

August 14, 1984

Docket Nos. 50-219 and 50-220
LS05-84-08-015

LICENSEES: GPU NUCLEAR CORPORATION (GPUNC) AND NIAGARA MOHAWK POWER CORPORATION (NMPC)
FACILITY: OYSTER CREEK NUCLEAR GENERATING STATION AND NINE MILE POINT NUCLEAR STATION, UNIT 1
SUBJECT: SUMMARY OF MEETING HELD ON JULY 18, 1984 TO DISCUSS ECCS EVALUATION METHODOLOGY FOR BWR-2 APPLICATIONS

On July 18, 1984 a meeting was held in Bethesda, Maryland with representatives of GPU Nuclear Corporation and Niagara Mohawk Power Corporation. A list of attendees is provided as Enclosure 1, and the presentation is included as Enclosure 2. The purpose of the meeting was to obtain staff comments on the use of GE Safer/Gestre applications as related to Oyster Creek and Nine Mile Point, Unit 1.

In particular the staff provided the following comments:

- The program presented appears to have merit by virtue of the fact that more realistic modeling of LOCA responses will be made and should provide a better understanding of the physical phenomena.
- Relevant experimental data is necessary to support the modeling.
- If statistical treatment of data differs from that previously submitted, a potential impact to the review schedule could result.
- The expected NRC review time for volumes I and II of the BWR-2 LOCA Model appears optimistic. A review time of six months would be more realistic.
- Interaction by the NRC staff with GE during the period when the work is underway for volumes I and II would be desirable.
- The impact of the proposed new rule revising Appendix K to 10 CFR Part 50 could affect the benefits of the proposed analyses.

**Add: Bob HERMANN
TOM COLLINS
WAYNE HODGES
MARC WIGDOR
SUMNER**

Original signed by

James J. Lombardo, Project Manager
Operating Reactors Branch #5
Division of Licensing

Enclosures:
1. List of Attendees
2. Presentation

cc w/enclosure
See next page

DL:ORB#5
JLombardo:fb
8/14/84

DL:ORB#5
WPaulson
8/14/84

8408150229 840814
PDR ADOCK 05000219
P PDR

DSU Use code
51

SE01
11

Mr. P. B. Fiedler
Vice President and Director
Oyster Creek Nuclear Generating Station
Post Office Box 388
Forked River, New Jersey 08731

- 2--

August 14, 1984

cc
G.F. Trowbridge, Esquire
Shaw, Pittman, Potts and Trowbridge
1800 M Street, N.W.
Washington, D.C. 20036

Resident Inspector
c/o U.S. NRC
Post Office Box 445
Forked River, New Jersey 08731

J.B. Lieberman, Esquire
Berlack, Isreal & Lieberman
26 Broadway
New York, New York 10004

Commissioner
New Jersey Department of Energy
101 Commerce Street
Newark, New Jersey 07102

Dr. Thomas E. Murley
Regional Administrator
Nuclear Regulatory Commission
Region I Office
631 Park Avenue
King of Prussia, Pennsylvania 19406

Frank Cosolito, Acting Chief
Bureau of Radiation Protection
Department of Environmental
Protection
380 Scotch Road
Trenton, New Jersey 08628

BWR Licensing Manager
GPU Nuclear
100 Interplace Parkway
Parsippany, New Jersey 08625

Deputy Attorney General
State of New Jersey
Department of Law and Public Safety
36 West State Street - CN 112
Trenton, New Jersey 08625

Mayor
Lacey Township
818 Lacey Road
Forked River, New Jersey 08731

U.S. Environmental Protection Agency
Region II Office
ATTN: Regional Radiation Representative
26 Federal Plaza
New York, New York 10007

Licensing Supervisor
Oyster Creek Nuclear Generating Station
Post Office Box 388
Forked River, New Jersey 08731

ECCS EVALUATION METHODOLOGY

MEETING 7/18/84

OYSTER CREEK/NINE MILE POINT 1

ATTENDEES

Jim Lombardo
Bob Hermann
Tim Collins
Wayne Hodges
Marc Wigdor
Summer B. Sun
David Greene
Pandu Gururaj
Robert B. Lee
Larry Gifford
Gordon Bond
Peter F. Wells
Michael Laggart
Michael Heller
Mark Caruso
Tom Vaglewede

REPRESENTING

NRC/PM Oyster Creek
NRC, PM Nine Mile-1
NRC/RSB
NRC/RSB
NRC/RSB
NRC/CPB
Niagara Mohawk
GPUN Corporation
GPUN
GE (Bethesda Office)
GPUN
GPUN
GPUN-Licensing
GPUN
NRC/ORAB
CPB/NRC

