311.9	13.0	2.0	70.0	70.0
28	28 P,THMD27	10	1.335	-241.0	-13.1	-530.2	3.0	.0	70.0	70.0
29	29 P,THMD36,SRV16V	20	1.050	965.3	-117.3	-374.9	-50.0	-8.0	70.0	96.0

*NOTE: OBE AND SAM MOMENTS ARE INCLUDED IN RANGE VALUE CALCULATIONS NOT IN THESE SINGLE SET COMBINED MOMENTS.

CUF Summary for location 85 (Break Point 71W) Addendum 3K

AX-17D REV. 3K ATTACHMENT "D" PAGE 75 OF 156

1

CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 06/18/97 IP2010 PAGE 19

RUN NO.2 FOR MODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

SUMMARY OF CALCULATIONS OF CUMULATIVE USAGE FACTOR AT LOCATION 85 (CURB)

LOAD PAIR: I	J	EQ.11 S-P	K-E	EQ.14 SP*KE/2	OCCURENCE N-I	N-J	N	SET ELIM-INATED:	CYCLES LEFT N-I	N-J	ALLOW. CYCLES N-D	FATIQUE USAGE FACTOR
4	27	123.386:	1.109:	68.435:	5:	207:	5:	4, 4	0:	202:	1715	.0029:
5	27	109.099:	1.000:	54.550:	5:	202:	5:	5, 5	0:	197:	3443	.0015:
27	29	109.080:	1.000:	54.540:	197:	20:	20:	29,29	177:	0:	3445	.0058:
6	28	104.127:	1.000:	52.064:	200:	10:	10:	28,28	190:	0:	3974	.0025:
6	22	103.648:	1.000:	51.824:	190:	70:	70:	22,22	120:	0:	4030	.0174:
6	23	102.975:	1.000:	51.487:	120:	30:	30:	23,23	90:	0:	4112	.0073:
6	18	100.761:	1.000:	50.380:	90:	15:	15:	18,18	75:	0:	4396	.0034:
11	27	100.742:	1.000:	50.371:	1:	177:	1:	11,11	0:	176:	4398	.0002:
6	21	100.045:	1.000:	50.023:	75:	9999:	75:	6, 6	0:	9924:	4493	.0167:
12	27	96.067:	1.000:	48.034:	190:	176:	176:	27,27	14:	0:	5045	.0349:
12	24	93.741:	1.000:	46.870:	14:	15:	14:	12,12	0:	1:	5410	.0026:
7	24	93.105:	1.000:	46.552:	96:	1:	1:	24,24	95:	0:	5516	.0002:
9	21	91.493:	1.000:	45.747:	10:	9924:	10:	9, 9	0:	9914:	5797	.0017:
13	21	89.054:	1.000:	44.527:	249:	9914:	249:	13,13	0:	9665:	6261	.0398:
7	21	85.925:	1.000:	42.963:	95:	9665:	95:	7, 7	0:	9570:	6933	.0137:
8	21	76.012:	1.000:	38.006:	106:	9570:	106:	8, 8	0:	9464:	9896	.0107:
10	21	74.897:	1.000:	37.448:	632:	9464:	632:	10,10	0:	8832:	10341	.0611:
16	21	74.731:	1.000:	37.366:	1:	8832:	1:	16,16	0:	8831:	10409	.0001:
17	21	74.692:	1.000:	37.346:	15:	8831:	15:	17,17	0:	8816:	10425	.0014:
15	21	71.702:	1.000:	35.851:	15:	8816:	15:	15,15	0:	8801:	11772	.0013:
14	25	62.868:	1.000:	31.434:	15:	96:	15:	14,14	0:	81:	17406	.0009:
21	26	56.475:	1.000:	28.237:	8801:	126:	126:	26,26	8675:	0:	25434	.0050:
21	25	52.266:	1.000:	26.133:	8675:	81:	81:	25,25	8594:	0:	34588	.0023:
1	1	40.008:	1.000:	20.004:	45:	45:	45:	1, 1	0:	0:	99915	.0005:
20	21	28.853:	1.000:	14.426:	15:	8594:	15:	20,20	0:	8579:	436018	.0000:
19	21	28.853:	1.000:	14.426:	307:	8579:	307:	19,19	0:	8272:	436018	.0007:
2	2	16.381:	1.000:	8.191:	45:	45:	45:	2, 2	0:	0:	>1.E6	0
3	3	16.338:	1.000:	8.169:	7545:	7545:	7545:	3, 3	0:	0:	>1.E6	0

