PBAPS SIMULATOR PERFORMANCE TEST

SIMULATOR OPERATING PROCEDURE PERFORMANCE TEST

Rev. 1
Date: 12-27-90

Prepared by: B. Havens
Simulator Test Operator

Approved by: R.W. Fisher
Lead Test Operator

Date: 1/2/91

I. TEST REQUIREMENT
STEADY STATE AND NORMAL OPERATIONS TESTS. ANS-3.5, A3.2(2)
Demonstrate the ability to operate the simulator in accordance with reference plant operating procedures.

II. TEST ABSTRACT
This Performance Test Procedure is to be used to conduct all Simulator Performance tests that test the ability to operate the Simulator in accordance with PBAPS Unit 2 Operating Procedures.

III. TEST DESCRIPTION

A. Test Conditions

1. The test conditions of the test will be such that the prerequisites of the procedure are satisfied, and are to be based on one of the protected Initial Conditions.

2. Should the prerequisites of the procedure allow a wide variety of conditions which may result in differing response (as indicated in the procedure), additional test conditions should be identified, logged, and tested in the appropriate section of the Summary Sheet.

B. Test References

References to other Simulator Performance Tests that can or should be performed in conjunction with each Simulator Operating Procedure Test are to be listed in the Test References Section of the Summary Sheet.

C. Effects

The Simulator will be capable of simulating the response of the Reference Plant to an extent that step-by step performance of operating procedures will be possible without deleting, skipping, or omitting steps unless they would have been under similar circumstances in the plant. The expected response of the parameters required by the procedure to be observed during the performance of the procedure are considered to be a part of the Reference Plant Performance Data.

D. Documentation

1. Significant Parameters to be Collected

The Significant Parameters for this test are those required by the procedure to be observed during the performance of the procedure.

2. Other Required Documents:

A controlled copy of the current procedure to be tested.

E. Terminating Condition:

This test may be terminated when all steps in the procedure which can be performed in the control room have been tested and documented.

IV. ACCEPTANCE CRITERIA
The following Criteria are to be used to judge the acceptability of the results of this test:

A. General Criteria Applicable to all Tests

1. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria, the operator will not observe a difference between the response of the simulator and reference plant

control room instrumentation, and shall not violate the physical laws of nature.

2. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

B. Steady-State and Normal Operations Test Criteria

1. Significant Parameters Acceptance Criteria

The Simulator displayed values of all parameters noted in the procedure having an expected response will meet the expectations of the procedure.

2. The requirements in section III.B., EFFECTS, will be met.

V. PROCEDURE

A. Preparation:

1. Reset the Simulator to a protected IC in which the prerequisites of the procedure being tested can met.

2. Ensure that a Terminal is set up in ISD.

3. Place the Simulator in RUN and perform any additional manipulations required to meet the procedure prerequisites.

4. Obtain a copy of the controlled procedure from the Simulator Controlled Procedures and mark it "Simulator Certification Copy".

B. Performance:

1. Perform the operating procedure

   a. Steps which are not applicable to the scope of simulation should be marked "N/A".

   b. Document the satisfactory performance of steps by initialling the step on the Simulator Certification Copy of the procedure.

   c. Steps which result in unsatisfactory performance should be marked in a conspicuous manner, without initials.

   d. On any steps requiring the observation of specific parameter or instrument response, log the observed simulator value next to the requirement.

2. The test may be terminated when all procedural steps which can be performed in the control room at this plant condition have been completed.

3. Verify in the space provided on the Summary Sheet that the Real Time Criteria was/was not met.

4. Assemble Test Data for Analysis.

C. If required, repeat steps V.A and V.B as necessary to complete the test at other required conditions logged on the Summary Sheet.

D. Analyze the test results, initiate required corrective action and submit the completed test for data entry and review.

PBAPS SIMULATOR PROCEDURAL PERFORMANCE TEST
SUMMARY SHEET

SSPT-____________________

I. Test Conditions:

A. ____

B. ____

II. TEST REFERENCES

A. Remote Functions to be tested in conjunction with this performance test.

1. __________ 2. __________ 3. __________

4. __________ 5. __________ 6. __________

B. Other Simulator Performance Tests recommended for performance with this test.

1. __________ 2. __________ 3. __________

III. RESULTS ANALYSIS

Date of Test __________ Test Performer __________________

A. General Criteria Applicable to all Tests

The response of the Simulator resulting from operator action ... __________

The Simulator met the real time acceptance criteria during this Performance Test __________

B. Steady-State and Normal Operations Test Criteria

Significant Parameters Acceptance Criteria:
The Simulator displayed values of all parameters noted in the procedure having an expected response will meet the expectations of the procedure. __________

C. The Simulator will be capable of simulating the response of the Reference Plant to an extent that step-by step ... __________

IV. CORRECTIVE ACTION

A. For any of the Criteria analyzed in III as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the Performance Test Database as Unsat.

B. List all Unsat's or the assigned Work Order Number:

1.

2.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Test Completion section.

V. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ____

Database updated ____________________
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ____ NO ____

2. All SDR's resolved, Test Sat:

____________________ ____________________
Test Operator

Database updated ____________________
Data Entry

C. Test Reviewed:

____________________ ____________________
Lead Test Operator Date

D. Test Completed:

____________________ ____________________
Sim. Support Supv. Date

PBAPS SIMULATOR STABILITY/MASS BALANCE PERFORMANCE TEST

SSPT-STABILITY/MASS BAL

SIMULATOR STABILITY/MASS BALANCE TEST

Prepared by: Bud Havens — Simulator Test Operator — Date: 11/09/90

Approved by: R.W. T... — Lead Test Operator — Date: 1/2/91

I. TEST REQUIREMENT
SIMULATOR OPERABILITY STEADY STATE PERFORMANCE TEST
ANS-3.5 Section 4.1; Appendix B, Section B1.1
Verify Simulator stability at 100% rated thermal power with the Reference Plant control configuration for 60 min.

II. TEST ABSTRACT
This test verifies the stability of the Simulator computed values for selected parameters at full power. Data is collected at periodic intervals using GINDAC and selected recorders, then processed to determine the maximum variation of each parameter from the initial value. The data collected for this test includes information that verifies the mass balance among major vessels, tanks, etc. is satisfied. In addition, the data can be used as input for the 100% Heat Balance Performance Test, SSPT HEAT BAL.

III. TEST REFERENCES

A. Reference Plant Data for 100% power, dated 12/06.

B. Simulator Performance Tests

1. SSPT GP-5, Power Operations

2. SSPT HEAT BAL

IV. TEST DESCRIPTION

A. This test is to be run for a one hour interval at 100% rated power from IC 14.

B. Effects

There are no dynamic effects expected during this test.

C. Documentation

1. Significant Parameters to be Collected

   a. Reactor Power (% Flux)
   b. Core Thermal Power
   c. Total Core Flow
   d. Recirculation Pump A Flow
   e. Recirculation Pump B Flow
   f. Total Steam Flow
   g. Total Feedwater Flow
   h. NR Reactor Vessel Water Level
   i. NR Reactor Pressure
   j. Feedwater Inlet Temperature
   k. Control Rod Drive Flow
   l. Control Rod Drive Temperature
   m. Reactor Water Cleanup System Flow
   n. Reactor Water Cleanup System Inlet Temperature
   o. Reactor Water Cleanup System Outlet Temperature
   p. Main Steamline Pressure
   q. Turbine Steam Flow
   r. Main Condenser Vacuum
   s. Main Condenser Hotwell Temperature
   t. Main Generator Megawatts Electric
   u. Main Condenser Hotwell Level
   v. Condensate Storage Tank Level
   w. Torus Level

2. Data Collection Methods:

   a. Significant Parameters a through t are to be collected using the GINDAC method described in Appendix I; use suspend level 400 and the DRIFTHB dataset.

   b. Significant Parameters u through w are to be collected using the attached Data Form for this Performance Test.

D. Terminating Condition

This Performance Test may be terminated when a minimum of one hour of data has been collected.

V. ACCEPTANCE CRITERIA

A. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.C.1 above; the parameter value shall not vary by more than ±2% of the initial value over the time interval of data collection.

B. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. If necessary, maneuver the simulator to match Core Thermal Power to the within 2% of the value for the Reference III.A, IAW GP-5, Power Operation

3. Prepare to collect data IAW Appendix I and Section IV.C.2. Filename DRIFT.DAT

4. Check the data form attached to this procedure for the items listed in IV.c.1.u through w.; make additions or deletions as necessary.

B. Performance

1. While collecting data in accordance with Appendix I and Significant Parameters, take the simulator out of freeze.

2. Take an initial set of data on the attached data form.

3. When the Termination Conditions are reached, terminate GINDAC data collection, and take a final set of data on the dataform; then place the simulator in freeze.

4. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 01/05/91 Test Performer E. Havens

Date Analyzed 01/08/91 Analysis by E. Havens

Process the Stability and Mass Balance data by selecting the Stability Data Processing Option from the Cert. Data Processing submenu. Calculate and enter the % variation of the parameters collected on the dataform for this test, and mark the Sat./Unsat column as appropriate. Review the results of the data processing for the remaining parameters for Unsat results (the data processing program will assign Sat/Unsat).

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the Simulator Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. N/A

2

C. If a complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Test Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ✓ Unsat ____

Database updated ____BJO____
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ____ NO ____

2. All SDR's resolved, Test Sat:

____________________ ____________________
Test Operator Date

Database updated ____________________
Data Entry

C. Test Reviewed:

R.H. Tyler ____________________ 1/29/91 ____________________
Lead Test Operator Date

D. Test Completed:

M.A. Rosenberg ____________________ 30JAN91 ____________________
Sim. Support Supv. Date

SIMULATOR STABILITY/MASS BALANCE PERFORMANCE TEST
DATA SHEET - STABILITY/MASS BAL

PERFORMANCE CRITERIA
The criteria for acceptable performance for the following data are listed in the Performance Test Procedure.

DATE: 01/05/91

ITEM NUMBER	DESCRIPTION	INITIAL VALUE (I)	FINAL VALUE (F)	% VARIATION = 100*(F-I)/I	SAT / UNSAT
IV.C.1.u	Main Condenser Hotwell Level Level (in.)	16.1	16.1	0%	S
IV.C.1.v	Condensate Storage Tank Level (ft.)	33.8	33.9	0.296%	S
IV.C.1.w	Torus Level (ft.)	14.69	14.19	0%	S
V.B	Computer Real Time Verification	N/A	N/A	N/A	S

DATA TAKEN BY B. Havens

DATA ANALYZED BY B. Havens

PBAPS SIMULATOR COMPUTER REAL TIME PERFORMANCE TEST

SCPT-RT001

SIMULATOR COMPUTER REAL TIME TIMING TEST

Prepared by: Bud Havens Date: 11/09/90
Simulator Test Operator

Approved by: R.L. Tiler Date: 1/2/91
Lead Test Operator

I. TEST REQUIREMENT
SIMULATOR COMPUTER REAL TIME PERFORMANCE TEST
ANS-3.5 Appendix A, Section A3.(1)
Test the computer complex for verification of real time simulation.

II. TEST ABSTRACT
This performance test will test the simulator for real time operation by timing specific intervals that are calculated in the computer code and that have visual outputs that can be verified on the control panels. Timing is tested primarily by timing the stroke time of various valves selected for 1) distribution among the various operating panels, 2) distribution among several simulation models, and 3) operating at different cycle rates in the computer program.
Real time testing is continuously tested by the computer program itself. The simulation environment is checked each computer cycle by the simulation Executive programs to ensure that each simulation module completes its calculations within the time frame before the next cycle is called. Any module that does not complete within that time is flagged by its controlling Executive program; if the same module does not complete on the next cycle, its controlling Executive will report a failure to the Master Simulation Task, which will suspend the simulation program. During Simulator testing, this condition can be determined by observing a FAIL status on a Simulator computer ISD/IST monitor. Observation of non-FAILure is documented as a part of all Simulator Performance Tests.

III. TEST REFERENCES

A. The S^3 User's Manual

B. Simulator Performance Tests

1. SSPT GP-5, Power Operations

2. SSPT GP-2, Normal Plant Startup

3. SMPT RRS20, Recirc Suction Break

4. STPT IPM03, Anticipated Transient Without Scram

IV. TEST DESCRIPTION

A. This test is to be run in four segme. representing different levels of computer activity; in each the valve stroke and other timing intervals listed on the attached data sheet are measured and compared to the computer programmed interval.

1. Steady-State Ful' Power Operation, IC 14

2. Reactor Startup, IC 2

   - Pull critical IAW GP-2 and establish a 100 sec. Reactor Period prior to timing tests

3. Loss of Coolant Accident, IC 14

   - Insert Malfunction RRS20 at 100% severity prior to timing tests

4. Anticipated Transient Without Scram, IC 14

   - Insert Malfunction IPM03 and Trip Overrides ARI1A and ARI1B prior to timing tests

B. Effects

Each of the conditions above is tested separately in other performance tests; it is not intended to test them again in this test. Refer to the referenced Simulator Performance Tests for details of the Simulator response for each.

C. Documentation

1. Components to be timed:

a.	MO-2-12-056	RWCU LETDOWN TO CONDENSER ISOLATION VALVES
b.	MO-2140	RFP SUCTION VALVES (A/B/C)
c.	MO-2129	FW HTR INLET ISOLATION VALVES (A/B/C)
d.	MO-2663	COMMON LONG PATH FEEDWATER RECIRCULATION VALVE
e.	MO-2-23-019	HPCI PUMP DISCHARGE VALVE
f.	MO-2322	MAIN STEAM SEAL BYPASS VALVE
g.	MO-2-02-079	MAIN STEAM LINE DRAIN VALVE
h.	MO-2990	JET COMPRESSOR SUPPLY VALVE (A/B)
i.	MO-4027	JET COMPRESSOR DISCHARGE VALVE (A/B)
j.	MO-2-13-131	RCIC STEAM LINE SUPPLY VALVE
k.	MO-2-03-022	CRD COOLING WATER PRESSURE CONTROL VALVE
l.	MO-10-013	RHR PUMP TORUS SUCTION VALVE (A/B/C/D)
m.	FIELD BREAKER TIMER	RECIRC. PUMP START FIELD BREAKER TIMER
n.	MO-0501	COOLING TOWER INLET VALVE (A/B/C)

2. For each of the test conditions, time the items listed above on the attached data form.

D. Terminating Condition

The test may be suspended after the completion of the timing for any of the conditions; timing data must be completed for all the conditions for the test to be considered complete.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test.