AGENDA

ECSS EVALUATION METHODOLOGY
FOR BWR-2 APPLICATIONS
NRC/GPUN/NMPC MEETING
JULY 18, 1984

- | | |
|--|--------------|
| I. INTRODUCTION | P. F. WELLS |
| II. BWR-2 LOCA REVIEW | G. R. BOND |
| III. BWR-2 LOCA MODEL PROGRAM | R. B. LEE |
| IV. APPLICATION TO NINE MILE
POINT UNIT 1 | D. K. GREENE |
| V. SUMMARY | |
| VI. QUESTIONS & COMMENTS | |

INTRODUCTION

PROJECT OBJECTIVES:

- . TO DETERMINE LOCA RESPONSES BY USING A REALISTIC MODEL FOR OPERATIONS AND ENGINEERING APPLICATIONS
- . TO OBTAIN LOCA LICENSING LIMITS BASED ON A REALISTIC MODEL

MEETING OBJECTIVES:

- . TO HELP NRC MANAGEMENT AND TECHNICAL STAFF UNDERSTAND THE PROJECT OBJECTIVES
- . TO OBTAIN STAFF COMMENTS ON USE OF GE SAFER/GESTR/APPLICATIONS TO BWR-2
- . TO DISCUSS DIFFERENCES IN JET PUMP AND NON-JET PUMP MODELS
- . TO OBTAIN STAFF COMMENTS ON SCOPE AND SCHEDULE
- . TO OBTAIN STAFF COMMENTS ON LICENSING ASPECTS
- VALUE, CONCERN, ABILITY TO SUPPORT REVIEW

RBL (2)
7/84

BWR-2 LOCA REVIEW

- 0 LOCA MODEL EVOLUTION
- 0 CURRENT APPENDIX K MODEL CONSERVATISMS
- 0 RESULTS FROM CURRENT LOCA ANALYSES
- 0 LOCA HEAT TRANSFER MODELS
- 0 OC PCT SPECTRA
- 0 LICENSING ISSUES COMPLICATED BY APPENDIX K MODELS
- 0 EXPECTED RESULTS FROM REVISED LOCA MODELS
- 0 OTHER ADVANTAGES AND DISADVANTAGES

RBL (3)
7/84

LOCA MODEL EVOLUTION

	<u>PRE-APPENDIX K</u> <u>(GE AND EXXON)</u>	<u>APPENDIX K</u> <u>(GE AND EXXON)</u>	<u>POST-APPENDIX K</u> <u>(EXXON)</u>	<u>POST-APPENDIX K</u> <u>(GE)</u>
BLOWDOWN HEAT TRANSFER	DRYOUT CORRELATION	EXTENDED ADIABATIC PERIOD	DETAILED MODEL STEAM COOLING	MINOR IMPROVEMENTS NO STEAM COOLING NO REFLOOD
POTENTIAL SINGLE FAILURES	CORE SPRAY SYSTEM	CORE SPRAY SYSTEM, ISOLATION CONDENSER, ADS VALVE	ISOLATION CONDENSER, ADS VALVE	ISOLATION CONDENSER, ADS VALVE
LIMITING SINGLE FAILURE	CORE SPRAY	ISOLATION CONDENSER	ISOLATION CONDENSER	ISOLATION CONDENSER
ACCEPTANCE CRITERIA				
PCT	2300°F	2200°F	2200°F	2200°F
MWR		17%	17%	17%
LIMITING BREAK SIZE	LARGE BREAK	SMALL BREAK	LARGE BREAK	SMALL/LARGE BREAK
PLANT IMPACT	NONE	DERATE	NONE	LIMITED MARGIN

RBL (4)
7/84

BWR-2 LOCA REVIEW2. CURRENT APPENDIX K MODEL CONSERVATISMS

APPENDIX K REQUIRED CONSERVATISMS:

- 20% ADDER TO DECAY HEAT, 1.02 FULL POWER
- UNLIMITED BAKER-JUST METAL-WATER REACTION
- NO STEAM LIMITING FOR METAL-WATER REACTION
- SINGLE SIDE CHANNEL WETTING AND 60 SECOND DELAY
- LIMITED REFLOOD HEAT TRANSFER

ADDITIONAL MODEL CONSERVATISMS:

