



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

September 28, 1988

Docket No. STN 50-605

MEMORANDUM FOR: Charles L. Miller, Acting Director  
Standardization and Non-Power  
Reactor Project Directorate  
Division of Reactor Projects III,  
IV, V and Special Projects

FROM: Dino C. Scaletti, Project Manager  
Standardization and Non-Power  
Reactor Project Directorate  
Division of Reactor Projects III,  
IV, V and Special Projects

SUBJECT: MEETING SUMMARY RELATED TO POSTULATED ALL RIP TRIP, ABWR

On September 14, 1988, a meeting was held with members of General Electric Co. (GE) to discuss the postulated ALL-Pump-Trip (APT) for the ABWR design. This meeting was requested by GE to determine the staff's position related to classification of the APT; presently classified as an operational transient. GE was exploring the possible reclassification of the APT as an accident. The GE presentation slides and the list of attendees are enclosed.

Presently the ABWR design employs MG sets as pass through energy devices on six of the ten Reactor Internal Pumps (RIP). The MG sets, powered from two separate electrical distribution systems, are utilized to slow the coast down of two groups of three RIPs, thus eliminating the potential for DNB on an APT. Removal of the MG sets would result in a brief period in which DNB would occur and the peak cladding temperature (PCT) would approach approximately 1000°F. Credit for rewet would reduce the PCT temperature presently calculated, by approved NRC methods, by 200°F to the 800-900°F range.

The topics pursued at the meeting were; how to obtain regulatory credit for rewet, what would be the after-event fuel inspection criteria, and what type of test data would be needed for an NRC review. In the discussions that followed:

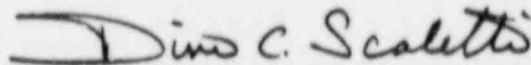
1. The staff agreed that they would be amenable to consider rewet. However, even without rewet, preliminary analyses show that the cladding does not appear to reach a limiting temperature.
2. Integral tests varying starting power, power shapes, starting CPR, power coast down, flow coast down, subcooling would be some of the tests required.
3. If the transient occurred, monitoring offgas and water chemistry would be required to check for failed fuel.

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September 28, 1988

4. Although the staff staff believes that justification for reclassification for the ABWR could be achieved, a request at this time would have a very low priority due to limited resources. Also, because DNB is the design basis for fuel failure, Commission approval may be required.
5. GE does not plan to request changes at this time.



Dino C. Scaletti, Project Manager  
Standardization and Non-Power  
Reactor Project Directorate  
Division of Reactor Projects III,  
IV, V and Special Projects

Enclosures:  
As stated

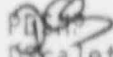
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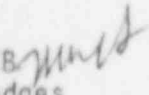
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Dino C. Scaletti, Project Manager  
Standardization and Non-Power  
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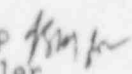
Enclosures:  
As stated

DISTRIBUTION:

<u>Docket File</u>	GThomas
NRC PDR	MHodges
PDSNP Reading	OGC-Rockville
EHylton	EJordan
DScaletti	BGrimes
NRC Participants	ACRS (10)

  
DScaletti  
09/28/88

SRXB   
MHodges  
09/28/88

PDSNP   
CMiller  
09/28/88

NRR/GE Meeting  
All Reactor Internal Pump Trip

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Ashok Thadani	NRR/SAD	(301) 492-0774
Charlie Miller	NRR/PDSNP	(301) 492-1118

## POST-BOILING TRANSITION HEAT TRANSFER AND REWETTING

### APPLICATION

- o LOW PROBABILITY EVENTS
  - E.G., ABWR ALL-PUMP TRIP
  
- o RAPID TRANSIENTS WHICH "DIP" IN AND OUT OF BOILING TRANSITION
  
- o SHORT DURATION TEMPERATURE RISE  
(~1000°F FOR 10 SECONDS)