TOTAL USAGE FACTOR= .2345

Load Combinations for location 87 (Break Point 70W) Addendum 3K

AX-17D REV. 3K ATTACHMENT "D" PAGE 76 OF 156

1

CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 06/18/97 IP2010 PAGE 20

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

LOAD TABLE FOR EQ.11 AT LOCATION 87 (CURE)

LOAD SET NO	LOAD SET DESCRIPTION	NO. OF CYCLES	P	X *	Y *	Z *	DT1	DT2	TA	TB
1	1 DWT,DYNTTL*2	45	.000	.0	.0	.0	.0	.0	420.0	420.0
2	2 DWT,SRVFT*2	45	.000	.0	.0	.0	.0	.0	420.0	420.0
3	3 DWT,SRV*2	7545	.000	.0	.0	.0	.0	.0	420.0	420.0
4	4 P,THMD36,DYNTTL	5	1.050	68.5	-736.1	-366.3	-50.0	-8.0	70.0	96.0
5	5 P,THMD36,SRVFT	5	1.050	68.5	-736.1	-366.3	-50.0	-8.0	70.0	96.0
6	6 P,THMD15,SRV16V	200	.020	66.5	-714.0	-355.3	-21.0	-3.0	70.0	80.0
7	7 P,THMD17,SRV16V	96	1.050	66.5	-714.0	-355.3	-21.0	-3.0	70.0	80.0
8	8 P,THMD29,SRV16V	106	1.100	66.5	-714.0	-355.3	.0	.0	70.0	70.0
9	9 P,THMD32,SRV1V	10	.120	66.5	-714.0	-355.3	-9.0	-1.0	70.0	94.0
10	10 P,THMD33,SRV1V	632	1.100	66.5	-714.0	-355.3	.0	.0	190.0	190.0
11	11 P,THMD34,SRV1V	1	1.516	66.5	-714.0	-355.3	-21.0	-3.0	70.0	80.0
12	12 P,THMD35,SRV1V	190	1.175	66.5	-714.0	-355.3	-21.0	-3.0	70.0	80.0
13	13 P,THMD26,SRV1V	249	.000	64.4	-691.9	-344.3	.0	.0	70.0	70.0
14	14 P,THMD19,SRV1V	15	1.050	43.7	-431.6	-264.2	-22.0	-4.0	70.0	91.0
15	15 P,THMD20,SRV1V	15	.700	45.5	-449.6	-275.2	-25.0	-4.0	70.0	94.0
16	16 P,THMD28,SRV1V	1	.020	25.5	-251.8	-154.1	-46.0	-8.0	70.0	103.0
17	17 P,THMD31,SRV1V	15	.200	42.3	-418.1	-256.0	-21.0	-3.0	70.0	91.0
18	18 P,THMD06	15	1.100	-23.9	356.1	-23.4	.3	.1	71.0	70.0
19	19 P,THMD07	307	1.100	4.0	31.6	-121.9	17.0	3.0	81.0	70.0
20	20 P,THMD08	15	1.100	4.0	31.6	-121.9	17.0	3.0	81.0	70.0
21	21 P,THMD11	9999	1.100	-23.0	342.4	-22.5	1.0	.0	70.0	70.0
22	22 P,THMD14	70	1.100	-23.0	342.4	-22.5	8.0	1.0	75.0	70.0
23	23 P,THMD18	30	1.050	-22.7	339.0	-22.3	11.0	2.0	90.0	70.0
24	24 P,THMD21	15	.700	-21.6	321.9	-21.2	12.0	2.0	90.0	70.0
25	25 P,THMD22	96	.050	11.1	-92.9	-65.2	12.0	2.0	78.0	70.0
26	26 P,THMD23	126	.050	15.8	-167.7	-77.3	-8.0	-1.0	70.0	75.0
27	27 P,THMD24	207	.050	-13.8	205.4	-13.5	8.0	1.0	75.0	70.0
28	28 P,THMD27	10	1.335	-23.4	349.2	-23.0	2.0	.0	72.0	70.0
29	29 P,THMD36,SRV16V	20	1.050	68.5	-736.1	-366.3	-50.0	-8.0	70.0	96.0

*NOTE: OBE AND SAM MOMENTS ARE INCLUDED IN RANGE VALUE CALCULATIONS NOT IN THESE SINGLE SET COMBINED MOMENTS.