- NO CORE SPRAY HEAT TRANSFER UNTIL RATED SPRAY/FLOW
- LIMITED PERIOD OF TRANSITION BOILING HEAT TRANSFER
- NO RETURN TO NUCLEATE BOILING FOLLOWING FLOW REVERSAL OR AFTER DNB
- NO STEAM COOLING
- NO BUNDLE-TO-BUNDLE OR BUNDLE-TO-BYPASS HEAT TRANSFER
- NO REFLOODING

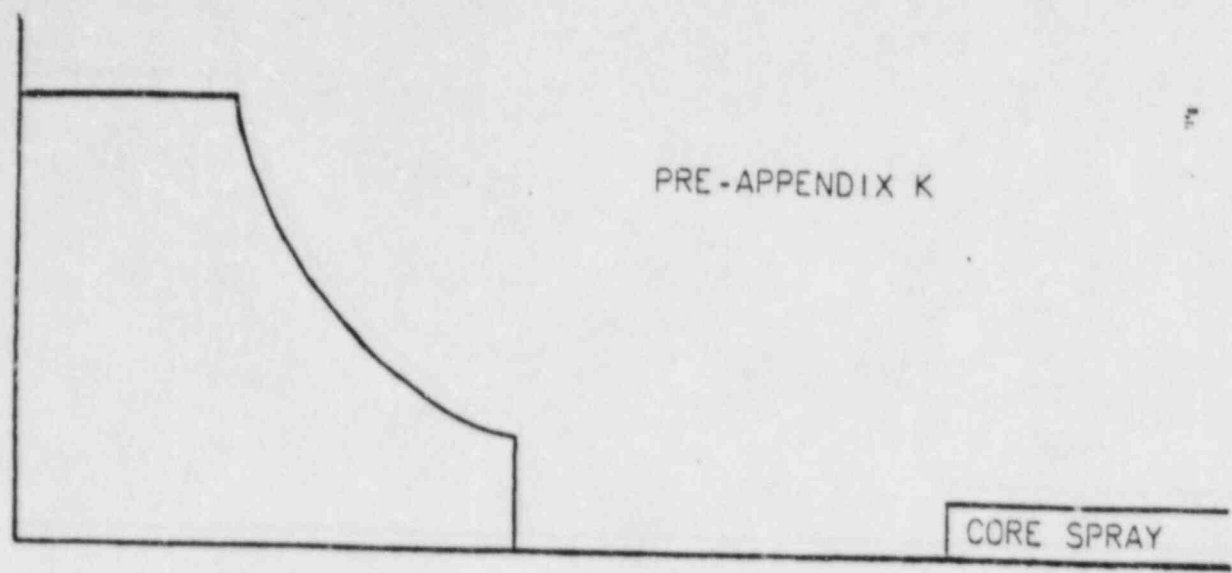
WORST CASE CONDITIONS:

- PEAK POWER BUNDLE, PEAK PLANE
- MAXIMUM CORE FLOW MALDISTRIBUTION
- MINIMUM CORE SPRAY FLOW
- MINIMUM SPRAY HEAT TRANSFER EFFECTIVENESS

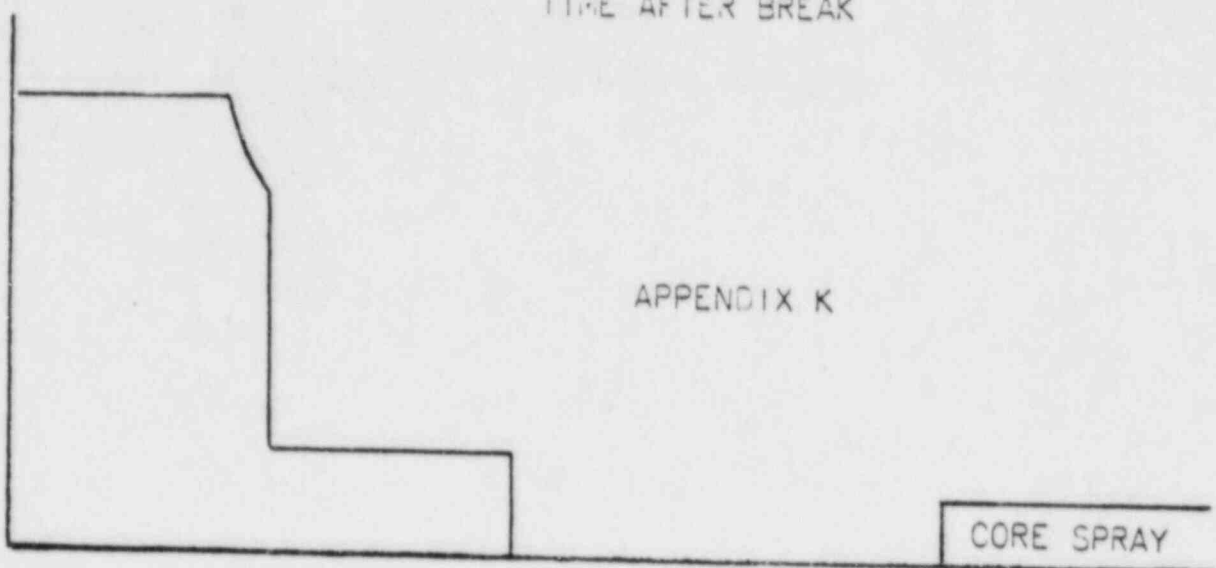
MANY OF THE MODEL CONSERVATISMS RESULT IN COMPOUNDED RATHER THAN ADDITIVE EFFECTS