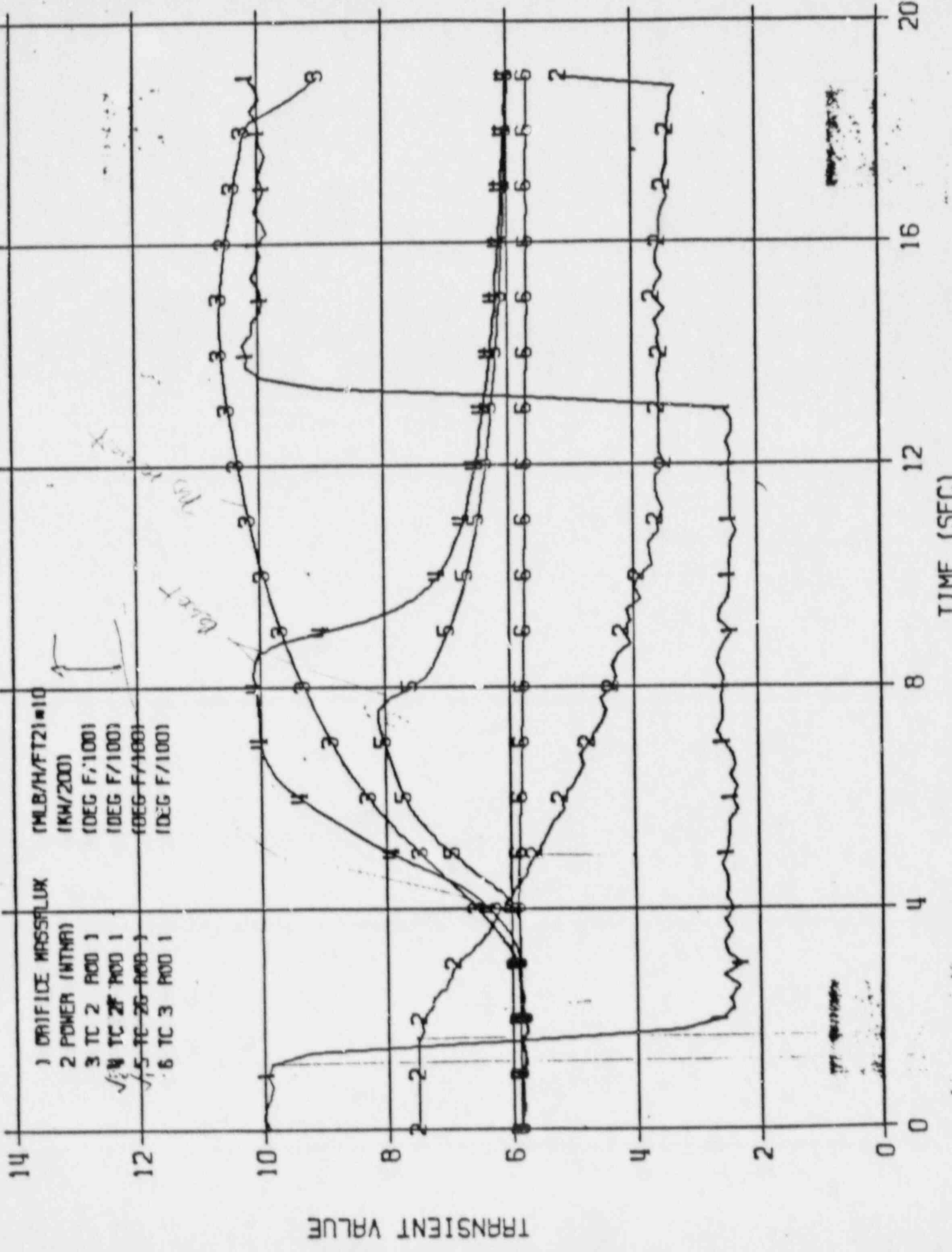
## DATA BASE

- o STEADY STATE POST BOILING TRANSITION HEAT TRANSFER DATA
  - 15 ROD BUNDLES
  - DOUGALL-ROHSENOW CORRELATION ADEQUATE FOR FILM BOILING AT BWR CONDITIONS
  - CONSERVATIVE IN TRANSITION BOILING
  
- o TRANSIENT ROD BUNDLE DATA
  - 16 AND 64 ROD BUNDLE
  - SIMULATION OF VARIOUS TRANSIENTS
    - . PUMP TRIP
    - . DBA FRONT END
    - . TURBINE TRIP WITHOUT BYPASS
  
- o INTEND TO BOUND SPECIFIC TRANSIENTS WITH FULL SCALE DATA.

