UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Docket Nos.: 50-361, 50-362, 50-382,50-528, 50-529,
and 50-530

APPLICANTS: Combustion Engineering (CE)

FACILITY: CE Plants

SUBJECT: SUMMARY OF MEETING TO DISCUSS LOCA ANALYSIS FOR CE PLANTS

By letter dated July 2, 1985, CE informed the NRC that the large-break LOCA analysis for CE plants contained a non-conservative assumption. Specificically, the axial power distribution and peaking factor assumed in the analysis was not the worst case. CE subsequently informed the staff that CE plants on their first cycle (Palo Verde 1, San Onofre 3, and Waterford 3) were close enough to the 2200°F peak clad temperature limit that correction of the non-comservative assumption in the LOCA analysis of record might result in exceedance of the 2200°F limit.

A meeting was held on July 10, 1985, in Bethesda, Maryland to discuss this issue. Attendees are given in Enclosure 1. At the meeting, CE stated that changing the axial power shape and peaking factor to appropriately conservative values resulted in a 34°F increase in peak clad temperature for CESSAR plants. CE also stated that only plants in their first operating cycle (prior to first refueling) were within 34°F of the 2200°F limit of 10 CFR 50.46. The view graphs presented by CE at the meeting are given in Enclosure 2.

CE also presented data indicating that other proposed revisions to the CE LOCA evaluation model would result in peak clad temperatures below 2200°F for all CE plants. These revisions have not been approved by the staff at this time for most CE plants.

At the meeting, the NRC staff indicated that all owners of CE plants, especially licensees of the three plants now on their first cycle should evaluate their compliance with the ECCS regulations, and should document the current status of their plants relative to the requirements 10 CFR 50. For plants where the addition of 34°F would put the peak clad temperature over 2200°F, a justification for continued operation should be provided, along with a schedule for

submittal of a revised LOCA analysis documenting compliance with 50.46 and Appendix K.

Harry Rood

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Enclosures:
As stated

cc: See next page

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Enclosure 1 - Attendees

MEETING TO DISCUSS CE ECCS ANALYSIS

July 10, 1985

Name	Organization
H. Rood	NRC - DL
G. Knighton	NRC - DL
C. Molnar	CE - Licensing
M. Barnoski	CE
D. Statile	ANPP - Nuc. Fuel
K. L. McCandless	ANPP - Licensing
J. B. Holman	LP&L
R. M. McIntyre	NRC - VPB
C. B. Brinkman	CE - Bethesda
J. H. Wilson	LB#3 - NRR
K. W. Cook	LP&L - Nuclear Supp. & Lic.
R. J. Murillo	LP&L Licensing
K. R. Iyengar	LP&L - Nuclear Support
Ronald J. Stevens	FPL - Nuclear Licensing
Joel Handschuh	FPL
Donald E. Sells	DL, ORB#3, St Lucie
Ed. Finsternacha	PLG representing OPPD
Harry Mulliken	CE
Lee Anderson	SCE
Peter Smith	SCE
Ian Richard	C-E
R. C. Jones	NRC - RSB
Norm Lauben	NRC - RSB
Brian Sheron	NRC - RSB
Jeb Kingseed	Combustion Engineering
Chuck Kling	Combustion Engineering
Manny Licitra	NRC, DL/LB3
Joe Mihalcik	BG&E
D. H. Jaffe	ORB3, DL

Enclosure 2

COMBUSTION ENGINEERING

LARGE BREAK LOCA EVALUATION MODEL

AXIAL POWER DISTRIBUTION AND PEAKING FACTOR

SENSITIVITY

JULY 10, 1985

INFLUENCE OF AXIAL SHAPE ON C-E LOCA EM

* BACKGROUND
* REVISED C-E EVALUATION MODEL
* INFLUENCE OF AXIAL SHAPE ON SBLOCA
* INFLUENCE OF AXIAL SHAPE ON LBLOCA
* CURRENT RESULTS
* STATUS OF INDIVIDUAL C-E PLANTS
* CONCLUSIONS
* RECOMMENDATIONS

BACKGROUND

* C-E POSITION ON AXIAL SHAPES FOR LBLOCA STATED IN CENPD-132 (1974)
  - : CLAD TEMPERATURE AT CONTACT SLIGHTLY HIGHER FOR TOP PEAK SHAPE
  - : TOP PEAKED SHAPES ARE HARDER TO COOL DURING REFLOOD THAN CENTER PEAKED SHAPES (BASED ON HIGHER INTEGRATED ENERGY TO THE PEAK)

* FLECHT DATA CONFIRMS INTEGRATED ENERGY HYPOTHESIS IS CONSERVATIVE FOR TOP PEAKS

* NRC REQUESTED ADDITIONAL DATA ON 2/85

* C-E STATED THAT APPLICABLE AXIAL SHAPE STUDIES WOULD BE PRESENTED IN TOPICALS ON REVISED EM

REVISED C-E EM

* CEFLASH NUMERICS
* CEFLASH LEAK FLOW MODEL
* FLOW BLOCKAGE MODEL (NUREG-630)**
* CONSIDERATION OF NO SINGLE FAILURE ADDED
* LPSI INJECTION
* AXIAL SHAPE SENSITIVITY