A. The measured time interval shall not exceed the simulation code calculated interval by more than twice the inverse of the module frequency plus 0.25 sec. (twice the inverse of the Simulator I/O frequency -20 Hz- plus 0.15 sec. for operator response).

B. The measured interval shall not be less than the simulation code calculated interval by more thantwice the inverse of the module frequency plus 0.25 sec. (twice the inverse or the Simulator I/O frequency -20 Hz- plus 0.15 sec. for operator response).

VI. PROCEDURE

A. Preparation

1. For the condition listed in Section IV.A to be tasted, Reset the Simulator to the required IC.

2. As necessary, insert the Malfunctions required in Section IV.A for the condition to be tested.

3. Check the data form attached to this procedure for all the items listed in Section IV.C.1; make additions or deletions as necessary. Enter the date and condition information on the data form.

B. Performance

1. Take the simulator out of freeze.

2. Time the components listed in Section IV.C.1 and document on the data form.

a. Although desireable, a calibrated stopwatch is not necessary. One may need to be used in the case of unresolved unsat. timing tests.

b. Timing is to be started when the control switch is placed to the position necessary to initiate the required action, and stopped when the desired response is observed.

c. Valve stroke intervals may be timed in either the open or close direction.

d. If an item cannot be timed because of interlocks present because of the condition being tested, enter N/A as the Measured Time for that item.

e. Additional manipulations may be performed to complete a timing test as necessary (e.g., lineups for Recirculation Pump restart).

f. As each component is tested, enter Sat for measured intervals that are within the allowable band as listed on the data sheet, or Unsat for those outside the allowable band.

3. When testing is completed for the current condition, reset the Simulator for the next test condition unless the test is to be suspended. If continuing, repeat this procedure beginning at step VI.A.1 for the next test condition.

4. Assemble Test Data for Analysis.

VII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List the assigned Work Order Number for all Unsat items on the appropriate datasheet.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

VIII. TEST COMPLETION

A. Performance Test completed: SAT ✓ Unsat ____

Database updated ____ Bk ____
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES N/A NO ____

2. All SDR's resolved, Test Sat:

____________________ ____________________
Test Operator Date

Database updated ____________________
Data Entry

C. Test Reviewed:

R.W. Tyler 1/19/91
Lead Test Operator Date

D. Test Completed:

[signature] 30 JAN 91
Sim. Support Supv. Date

PBAPS SIMULATOR COMPUTER
REAL TIME VALVE STROKE
DATA SHEET

DATE: 01/05/91

CONDITION: IC 14 100%

SYSTEM	COMPONENT	COMPONENT DESC.	MODULE FREQUENCY Hz	PROGRAMMED TIME INTERVAL SEC.	MEASURED TIME INTERVAL SEC.	ALLOWABLE BAND (MAX/MIN) SEC.	SAT./UNSAT.
CU	MO-2-12-056	LETDOWN TO CONDENSER ISOLATION	2	20	20.32	21.25 / 18.75	S
FW	MO-2140 A/B/C	RFP SUCTION VALVES	1	100	98.61	102.25 / 97.75	S
FW	MO-2120 A/B	FW HTR INLET ISOL. VALVES	1	100	98.86	102.25 / 97.75	S
FW	MO-2663	COMMON LONG PATH RECIRC. VALVE	1	60	59.21	62.25 / 57.75	S
HP	MO-2-23-019	HPCI PUMP DISCHARGE	2	15	14.42	16.25 / 13.75	S
MS	MO-2322	MAIN STEAM SEAL BYPASS	2	40	39.58	41.25 / 38.75	S
MS	MO-2-02-079	MAIN STEAM LINE DRAIN	2	20	19.63	21.25 / 18.75	S
OG	MO-2990 A/B	JET COMPRESSOR SUPPLY	1	20	17.95	22.25 / 17.75	S
OG	MO-4027 A/B	JET COMPRESSOR DISCHARGE	1	20	18.05	22.25 / 17.75	S
RC	MO-2-13-131	RCIC STEAM LINE SUPPLY	2	15	14.79	16.25 / 13.75	S
RD	MO-2-03-022	CRD COOLING WATER PRESSURE CONTROL	2	35	34.65	36.25 / 33.75	S
RH	MO-10-013 A/T -D	RHR PUMP TORUS SUCTION	1	30	29.92	32.25 / 27.75	S
RR	FLD. BRK. TIMER	RECIRC. PUMP START FIELD BREAKER TIMER	2	20.75	21.31	22 / 19.5	S
SW	MO-0501 A/B/C	COOLING TOWER INLET	2	55	53.95	56.25 / 53.75	S

PERFORMED BY B. Havens

WORK ORDERS FOR UNSAT RESULTS N/A

PBAPS SIMULATOR COMPUTER
REAL TIME VALVE STROKE
DATA SHEET

DATE: 1/3/91

CONDITION: IC-14

SYSTEM	COMPONENT	COMPONENT DESC.	MODULE FREQUENCY Hz	PROGRAMMED TIME INTERVAL SEC.	MEASURED TIME INTERVAL SEC.	ALLOWABLE BAND (MAX/MIN) SEC.	SAT./UNSAT.
CU	MO-2-12-036	LETDOWN TO CONDENSER ISOLATION	2	20	20.28	21.25 18.75	S
FW	MO-2140 A/B/C	RFP SUCTION VALVES	1	100	98.59	102.25 97.75	S
FW	MO-2129 A/B/C	FW HTR INLET ISOL. VALVES	1	100	99.22	102.25 97.75	S
FW	MO-2663	COMMON LONG PATH RECIRC. VALVE	1	60	59.02	62.25 57.75	S
HP	MO-2-23-019	HPCI PUMP DISCHARGE	2	15	14.38	16.25 13.75	S
MS	MO-2322	MAIN STEAM SEAL BYPASS	2	40	39.46	41.25 38.75	S
MS	MO-2-02-079	MAIN STEAM LINE DRAIN	2	20	19.84	21.25 18.75	S
OG	MO-2990 A/B	JET COMPRESSOR SUPPLY	1	20	18.04	22.25 17.75	S
OG	MO-4027 A/B	JET COMPRESSOR DISCHARGE	1	20	18.21	22.25 17.75	S
RC	MO-2-13-131	RCIC STEAM LINE SUPPLY	2	15	14.73	16.25 13.75	S
RD	MO-2-03-022	CRD COOLING WATER PRESSURE CONTROL	2	35	34.61	36.25 33.75	S
RH	MO-10-013 A/B/C/D	RHR PUMP TORUS SUCTION	1	30	29.9	32.25 27.75	S
RR	FLD. BRK. TIMER	RECIRC. PUMP START FIELD BREAKER TIMER A	2	20.75	21.38	22 19.5	S
SW	MO-0501 A/B/C	COOLING TOWER INLET	2	55	54.06	56.25 53.75	S

PERFORMED BY B Havens

WORK ORDERS FOR UNSAT RESULTS N/A

PBAPS SIMULATOR COMPUTER
REAL TIME VALVE STROKE
DATA SHEET

DATE: 01/05/90

CONDITION: Recirc. Suction Break

SYSTEM	COMPONENT	COMPONENT DESC.	MODULE FREQUENCY Hz	PROGRAMMED TIME INTERVAL SEC.	MEASURED TIME INTERVAL SEC.	ALLOWABLE BAND (MAX/MIN) SEC.	SAT./ UNSAT.
CU	MO-2-12-056	LETDOWN TO CONDENSER ISOLATION	2	20	19.88	21.25 18.75	
FW	MO-2140 A/B/C	RFP SUCTION VALVES	1	100	98.9	102.25 97.75	
FW	MO-2129 A/B/C	FW HTR INLET ISOL. VALVES	1	100	98.98	102.25 97.75	
FW	MO-2663	COMMON LONG PATH RECIRC. VALVE	1	60	58.63	62.25 57.75	
HP	MO-2-23-019	HPCI PUMP DISCHARGE	2	15	14.12	16.25 13.75	
MS	MO-2322	MAIN STEAM SEAL BYPASS	2	40	39.69	41.25 38.75	
MS	MO-2-02-079	MAIN STEAM LINE DRAIN	2	20	19.49	21.25 18.75	
OG	MO-2990 A/B	JET COMPRESSOR SUPPLY	1	20	17.79	22.25 17.75	
OG	MO-4027 A/B	JET COMPRESSOR DISCHARGE	1	20	18.26	22.25 17.75	
RC	MO-2-13-131	RCIC STEAM LINE SUPPLY	2	15	*	16.25 13.75	N/A
RD	MO-2-03-022	CRD COOLING WATER PRESSURE CONTROL	2	35	34.54	36.25 33.75	
RH	MO-10-013 A/B/C/D	RHR PUMP TORUS SUCTION	1	30	29.43	32.25 27.75	
RR	FLD. BRK. TIMER	RECIRC. PUMP START FIELD BREAKER TIMER	2	20.75	N/A	22 19.5	N/A
SW	MO-0501 A/B/C	COOLING TOWER INLET	2	55	54.25	56.25 53.75	

PERFORMED BY B. Havens

WORK ORDERS FOR UNSAT RESULTS

* Could not stroke - see W.O. #

PBAPS SIMULATOR COMPUTER
REAL TIME VALVE STROKE
DATA SHEET

DATE: 01/05/91

CONDITION: IC 14 ATWS

SYSTEM	COMPONENT	COMPONENT DESC.	MODULE FREQUENCY Hz	PROGRAMMED TIME INTERVAL SEC.	MEASURED TIME INTERVAL SEC.	ALLOWABLE BAND (MAX/MIN) SEC.	SAT./UNSAT.
CU	MO-2-12-056	LETDOWN TO CONDENSER ISOLATION	2	20	20.43	21.25 18.75	S
FW	MO-2140 A/B/C	RFP SUCTION VALVES	1	100	99.34	102.25 97.75	S
FW	MO-2129 A/B/C	FW HTR INLET ISOL. VALVES	1	100	99.47	102.25 97.75	S
FW	MO-3663	COMMON LONG PATH RECIRC. VALVE	1	60	58.49	62.25 57.75	S
HP	MO-2-23-019	HPCI PUMP DISCHARGE	2	15	14.8	16.25 13.75	S
MS	MO-2322	MAIN STEAM SEAL BYPASS	2	40	39.54	41.25 38.75	S
MS	MO-2-02-079	MAIN STEAM LINE DRAIN	2	20	19.51	21.25 18.75	S
OG	MO-2990 A/B	JET COMPRESSOR SUPPLY	1	20	18.15	22.25 17.75	S
OG	MO-4027 A/B	JET COMPRESSOR DISCHARGE	1	20	18.47	22.25 17.75	S
RC	MO-2-13-131	RCIC STEAM LINE SUPPLY	2	15	14.53	16.25 13.75	S
RD	MO-2-03-022	CRD COOLING WATER PRESSURE CONTROL	2	35	34.58	36.25 33.75	S
RH	MO-10-013 A/B/C/D	RHR PUMP TORUS SUCTION	1	30	29.76	32.25 27.75	S
RR	FLD. BRK. TIMER	RECIRC. PUMP START FIELD BREAKER TIMER	2	20.75	N/A	22 19.5	N/A
SW	MO-050. A/B/C	COOLING TOWER INLET	2	55	54.46	56.25 53.75	S

PERFORMED BY B. Havens

WORK ORDERS FOR UNSAT RESULTS N/A

PBAPS SIMULATOR COMPUTER
REAL TIME VALVE STROKE
DATA SHEET

DATE: 01/05/91

CONDITION: IC-02 5/a

SYSTEM	COMPONENT	COMPONENT DESC.	MODULE FREQUENCY Hz	PROGRAMMED TIME INTERVAL SEC.	MEASURED TIME INTERVAL SEC.	ALLOWABLE BAND (MAX/MIN) SEC.	SAT./ UNSAT.
CU	MO-2-12-056	LETDOWN TO CONDENSER ISOLATION	2	20	20.27	21.25 / 18.75	S
FW	MO-2140 A/B/C	RFP SUCTION VALVES	1	100	98.68	102.25 / 97.75	S
FW	MO-2129 A/B/C	FW HTR INLET ISOL. VALVES	1	100	99.15	102.25 / 97.75	S
FW	MO-2663	COMMON LONG PATH RECIRC. VALVE	1	60	59.02	62.25 / 57.75	S
HP	MO-2-23-019	HPCI PUMP DISCHARGE	2	15	14.56	16.25 / 13.75	S
MS	MO-2322	MAIN STEAM SEAL BYPASS	2	40	39.66	41.25 / 38.75	S
MS	MO-2-02-079	MAIN STEAM LINE DRAIN	2	20	19.84	21.25 / 18.75	S
OG	MO-2990 A/B	JET COMPRESSOR SUPPLY	1	20	18.07	22.25 / 17.75	S
OG	MO-4027 A/B	JET COMPRESSOR DISCHARGE	1	20	18.10	22.25 / 17.75	S
RC	MO-2-13-131	RCIC STEAM LINE SUPPLY	2	15	14.67	16.25 / 13.75	S
RD	MO-2-03-022	CRD COOLING WATER PRESSURE CONTROL	2	35	34.59	36.25 / 33.75	S
RH	MO-10-013 A/B/C/D	RHR PUMP TORUS SUCTION	1	30	29.62	32.25 / 27.75	S
RR	FLD. BRK. TIMER	RECIRC. PUMP START FIELD BREAKER TIMER	2	20.75	21.34	22 / 19.5	S
SW	MO-0501 A/B/C	COOLING TOWER INLET	2	55	54.16	56.25 / 53.75	S

PERFORMED BY B. Havens

WORK ORDERS FOR UNSAT RESULTS N/A

PEACH BOTTOM ATOMIC POWER STATION
UNIT 2 SIMULATOR DRIFT TEST RESULTS

DRIFT TEST CONDUCTED: 01/05/91

Parameters values with an * are listed in fraction of control room indicator or recorder scale.