BS SHIRALKAR  
9/14/88

TYPICAL TRANSIENT DATA WITH REWET

<u>ATA</u>	<u>NO. OF RODS</u>	<u>TYPE OF TRANSIENT</u>
28	16	PUMP TRIP (FLOW AND POWER DECAY)
40	16	DBA FRONT END SIMULATION (FLOW DECAY, POWER DECAY)
44	16	FLOW "WINDOW" AT CONSTANT POWER
35	64	POWER RAMPS
56	64	TURBINE TRIP WITHOUT BYPASS
65	64	TURBINE TRIP WITHOUT BYPASS
<u>TLTA</u>		
4906	49	LOCA SIMULATION
6414	64	HIGH POWER BUNDLE LOCA SIMULATION



TRANSIENT VALUE

TIME (SECC)



## ANALYSIS

- o CURRENT LOCA MODELS ALREADY PREDICT POST BOILING TRANSITION HEAT TRANSFER AND REWET
  - CRITERIA BASED ON WALL TEMPERATURE AND THERMAL MARGIN (CRITICAL QUALITY)
  
- o MINOR REFINEMENTS FOR MORE ACCURATE PREDICTIONS
  - REWET QUALITY, PRECURSORY COOLING
  
- o BOUND UNCERTAINTIES
  - No "CLIFF"
  - TEMPERATURE LIMITED BY FAIRLY HIGH FILM BOILING HEAT TRANSFER COEFFICIENTS
  
- o REWETTING NOT PRECLUDED UNDER NEW ECCS RULE.

