

Attachment #2

NRC/GE MEETING
ECCS LICENSING ISSUES
JUNE 19, 1980

LFR:PES/360
6/19/80

8007150 734

ECCS LICENSING ISSUES

AGENDA

- INTRODUCTION L. F. RODRIGUEZ
 - MEETING OBJECTIVE
 - OVERVIEW
 - NRC ACTION NEEDED
- GESTR-FISSION GAS RELEASE MODEL G. A. POTTS
- LOCA ANALYSIS MODELS A. S. RAO
- ECCS INPUT REVERIFICATION PROGRAM A. S. RAO
- SUMMARY L. F. RODRIGUEZ

LFR:PES/515
6/19/80

MEETING OBJECTIVES

- BRIEF NRC MANAGEMENT ON ECCS LICENSING ISSUES
 - GESTR
 - LOCA ANALYSIS MODEL
 - ECCS REVERIFICATION PROGRAM
- DESCRIBE ACTION PLAN TO CLOSE ISSUES

LFR:PES/516
6/19/80

GESTR

BACKGROUND

- FOR BURNUPS > 20,000 MWD/T, NRC REQUESTED
 - USE OF NRC CORRECTION FACTOR, OR
 - SUBMITTAL OF NEW FISSION GAS RELEASE MODEL
- GESTR SUBMITTED (INCLUDES NEW FISSION GAS RELEASE MODEL) - 8/78
 - PRELIMINARY QUESTIONS ANSWERED
 - FORMAL QUESTIONS NOT ISSUED

NRC ACTION REQUIRED

- COMPLETE REVIEW OF GESTR INSTEAD OF REQUIRING NRC CORRECTION FACTORS
 - GE/NRC TECHNICAL MEETING TO RESOLVE OPEN ISSUES
- ISSUE APPROVAL OF GESTR

LFR:PES/517
6/19/80

LOCA ANALYSIS MODELS

BACKGROUND

<u>AMEND. NO.</u>	<u>SUBJECT</u>	<u>DATE SUBMITTED</u>	<u>STATUS</u>
0	BASE MODEL (NEDE-20566)	1/76	REVIEW COMPLETED
1	LOW FLOW BOILING CORRELATION	1/78	REVIEW COMPLETED
2	ONE RECIRCULATION LOOP	8/78	REVIEW COMPLETED
3	ORE SPRAY EFFECTS	5/77	INTERIM APPROVAL 6/78
4	IMPROVED CCFL CORRELATION	8/78	NO ACTION
5	BACKFLOW LEAKAGE	8/78	NO ACTION
6	ENERGY/FISSION; DECAY HEAT, GAMMA SMEAR	8/78	"RULE CHANGE NEEDED" 8/78
7	CHASTE 06 (GESTR RELATED)	8/78	NO ACTION

NRC ACTION REQUIRED

- ISSUE APPROVAL OF BASE MODEL AND AMENDMENTS NO. 1, 2, 4, 5, 7
- GE/NRC TECHNICAL MEETING TO RESOLVE OPEN ISSUES

LFR:ps/305
6/19/80

WHY NRC ACTION NEEDED

GESTR APPROVAL

- IMPROVED FISSION GAS RELEASE MODEL
- BETTER MODEL THAN GEGAP PLUS NRC CORRECTION FACTOR

LOCA ANALYSIS MODEL AND AMENDMENT APPROVAL

- GE ONLY VENDOR WITHOUT APPROVED MODEL
- REDUCE PRESENT PLANT RESTRICTIONS
- IMPROVE PLANT OPERATIONAL FLEXIBILITY
- IMPLEMENTATION OF REVERIFIED ECCS INPUTS
- INCREASED FLEXIBILITY FOR RELOADS SUBMITTALS UNDER 10CFR50.59