LOCA HEAT TRANSFER MODELS

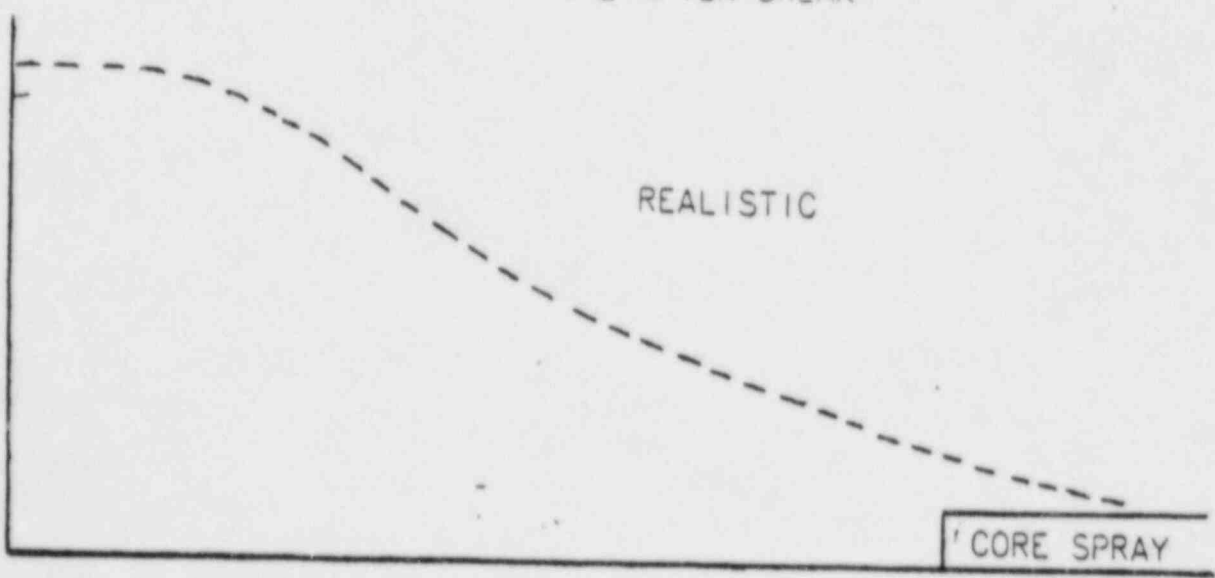
HEAT
TRANSFER
COEFFICIENT



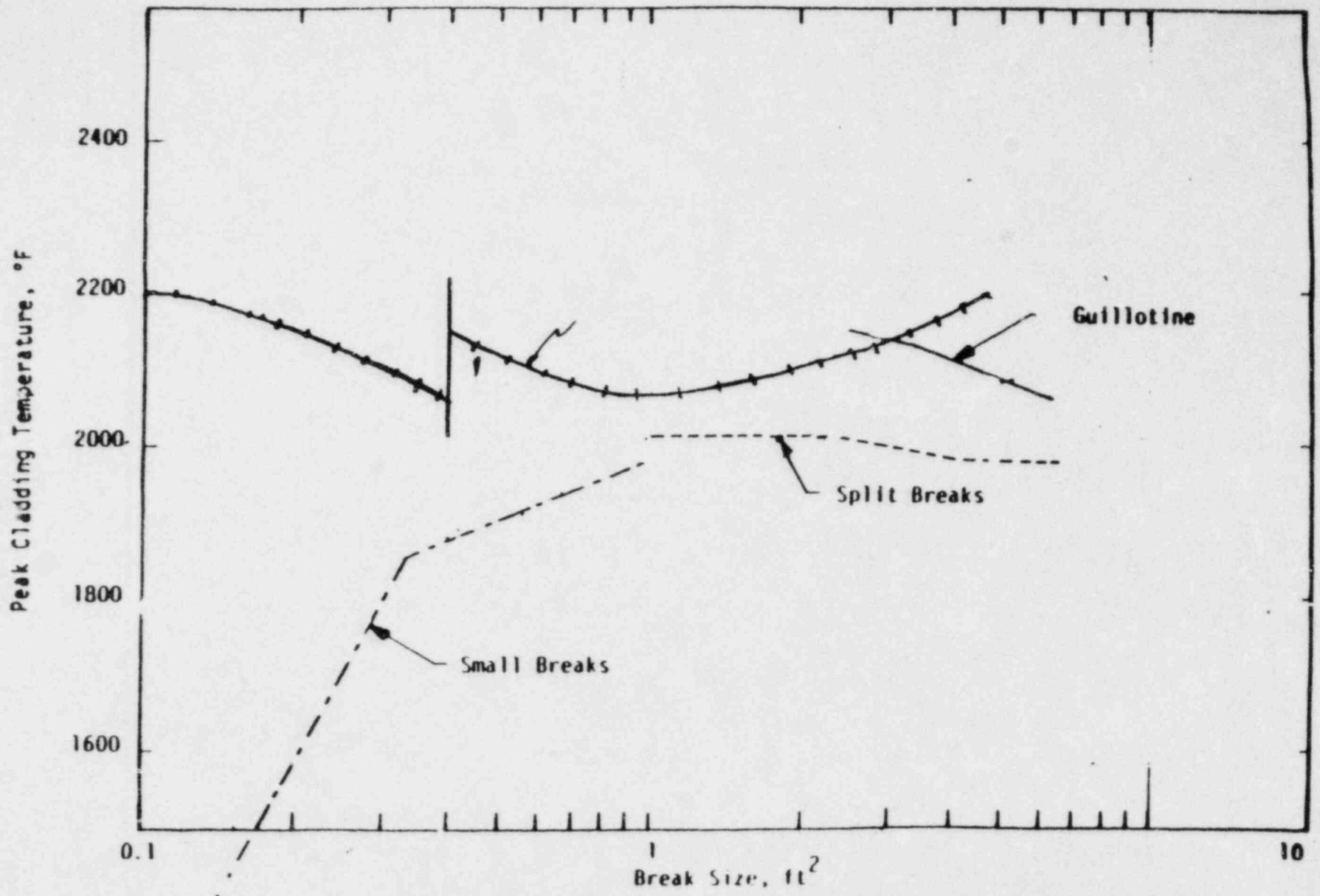
HEAT
TRANSFER
COEFFICIENT



HEAT
TRANSFER
COEFFICIENT



TIME AFTER BREAK



OYSTER CREEK BREAK SPECTRUM RESULTS PUMP DISCHARGE LINE BREAK BETWEEN REACTOR VESSEL AND VENTURI

R3L (7)
7/84

BWR-2 LOCA REVIEWRESULTS FROM CURRENT LOCA ANALYSES

- . MODELS ARE EXTREMELY CONSERVATIVE AND YIELD RESULTS WHICH ARE PHYSICALLY UNREALISTIC AND DO NOT CORRECTLY REPRESENT EXPECTED PLANT BEHAVIOR
- . MODELS ARE INAPPROPRIATE FOR USE IN EVALUATING THE EFFECTS OF PLANT MODIFICATIONS AND IF USED COULD LEAD TO IMPROPER CONCLUSIONS
- . MODELS ARE NOT ADEQUATE TO PROVIDE OPERATOR TRAINING IN LOCA PHENOMENA
- . MODELS PROVIDE CONSERVATIVE RESULTS, BUT NO QUANTITATIVE MEASURE OF SAFETY MARGINS
- . MEETS APPENDIX K REQUIREMENTS
- . PROVIDES CURRENT LICENSING AND OPERATING BASES

REL (8)
7/84

BWR-2 LOCA REVIEW

LICENSING ISSUES COMPLICATED BY APPENDIX K MODELS

- o EFFORTS FOLLOWING APPENDIX K TO RECOVER MARGINS
- o ELECTRICAL CONNECTOR ENVIRONMENTAL PERFORMANCE
- o POST TMI-2 SMALL BREAK MODELING CONCERNS
- o CORE SPRAY DISTRIBUTION