Data collection interval is approximately every 10 sec.

PARAMETER	APRM *	CTP	CORE FL *	RR A FL	RR B FL	TSP *	TFWF *	NR LVL *	NR PR *	FW TEMP *	CRD FL
VALUES	0.8018	99.160	0.8657	5745.2	5745.6	0.82092	0.81968	[illegible].39617	0.72374	0.97158	7.9432
	0.80157	99.16	0.86565	5744.5	5745.8	0.82094	[illegible].81965	0.39613	0.72374	0.97157	7.9433
	0.80134	99.162	0.8656	5743.7	5746.1	0.82096	0.8197	[illegible].39609	0.72372	0.97156	7.9433
	0.80111	99.171	0.86565	5744.1	5746.3	0.[illegible]2098	0.81996	0.29614	0.72379	0.97155	7.9431
	0.80087	99.179	0.86563	5744.4	5746.4	0.821	0.82023	0.39618	0.72385	0.97154	7.9428
	0.8009	99.175	0.86573	5744.6	5746.4	0.82099	0.81998	0.39621	[illegible]	0.97153	7.9428
	0.80092	99.171	0.86574	5744.9	5746.3	0.82098	0.81974	0.39624	[illegible]	0.97153	7.9428
	0.80119	99.171	0.86577	5744.9	5746.6	0.82093	0.81996	0.39615	0.7239	0.97152	7.943
	0.80146	99.172	0.8658	5744.9	5746.9	0.82087	0.82017	0.39607	0.72395	0.97152	7.9433
	0.80128	99.179	0.86573	5744.3	5746.9	0.82087	0.82041	0.39611	0.72396	0.97152	7.9433
	0.8011	99.[illegible]85	0.86566	5743.7	5746.9	[illegible].82086	[illegible].82064	0.39616	0.72395	0.97151	7.9433
	0.80105	99.182	0.86568	5744.1	5746.7	0.82086	0.82038	0.39621	0.72384	0.97151	7.9433
	0.801	99.179	0.8657	5744.4	5746.4	0.82085	0.82011	0.39627	0.72373	0.97151	7.9433
	0.80116	99.182	0.86579	5745.3	5746.4	0.82089	0.81997	0.39628	0.72376	0.97151	7.9432
	0.80133	99.185	0.86587	5746.1	5746.3	0.82094	0.81983	0.3963	0.72379	0.97151	7.9432
	0.80139	99.183	0.86584	5745.7	5746.4	0.82093	0.82	0.39616	0.72375	0.97151	7.9432
	0.80145	99.182	0.8658	5745.3	5746.5	0.82091	0.82016	0.39603	0.72372	0.97151	7.9433
	0.8017	99.185	0.86581	57[illegible].4	5746.5	0.82091	0.82015	0.39607	0.72371	0.97151	7.9433
	0.801[illegible]	99.189	0.86581	57[illegible].5	5746.6	0.82091	0.82014	0.39611	0.72371	0.97151	7.9433
	0.[illegible]126	99.185	0.8657[illegible]	5744.8	5746.6	0.82093	0.82019	0.39619	0.72374	0.97151	7.9433
	0.80076	99.181	0.86[illegible]	5744.2	5746.7	0.82096	0.82[illegible]24	0.39627	0.72378	0.97151	7.9433
	0.8012	99.188	0.865[illegible]8	5745	5746.6	0.82095	0.82	0.39628	0.72377	0.97151	7.9433
	[illegible].80124	99.195	0.8658[illegible]	5745.[illegible]	5746.5	0.82095	0.81975	0.39629	0.72377	0.97151	7.9432
	[illegible]80204	99.2	0.86588	5745.7	5746.7	0.82098	0.81997	0.39618	0.7238	0.97151	7.9432
	[illegible].80244	99.201	0.86587	5745.6	574[illegible]	0.82101	0.82019	0.39608	0.72382	0.97151	7.9433
	0.80241	99.20[illegible]	0.86586	5745.8	5746.7	0.82103	0.82023	0.39605	0.72382	0.97151	7.943
	[illegible].80239	99.198	0.86586	5745.9	5746.5	0.82104	0.82028	0.39603	0.72382	[illegible].97151	7.9428
	0.80199	99.192	0.86584	57[illegible]7	5746.5	0.82106	0.82022	0.3961	0.72387	0.97151	7.9428
	0.[illegible]	99.187	0.86582	5745.5	5746.6	0.82108	0.82007	0.39618	0.72392	0.97151	7.9428
	0.80147	99.186	0.86584	5745.8	5746.4	0.82109	0.81982	0.39618	0.72393	0.97151	7.943
	0.80135	99.186	0.86586	5746.1	5746.3	0.8211	0.81957	0.39621	0.72394	0.97151	7.9432
	0.80122	99.186	0.86586	574[illegible]	5746.7	0.82101	0.81977	0.39619	0.72397	0.97151	7.9432
	0.80109	99.187	0.86586	5745.2	5747.2	0.82093	0.81997	0.39616	0.72401	0.97151	[illegible].9432
	0.80133	99.189	0.86584	5745	5747.2	0.82094	0.82013	0.39617	0.72388	0.97151	7.9432
	0.80157	99.191	[illegible].86582	5744.9	574[illegible].1	0.82095	0.82028	0.39617	0.72376	0.97151	7.9433
	0.80165	99.194	0.86579	5744.9	5746.[illegible]	0.8[illegible]	0.82004	0.39617	0.72378	[illegible].97151	7.9433
	0.80173	99.198	0.865[illegible]7	5744.9	5746.7	0.82097	0.8198	0.39616	0.7238	0.97151	7.9433
	0.80168	99.198	0.86586	5745.6	5746.8	0.82095	0.82008	0.39612	0.72379	0.97151	7.9433
	0.80163	99.198	0.86596	5746.4	5747	0.82094	0.82035	0.39609	0.72377	0.97151	7.9433
	0.80193	99.201	0.86595	5746.6	5746.8	0.82101	0.82044	0.39611	[illegible].72382	0.97151	7.9433
	[illegible].80222	[illegible].204	0.86595	5746.8	5746.5	0.82108	0.82053	0.39613	0.72388	0.97151	7.9432
	0.8021[illegible]	[illegible].195	0.86587	5745.9	5746.6	0.82102	0.82055	0.39617	0.72383	0.97151	7.9432
	[illegible].8021[illegible]	99.187	0.86579	5745.1	5746.8	0.82096	0.92066	0.39621	0.72377	0.97151	7.9432
	0.8[illegible]165	99.187	0.865[illegible]8	5745.3	5746.4	0.82093	0.9203	0.39624	0.72374	0.97151	7.9433

D TEMP	CU FL	CU IN T	CU OUT T	MSL PR *	TUR SP *	MC VAC	MC TEMP	MWE *
99.809	34.727	528.62	395.53	0.94169	0.81949	28.31988	97.881	0.71681
99.806	34.727	528.62	395.53	0.9417	0.81955	28.3197	97.883	0.71685
99.803	34.727	528.62	395.53	0.9417	0.8196	28.31955	97.885	0.71689
99.801	34.723	528.61	395.53	0.9417	0.81956	28.31937	97.888	0.71684
99.798	34.72	528.61	395.53	0.94169	0.81952	28.31919	97.89	0.71679
99.795	34.723	528.61	395.53	0.9417	0.81954	28.31904	97.892	0.71681
99.793	34.726	528.61	395.53	0.9417	0.81956	28.31889	97.894	0.71683
99.79	34.722	528.61	395.53	0.9417	0.81958	28.31871	97.896	0.71683
99.788	34.717	528.61	395.53	0.[illegible]	[illegible].8196	28.31853	97.899	0.71682
99.785	34.716	528.61	395.53	0.9417	0.81961	28.31832	97.901	0.71683
99.783	34.715	528.61	395.53	0.9417	0.81962	28.31814	97.904	0.71684
99.781	34.718	528.61	395.53	0.9417	0.8196	28.31799	97.905	0.71682
99.779	34.722	528.61	395.53	0.9417	0.81958	28.31787	97.907	0.71681
99.777	34.725	528.61	395.53	0.9417	0.81957	28.31769	97.909	0.7168
99.775	34.727	528.61	395.53	0.9417	0.81956	28.31748	97.913	0.71679
99.773	34.727	528.61	395.53	0.9417	0.81959	28.3173	97.915	0.71679
99.771	34.719	528.61	395.53	0.9417	0.81961	28.31709	[illegible]17	0.71678
99.77	34.72	528.61	395.53	0.9417	0.81961	28.317	97.918	0.71678
99.768	34.722	528.61	395.53	0.9417	0.81961	28.31688	97.92	0.71678
99.767	34.72	528.61	395.53	0.9417	0.81962	28.31664	97.923	0.71678
99.766	34.719	528.61	395.53	0.9417	0.81964	28.31643	97.926	0.71678
99.765	34.723	528.61	395.53	0.9417	0.81961	28.31631	97.927	0.71677
99.763	34.727	528.61	395.53	0.9417	0.81959	28.31622	97.929	0.71675
99.763	34.724	528.61	395.53	0.9417	0.81961	28.31598	97.931	0.71676
99.762	34.721	528.61	395.53	0.9417	0.81963	28.31574	97.935	0.71677
99.761	34.719	528.61	395.53	0.9417	0.81962	28.31556	97.937	0.71674
99.76	34.716	528.61	395.53	0.9417	0.81961	28.31538	97.939	0.71671
99.76	34.72	528.61	395.53	0.9417	0.81963	28.31523	97.941	0.71673
99.759	34.723	528.61	395.53	0.9417	0.81965	28.31508	97.943	0.71676
99.759	34.727	528.61	395.53	0.9417	0.81963	28.31493	97.944	0.71675
99.759	34.731	528.61	395.53	0.9417	0.81962	28.31478	97.946	0.71673
99.759	34.73	528.61	395.53	0.9417	0.81962	28.3146	97.949	0.71672
99.758	34.728	528.61	395.53	0.9417	0.81962	28.31445	97.951	0.7167
99.759	34.724	528.61	395.53	0.9417	0.81962	28.3143	97.953	0.71669
99.759	34.719	528.61	395.53	0.9417	0.81962	28.31415	97.955	0.71668
99.759	34.723	528.61	395.53	0.9417	0.81964	28.31397	97.957	0.71671
99.759	34.728	528.61	395.53	0.9417	0.81966	28.31382	97.959	0.71674
99.76	34.723	528.61	395.53	0.9417	0.81966	28.31364	97.961	0.71671
99.76	34.717	528.61	395.53	0.9417	0.81966	28.31346	97.963	0.71668
99.76	34.716	528.61	395.53	0.9417	0.8197	28.31328	97.965	0.7167
99.761	34.715	528.61	395.53	0.9417	0.81974	28.31313	97.968	0.71672
99.762	34.715	528.61	395.53	0.9417	0.81966	28.31292	97.97	0.71666
99.762	34.715	528.61	395.53	0.9417	0.81958	28.31271	97.972	0.71659
99.763	34.719	528.61	395.53	0.9417	0.8196	28.31262	97.974	0.71661