CUF Summary for location 87 (Break Point 70W) Addendum 3K

AX-17D REV. 3K ATTACHMENT "D" PAGE 79 OF 156

1

CLASS 1 CODE COMPLIANCE ANALYSYS ME101/N4 RB/562367 06/18/97 IP2010 PAGE 23

RUN NO.2 FOR NODE POINTS 82, 85, 87, 100, 105, 110 & 125 OF AX-17D

SUMMARY OF CALCULATIONS OF CUMULATIVE USAGE FACTOR AT LOCATION 87 (CURE)

LOAD PAIR: I	J	EQ.11 S-P	K-E	EQ.14 SP*KE/2	OCCURENCE N-I	N-J	N	SET ELIM-INATED:	CYCLES LEFT N-I	N-J	ALLOW. CYCLES N-D	FATIQUE USAGE FACTOR
4	24	122.380:	1.021:	62.492:	5:	15:	5:	4, 4 :	0:	10:	2267 :	.0022:
5	24	113.304:	1.000:	56.652:	5:	10:	5:	5, 5 :	0:	5:	3065 :	.0016:
24	29	113.263:	1.000:	56.632:	5:	20:	5:	24,24 :	0:	15:	3068 :	.0016:
23	29	109.811:	1.000:	54.905:	30:	15:	15:	29,29 :	15:	0:	3375 :	.0044:
6	23	108.136:	1.000:	54.068:	200:	15:	15:	23,23 :	185:	0:	3538 :	.0042:
6	28	104.173:	1.000:	52.087:	185:	10:	10:	28,28 :	175:	0:	3968 :	.0025:
6	22	103.405:	1.000:	51.702:	175:	70:	70:	22,22 :	105:	0:	4059 :	.0172:
6	18	101.068:	1.000:	50.534:	105:	15:	15:	18,18 :	90:	0:	4355 :	.0034:
6	21	100.061:	1.000:	50.031:	90:	9999:	90:	6, 6 :	0:	9909:	4491 :	.0200:
9	21	98.186:	1.000:	49.093:	10:	9909:	10:	9, 9 :	0:	9899:	4741 :	.0021:
11	27	98.099:	1.000:	49.049:	1:	207:	1:	11,11 :	0:	206:	4753 :	.0002:
7	27	94.254:	1.000:	47.127:	96:	206:	96:	7, 7 :	0:	110:	5326 :	.0180:
12	27	93.947:	1.000:	46.973:	190:	110:	110:	27,27 :	80:	0:	5376 :	.0205:
13	21	88.408:	1.000:	44.204:	249:	9899:	249:	13,13 :	0:	9650:	6393 :	.0389:
12	21	86.010:	1.000:	43.005:	80:	9650:	80:	12,12 :	0:	9570:	6914 :	.0116:
16	21	79.449:	1.000:	39.725:	1:	9570:	1:	16,16 :	0:	9569:	8676 :	.0001:
17	21	79.085:	1.000:	39.542:	15:	9569:	15:	17,17 :	0:	9554:	8796 :	.0017:
8	21	78.421:	1.000:	39.211:	106:	9554:	106:	8, 8 :	0:	9448:	9019 :	.0118:
15	21	77.415:	1.000:	38.707:	15:	9448:	15:	15,15 :	0:	9433:	9372 :	.0016:
10	21	76.608:	1.000:	38.304:	632:	9433:	632:	10,10 :	0:	8801:	9669 :	.0654:
14	21	70.221:	1.000:	35.111:	15:	8801:	15:	14,14 :	0:	8786:	12526 :	.0012:
21	26	50.055:	1.000:	25.028:	8786:	126:	126:	26,26 :	8660:	0:	41060 :	.0031:
21	25	46.743:	1.000:	23.372:	8660:	96:	96:	25,25 :	8564:	0:	53880 :	.0018:
1	1	31.950:	1.000:	15.975:	45:	45:	45:	1, 1 :	0:	0:	275367 :	.0002:
20	21	28.997:	1.000:	14.498:	15:	8564:	15:	20,20 :	0:	8549:	426330 :	.0000:
19	21	28.997:	1.000:	14.498:	307:	8549:	307:	19,19 :	0:	8242:	426330 :	.0007:
2	2	12.656:	1.000:	6.328:	45:	45:	45:	2, 2 :	0:	0:	>1.E6 :	0 :
3	3	12.572:	1.000:	6.286:	7545:	7545:	7545:	3, 3 :	0:	0:	>1.E6 :	0 :

TOTAL USAGE FACTOR= .2362

RBG-47895

Attachment 4

Addendum 3J and 3K Cover Pages:

Addendum 3J Cover Page:

ENTERGY

CALCULATION TITLE PAGE
ENGINEERING DEPARTMENT
ENTERGY OPERATIONS INCORP.