LFR:PES/306
6/19/80

INCREASED MAPLHGR MARGIN BENEFITS

- REDUCE PRESENT PLANT RESTRICTIONS
13 PLANTS WITH REDUCED MAPLHGR LIMITS
- IMPROVE PLANT OPERATIONAL FLEXIBILITY FOR
 - SINGLE LOOP RECIRCULATION LOOP - 19 DAYS OUTAGE FOR 4 PLANTS SINCE 1978
 - BETTER LOAD FOLLOWING
 - URANIUM UTILIZATION
 - POWER DISTRIBUTION SHAPING
- INCREASED FLEXIBILITY FOR RELOAD SUBMITTALS UNDER 10CFR50.59

LFR:PES/537
6/19/80

PLANTS WITH REDUCED MAPLHGR LIMITS

	MAPLHGR LIMIT (8X8R)
DRESDEN 2 & 3	0.98
QUAD CITIES 1 & 2	0.98
MILLSTONE	0.79
PILGRIM	0.91 (0.88)*
MONTICELLO	0.86
NINE MILE POINT 1	0.69
VERMONT YANKEE	0.99 (TEST BUNDLE)
BRUNSWICK 2	0.99
FITZPATRICK	0.99
HATCH 2	0.96
SHOREHAM	0.93

*NEXT RELOAD

LFR:pes/538
6/19/80

GESTR
GENERAL ELECTRIC STRESS AND THERMAL ANALYSIS OF BWR FUEL RODS

- IMPROVED FUEL ROD BEHAVIORAL MODEL
 - EVALUATION OF FUEL ROD INITIAL CONDITIONS FOR LOCA
 - PERFORMANCE OF FUEL ROD THERMAL-MECHANICAL DESIGN ANALYSES

- GEGAP-III BASE
 - FUEL AND CLADDING TEMPERATURES (IMPROVED)
 - FUEL AND CLADDING THERMAL EXPANSION
 - FUEL IRRADIATION SWELLING (IMPROVED)
 - FUEL DENSIFICATION
 - FUEL RELOCATION (IMPROVED)
 - FISSION GAS RELEASE (IMPROVED)

- NEW FEATURES
 - SIMPLIFIED FINITE-ELEMENT MECHANICS MODEL
 - FUEL-CLADDING AXIAL LOCKING
 - LOCAL MECHANICAL INTERACTION
 - FUEL AND CLADDING CREEP AND PLASTICITY
 - FUEL HOT PRESSING
 - CLADDING IRRADIATION GROWTH

INCENTIVES FOR GESTR IMPLEMENTATION

- MORE ACCURATE FUEL PERFORMANCE PREDICTOR
 - ADDRESSES MORE KNOWN PHENOMENA
 - ADDRESSES KNOWN PHENOMENA BETTER
 - EXTENSIVE INDEPENDENT MODEL CALIBRATION
 - EXTENSIVE INTEGRAL MODEL QUALIFICATION (NEDE-23785-P)
- ADDRESSES NRC REQUEST FOR EXPOSURE - DEPENDENT FGR MODEL
- DUAL-PURPOSE BEST-ESTIMATE MODEL SIMPLIFIES, IMPROVES DESIGN PROCESS

LOCA ANALYSIS MODELS AND INPUTS

- INTRODUCTION
- REVIEW OF 1977/1978 MODEL/INPUT CHANGES
- CONCLUSION

ASP-1
6/17/80

INTRODUCTION

- AMMENDMENTS
 - LOW FLOW FILM BOILING CORRELATION
 - SINGLE LOOP ANALYSIS
 - IMPROVED CCFL CORRELATION
 - BACKFLOW LEAKAGE
 - NUCLEAP MODELS
 - GESTR/CHAST06

- INPUT CHANGES
 - REVERIFICATION

ASR-2
6/17/80

LOW FLOW FILM BOILING CORRELATION

(AMENDMENT #1)