BS SHIRALKAR  
9/14/88

## ABWR ACCIDENT ANALYSIS

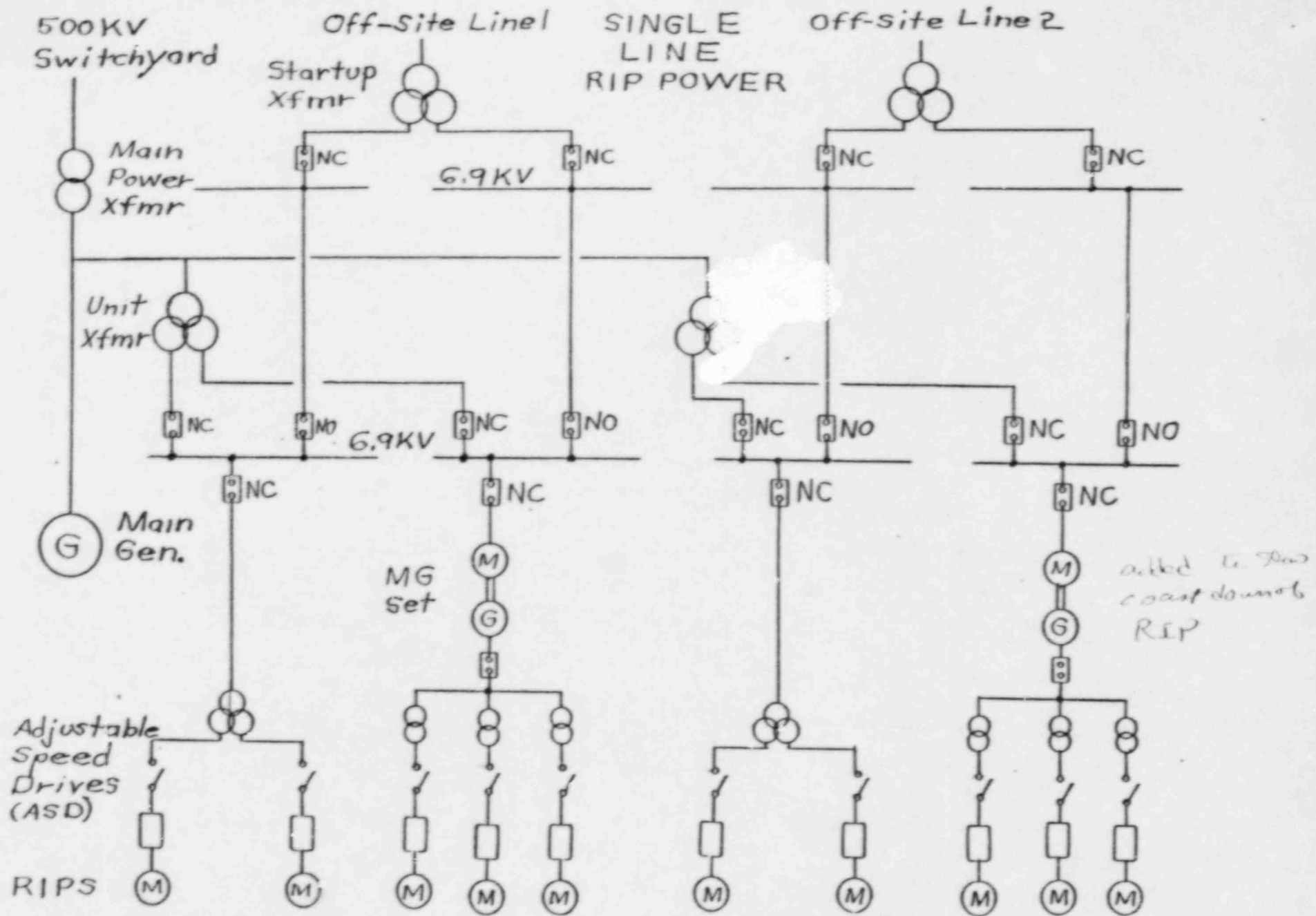
### CURRENT STATUS

#### o ALL PUMP TRIP (APTA)

- 10 PUMPS ON 4 SEPARATE POWER DISTRIBUTION SYSTEMS
- VERY LOW PROBABILITY OF SIMULTANEOUS TRIP APPROX.  $10^{-5}$ /YR
- CLASSIFIED AS AN ACCIDENT
- USING EXISTING NRC APPROVED METHODS, PCT APPROX. 1050°F