** SUBMITTED 12/81, USED ON WATERFORD DOCKET

INFLUENCE OF AXIAL SHAPE ON SBLOCA TRANSIENT

* TOP PEAKS MORE ADVERSE BECAUSE ONLY TOP OF CORE UNCOVERS

* HIGHER PEAK/AVERAGE AXIALS AND LOWER RADIALS (FOR SAME PEAK KW/FT) MORE ADVERSE BECAUSE LOWER INTEGRATED ENERGY TO PEAK PRODUCES LESS STEAM COOLING

* CONFIRMED BY SBLOCA AXIAL SHAPE STUDIES

* THEREFORE CURRENT EM APPROACH IS CONSERVATIVE

INFLUENCE OF AXIAL SHAPE ON LBLOCA TRANSIENT

* BLOWDOWN
  - : LARGER CORE FLOWS PRODUCE SMALL AXIAL TEMPERATURE DIFFERENCES AT EOB
  - : SMALLER REVERSE CORE FLOWS PRODUCE HIGHER MIDPLANE TEMPERATURES AT EOB

* REFILL - ESSENTIALLY ADIABATIC HEATUP RESULTS IN SAME TEMPERATURE RISE FOR ALL PEAKS AT SAME KW/FT

* REFLOOD
  - : FLECHT DATA ABOVE 1 IN/SEC, WITH INTEGRATED ENERGY CORRECTION, PRODUCES SLIGHTLY MORE ADVERSE RESULTS FOR TOP PEAKS
  - : STEAM COOLING (BELOW 1 IN/SEC) PRODUCES BETTER RESULTS FOR FLATTER AXIAL PEAKS

CURRENT LBLOCA RESULTS

(PRELIMINARY)

* APPLICATION OF REVISED C-E EM TO W LBLOCA

DPCT	AXIAL SHAPE
---	1.52 CENTER
-43	1.52 TOP
-144	1.68 TOP

* APPLICATION OF CURRENT EM TO CESSAR LBLOCA (ONLY AXIAL SHAPE INFLUENCE)

DPCT	AXIAL SHAPE
---	1.68 TOP
34	1.52 TOP
24	1.52 CENTER

* APPLICATION OF REVISED C-E EM TO CESSAR LBLOCA (INCLUDING AXIAL SHAPE INFLUENCE)

DPCT	AXIAL SHAPE
-30	1.52 TOP

STATUS OF INDIVIDUAL C-E PLANTS

PLANT	CURRENT LBLOCA PCT(°F)	MARGIN PCT(°F)	TECH SPEC KW/FT
CALVERT CLIFFS			
UNIT 1	1836	364	15.5
UNIT 2	1945	255	15.5
ST LUCIE 2	2041	159	13.0
ANO-2	2041	159	14.5
SONGS UNIT 2	2015	185	13.9
UNIT 3	2183	17	13.9
WATERFORD 3	2188	12	13.4
PVNGS 1,2,3	2169	31	14.0

CONCLUSIONS

* ALL C-E PLANTS, EXCEPT PALO VERDE, SONGS, AND WATERFORD, HAVE SUFFICIENT MARGIN IN PCT TO COVER ADVERSE EFFECT OF REVISED AXIAL SHAPE WITH CURRENT ANALYSES

* ALL C-E PLANTS EXPECTED TO HAVE PCT'S BELOW 2200° F WHEN APPLYING MOST ADVERSE AXIAL SHAPE AND REVISED EM

CONCLUSIONS (CONTINUED)

* PALO VERDE AND SONGS ARE EXPECTED TO HAVE SUFFICIENT MARGIN TO COVER AXIAL SHAPE INFLUENCE BY TAKING CREDIT FOR NUREG-0630

* WATERFORD IS EXPECTED TO HAVE SUFFICIENT MARGIN TO COVER AXIAL SHAPE INFLUENCE BY NOT INCLUDING CONTAINMENT PURGE

RECOMMENDATIONS

* C-E FINALIZE SENSITIVITY STUDIES AND PREPARE MATERIAL FOR INCORPORATION INTO REVISED LARGE BREAK LOCA EVALUATION MODEL

* NRC INITIATE REVIEW OF REVISED LARGE BREAK LOCA EVALUATION MODEL MATERIALS ALREADY SUBMITTED TO NRC FOR REVIEW AND APPROVAL (LD-85-032)

MEETING SUMMARY DISTRIBUTION

Docket No(s): 50-361, 50-362, 50-382, 50-528, 50-529, and 50-530
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submittal of a revised LOCA analysis documenting compliance with 50.46 and Appendix K.

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