1. CALCULATION NUMBER	REV OR ADD:
AX-17D	3J
JBI NO. G13.18.10.2	
PAGE 1 OF 365	

2. CALCULATION TITLE:
ME101 class 1 pipe stress analysis using Code Case N-411 damping for selected components

3. SUPERSEDES: N/A

SUPPLEMENTS: AX-17D REV. 3

4. OBJECTIVE OF CALCULATION:

The objective of this addendum is to reduce the dynamic loads for OBE and SRV 1V, 2V and 16V cases by using the Code Case N-411 damping in stress analysis, then to perform the class 1 pipe stress analysis for the critical piping components such as elbow, reducer, tee, taper transition, and RPV nozzle.

5. CALCULATION METHOD / ASSUMPTIONS:

See page 3

6. SOURCES OF DATA/EQUATIONS (REFERENCES):

(1) Calculation AX-17D Rev. 3 (2) ME101 Computer Program, Version N4
(3) G13.18.1.5*08 Rev. 1 Peak-spread ARS for Seismic Events Including Curves with N-411-1 Damping
(4) Code Case N-411-1 Alternative Damping Values for Response Spectra Analysis of Class 1, 2, and 3 Piping Section III, Division 1, dated Feb. 20, 1986

7. CONCLUSIONS:

1. The class 1 results from ME101C1 analysis are consistent with those from NUPIPE analysis. The Class 1 stresses as well as CUF went down slightly as expected. There is no need to revise the support loads, equipment loads, and valve accelerations in this addendum.
2. Stress report for feedwater system SR-504 needs not to be revised per the above reasons.

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8. REASON FOR REVISION (IF APPLICABLE): SDC

This calculation is used as a basis for the class 1 qualification of some fittings affected by flow accelerated corrosion (FAC) to determine the remaining life.

9. RELATED DOCUMENTS:
N/A

10. Q-CLASS
_X_ 1 - NUCLEAR SAFETY RELATED
___ 2
___ 3 QAPA ? Y ___ N _X_

11.	12.	13.
Y. Sun 0667 9/5/96	Hung K. Lee KCN 0996 9/10/96	Lothar Kuhn KCN 1105 9/11/96
PREPARER KCN DATE	CHECKER/REVIEWER DATE	INDEPENDENT REVIEWER DATE

14. DATA REQUIRING CONFIRMATION:

DATA CONFIRMED BY: DATE

15. APPROVED:
Rajni R Patel FOR RG (0261) 10/31/96
SIGNATURE KCN DATE

Addendum 3K Cover Page:

ENTERGY

CALCULATION COVER PAGE
ENGINEERING DEPARTMENT
RIVER BEND STATION

CALC. NO. - REV. ADDENDUM	AX-17D, Revision 3K
ATTACHMENT NO.:	
JBI NO.: G13.10.2.2	17,148
PAGE 1 OF 2040	539

TITLE:
Pipe Stress Analysis for FWS-Piping in Reactor and Auxiliary Bldgs (West Loop)

SUPERSEDES: Rev. 3B, E, F, G, H, J

SUPPLEMENTS: AX-17D, Rev. 3

CALCULATION STATUS: □ APPROVED ■ PENDING □ CANCELED

SYSTEM NO.: 107 | **MARK NO.:**

CLASSIFICATION: ■ SAFETY RELATED | **NON-SAFETY RELATED:** □ QAPA □ NON-QAPA

PURPOSE / SCOPE / OBJECTIVE:

MR 96-0069 reroutes the RCIC Injection Line from its original connection to the RPV Head to the FWS system through a short portion of the RHS piping. The objective of Revision 3K is to evaluate the FWS piping for the new function of RCIC injection in addition to the existing FWS function. A new check valve is to be added in the Auxiliary Building (see worksketch). The piping is to be evaluated for thermal and fluid transient events associated with RCIC Injection into feedwater loop A. The information contained in Revisions 3B, 3E, 3F, 3G, 3H, and 3J has been incorporated into the input file. See also comment cards in the input listings.

Class 1 piping analysis covers only the critical components such as Reducer, Tee, Taper Transition (Valve), Elbow, and RPV nozzle junction.

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JUL 0 1 1998
SDC

CONCLUSION:

The analysis demonstrates the acceptability of the piping for MR 96-0069.