#### o LOCAs

- NO CORE UNCOVERY
- FOR CONSERVATISM, ALL PUMPS TRIPPED AT T=0
- THEREFORE, PCTs SIMILAR TO ALL PUMP TRIP CASE

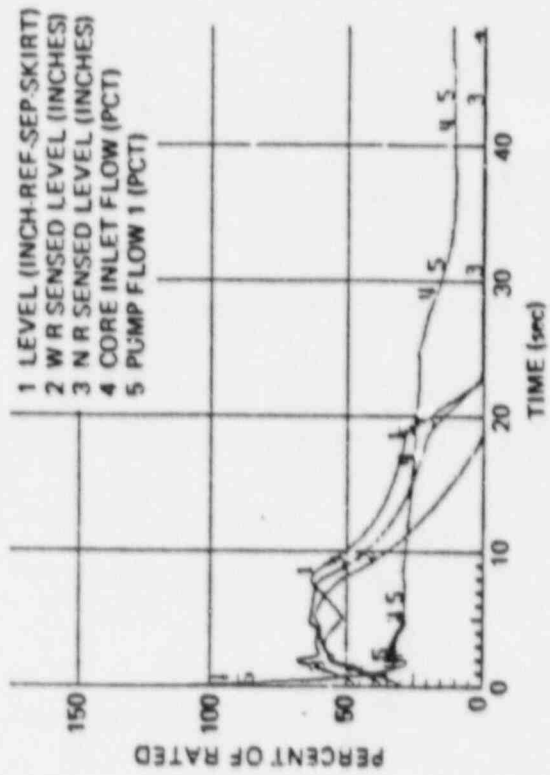
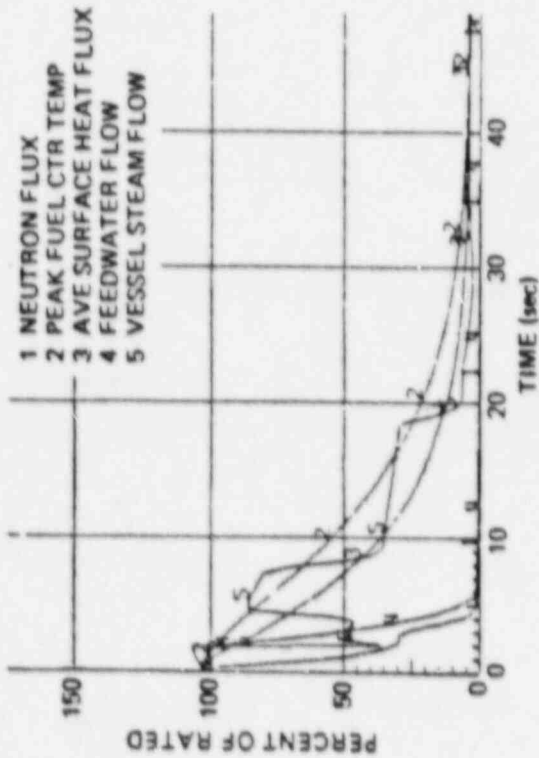
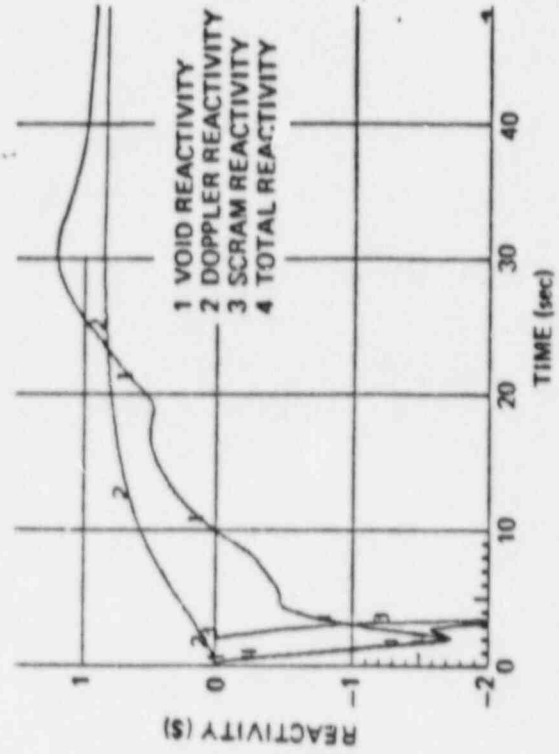
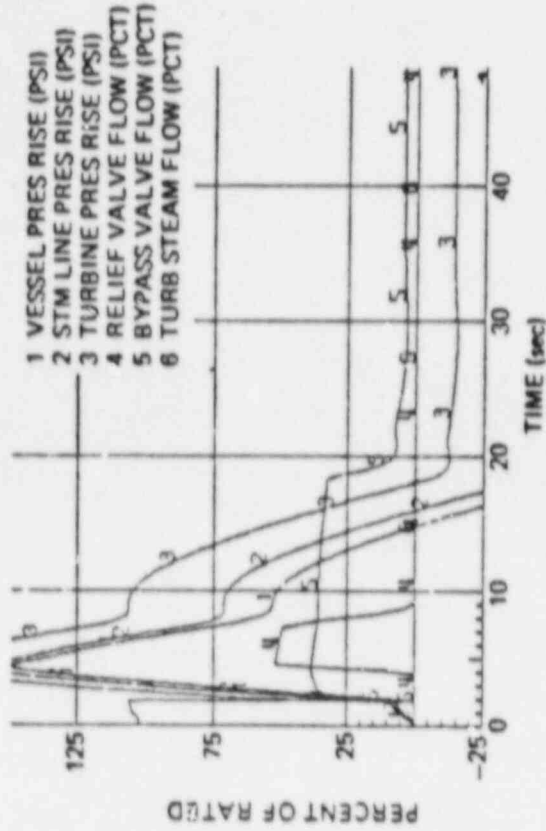