BWR-2 LOCA REVIEW

EXPECTED RESULTS FROM REVISED LOCA MODELS

- O LARGE (DBA) BREAK WILL BE MOST LIMITING
- O SMALL BREAKS WILL SHOW SUBSTANTIAL MARGINS
- O DETERMINE QUANTITATIVE MEASURE OF ACTUAL MAPLHGR MARGINS
- O POTENTIALLY SIGNIFICANT IMPROVEMENT IN MAPLHGR MARGINS
- O PROVIDE USEFUL BASES FOR MORE REALISTIC AND EFFECTIVE ENGINEERING EVALUATIONS, E.G., POTENTIAL PLANT MODIFICATIONS
- O PROVIDE MORE REALISTIC RESULTS OF EXPECTED PLANT PERFORMANCE FOR APPLICATIONS IN PROCEDURE IMPROVEMENT AND OPERATOR TRAINING

RBL (10)
7/84

BWR-2 LOCA REVIEW

OTHER ADVANTAGES OF REVISED LOCA MODELS

- o PROVIDES COMMON UNIFORM MODEL TO ADDRESS BWR-2
- o MODEL WILL BE MORE CONSISTENT WITH THAT APPLIED TO LATER BWRs, WHICH WILL FACILITATE STANDARD EVALUATIONS AND GENERIC APPROACHES TO CERTAIN ISSUES
- o MORE REALISTIC RESULTS WILL PROVIDE A BETTER UNDERSTANDING OF PHYSICAL PHENOMENA AND ENABLE A MORE EFFECTIVE EVALUATION OF OTHER EVENTS, E.G., ATWS

DISADVANTAGES OF MODEL DEVELOPMENT

- o SUBSTANTIAL DOLLAR COSTS
- o HEAVY COMMITMENT OF BOTH LICENSEE AND NRC RESOURCES.

BWR-2 LOCA MODEL PROGRAM

- O JET PUMP PLANT BACKGROUND
- O DIFFERENCES IN JET PUMP/NON-JET PUMP MODELS
- O SCOPE & DOCUMENTATION
- O SCHEDULE

RBL (12)
7/84

BWR-2 LOCA MODEL PROGRAM

. JET PUMP PLANT BACKGROUND

- . NEDE-23785-1-P, VOLUMES 1, 2, AND 3
- . SAFER (NRC SER, AUGUST 29, 1983)
- . GESTR/LOCA (NRC SER, NOV. 2, 1983)
- . APPLICATIONS (NRC SER, JUNE 4, 1984)

RBL (13)
7/84

DIFFERENCES IN JET PUMP/NON-JET PUMP MODELS

JET PUMP PLANTS

1. HIGHER CORE POWER DENSITY
2. BOTTOM BREAKS ARE NOT CONSIDERED
3. CORE FLOW IS PREDOMINANTLY IN UPWARD DIRECTION IN THE EARLIER PART OF THE TRANSIENT
4. ALL BREAKS ARE REFLOODABLE. CORE SPRAY IS NOT THE DOMINANT COOLING MECHANISM

NON-JET PUMP PLANTS

- RELATIVELY LOWER POWER DENSITY
- BOTTOM BREAKS ARE CONSIDERED DUE TO RECIRCULATION LINES CONNECTED TO LOWER PLENUM
- FLOW REVERSAL OCCURS EARLY IN THE TRANSIENT
- ONLY SMALL BREAKS ARE REFLOODABLE. FOR INTERMEDIATE AND LARGE BREAKS, CORE SPRAY COOLING IS THE DOMINANT COOLING MECHANISMS IN THE LATTER PART OF THE TRANSIENT.

BWR-2 LOCA MODEL PROGRAM

SCOPE & DOCUMENTATION

VOLUME I - TECHNICAL DESCRIPTION

- . SAFER MODEL DESCRIPTION (NON-JET PUMP PLANTS)
- . CORECOOL MODEL DESCRIPTION
- . SAFER QUALIFICATION RESULTS
- . CORECOOL QUALIFICATION RESULTS