SOFTWARE USED FOR CALCULATION: ■ YES □ NO **SDDF #:** 6229.400-100-001A
Manufacturer: Bechtel **Name** ME101 **Version/Release No.** N4

CONFIRMATIONS REQUIRED: □ YES ■ NO | **CONFIRMATION COMPLETE:** □ YES □ NO ■ N/A

KEYWORDS:

MR 96-0069, PIPE STRESS, FWS, ICS, N411

REVIEW & APPROVAL

Y-S Sun (0667) 6-19-97	Ren Lu (1956) 6-19-97	Rajesh Gupta 11-20-97
(Signature/Date)	(Signature/Date)	(Signature/Date)
Preparer	□ Reviewer (Non-Safety)	Supervisor
(Printed Name, KCN, or SSN)	□ Design Verification Reviewer	(Printed Name, KCN, or SSN)
	(Printed Name, KCN, or SSN)	RAJESH GUPTA

RBG-47895

Attachment 5

Addendum 3J Stress/ Cumulative Usage Factor (CUF) comparison with Addendum 3B

Addendum 3J Stress/CUF comparison with Addendum 3B

ENTERGY

CALCULATION WORK SHEET

ENTERGY OPERATIONS INCORP.

EOI CALCULATION NUMBER:
AX-17D Rev. 3J

JBI No.
PAGE 24 of

SUMMARY OF RESULTS (continued)

CLASS 1 STRESS COMPARISON Rev. 3J vs Rev. 3B

N.P.	EQ. 9 (psi)		EQ. 10 (psi)			EQ. 12 (psi)			EQ. 13 (psi)		CUF		
	3J	3B	3J	3J	3B	3J	3J	3B	3J	3B	3J	3J	3B
				inc3.3%			inc3.3%					inc3.3%	
2	11101	9577	39074	40363	37894						0.0142	0.0147	0.0189
4	18361	16971	52562	54297	49781						0.0116	0.0120	0.0213
6	17417	16472	50785	52461	48087						0.0099	0.0102	0.0182
10	17158	15898	47934	49516	46011						0.0081	0.0084	0.0145
12	16113	15851	43694	45136	44357						0.0048	0.0050	0.0096
35	19991	20729	47543	49112	48198						0.0060	0.0062	0.0138
45	18212	18586	54237	56027	53924						0.0079	0.0082	0.0186
58	15032	15849	32984	34072	35051						0.0096	0.0099	0.0178
59	15372	15693	37159	38385	35451						0.0161	0.0166	0.0175
65	14770	19879	37991	39245	44172						0.0031	0.0032	0.0058
70	14077	19203	37154	38380	42829						0.0028	0.0029	0.0050
82	18183	20548	67590	69820	70498	26034	26893	29393	29533	31388	0.1543	0.1594	0.6490
85	15493	16056	72596	74992	77836	41302	42665	46162	21027	24027	0.1653	0.1708	0.6512
87	14651	15084	68996	71273	71289	41599	42972	43990	20622	23946	0.1572	0.1624	0.3722
100	12723	13656	67082	69296	67257						0.0348	0.0359	0.0604
105	12684	13455	61324	63348	59836						0.0186	0.0192	0.0343
110	14670	16324	51770	53478	46983						0.0106	0.0109	0.0161
115	13909	15696	63300	65389	61591						0.0327	0.0338	0.0386
119	13073	13934	71583	73945	74505	40462	41797	46486	27701	32653	0.2802	0.2894	0.4038
125	10800	11483	56865	58742	60116						0.0461	0.0476	0.0657
140	10283	10191	45867	47381	46369						0.0318	0.0328	0.0346
145	14325	14040	45513	47015	45871						0.0064	0.0066	0.0074
150	14408	14449	46576	48113	47032						0.0089	0.0092	0.0097
155	10332	10479	46919	48467	47823						0.0390	0.0403	0.0424
159	9522	9670	46636	48175	54351						0.0381	0.0394	0.0763
205	12239	12968	56705	58576	67775						0.0424	0.0438	0.0940
215	10239	10416	52147	53868	55567						0.0326	0.0337	0.0522

Note:

The thermal stresses from ME101 run would be expected to be nearly identical to those from NUPIPE. However, in the ME101 model the nozzle elements (nodes1-2 & 119-120) were not included. As a result, the piping is slightly stiffer. This explains why EQ. 9 & 10 stresses are different from those of the NUPIPE analysis. The purpose of this addendum is to provide a reference for wall thinning analysis (FAC), and critical wall thickness calculation.