added to this coast down to RIP

THPES  
M RIPS

TRIP  
011 100

JEM 5-26-88

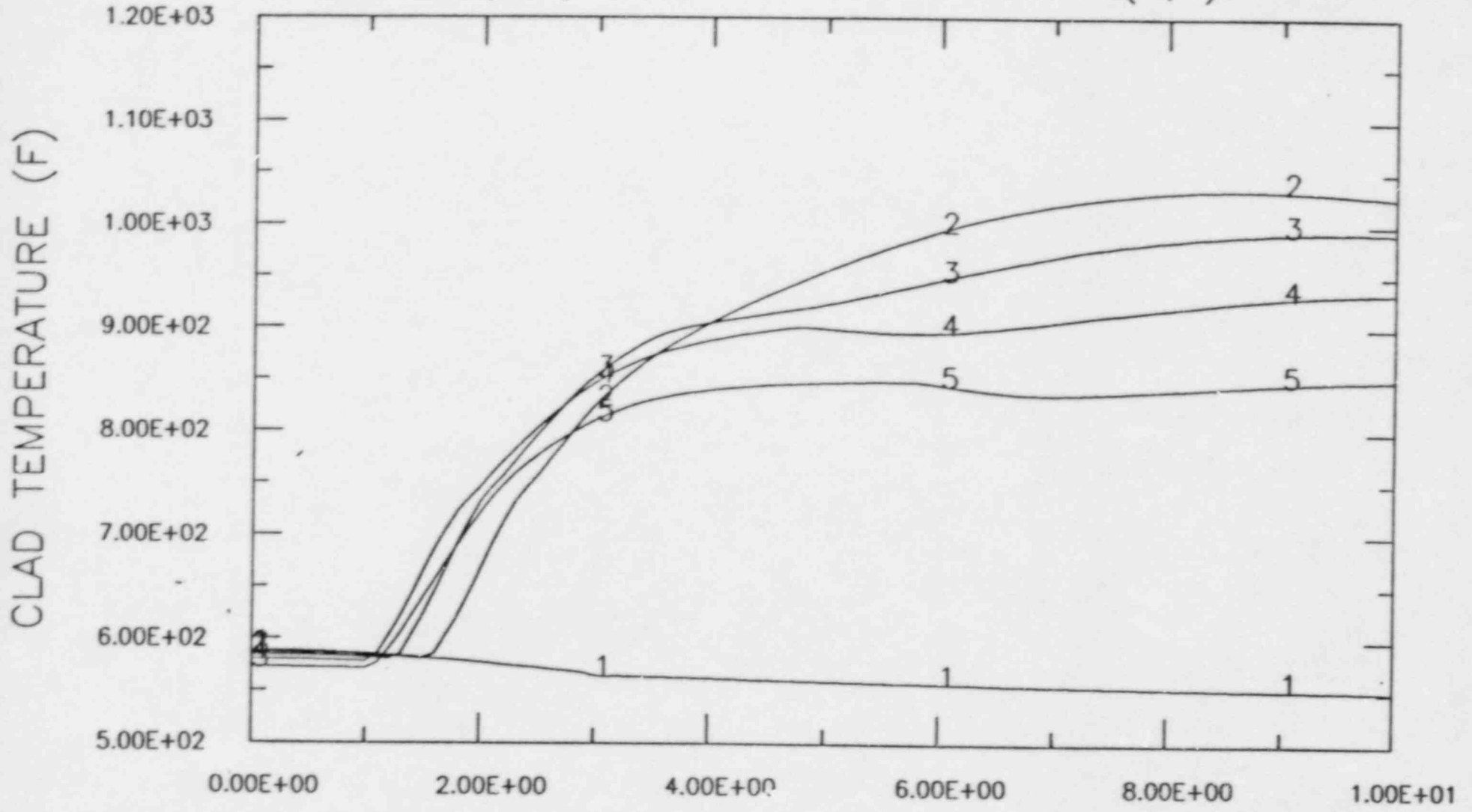


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Figure 15.3-2 ALL PUMP TRIP

5 TCLOUT(10,4)  
3 TCLOUT(8,4)  
1 TCLOUT(6,4)

4 TCLOUT(9,4)  
2 TCLOUT(7,4)



ALL PUMP TRIP -C2A1T

26-AUG-88  
14:01:55 HRS