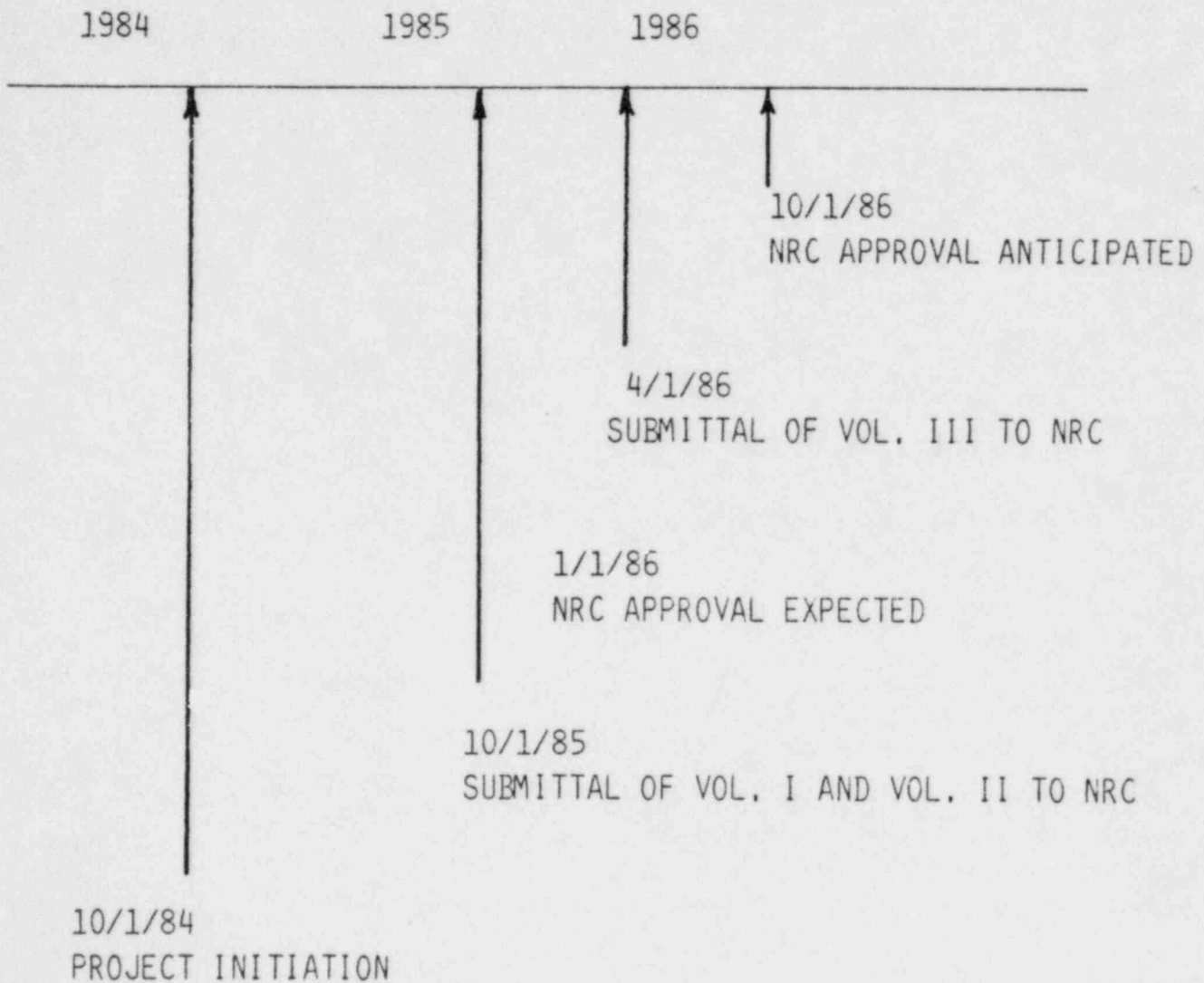
VOLUME II - APPLICATION METHODOLOGY

- . SAFER/GESTR/CORECOOL APPLICATION METHODOLOGY (NON-JET PUMP PLANTS)
- . TYPICAL (GENERIC) BREAK SPECTRUM RESULTS (NON-JET PUMP PLANTS)
 - 1) REALISTIC RESULTS
 - 2) LICENSING BASIS (APPENDIX K) RESULTS