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0.80117	99.186	0.86577	5745.4	5746.1	0.82091	0.82004	0.39627	0.72372	0.97151	7.9433
0.80158	99.189	0.86583	5745.7	5746.4	0.82095	0.82009	0.39623	0.72377	0.97151	7.9433
0.80198	99.193	0.8659	5746	5746.7	0.82099	0.82014	0.39619	0.72382	0.97151	7.9432
0.80186	99.197	0.86591	5745.1	5745.7	0.82103	0.82016	0.39614	0.72383	0.97151	7.9432
0.80174	99.201	0.86592	5746.2	5746.7	0.82106	0.82019	0.39609	0.72384	0.97151	7.9432
0.80213	99.2	0.86588	5745.7	5746.9	0.82104	0.82036	0.39612	0.72386	0.97151	7.943
0.80252	99.198	0.86584	5745.2	5747.1	0.82102	0.82053	0.39614	0.72388	0.97151	7.9429
0.80231	99.202	0.86585	5745.5	5746.9	0.82102	0.82033	0.39613	0.72387	0.97151	7.9429
0.80209	99.205	0.86587	5745.8	5746.8	0.82101	0.82013	0.39611	0.72386	0.97151	7.9429
0.8017	99.209	0.86591	5746.4	5746.7	0.82097	0.81992	0.39613	0.72393	0.97151	7.9431
0.80131	99.213	0.86596	5747	5746.5	0.82094	0.81972	0.39614	0.724	0.97151	7.9433
0.80159	99.208	0.86599	5747.1	5746.6	0.82093	0.81988	0.39611	0.724	0.97151	7.9432
0.80187	99.202	0.86601	5747.3	5746.7	0.82092	0.82004	0.39607	0.724	0.97151	7.9432
0.80196	99.207	0.86599	5746.8	5746.9	0.82098	0.82015	0.39611	0.72392	0.97151	7.9432
0.80205	99.211	0.86596	5746.3	5747.2	0.82103	0.82026	0.39614	0.72385	0.97151	7.9432
0.80228	99.212	0.8659	5746	5746.9	0.821	0.82008	0.39616	0.72382	0.97151	7.9433
0.80251	99.213	0.86584	5745.8	5746.6	0.82097	0.81989	0.39619	0.72379	0.97151	7.9433
0.80234	99.211	0.86589	5746.1	5746.7	0.82098	0.82013	0.3962	0.7238	0.97151	7.9433
0.80217	99.209	0.86594	5746.4	5746.8	0.82098	0.82036	0.39621	0.72381	0.97151	7.9432
0.8021	99.213	0.86598	5746.6	5747	0.82099	0.8204	0.39617	0.72381	0.97151	7.9432
0.80203	99.217	0.86601	5746.9	5747.1	0.821	0.82044	0.39613	0.72382	0.97151	7.9432
0.80222	99.216	0.86598	5746.7	5746.9	0.82105	0.82029	0.39613	0.72384	0.97151	7.9432
0.8024	99.212	0.86595	5746.5	5746.8	0.82109	0.82015	0.39613	0.72386	0.97151	7.9432
0.80212	99.208	0.86589	5746.1	5746.7	0.82106	0.82019	0.39615	0.72383	0.97151	7.9433
0.80183	99.204	0.86582	5745.6	5746.6	0.82102	0.82023	0.39618	0.7238	0.97151	7.9433
0.80174	99.204	0.86585	5745.7	5746.7	0.82099	0.8204	0.39619	0.72379	0.97151	7.9433
0.80164	99.203	0.86598	5745.9	5746.8	0.82096	0.82058	0.3962	0.72378	0.97151	7.9433
0.80132	99.209	0.86597	5746.7	5746.8	0.82103	0.82021	0.39616	0.72384	0.97151	7.9432
0.80101	99.215	0.86606	5747.6	5746.8	0.8211	0.81984	0.39613	0.72389	0.97151	7.9432
0.80166	99.216	0.86601	5747	5747	0.82111	0.82015	0.39611	0.72393	0.97151	7.943
0.80231	99.218	0.86596	5746.4	5747.2	0.82113	0.82046	0.39609	0.72396	0.97151	7.9428
0.8021	99.219	0.86594	5746.4	5747	0.82116	0.82036	0.39613	0.72399	0.97151	7.9428
0.80189	99.219	0.86592	5746.4	5746.8	0.8212	0.82027	0.39618	0.72402	0.97151	7.9428
0.80198	99.212	0.86589	5746.9	5747	0.82106	0.82026	0.39618	0.72402	0.97151	7.9431
0.80208	99.205	0.86585	5745.3	5747.2	0.82092	0.82026	0.39619	0.72401	0.97151	7.9433
0.80177	99.216	0.86595	5746.2	5747.2	0.82097	0.82031	0.39616	0.72406	0.97151	7.9432
0.80146	99.227	0.86604	5747	5747.2	0.82102	0.82035	0.39612	0.72411	0.97151	7.9432
0.80189	99.221	0.86597	5746.5	5747.1	0.82102	0.82039	0.39615	0.72397	0.9715	7.9432
0.80232	99.214	0.8659	5745.9	5747	0.82103	0.82043	0.39617	0.72384	0.9715	7.9433
0.80208	99.217	0.86591	5746.1	5747	0.82105	0.82036	0.39619	0.72385	0.9715	7.9433
0.80183	99.22	0.86592	5746.3	5746.9	0.82107	0.8203	0.39621	0.72386	0.9715	7.9433
0.80141	99.221	0.86594	5746.7	5746.7	0.82105	0.82028	0.3962	0.72385	0.9715	7.9433
0.80098	99.222	0.86596	5747.1	5746.4	0.82103	0.82027	0.39618	0.72385	0.9715	7.9433
0.80152	99.222	0.86603	5747.2	5746.9	0.82106	0.82029	0.39616	0.72388	0.9715	7.9433
0.80206	99.221	0.8661	5747.3	5747.4	0.82108	0.82031	0.39614	0.72387	0.9715	7.9432
0.80228	99.216	0.86603	5746.7	5747.4	0.82108	0.82037	0.39611	0.72386	0.9715	7.9432
0.8025	99.211	0.86596	5746.2	5747.3	0.82109	0.82043	0.39609	0.72385	0.9715	7.9433
0.80214	99.213	0.86597	5746.3	5747.3	0.82109	0.82052	0.39613	0.72386	0.9715	7.9433
0.80178	99.215	0.86598	5746.3	5747.4	0.82108	0.82061	0.39617	0.72387	0.9715	7.9433
0.80198	99.216	0.86598	5746.4	5747.3	0.82107	0.82044	0.39618	0.72386	0.9715	7.9433
0.80218	99.217	0.86598	5746.5	5747.2	0.82106	0.82027	0.39619	0.72385	0.9715	7.9433
0.80186	99.22	0.866	5746.9	5747	0.82108	0.82043	0.39619	0.72388	0.9715	7.9433
0.80154	99.223	0.86602	5747.3	5746.8	0.82111	0.82059	0.39613	0.72392	0.9715	7.9432
0.80147	99.222	0.866	5747.3	5746.6	0.82117	0.82063	0.39613	0.72398	0.9715	7.943
0.8014	99.221	0.86598	5747.4	5746.4	0.82123	0.82066	0.39609	0.72404	0.9715	7.9428
0.80184	99.22	0.86599	5747.3	5746.6	0.82118	0.82052	0.39611	0.724	0.9715	7.9429

99.764	34.722	528.61	395.53	0.9417	0.81961	28.31253	97.975	0.71633
99.765	34.722	528.61	395.53	0.9417	0.81962	28.31244	97.976	0.71663
99.766	34.721	528.61	395.53	0.9417	0.81962	28.31235	97.977	0.71662
99.767	34.721	528.61	395.53	0.9417	0.81963	28.31211	97.98	0.71669
99.768	34.721	528.61	395.53	0.9417	0.81964	28.3119	97.983	0.71663
99.769	34.718	528.61	395.53	0.9417	0.81964	28.31178	97.985	0.71661
99.77	34.718	528.61	395.53	0.9417	0.81964	28.31165	97.986	0.7166
99.771	34.719	528.61	395.53	0.9417	0.81962	28.31148	97.988	0.71659
99.773	34.722	528.61	395.53	0.9417	0.81961	28.3113	97.991	0.71657
99.774	34.726	528.61	395.53	0.9417	0.81964	28.31118	97.992	0.7166
99.775	34.729	528.61	395.53	0.9417	0.81967	28.31109	97.994	0.71663
99.777	34.729	528.61	395.53	0.9417	0.81965	28.31085	97.997	0.7166
99.778	34.729	528.61	395.53	0.9417	0.81963	28.31061	97.999	0.71657
99.779	34.725	528.61	395.53	0.9417	0.81967	28.31052	98.001	0.7166
99.781	34.722	528.61	395.53	0.9417	0.81971	28.3104	98.002	0.71664
99.782	34.725	528.61	395.53	0.9417	0.8197	28.31022	98.004	0.71663
99.784	34.728	528.61	395.53	0.9417	0.81969	28.31004	98.007	0.71661
99.785	34.723	528.61	395.53	0.9417	0.81967	28.30989	98.008	0.71658
99.787	34.718	528.61	395.53	0.9417	0.81966	28.30977	98.01	0.71655
99.789	34.718	528.61	395.53	0.9417	0.81966	28.30962	98.012	0.71654
99.79	34.719	528.61	395.53	0.9417	0.81967	28.30947	98.014	0.71654
99.792	34.72	528.61	395.53	0.9417	0.81967	28.30932	98.016	0.71654
99.793	34.722	528.61	395.53	0.9417	0.81967	28.30917	98.018	0.71653
99.795	34.721	528.61	395.53	0.9417	0.81967	28.30902	98.02	0.71653
99.797	34.72	528.61	395.53	0.9417	0.81967	28.30887	98.022	0.71652
99.798	34.717	528.61	395.53	0.9417	0.81965	28.30878	98.023	0.7165
99.8	34.715	528.61	395.53	0.9417	0.81963	28.30869	98.024	0.71649
99.802	34.721	528.61	395.53	0.9417	0.81966	28.30857	98.026	0.71651
99.803	34.727	528.61	395.53	0.9417	0.81968	28.30845	98.027	0.71654
99.805	34.721	528.61	395.53	0.9417	0.81968	28.30827	98.029	0.71652
99.807	34.716	528.61	395.53	0.9417	0.81968	28.30812	98.031	0.71649
99.809	34.719	528.61	395.53	0.9417	0.81973	28.30797	98.033	0.71654
99.811	34.723	528.61	395.53	0.94171	0.81978	28.30779	98.035	0.71659
99.812	34.722	528.61	395.53	0.9417	0.81975	28.30761	98.038	0.71656
99.814	34.721	528.61	395.53	0.9417	0.81972	28.30743	98.04	0.71653
99.816	34.722	528.61	395.53	0.9417	0.81974	28.30737	98.041	0.71654
99.817	34.723	528.61	395.53	0.9417	0.81976	28.30731	98.041	0.71654
99.819	34.721	528.61	395.53	0.9417	0.81973	28.3071	98.044	0.71651
99.821	34.72	528.61	395.53	0.9417	0.8197	28.30686	98.047	0.71648
99.823	34.721	528.61	395.53	0.9417	0.81972	28.30683	98.047	0.7165
99.825	34.721	528.61	395.53	0.94171	0.81975	28.3068	98.048	0.71651
99.827	34.721	528.61	395.53	0.9417	0.81975	28.30659	98.051	0.71651
99.828	34.721	528.61	395.53	0.9417	0.81975	28.30635	98.054	0.71651
99.83	34.721	528.61	395.53	0.9417	0.81975	28.30626	98.055	0.7165
99.832	34.721	528.61	395.53	0.9417	0.81976	28.30617	98.056	0.71649
99.834	34.719	528.61	395.53	0.9417	0.81973	28.30602	98.058	0.71647
99.836	34.716	528.61	395.53	0.9417	0.81972	28.30584	98.06	0.71645
99.838	34.716	528.61	395.53	0.9417	0.81973	28.30578	98.061	0.71645
99.84	34.716	528.61	395.53	0.9417	0.81974	28.30572	98.062	0.71645
99.841	34.718	528.61	395.53	0.9417	0.81973	28.30554	98.064	0.71645
99.843	34.721	528.61	395.53	0.9417	0.81972	28.30533	98.067	0.71645
99.845	34.718	528.61	395.53	0.9417	0.81972	28.30524	98.068	0.71644
99.847	34.715	528.61	395.53	0.9417	0.81972	28.30515	98.069	0.71643
99.848	34.716	528.61	395.53	0.94171	0.81977	28.305	98.071	0.71647
99.85	34.717	528.61	395.53	0.94171	0.81982	28.30488	98.073	0.71651
99.852	34.718	528.61	395.53	0.94171	0.81973	28.3047	98.075	0.71649