- ADDITIONAL DATA PROVIDED TO SHOW CORRELATION IS CONSERVATIVE FOR INTENDED APPLICATION

- REGION OF APPLICATION (CORE HEATUP ANALYSIS)
 - DURING BLOWDOWN
 - BOTTOM CORE REFLOODING
 - BYPASS REFLOODING

- EFFECT ON LOCA ANALYSIS
 - HIGHER BLOWDOWN HEAT TRANSFER
 - HIGHER REFLOOD HEAT TRANSFER

ASR-3
6/17/80

IMPROVED CCFL CORRELATION

(AMENDMENT #4)

- MORE ACCURATE CORRELATION CONSTANT RESULTING FROM DATA RE-EVALUATION
 - FACILITY HEAT LOSS
 - IMPACT OF SPRAY SUBCOOLING

- ADDITIONAL CONFIRMATORY EXPERIMENTAL DATA
 - ATMOSPHERIC PRESSURE DATA
 - HIGH PRESSURE DATA

- EFFECT ON LOCA ANALYSIS RESULTS
 - DECREASE IN REFLOODING TIME

ASR-4
6/17/80

BACKFLOW LEAKAGE CALCULATION

(AMENDMENT #5)

- MORE ACCURATE CALCULATION OF FLOW FROM THE BYPASS TO THE LOWER PLENUM THROUGH VARIOUS PATHS
 - BETTER ANALYTICAL REPRESENTATION
 - ADDITIONAL EXPERIMENTAL DATA

- CALCULATION ACCOUNTS FOR:
 - FLOW THROUGH TIE PLATE-CHANNEL FLOW PATH
 - CALCULATION OF FLOW THROUGH LOWER TIE PLATE HOLES AS A FUNCTION OF NUMBER OF DRILLED BUNDLES
 - HOT WALL EFFECTS WHICH REDUCE CALCULATED FLOWS IF NO BYPASS SUBCOOLING
 - MORE ACCURATE CALCULATION OF OTHER PATHS

- EFFECT ON LOCA ANALYSIS
 - DECREASED REFLOODING TIME

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CONCLUSION

- AMENDMENTS ARE RELATIVELY SIMPLE CHANGES
- CHANGES BACKED BY CONSIDERABLE RELEVANT EXPERIMENTAL DATA
- CHANGES REMOVE EXCESSIVE CONSERVATISM

ASR-6
6/17/80

REVEPIFICATION

PURPOSE:

- BETTER DOCUMENTATION OF INPUT PARAMETERS
 - ONE OVER ONE REVIEW
 - JUSTIFICATION/BASIS

- AUTOMATE INPUT GENERATION
 - LATEST AVAILABLE INFORMATION USED
 - ASSURES ALL PLANTS CONSISTENT

- REVIEW ENCODING OF EQUATIONS

<p>CONCLUSION : NO NEGATIVE ESTIMATED IMPACT ON MAPLHGR LIMIT</p>

- REPORTED TO NRC 10/78 BY LETTER

- PLANNED IMPLEMENTATION AFTER NRC APPROVAL OF
1977/78 MODELS

RESULTS OF CODE REVIEW

- LAMB
 - CRITICAL FLOW TABLE
 - IMPROVED ACCURACY
 - CONSTANT IN SINGLE PHASE FRICTION FACTOR CORRELATION
 - TRUNCATION APPROXIMATION

- SAFE
 - CRITICAL FLOW TABLE
 - IMPROVED ACCURACY
 - LEIBNITZ RULE
 - APPROXIMATION
 - SPILLOVER CALCULATIONS
 - IMPROVES REALISTIC CALCULATIONS

- REFLOOD
 - LEIBNITZ RULE
 - APPROXIMATION
 - BUBBLE RISE CORRELATION
 - TRUNCATION APPROXIMATION

- SCAT AND CHASTE
 - NO CHANGES

CONCLUSION: ENHANCED PRECISION ESTIMATED IMPACT \leq 30% (w/o LEIBNITZ)
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ESTIMATED IMPACT OF REVERIFICATION
ON LOCA ANALYSIS