VOLUME III - OC/NMP LOCA ANALYSIS

BWR-2 LOCA MODEL PROGRAM

3. SCHEDULE



APPLICATION TO NINE MILE POINT UNIT 1

INTRODUCTION

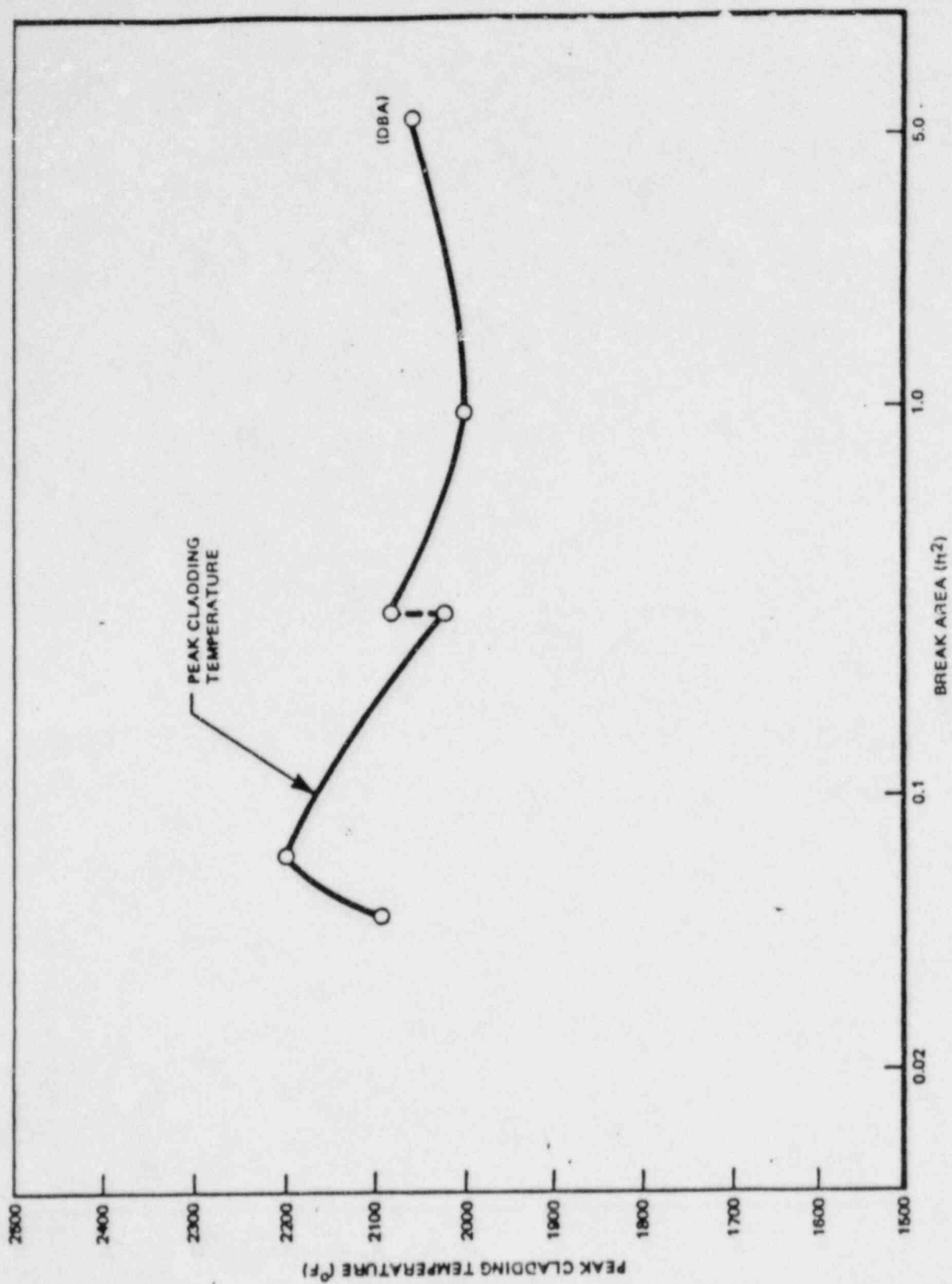
- MEETING AND PROJECT OBJECTIVES AS PREVIOUSLY DISCUSSED ARE CONSISTENT WITH NIAGARA MOHAWK'S PLANS AND NEEDS.

BACKGROUND

- CURRENT LOCA MODELS (GENERAL ELECTRIC) AND RESULTING APPENDIX K CONSERVATISMS ARE IDENTICAL FOR OYSTER CREEK AND NINE MILE POINT UNIT 1.
- NINE MILE PINT UNIT 1 PCT SPECTRUM
 - SAME SHAPE, I.E., CURRENTLY SMALL BREAK LIMITING
 - SAME EXPECTED RESULTS FROM REALISTIC MODELS
- IN ADDITION TO THE BENEFITS DISCUSSED BY GPU, NINE MILE POINT UNIT 1 SPECIFIC USE FOR INCREASED MARGIN MAY INCLUDE IMPROVED FUEL MANAGEMENT
 - INCREASED CYCLE ENERGY
 - REDUCED BATCH SIZE

CONCLUSION

- NIAGARA MOHAWK PLANS TO PARTICIPATE IN THE BWR/2 LOCA MODEL PROGRAM.



SUMMARY

0 SUMMARY

RBL (18)
7/84