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0.80227	99.219	0.86601	5747.2	5746.8	0.82113	0.82038	0.39613	0.72397	0.9715	7.9429
0.80195	99.221	0.86606	5747.4	5747.1	0.82111	0.82036	0.39615	0.72405	0.9715	7.9431
0.80164	99.224	0.8661	5747.5	5747.3	0.82109	0.82034	0.39617	0.72414	0.9715	7.9432
0.80176	99.225	0.86607	5747.3	5747.2	0.82105	0.82028	0.39618	0.7241	0.9715	7.9432
0.80187	99.225	0.86603	5747.1	5747	0.82102	0.82021	0.39619	0.72407	0.9715	7.9432
0.80214	99.23	0.86603	5746.9	5747.3	0.82107	0.82035	0.39617	0.724	0.9715	7.9433
0.8024	99.234	0.86604	5746.7	5747.6	0.82112	0.82049	0.39615	0.72393	0.9715	7.9433
0.80235	99.237	0.86602	5746.5	5747.7	0.8211	0.82016	0.39618	0.7239	0.9715	7.9433
0.8023	99.24	0.86599	5746.2	5747.7	0.82107	0.81983	0.3962	0.72388	0.9715	7.9433
0.8019	99.243	0.86606	5746.6	5748	0.82111	0.81986	0.39622	0.72391	0.9715	7.9433
0.80149	99.245	0.86613	5747	5748.2	0.82116	0.81989	0.39624	0.72394	0.9715	7.9433
0.80164	99.238	0.86613	5747.2	5748	0.82115	0.82001	0.39622	0.72394	0.9715	7.9432
0.80179	99.23	0.86613	5747.4	5747.7	0.82114	0.82013	0.3962	0.72394	0.9715	7.9432
0.80174	99.226	0.8661	5747	5747.8	0.82115	0.82036	0.3962	0.72393	0.9715	7.9432
0.8017	99.221	0.86606	5746.7	5747.8	0.82117	0.82059	0.39619	0.72393	0.9715	7.9432
0.80211	99.23	0.86607	5746.6	5748.1	0.82118	0.820"2	0.39618	0.72393	0.9715	7.9433
0.80253	99.238	0.86608	5746.4	5748.4	0.82118	0.82044	0.39618	0.72393	0.9715	7.9433
0.80228	99.236	0.86612	5747	[illegible]	0.82121	0.82042	0.39617	0.72396	0.9715	7.9433
0.80204	99.233	0.86616	5747.6	[illegible]	0.82123	0.82041	0.39616	0.724	0.9715	7.9432
0.80205	99.236	0.86619	5747.7	[illegible]	0.82123	0.82051	0.39612	0.724	0.9715	7.943
0.80205	99.24	0.86621	5747.9	5748.1	0.82123	0.8206	0.39609	0.724	0.9715	7.9428
0.80191	99.237	0.86618	5747.4	5748.3	0.82124	0.82073	0.39605	0.72403	0.9715	7.9429
0.80178	99.235	0.86615	5747	5748.5	0.82124	0.82086	0.39602	0.72405	0.9715	7.9428
0.80166	99.235	0.86611	5747	5748.1	0.82121	0.82072	0.39609	0.72404	0.9715	7.9429
0.80153	99.234	0.86607	5747	5747.6	0.8212	0.82057	0.39616	0.72402	0.9715	7.9429
0.80156	99.232	0.86608	5747.2	5747.5	0.82114	0.8204	0.39621	0.72408	0.9715	7.9431
0.80159	99.23	0.86609	5747.4	5747.4	0.82109	0.82022	0.39626	0.72414	0.9715	7.9432
0.80203	99.236	0.86612	5747.4	5747.7	0.82111	0.82041	0.3962	0.72416	0.9715	7.9433
0.80246	99.242	0.86615	5747.4	5748	0.82113	0.8206	0.39616	0.72417	0.9715	7.9433
0.80251	99.245	0.86614	5747.4	5747.9	0.82114	0.8204	0.39615	0.72405	0.9715	7.9433
0.80277	99.247	0.86614	5747.4	5747.9	0.82115	0.82019	0.39615	0.72393	0.9715	7.9433
0.80301	99.238	0.86603	5746.7	5748.1	0.82112	0.82044	0.39615	0.72391	0.9715	7.9433
0.80326	99.229	0.86602	5745.9	5748.3	0.82109	0.8207	0.39615	0.72389	0.9715	7.9433
0.80266	99.235	0.86606	5746.4	5748.2	0.82112	0.82053	0.39619	0.72392	0.9715	7.9433
0.80206	99.242	0.8661	5746.9	5748.1	0.82116	0.82036	0.39623	0.72396	0.9715	7.9433
0.80214	99.246	0.86618	5747.4	5748.3	0.8212	0.82016	0.39617	0.72398	0.9715	7.9432
0.80223	99.25	0.86625	5747.9	5748.5	0.82125	0.81996	0.39612	0.72401	0.9715	7.9432
0.80256	99.246	0.86618	5747.5	5748.3	0.82124	0.82015	0.39611	0.72399	0.9715	7.9432
0.80289	99.242	0.86611	5747	5748.1	0.82123	0.82033	0.3961	0.72397	0.9715	7.9433
0.8028	99.246	0.86609	5747	5748	0.82125	0.82019	0.39612	0.72399	0.9715	7.9433
0.80232	99.25	0.86607	5746.9	5747.9	0.82128	0.82005	0.39614	0.724	0.9715	7.9433
0.80238	99.245	0.86605	5746.7	5747.8	0.82124	0.82025	0.39617	0.72399	0.9715	7.9433
0.80243	99.24	0.86601	5746.5	5747.8	0.82119	0.82043	0.3962	0.72398	0.9715	7.9432
0.80246	99.238	0.8661	5747.3	5747.7	0.82121	0.82037	0.39619	0.72401	0.9715	7.9418
0.80249	99.237	0.86617	5748	5747.6	0.82124	0.82026	0.39617	0.72404	0.9715	7.9403
0.80211	99.239	0.86615	5747.6	5747.8	0.82123	0.82052	0.39611	0.72405	0.9715	7.9416
0.80172	99.241	0.86614	5747.2	5748	0.82122	0.82078	0.39604	0.72406	0.9715	7.9428
0.80203	99.243	0.86614	5747.2	5748	0.8212	0.82058	0.39606	0.72412	0.9715	7.9431
0.80234	99.245	0.86614	5747.3	5748.1	0.82117	0.82037	0.39608	0.72419	0.9715	7.9433
0.80201	99.245	0.86603	5747	5747.8	0.82112	0.82022	0.39617	0.72416	0.9715	7.9433
0.80168	99.244	0.86592	5746.2	5747.5	0.82108	0.82007	0.39626	0.72414	0.9715	7.9432
0.80176	99.243	0.86609	5747.4	5747.5	0.82109	0.82019	0.39619	0.72403	0.9715	7.9432
0.80185	99.242	0.86626	5748	5747.6	0.8211	0.8203	0.39612	0.72391	0.9715	7.9433
0.80193	99.241	0.86613	5747.6	5747.7	0.82111	0.82037	0.39617	0.72392	0.9715	7.9433
0.80201	99.24	0.8661	5747.3	5747.7	0.82111	0.82044	0.39622	0.72392	0.9715	7.9433
0.80183	99.238	0.86609	5747.2	5747.7	0.82112	0.82045	0.39622	0.72392	0.9715	7.9436

99.854	34.72	528.61	395.52	0.9417	0.81976	28.30455	98.077	0.71646
99.855	34.722	528.61	395.52	0.94171	0.8198	28.30437	98.079	0.71649
99.857	34.724	528.61	395.52	0.94171	0.81983	28.30422	98.081	0.71651
99.859	34.725	528.61	395.52	0.94171	0.81978	28.30407	98.083	0.71646
99.861	34.726	528.61	395.52	0.9417	0.81973	28.30392	98.085	0.71641
99.862	34.722	528.61	395.52	0.94171	0.81979	28.30386	98.086	0.71645
99.864	34.719	528.61	395.52	0.94171	0.81985	28.30377	98.087	0.71649
99.866	34.724	528.61	395.52	0.94171	0.81981	28.30359	98.089	0.71646
99.868	34.73	528.61	395.52	0.94171	0.81978	28.30341	98.091	0.71643
99.869	34.73	528.61	395.52	0.94171	0.81981	28.30329	98.093	0.71646
99.871	34.73	528.61	395.52	0.94171	0.81985	28.30317	98.095	0.7165
99.873	34.727	528.61	395.52	0.94171	0.81983	28.30296	98.097	0.71646
99.875	34.725	528.61	395.52	0.94171	0.81981	28.30275	98.1	0.71643
99.876	34.721	528.61	395.52	0.94171	0.81979	28.30269	98.1	0.7164
99.878	34.716	528.61	395.52	0.94171	0.81978	28.30263	98.101	0.71638
99.88	34.719	528.61	395.52	0.94171	0.81981	28.30248	98.103	0.7164
99.882	34.721	528.61	395.52	0.94171	0.81983	28.3023	98.106	0.71641
99.883	34.721	528.61	395.52	0.94171	0.81983	28.30218	98.107	0.71641
99.885	34.722	528.61	395.52	0.94171	0.81982	28.30206	98.109	0.71642
99.887	34.719	528.61	395.52	0.94171	0.81982	28.30188	98.111	0.7164
99.888	34.717	528.61	395.52	0.94171	0.81981	28.3017	98.114	0.71637
99.89	34.715	528.61	395.52	0.94171	0.81985	28.30155	98.115	0.71641
99.892	34.713	528.61	395.52	0.94171	0.81989	28.30143	98.117	0.71644
99.894	34.715	528.61	395.52	0.94171	0.81986	28.30128	98.119	0.71641
99.896	34.717	528.61	395.52	0.94171	0.81983	28.3011	98.121	0.71638
99.897	34.722	528.61	395.52	0.94171	0.81983	28.30098	98.122	0.71639
99.899	34.727	528.61	395.52	0.94171	0.81983	28.30089	98.124	0.7164
99.901	34.723	528.61	395.52	0.94171	0.81986	28.30077	98.125	0.71641
99.903	34.72	528.61	395.53	0.94171	0.81989	28.30065	98.126	0.71641
99.904	34.723	528.61	395.52	0.94171	0.81988	28.30047	98.129	0.7164
99.906	34.725	528.61	395.52	0.94171	0.81987	28.30026	98.131	0.71638
99.908	34.72	528.61	395.52	0.94171	0.81985	28.30014	98.133	0.71636
99.91	34.715	528.61	395.52	0.94171	0.81985	28.30002	98.135	0.71635
99.911	34.718	528.61	395.52	0.94171	0.81992	28.29993	98.136	0.71632
99.913	34.721	528.61	395.53	0.94171	0.81979	28.29984	98.137	0.7163
99.915	34.724	528.61	395.52	0.94171	0.81982	28.29969	98.139	0.71633
99.916	34.726	528.61	395.52	0.94171	0.81986	28.29954	98.141	0.71635
99.918	34.725	528.61	395.52	0.94171	0.81985	28.29933	98.144	0.71633
99.92	34.723	528.61	395.52	0.94171	0.81983	28.29912	98.147	0.71631
99.922	34.724	528.61	395.52	0.94171	0.81985	28.299	98.148	0.71633
99.923	34.726	528.61	395.52	0.94171	0.81988	28.29891	98.149	0.71634
99.925	34.722	528.61	395.52	0.94171	0.81983	28.29876	98.151	0.71629
99.927	34.718	528.61	395.52	0.94171	0.81978	28.29861	98.153	0.71624
99.929	34.72	528.61	395.52	0.94171	0.81979	28.29855	98.154	0.71625
99.93	34.723	528.61	395.52	0.94171	0.8198	28.29846	98.155	0.71626
99.932	34.719	528.61	395.52	0.94171	0.81982	28.29831	98.157	0.71626
99.934	34.7[illegible]	528.61	395.52	0.94171	0.81983	28.29813	98.159	0.71626
99.936	34.718	528.61	395.52	0.94171	0.81987	28.29801	98.16	0.71629
99.937	34.721	528.61	395.52	0.94171	0.81991	28.29789	98.162	0.71632
99.939	34.725	528.61	395.52	0.94[illegible]	0.81985	28.29771	98.164	0.71628
99.941	34.73	528.61	395.52	[illegible]	0.81979	28.2975	98.167	0.71623
99.943	34.725	528.61	395.52	0.94171	0.81981	28.29744	98.168	0.71623
99.944	34.721	528.61	395.52	0.94171	0.81992	28.29738	98.168	0.71622
99.946	34.72	528.61	395.52	0.94171	0.81982	28.29723	98.17	0.71622
99.948	34.72	528.61	395.52	0.94171	0.81982	28.29708	98.173	0.71622
99.949	34.72	528.61	395.52	0.94171	0.81982	28.29693	98.174	0.71621

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0.80166	99.236	0.86608	5747.1	5747.6	0.82113	0.82047	0.39623	0.72392	0.9715	7.9439
0.80175	99.24	0.86607	5747	5747.6	0.82115	0.82052	0.39628	0.72393	0.9715	7.9436
0.80185	99.243	0.86606	5747	5747.6	0.82117	0.82056	0.39633	0.72395	0.9715	7.9432
0.80215	99.246	0.86613	5747.5	5747.8	0.82122	0.82055	0.39622	0.72398	0.9715	7.9433
0.80245	99.25	0.86619	5748	5747.9	0.82126	0.82055	0.39612	0.72401	0.9715	7.9433
0.80246	99.243	0.86612	5747.4	5747.8	0.82121	0.82048	0.39614	0.72396	0.9715	7.9433
0.80248	99.235	0.86604	5746.8	5747.6	0.82117	0.82041	0.39615	0.72391	0.9715	7.9433
0.80217	99.247	0.86608	5746.9	5748	0.82123	0.82042	0.39613	0.72397	0.9715	7.9433
0.80186	99.258	0.86612	5746.9	5748.3	0.82129	0.82043	0.39612	0.72403	0.9715	7.9432
0.80187	99.25	0.86606	5746.7	5748	0.82123	0.82037	0.39616	0.72399	0.9715	7.9431
0.80188	99.242	0.866	5746.4	5747.6	0.82118	0.8203	0.3962	0.72395	0.9715	7.9429
0.80178	99.247	0.86607	5746.9	5747.7	0.82121	0.82013	0.3962	0.72401	0.9715	7.9428
0.80168	99.251	0.86614	5747.5	5747.8	0.82124	0.81997	0.3962	0.72407	0.9715	7.9428
0.80185	99.247	0.86609	5747	5747.8	0.82121	0.82006	0.39613	0.72403	0.9715	7.943
0.80202	99.243	0.86604	5746.6	5747.8	0.82119	0.82015	0.39607	0.72399	0.9715	7.9432
0.80193	99.249	0.86608	5746.8	5748	0.82116	0.82032	0.39606	0.72408	0.9715	7.9433
0.80197	99.254	0.86613	5747	5748.3	0.82113	0.82049	0.39605	0.72416	0.9715	7.9433
0.80198	99.253	0.86618	5747.1	5748.7	0.82115	0.82056	0.39601	0.72417	0.9715	7.9433
0.80198	99.252	0.86623	5747.2	5749.1	0.82116	0.82064	0.39598	0.72418	0.9715	7.9433
0.80191	99.252	0.86619	5747.5	5748.4	0.82115	0.82053	0.39609	0.72407	0.9715	7.9433
0.80182	99.253	0.86616	5747.8	5747.7	0.82115	0.82042	0.39621	0.72396	0.9715	7.9432
0.80216	99.252	0.86612	5747	5748.2	0.82119	0.82041	0.39617	0.72397	0.9715	7.9433
0.80254	99.251	0.86608	5746.2	5748.6	0.82123	0.82039	0.39614	0.72398	0.97151	7.9433
0.80254	99.252	0.86607	5746.3	5748.5	0.82123	0.82051	0.3962	0.72398	0.97151	7.9433
0.80255	99.254	0.86606	5746.3	5748.3	0.82123	0.82063	0.39626	0.72399	0.97151	7.9433
0.80235	99.251	0.8661	5746.7	5749.3	0.82121	0.82063	0.39622	0.72398	0.9715	7.9433
0.80216	99.253	0.86615	5747.1	5749.4	0.82119	0.82062	0.39618	0.72397	0.9715	7.9433
0.80226	99.255	0.86618	5747.4	5748.4	0.82124	0.82039	0.39616	0.72399	0.9715	7.9433
0.80235	99.257	0.86622	5747.7	5748.5	0.82129	0.82016	0.39613	0.72402	0.97151	7.9433
0.80247	99.256	0.8662	5747.6	5748.4	0.82128	0.82024	0.39607	0.72401	0.9715	7.9432
0.80259	99.254	0.86619	5747.4	5748.3	0.82137	0.82031	0.396	0.724	0.9715	7.9432
0.8024	99.245	0.86614	5747.1	5748.3	0.82126	0.82054	0.39607	0.72399	0.9715	7.9433
0.80221	99.236	0.86611	5746.8	5748.3	0.82124	0.82076	0.39615	0.72399	0.97151	7.9433
0.80238	99.236	0.86611	5747.1	5748	0.82123	0.82058	0.39617	0.72399	0.97151	7.9431
0.80255	99.235	0.86612	5747.4	5747.8	0.82122	0.8204	0.39619	0.72393	0.97151	7.9429
0.80223	99.248	0.86618	5747.6	5748.1	0.82125	0.82035	0.39619	0.72405	0.97151	7.9428
0.80203	99.26	0.86624	5747.9	5748.4	0.82129	0.8203	0.3962	0.72411	0.97151	7.9438
0.80214	99.258	0.86621	5747.7	5748.1	0.82132	0.82033	0.39616	0.72412	0.97151	7.943
0.80225	99.257	0.86617	5747.6	5748.1	0.82134	0.82035	0.39612	0.72413	0.97151	7.9432
0.80225	99.262	0.86615	5747	5748.6	0.82129	0.82021	0.39613	0.72418	0.97151	7.9432
0.80225	99.267	0.86613	5746.4	5749	0.82124	0.82008	0.39614	0.72423	0.97151	7.9433
0.80218	99.255	0.86611	5746.3	5748.8	0.82117	0.82025	0.39616	0.72418	0.97151	7.9433
0.8021	99.244	0.86609	5746.3	5748.7	0.82109	0.82045	0.39618	0.72413	0.97151	7.9433
0.80198	99.244	0.8661	5746.6	5748.4	0.82111	0.82037	0.39622	0.72401	0.97151	7.9433
0.80187	99.245	0.86612	5746.9	5748.2	0.82113	0.8203	0.39625	0.72394	0.97151	7.9433
0.80199	99.25	0.86612	5746.9	5748.3	0.82117	0.82013	0.39624	0.72396	0.97151	7.9433
0.80212	99.255	0.86612	5746.8	5748.4	0.82121	0.81995	0.39623	0.72399	0.97151	7.9432
0.80265	99.255	0.86611	5746.6	5748.5	0.82121	0.8204	0.39623	0.72399	0.97151	7.9432
0.80318	99.255	0.86611	5746.4	5748.7	0.82122	0.82085	0.39625	0.72398	0.97151	7.9432
0.8027	99.255	0.86612	5746.5	5748.7	0.82122	0.82048	0.39621	0.72398	0.97151	7.9433
0.80223	99.255	0.86613	5746.7	5748.6	0.82122	0.82012	0.39617	0.72397	0.97151	7.9433
0.80222	99.244	0.86614	5747	5748.3	0.82122	0.82003	0.39617	0.72396	0.97151	7.9433
0.80222	99.233	0.86615	5747.4	5748	0.82121	0.81994	0.39617	0.72394	0.97151	7.9433
0.80222	99.247	0.86614	5746.8	5748.6	0.82125	0.82004	0.39613	0.72399	0.97151	7.9432
0.80223	99.26	0.86614	5746.3	5749.2	0.82129	0.82014	0.39608	0.72404	0.97151	7.9432
0.80205	99.252	0.86613	5746.3	5749	0.82131	0.82026	0.39611	0.72404	0.97151	7.9432