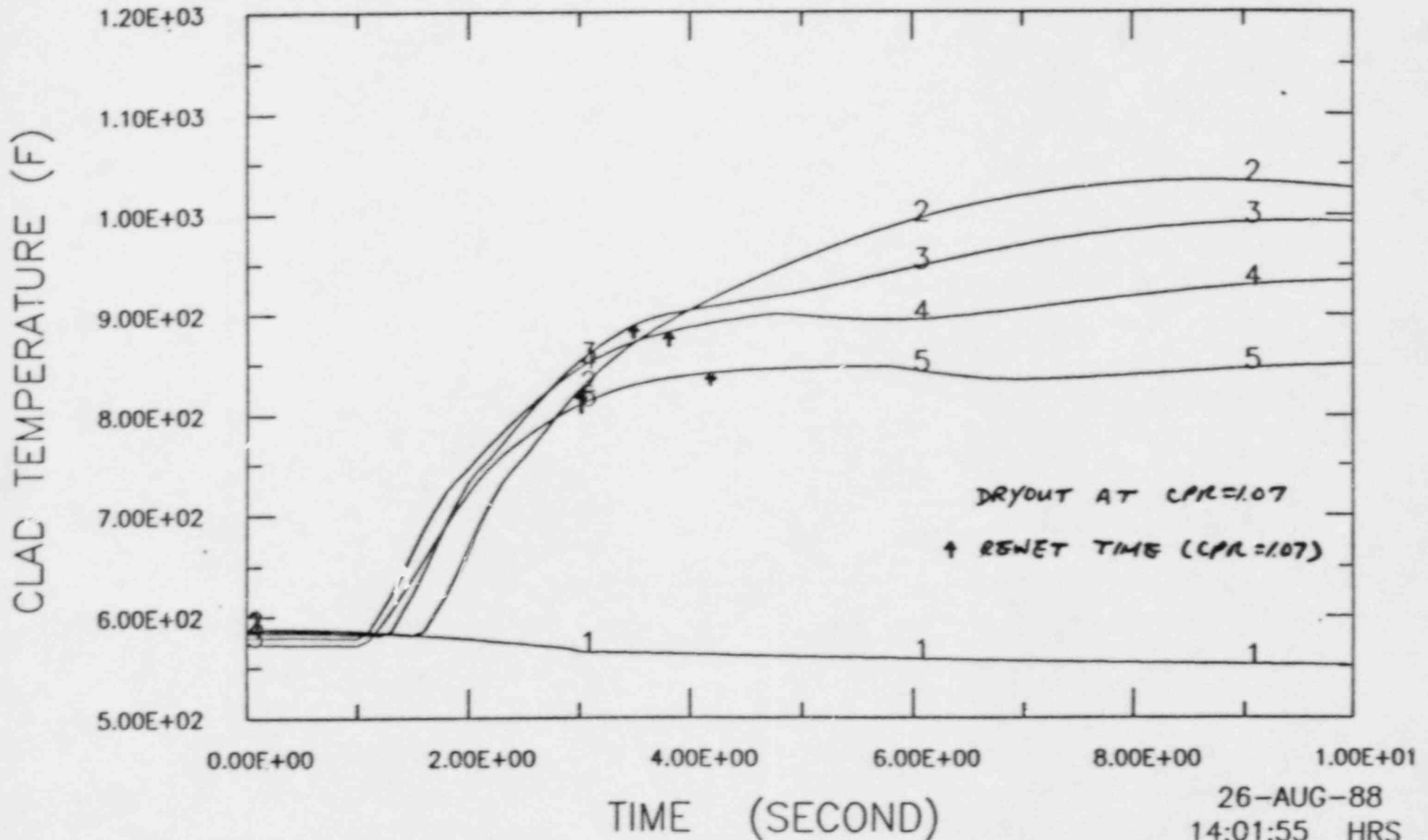
ABWR ACCIDENTS

REALISTIC RESULTS

- o REWET TEST DATA AND CORRELATIONS EXIST
- o CONFIRMATORY INTEGRAL TESTS AND ANALYSIS INDICATE PCTs FROM APTA 800-900°F

5 TCLOUT(10,4)  
3 TCLOUT(8,4)  
1 TCLOUT(6,4)

4 TCLOUT(9,4)  
2 TCLOUT(7,4)



ALL PUMP TRIP -C2A1T

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