- BASIS FOR ASSESSING IMPACT
 - CURRENTLY LIMITING BREAK
 - LARGEST RECIRCULATION LINE BREAK
 - SMALL BREAKS NOT LIMITING

- RESULTS

- LIMITING BREAK

<u>PLANT TYPE</u>	<u>MAPLHGR CHANGE</u>	<u>PCT CHANGE</u>
BWR/3	0	< 20
BWR/4 NON LPCI-MOD	0	UP TO 100F DECREASE
BWR/4 LPCI-MOD	0 TO IMPROVEMENT	UP TO 100F DECREASE
BWR/5	0	UP TO 50F DECREASE
BWR/6	0	UP TO 50F DECREASE

- ALL LIMITING BREAKS NOW DBA
- CHANGE IN SMALL BREAK PCT'S
 - LIMITED ANALYSIS - NON LIMITING
 - PCT CHANGES - 300°F (BWR/6)
 - LESS FOR OTHERS

ASR-9
6/17/80

IMPACT OF CHANGES ON LIMITING BREAK

• AMENDMENTS	Δ PCT (LIMITING BREAK)
- LOW FLOW FILM BOILING CORRELATION	- 50 TO - 150
- SINGLE LOOP ANALYSIS	N/A
- IMPROVED CCFL CORRELATION	- 50 TO -200
- BACKFLOW LEAKAGE	- 30 TO -200
- ADDITIONAL FLOW PATH	- 30 TO -250
- HOT WALL EFFECTS	0 TO + 40
- NUCLEAR MODELS	
- DECAY POWER	- 35
- GAMMA SMEARING	± 10
- GESTR/CHAST06	- 80 TO +250
- POST ACCIDENT RELEASE	- 20 TO - 40
- NRC FISSION GAS MODEL	0 TO + 70
• INPUT CHANGES	
- REVERIFICATION	-100 TO + 20

ASR-10
6/17/80

CORE SPRAY PROGRAM

PREVIOUS ACTIONS

- STEAM EFFECTS ON NOZZLE SPRAY IDENTIFIED 1974
- INTERIM APPROVAL OBTAINED FOR BWR 2-5 CSHT* 6/78
- DESIGN METHODOLOGY DEVELOPED 12/78
- SSTF CONFIRMATION TESTS 6/79
- REPORT SUBMITTED TO NRC 8/79
- NRC/GE MEETING 11/79
 - METHODOLOGY/APPLICATION ISSUES SEPARATED
- METHODOLOGY QUESTIONS ANSWERED 4/80

FUTURE ACTIONS

- NRC/GE MEETING TO RESOLVE REMAINING METHODOLOGY ISSUES 6/26/80
 - DESCRIPTION OF APPLICATION APPROACH
- METHODOLOGY APPROVAL 8/8/80
- BWR/6 CSHT* SUBMITTED ON GRAND GULF DOCKET 11/25/80
- APPROVAL OF BWR/6 CSHT 2/28/81

CSHT* = CORE SPRAY HEAT TRANSFER

LFR:RF/758
6/20/80

ECCS LICENSING ISSUES

SUMMARY

- NEED REVIEW AND APPROVAL OF GESTR AND LOCA ANALYSIS MODEL AND AMENDMENTS
 - GESTR IS BETTER MODEL THAN GEGAP WITH CORRECTION FACTORS
 - APPROVAL OF LOCA ANALYSIS BENEFITS GE AND NRC
 - TECHNICAL MEETING TO RESOLVE ISSUES
 - TARGET DATE FOR FINAL RESOLUTION - 8040
- REVERIFIED ECCS INPUTS
 - IMPLEMENT AFTER NRC APPROVAL OF GESTR AND LOCA ANALYSIS MODEL, AT CUSTOMER'S REQUEST

LR:PEs/536
6/19/80