99.951	34.72	528.61	395.52	0.94171	0.81981	28.29681	98.176	0.7162
99.953	34.719	528.61	395.52	0.94171	0.81982	28.29663	98.177	0.71619
99.955	34.718	528.61	395.52	0.94171	0.81983	28.29657	98.179	0.71619
99.956	34.718	528.61	395.52	0.94171	0.81985	28.29642	98.181	0.7162
99.958	34.717	528.61	395.52	0.94171	0.81986	28.29624	98.183	0.71621
99.96	34.719	528.61	395.52	0.94171	0.81984	28.29609	98.185	0.7162
99.962	34.72	528.61	395.53	0.94171	0.81982	28.29594	98.187	0.71618
99.963	34.719	528.61	395.53	0.94171	0.81986	28.29585	98.188	0.7162
99.965	34.719	528.61	395.53	0.94171	0.81989	28.29576	98.189	0.71622
99.967	34.72	528.61	395.53	0.94171	0.81985	28.29555	98.192	0.71618
99.969	34.721	528.61	395.53	0.94171	0.81981	28.29531	98.195	0.71614
99.97	34.725	528.61	395.53	0.94171	0.81982	28.29528	98.195	0.71615
99.972	34.723	528.61	395.53	0.94171	0.81983	28.29522	98.196	0.71617
99.974	34.728	528.61	395.53	0.94171	0.8198	28.29504	98.198	0.71613
99.976	34.723	528.61	395.53	0.94171	0.81977	28.29483	98.201	0.71609
99.977	34.72	528.61	395.53	0.94171	0.81983	28.29474	98.202	0.71613
99.979	34.717	528.61	395.53	0.94171	0.81988	28.29465	98.204	0.71616
99.981	34.72	528.61	395.53	0.94171	0.8199	28.29444	98.206	0.71617
99.983	34.722	528.61	395.53	0.94171	0.81992	28.29423	98.209	0.71618
99.984	34.72	528.61	395.53	0.94171	0.81988	28.29405	98.211	0.71614
99.986	34.719	528.61	395.53	0.94171	0.81985	28.29387	98.213	0.71611
99.988	34.718	528.61	395.53	0.94171	0.81988	28.29378	98.215	0.71612
99.99	34.718	528.61	395.53	0.94171	0.81991	28.29369	98.216	0.71614
99.991	34.718	528.61	395.53	0.94171	0.81989	28.29351	98.218	0.71613
99.993	34.717	528.61	395.53	0.94171	0.81988	28.29333	98.22	0.71612
99.995	34.718	528.61	395.53	0.94171	0.81989	28.29331	98.222	0.71612
99.996	34.718	528.61	395.53	0.94171	0.8199	28.29306	98.223	0.71612
99.998	34.722	528.61	395.53	0.94171	0.81991	28.29288	98.226	0.71613
100	34.726	528.61	395.53	0.94171	0.81992	28.2927	98.228	0.71614
100	34.725	528.61	395.53	0.94171	0.81991	28.29250	98.23	0.71612
100	34.723	528.61	395.53	0.94171	0.81991	28.29246	98.231	0.71611
100.01	34.719	528.61	395.53	0.94171	0.81991	28.29231	98.233	0.7161
100.01	34.715	528.61	395.53	0.94171	0.81991	28.29216	98.235	0.7161
100.01	34.717	528.61	395.53	0.94171	0.81987	28.29204	98.237	0.71607
100.01	34.72	528.61	395.53	0.94171	0.81984	28.29189	98.238	0.71604
100.01	34.721	528.61	395.53	0.94171	0.81984	28.29177	98.24	0.71604
100.01	34.723	528.61	395.53	0.94171	0.81984	28.29165	98.241	0.71603
100.02	34.723	528.61	395.53	0.94171	0.81988	28.2915	98.243	0.71607
100.02	34.721	528.61	395.53	0.94171	0.81992	28.29135	98.245	0.7161
100.02	34.725	528.61	395.53	0.94171	0.81993	28.29117	98.247	0.7161
100.02	34.729	528.61	395.53	0.94171	0.81994	28.29099	98.249	0.71611
100.02	34.726	528.61	395.53	0.94171	0.8199	28.29084	98.251	0.71605
100.02	34.724	528.61	395.53	0.94171	0.81985	28.29066	98.253	0.716
100.03	34.723	528.61	395.53	0.94171	0.81983	28.29057	98.255	0.716
100.03	34.722	528.61	395.53	0.94171	0.81985	28.29048	98.256	0.716
100.03	34.726	528.61	395.53	0.94171	0.81986	28.29036	98.257	0.71601
100.03	34.729	528.61	395.53	0.94171	0.81987	28.29024	98.259	0.71603
100.03	34.721	528.61	395.53	0.94171	0.81987	28.29006	98.261	0.71599
100.03	34.719	528.61	395.53	0.94171	0.81987	28.28991	98.263	0.71597
100.04	34.718	528.61	395.53	0.94171	0.81984	28.28979	98.264	0.71598
100.04	34.724	528.61	395.53	0.94171	0.81989	28.28967	98.266	0.71599
100.04	34.726	528.61	395.53	0.94171	0.81984	28.28949	98.268	0.71595
100.04	34.723	528.61	395.53	0.94171	0.81979	28.28931	98.27	0.71591
100.04	34.727	528.61	395.53	0.94171	0.81984	28.28925	98.271	0.71594
100.05	34.725	528.61	395.53	0.94171	0.81989	28.28916	98.272	0.71597
100.05	34.723	528.61	395.53	0.94171	0.81989	28.28898	98.274	0.71596

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0.80188	99.265	0.86611	5746.[illegible]	5748.8	0.82133	0.82027	0.39614	0.72405	0.97151	7.9432
0.80184	99.258	0.86609	5746.1	5748.2	0.8213	0.82038	0.39619	0.72406	0.97151	7.943
0.8018	99.25	0.86606	5745.9	5748.8	0.82127	0.82039	0.39623	0.72408	0.97151	7.9429
0.80175	99.256	0.86616	5746.8	5748.8	0.82131	0.82033	0.39621	0.72412	0.97151	7.9428
0.8017	99.263	0.86626	5747.8	5748.7	0.82136	0.82027	0.39619	0.72417	0.97151	7.9427
0.80221	99.257	0.86621	5747.4	5748.7	0.82123	0.82026	0.39615	0.72416	0.97151	7.943
0.80272	99.251	0.86617	5747	5748.7	0.82111	0.82026	0.3961	0.72416	0.97151	7.9432
0.80252	99.253	0.86618	5747.1	5748.6	0.82113	0.82031	0.39611	0.72416	0.97151	7.9433
0.80232	99.256	0.8662	5747.6	5748.5	0.82115	0.82037	0.39612	0.72417	0.97151	7.9433
0.80254	99.264	0.86623	5747.8	5748.6	0.82121	0.82053	0.39612	0.7241	0.97151	7.9433
0.80276	99.27	0.86627	5748.1	5748.6	0.82127	0.82069	0.39611	0.72404	0.97151	7.9433
0.80245	99.267	0.86624	5747.8	5748.7	0.82123	0.82052	0.39616	0.724	0.97151	7.9433
0.80214	99.263	0.86622	5747.4	5748.8	0.82119	0.82035	0.39622	0.72397	0.97151	7.9433
0.80247	99.261	0.86623	5747.5	5748.8	0.8212	0.82044	0.39616	0.72397	0.97151	7.9433
0.80279	99.26	0.86624	5747.5	5748.8	0.8212	0.82053	0.39611	0.72398	0.97151	7.9432
0.80253	99.257	0.86625	5747.6	5748.8	0.82122	0.82048	0.3961	0.72398	0.97151	7.9433
0.80228	99.254	0.86627	5747.7	5748.9	0.82126	0.82042	0.39608	0.72397	0.97151	7.9433
0.80231	99.253	0.8662	5747.3	5748.7	0.82125	0.82035	0.39613	0.72397	0.97151	7.9433
0.80234	99.252	0.86614	5746.8	5748.5	0.82123	0.82029	0.39617	0.72396	0.97151	7.9433
0.80231	99.255	0.86616	5747.1	5748.6	0.82121	0.82034	0.39621	0.72396	0.97151	7.9433
0.80227	99.258	0.86618	5747.3	5748.7	0.8212	0.82039	0.39624	0.72397	0.97151	7.9433
0.80223	99.261	0.86618	5747.3	5748.5	0.82125	0.82034	0.39622	0.72401	0.97151	7.9432
0.80219	99.264	0.86619	5747.4	5748.4	0.8213	0.82029	0.39619	0.72406	0.97151	7.9432
0.80243	99.267	0.86615	5747	5748.6	0.82134	0.82048	0.39619	0.72407	0.97151	7.9432
0.80267	99.269	0.86612	5746.6	5748.7	0.82137	0.82068	0.39619	0.72409	0.97151	7.9432
0.80251	99.27	0.86616	5746.7	5749.1	0.82136	0.82042	0.39616	0.72412	0.97151	7.943
0.80239	99.272	0.86621	5746.8	5749.5	0.82134	0.82015	0.39613	0.72414	0.97151	7.9428
0.80257	99.265	0.8662	5747.1	5748.9	0.82133	0.82014	0.39612	0.72412	0.97151	7.9428
0.80274	99.259	0.86618	5747.4	5748.4	0.82132	0.82013	0.3961	0.72411	0.97151	7.9428
0.80264	99.263	0.86624	5747.7	5748.7	0.82125	0.8202	0.39611	0.72418	0.97151	7.943
0.80254	99.267	0.8663	5747.9	5749	0.82119	0.82027	0.39612	0.72425	0.97151	7.9432
0.80213	99.262	0.86623	5747.3	5749.1	0.82121	0.82024	0.39611	0.72423	0.97151	7.9432
0.80198	99.257	0.86617	5746.6	5749.1	0.82123	0.8202	0.39611	0.72421	0.97151	7.9432
0.8023	99.262	0.86617	5746.6	5749.2	0.82122	0.82009	0.39611	0.72409	0.97151	7.9433
0.80262	99.267	0.86616	5746.5	5749.2	0.82122	0.81998	0.39612	0.72398	0.97151	7.9433
0.80238	99.264	0.8662	5747.2	5748.9	0.8212	0.82037	0.39617	0.72399	0.97151	7.9433
0.80213	99.26	0.86625	5747.9	5748.7	0.82118	0.82076	0.39622	0.724	0.97151	7.9433
0.80242	99.265	0.86621	5747.6	5748.5	0.82121	0.82062	0.39621	0.72399	0.97151	7.9433
0.80271	99.269	0.86618	5747.4	5748.4	0.82124	0.82049	0.39618	0.72398	0.97151	7.9433
0.80243	99.271	0.86616	5746.9	5748.8	0.82125	0.8204	0.39621	0.724	0.97151	7.9433
0.80214	99.273	0.86615	5746.4	5749.1	0.82125	0.82033	0.39624	0.72401	0.97151	7.9432
0.80215	99.265	0.86615	5746.4	5749.3	0.82124	0.82003	0.39617	0.72398	0.97151	7.9433
0.80215	99.256	0.86615	5746.3	5749.2	0.82123	0.81973	0.3961	0.72395	0.97151	7.9433
0.80237	99.264	0.86618	5747	5748.9	0.82124	0.82005	0.39614	0.72399	0.97152	7.9433
0.80258	99.272	0.86621	5747.7	5748.5	0.82125	0.82036	0.39619	0.72402	0.97152	7.9433
0.80265	99.273	0.86622	5747.4	5748.9	0.8213	0.82039	0.3962	0.72406	0.97152	7.9432
0.80272	99.274	0.86624	5747.2	5749.2	0.82134	0.82043	0.39621	0.7241	0.97152	7.9432
0.8025	99.273	0.86621	5747	5749.2	0.82135	0.82052	0.39617	0.72409	0.97152	7.9432
0.80228	99.272	0.86619	5746.8	5749.2	0.82136	0.82063	0.39612	0.72407	0.97152	7.9432
0.80213	99.268	0.8662	5747	5749	0.82133	0.82055	0.39614	0.72408	0.97152	7.943
0.80198	99.264	0.86621	5747.3	5748.8	0.8213	0.82047	0.39617	0.7241	0.97152	7.9428
0.80211	99.259	0.86621	5747.5	5748.6	0.8213	0.8202	0.39612	0.72409	0.97152	7.9433
0.80225	99.254	0.86621	5747.6	5748.4	0.82129	0.81992	0.39607	0.72409	0.97152	7.9428
0.80196	99.257	0.86622	5747.7	5748.4	0.82123	0.8204	0.39607	0.72414	0.97152	7.943
0.80167	99.26	0.86622	5747.9	5748.4	0.82115	0.82088	0.39608	0.72419	0.97152	7.9432
0.8021	99.25[illegible]	0.8662	5747.3	5748.8	0.8212	0.82051	0.39609	0.72421	0.97152	7.9432

100.05	34.721	528.61	395.53	0.94171	0.81988	28.28877	98.277	0.71594
100.05	34.722	528.61	395.53	0.94171	0.81988	28.28865	98.278	0.71594
100.05	34.722	528.61	395.53	0.94171	0.81987	28.28851	98.28	0.71595
100.05	34.722	528.61	395.53	0.94171	0.81988	28.28838	98.282	0.71594
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100.06	34.724	528.61	395.53	0.94171	0.81987	28.28805	98.286	0.71592
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100.06	34.726	528.61	395.53	0.94171	0.81987	28.28775	98.289	0.71591
100.06	34.727	528.61	395.53	0.94171	0.81989	28.28769	98.29	0.71592
100.06	34.722	528.61	395.53	0.94171	0.81994	28.28745	98.293	0.71594
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100.07	34.721	528.61	395.53	0.94171	0.81992	28.28694	98.299	0.71591
100.07	34.724	528.61	395.53	0.94171	0.81985	28.2867	98.302	0.71585
100.07	34.721	528.61	395.53	0.94171	0.81988	28.28667	98.302	0.71586
100.07	34.719	528.61	395.53	0.94171	0.8199	28.28664	98.302	0.71588
100.07	34.721	528.61	395.53	0.94171	0.81992	28.28646	98.305	0.7159
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100.08	34.724	528.61	395.53	0.94171	0.81992	28.2861	98.309	0.71589
100.08	34.726	528.61	395.53	0.94171	0.81989	28.28592	98.311	0.71586
100.08	34.724	528.61	395.53	0.94171	0.81987	28.28583	98.312	0.71584
100.08	34.723	528.61	395.53	0.94171	0.81985	28.28574	98.313	0.71582
100.09	34.722	528.61	395.53	0.94171	0.81986	28.28562	98.315	0.71582
100.09	34.723	528.61	395.53	0.94171	0.81987	28.2855	98.316	0.71582
100.09	34.719	528.61	395.53	0.94171	0.81991	28.28535	98.318	0.71583
100.09	34.715	528.61	395.53	0.94171	0.81995	28.2852	98.319	0.71585
100.09	34.721	528.61	395.53	0.94171	0.81992	28.28499	98.322	0.71583
100.09	34.726	528.61	395.53	0.94171	0.81989	28.28478	98.325	0.71581
100.1	34.727	528.61	395.53	0.94171	0.81988	28.28457	98.327	0.71581
100.1	34.727	528.61	395.53	0.94171	0.81988	28.28439	98.33	0.7158
100.1	34.726	528.61	395.53	0.94171	0.81988	28.28433	98.33	0.7158
100.1	34.725	528.61	395.53	0.94171	0.81989	28.2843	98.33	0.7158
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100.11	34.721	528.61	395.53	0.94171	0.81992	28.2876	98.288	0.71594
100.11	34.716	528.61	395.53	0.94171	0.8199	28.29147	98.239	0.71606
100.11	34.718	528.61	395.53	0.94171	0.8199	28.29537	98.191	0.7162
100.11	34.72	528.61	395.53	0.94171	0.81989	28.29927	98.143	0.71635
100.12	34.722	528.61	395.53	0.94171	0.8199	28.30305	98.095	0.71651
100.12	34.723	528.61	395.53	0.94171	0.81991	28.30686	98.048	0.71667
100.12	34.727	528.61	395.53	0.94171	0.81989	28.3104	98.003	0.71681
100.12	34.731	528.61	395.53	0.94171	0.81988	28.31397	97.958	0.71694
100.12	34.726	528.61	395.53	0.94171	0.8199	28.31757	97.913	0.71709
100.12	34.722	528.61	395.53	0.94171	0.81991	28.32117	97.867	0.71724
100.12	34.722	528.61	395.53	0.94171	0.8159	28.32459	97.824	0.71736
100.12	34.721	528.61	395.53	0.94171	0.8199	28.32831	97.78	0.71748
100.12	34.719	528.61	395.53	0.94171	0.8199[illegible]	28.32903	97.771	0.71751
100.12	34.716	528.61	395.53	0.94171	0.81991	28.33002	97.763	0.71755
100.12	34.718	528.61	395.53	0.94171	0.81987	28.32978	97.764	0.7175
100.12	34.719	528.61	395.53	0.94171	0.81983	28.32957	97.765	0.71746
100.12	34.725	528.61	395.53	0.94171	0.81985	28.32939	97.767	0.7175
100.12	34.73	528.61	395.53	0.94171	0.81987	28.32924	97.769	0.71753
100.12	34.721	528.61	395.53	0.94171	0.81988	28.32909	97.77	0.71751
100.12	34.713	528.61	395.53	0.94171	0.81989	28.32894	97.771	0.71748
100.11	34.723	528.61	395.53	0.94171	0.81992	28.32879	97.772	0.71752

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0.80252	99.279	0.86616	5746.7	5749.1	0.82125	0.82014	0.3961	0.72424	0.97152	7.9432
0.80301	99.27	0.86614	5746.6	5748.9	0.82122	0.82036	0.39616	0.7241	0.97152	7.9433
0.8015	99.262	0.86611	5746.5	5748.7	0.82119	0.82058	0.39623	0.72395	0.97152	7.9433
0.80185	99.259	0.86614	5746.7	5748.7	0.82116	0.82072	0.39624	0.72396	0.97152	7.9433
0.8022	99.256	0.86617	5746.9	5748.7	0.82115	0.82085	0.39624	0.72396	0.97152	7.9433
0.80246	99.264	0.86621	5747.3	5748.8	0.82117	0.82066	0.3962	0.72398	0.97152	7.9433
0.80272	99.272	0.86625	5747.8	5748.8	0.82119	0.82047	0.39616	0.72398	0.97152	7.9433
0.80273	99.271	0.8662	5747.3	5748.8	0.8212	0.82045	0.39616	0.72397	0.97152	7.9433
0.80273	99.271	0.86614	5746.7	5748.8	0.82122	0.82044	0.39617	0.72397	0.97152	7.9433
0.80267	99.272	0.86612	5746.4	5748.9	0.82123	0.82038	0.39619	0.72398	0.97152	7.9433
0.8026	99.273	0.86609	5746	5749	0.82124	0.82032	0.39622	0.72399	0.97152	7.9433
0.80242	99.272	0.86616	5746.9	5748.8	0.82125	0.82035	0.39622	0.724	0.97152	7.9433
0.80224	99.272	0.86622	5747.8	5748.5	0.82126	0.82038	0.39621	0.72401	0.97152	7.9433
0.8023	99.271	0.86623	5747.7	5748.6	0.82132	0.82047	0.39614	0.72406	0.97152	7.9433
0.80236	99.27	0.86623	5747.7	5748.7	0.82137	0.82056	0.39606	0.72411	0.97152	7.9434
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0.80245	99.264	0.86615	5746.6	5749	0.82132	0.8202	0.39611	0.72407	0.97152	7.9431
0.80231	99.259	0.86614	5746.4	5749	0.82132	0.82011	0.39614	0.7241	0.97152	7.9429
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0.80244	99.268	0.86619	5747	5748.9	0.82119	0.8203	0.3962	0.7241	0.97152	7.9432
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0.80275	99.266	0.86615	5746.8	5748.8	0.82117	0.82036	0.39622	0.72397	0.97152	7.9433
0.80306	9.268	0.86616	5746.8	5748.9	0.82115	0.82037	0.39619	0.72397	0.97152	7.9433
0.80318	99.268	0.86619	5747.3	5748.7	0.82117	0.82052	0.39616	0.72396	0.97152	7.9433
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0.80325	99.271	0.86622	5747.5	5748.7	0.82122	0.82047	0.3961	0.72396	0.97152	7.9433
0.80321	99.273	0.86621	5747.2	5748.9	0.82125	0.82018	0.39607	0.72397	0.97152	7.9433
0.80274	99.271	0.86619	5747.1	5748.9	0.82125	0.82024	0.39613	0.72398	0.97152	7.9433
0.80227	99.269	0.86618	5747	5748.9	0.82126	0.82031	0.39619	0.724	0.97152	7.9433
0.80246	99.279	0.86621	5747.5	5748.8	0.82126	0.82029	0.39619	0.72401	0.97152	7.9433
0.80265	99.288	0.86625	5747.9	5748.6	0.82127	0.82027	0.39618	0.72401	0.97152	7.9433
0.80279	99.278	0.86622	5747.6	5748.7	0.82126	0.82022	0.39618	0.72402	0.97152	7.9433
0.80294	99.268	0.86618	5747.2	5748.7	0.82126	0.82017	0.39616	0.72402	0.97152	7.9432
0.80246	99.269	0.86614	5746.7	5748.8	0.82126	0.82016	0.39619	0.72402	0.97152	7.9432
0.80197	99.269	0.8661	5746.3	5749	0.82126	0.82016	0.39619	0.72403	0.97152	7.9432
0.80196	99.273	0.86612	5746.4	5748.9	0.82128	0.82039	0.39613	0.72407	0.97152	7.9431
0.80195	99.276	0.86613	5746.6	5748.8	0.82131	0.82061	0.39608	0.72413	0.97152	7.9429
0.80212	99.277	0.86617	5747	5748.8	0.82133	0.82056	0.3961	0.72413	0.97152	7.9429
0.80228	99.278	0.8662	5747.4	5748.7	0.82135	0.8205	0.39612	0.72414	0.97152	7.9429
0.80233	99.273	0.8662	5747.5	5748.6	0.82124	0.82044	0.39612	0.72416	0.97152	7.943
0.80235	99.269	0.8662	5747.6	5748.5	0.82114	0.82037	0.39612	0.72417	0.97152	7.9432
0.80248	99.267	0.8662	5747.4	5748.7	0.82116	0.82035	0.39612	0.72418	0.97152	7.9432
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0.80199	99.273	0.86615	5746.8	5748.8	0.82123	0.81992	0.39624	0.72401	0.97152	7.9432
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0.80212	99.276	0.86622	5747.6	5748.6	0.82125	0.8206	0.3962	0.72402	0.97152	7.9432
0.80195	99.265	0.86621	5747.6	5748.5	0.82125	0.8206	0.39615	0.724	0.97152	7.9433
0.80262	99.268	0.8662	5747.2	5748.9	0.82124	0.82038	0.39613	0.724	0.97152	7.9433

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100.1	34.719	528.61	395.53	0.94171	0.8199	28.32825	97.778	0.71749
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100.02	34.722	528.61	395.53	0.94171	0.81991	28.32708	97.789	0.71744
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100.01	34.716	528.61	395.53	0.94171	0.81995	28.32681	97.793	0.71746
99.996	34.721	528.61	395.53	0.94171	0.81991	28.32666	97.795	0.71742
99.987	34.726	528.61	395.53	0.94171	0.81987	28.32648	97.796	0.71739
99.977	34.723	528.61	395.53	0.94171	0.8199	28.32642	97.797	0.71742
99.967	34.721	528.61	395.53	0.94171	0.81993	28.32636	97.798	0.71745
99.957	34.722	528.61	395.53	0.94171	0.8199	28.3263	97.799	0.71741
99.948	34.723	528.61	395.53	0.94171	0.81986	28.32621	97.799	0.71738
99.938	34.724	528.61	395.53	0.94171	0.81987	28.32609	97.801	0.71739
99.929	34.725	528.61	395.53	0.94171	0.81989	28.32597	97.802	0.7174
99.919	34.727	528.61	395.53	0.94171	0.81988	28.32588	97.803	0.71739
99.91	34.73	528.61	395.53	0.94171	0.81986	28.32579	97.804	0.71738
99.901	34.726	528.61	395.53	0.94171	0.81988	28.32564	97.806	0.71738
99.891	34.723	528.61	395.53	0.94171	0.81989	28.32546	97.809	0.71738
99.882	34.724	528.61	395.53	0.94171	0.81988	28.3254	97.809	0.71738
99.874	34.725	528.61	395.53	0.94171	0.81988	28.32537	97.81	0.71738
99.865	34.72	528.61	395.53	0.94171	0.81987	28.32528	97.811	0.71735
99.857	34.715	528.61	395.53	0.94171	0.81987	28.32516	97.812	0.71733
99.849	34.72	528.61	395.53	0.94171	0.81989	28.32507	97.813	0.71735
99.841	34.725	528.61	395.53	0.94171	0.81992	28.32498	97.815	0.71737
99.833	34.725	528.61	395.53	0.94171	0.81991	28.32486	97.816	0.71737
99.825	34.724	528.61	395.53	0.94171	0.8199	28.32474	97.817	0.71736
99.818	34.724	528.61	395.53	0.94171	0.81991	28.32462	97.819	0.71736
99.812	34.724	528.61	395.53	0.94171	0.81991	28.3245	97.82	0.71737
99.805	34.725	528.61	395.53	0.94171	0.81989	28.32438	97.822	0.71734
99.799	34.726	528.61	395.53	0.94171	0.81987	28.32421	97.823	0.71732
99.793	34.725	528.61	395.53	0.94171	0.81987	28.3242	97.824	0.71732
99.787	34.724	528.61	395.53	0.94171	0.81987	28.32414	97.825	0.71732
99.781	34.721	528.61	395.53	0.94171	0.81991	28.32399	97.827	0.71734
99.775	34.718	528.61	395.53	0.94171	0.81994	28.32384	97.828	0.71736
99.77	34.719	528.61	395.53	0.94171	0.81995	28.32372	97.83	0.71736
99.765	34.721	528.61	395.53	0.94171	0.81996	28.32357	97.832	0.71737
99.76	34.722	528.61	395.53	0.94171	0.81991	28.32343	97.833	0.71733
99.756	34.723	528.61	395.53	0.94171	0.81987	28.32333	97.835	0.71728
99.752	34.725	528.61	395.53	0.94171	0.81988	28.32324	97.836	0.71728
99.747	34.727	528.61	395.53	0.94171	0.81983	28.32315	97.837	0.71728
99.744	34.729	528.61	395.53	0.94171	0.8199	28.323	97.839	0.71729
99.74	34.73	528.61	395.52	0.94171	0.8199	28.32285	97.841	0.7173
99.736	34.725	528.61	395.52	0.94171	0.81991	28.32273	97.843	0.71729
99.733	34.72	528.61	395.53	0.94171	0.81992	28.32261	97.844	0.71728
99.73	34.719	528.61	395.52	0.94171	0.81993	28.32249	97.846	0.71729
99.727	34.719	528.61	395.52	0.94171	0.81993	28.32234	97.847	0.71729
99.725	34.722	528.61	395.52	0.94171	0.81991	28.32225	97.849	0.71727

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	0.80329	99.27	0.8662	5746.8	5745.3	0.82123	0.82017	0.3961	0.72399	0.97152	7.9433
	0.8026	99.272	0.86618	5747	5748.9	0.82125	0.82017	0.39612	0.724	0.97152	7.9433
	0.80191	99.273	0.86616	5747.2	5748.4	0.82127	0.82018	0.39614	0.724	0.97152	7.9433
	0.80212	99.274	0.86619	5747.3	5748.6	0.82126	0.82012	0.39615	0.72402	0.97152	7.9433
	0.80233	99.275	0.86621	5747.4	5748.8	0.82125	0.82008	0.39616	0.72403	0.97152	7.9432
	0.80249	99.276	0.8662	5747.5	5748.6	0.82131	0.82024	0.39619	0.72406	0.97152	7.9432
	0.80266	99.277	0.86618	5747.6	5748.4	0.82137	0.82043	0.39621	0.72409	0.97152	7.9432
	0.80249	99.277	0.86619	5747.4	5748.7	0.82137	0.82027	0.39619	0.72409	0.97152	7.9432
	0.80232	99.277	0.86619	5747.1	5749	0.82137	0.82011	0.39617	0.72409	0.97152	7.9432
	0.80227	99.278	0.86618	5747.3	5748.7	0.82135	0.82043	0.39616	0.72412	0.97152	7.943
	0.80222	99.279	0.86618	5747.5	5748.4	0.82133	0.82076	0.39615	0.72414	0.97152	7.9428
	0.80236	99.277	0.86621	5747.6	5748.5	0.82131	0.82064	0.39609	0.72412	0.97152	7.9428
	0.8025	99.274	0.86624	5747.7	5748.7	0.82129	0.82052	0.39603	0.72409	0.97152	7.9428
	0.80266	99.28	0.86624	5747.8	5748.7	0.82127	0.82039	0.39608	0.72418	0.97152	7.943
	0.80282	99.286	0.86625	5748	5748.7	0.82124	0.82026	0.39614	0.72426	0.97152	7.9432
	0.80255	99.287	0.86623	5747.7	5748.7	0.82124	0.82032	0.39613	0.72425	0.97152	7.9432
	0.80229	99.288	0.8662	5747.4	5748.7	0.82124	0.82039	0.39613	0.72425	0.97152	7.9432
	0.80226	99.289	0.8662	5747.3	5748.9	0.82124	0.82045	0.39614	0.72414	0.97152	7.9433
	0.80223	99.291	0.8662	5747.2	5749	0.82124	0.82051	0.39616	0.72404	0.97152	7.9433
	0.80251	99.291	0.86624	5747.6	5748.9	0.82126	0.82046	0.39616	0.72405	0.97152	7.9432
	0.80279	99.291	0.86627	5748	5748.8	0.82128	0.8204	0.39616	0.72406	0.97152	7.9432
	0.80254	99.287	0.86625	5747.9	5748.8	0.82128	0.82025	0.39618	0.72404	0.97153	7.9432
	0.80228	99.284	0.86622	5747.7	5748.7	0.82127	0.82009	0.39617	0.72402	0.97153	7.9432
	0.80247	99.281	0.86617	5747	5748.8	0.82129	0.8203	0.3962	0.72403	0.97153	7.9432
	0.80265	99.279	0.86612	5746.4	5749	0.82131	0.82052	0.39623	0.72403	0.97152	7.9432
	0.80259	99.272	0.86612	5746.4	5749	0.82128	0.82045	0.39619	0.724	0.97152	7.9433
	0.80253	99.265	0.86613	5746.4	5749	0.82124	0.82038	0.39615	0.72398	0.97152	7.9433
	0.80248	99.272	0.86615	5746.7	5748.9	0.82126	0.82057	0.39616	0.724	0.97152	7.9433
RESULTS	Sat	Sat	Sat	Sat	Sat	Sat	Sat	Sat	Sat	Sat	Sat
MAXIMUM DEVIATION	0.19%	0.13%	0.07%	0.05%	0.07%	0.05%	0.15%	0.05%	0.07%	0.01%	0.04%

99.722	34.726	528.61	395.52	0.94171	0.81989	28.32213	97.85	0.71726
99.72	34.726	528.61	395.52	0.94171	0.81991	28.32198	97.852	0.71727
99.717	34.726	528.61	395.52	0.94171	0.81992	28.32186	97.854	0.71728
99.715	34.727	528.61	395.52	0.94171	0.81993	28.32177	97.855	0.71729
99.713	34.729	528.61	395.52	0.94171	0.81995	28.32168	97.856	0.71731
99.712	34.725	528.61	395.52	0.94171	0.81994	28.32153	97.858	0.71729
99.71	34.723	528.61	395.52	0.94171	0.81994	28.32141	97.859	0.71726
99.709	34.723	528.61	395.52	0.94171	0.81994	28.32129	97.861	0.71725
99.708	34.725	528.61	395.52	0.94171	0.8199[illegible]	28.32117	97.862	0.71725
99.706	34.721	528.61	395.52	0.94171	0.81991	28.3210[illegible]	97.864	0.71722
99.705	34.717	528.61	395.52	0.94171	0.8199	28.32084	97.867	0.7172
99.704	34.718	528.61	395.52	0.94171	0.8199	28.32075	97.868	0.71721
99.704	34.719	528.61	395.52	0.94171	0.81991	28.32066	97.869	0.71721
99.703	34.723	528.61	395.52	0.94171	0.81993	28.32054	97.871	0.71723
99.702	34.726	528.61	395.52	0.94171	0.81994	28.32039	97.872	0.71723
99.702	34.726	528.61	395.52	0.94171	0.819[illegible]	28.32021	97.875	0.71723
99.701	34.727	528.61	395.52	0.941[illegible]	0.81993	28.32003	97.877	0.7172
99.701	34.724	528.61	395.52	0.94171	0.81993	28.31994	97.878	0.7172
99.701	34.721	528.61	395.52	0.94171	0.81994	28.31982	97.88	0.7172
99.701	34.722	528.61	395.52	0.94171	0.81994	28.3197	97.881	0.7172
99.701	34.722	528.61	395.52	0.94171	0.81994	28.31955	97.883	0.7172
99.701	34.726	528.61	395.52	0.94171	0.81993	28.3194	97.885	0.71718
99.701	34.729	528.61	395.52	0.94171	0.81995	28.31925	97.887	0.71716
99.701	34.726	528.61	395.52	0.94171	0.81991	28.31919	97.888	0.71715
99.702	34.722	528.61	395.52	0.94171	0.8199	28.31913	97.889	0.71715
99.702	34.722	528.61	395.52	0.94171	0.81992	28.31898	97.89	0.71716
99.702	34.723	528.61	395.52	0.94171	0.81993	28.31886	97.892	0.71716
99.703	34.719	528.61	395.52	0.94171	0.81993	28.31877	97.893	0.71715
Sat	Sat	Sat	Sat	Sat	Sat	Sat	Sat	Sat
0.32%	0.04%	0.00%	0.00%	0.00%	0.06%	0.13%	0.47%	0.15%

9102150044-07

PBAPS SIMULATOR HEAT BALANCE PERFORMANCE TEST

SSPT-HEAT BAL

SIMULATOR HEAT BALANCE TEST

Prepared by: Bud Havens   Date: 11/09/90
Simulator Test Operator

Approved by: [signature]   Date: 1/2/90
Lead Test Operator

I. TEST REQUIREMENT
SIMULATOR OPERABILITY STEADY STATE PERFORMANCE TEST
ANS-3.5 Section 4.1; Appendix B, Section B1.1
Record the appropriate data at those power levels for which heat balance data is normally available, or at approximately 25%, 75%, and 100% rated thermal power.

II. TEST ABSTRACT
This test verifies that the Simulator computed values of critical and noncritical steady state parameters used for heat balance calculation match the Reference Plant data for those parameters within 2% and 10% respectively. The data for these parameters is collected at three points over the power range for which Reference Plant steady state data is available using GINDAC, then processed to determine the maximum deviation of each parameter from the Reference Plant value. The three power levels are achieved by maneuvering to the highest, then using plant procedures to maneuver to each of the lower three in a continuous manner.

III. TEST REFERENCES

A. Reference Plant Data for approximately:

1. 100% power, dated 12/6/90.
2. 75% power, dated 11/12/90.
3. ~~25~~ 35 8W % power, dated 8/23/90.

B. Simulator Performance Tests

1. SSPT GP-5, Power Operations
2. SSPT GP-3, Normal Plant Shutdown
3. SSPT STABILITY/MASS BAL

IV. TEST DESCRIPTION

A. This test is to be run by maneuvering the Simulator continuously from:

NOTE: Any of the three approximate power levels listed below may have substituted a power level for which reference plant data is available as long as the three points are separated by at least 20% power.

1. IC 14, adjusted to match reference plant core thermal power data for approximately 100% power; to

2. a power level to match reference plant core thermal power data for approximately 75% power; to

3. a power level to match reference plant core thermal power data for approximately 25% power.

B. Effects

There are no dynamic effects expected during this test that are not covered in the testing of other Simulator Performance tests.

C. Documentation

1. Significant Parameters to be Collected (those parameters followed by an * are critical parameters):

a. Reactor Power (% Flux) *
b. Core Thermal Power *
c. Total Core Flow *
d. Recirculation Pump A Flow *
e. Recirculation Pump B Flow *
f. Total Steam Flow *
g. Total Feedwater Flow *
h. NR Reactor Vessel Water Level *
i. NR Reactor Pressure *
j. Feedwater Inlet Temperature
k. Control Rod Drive Flow
l. Control Rod Drive Temperature
m. Reactor Water Cleanup System Flow

n. Reactor Water Cleanup System Inlet Temperature
o. Reactor Water Cleanup System Outlet Temperature
p. Main Steamline Pressure *
q. Turbine Steam Flow
r. Main Condenser Vacuum *
s. Main Condenser Hotwell Temperature
t. Main Generator Megawatts Electric *

2. Data Collection Methods:

The Significant Parameters are to be collected using the GINDAC method described in Appendix I; use the DRIFTHB dataset.

D. Terminating Condition

This Performance Test may be terminated when a data has been collected at each of the power levels listed in Section IV.A above.

V. ACCEPTANCE CRITERIA

A. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.C.1 above; the parameter value shall agree with the reference plant data value within ±2% for critical parameters, and within ±10% for noncritical parameters.

B. The Simulator will operate in real time as indicated by the test being completed without interruption of si ation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. If necessary, maneuver the simulator to match Core

Thermal Power to the within 2% of the value for the Reference Plant Data for 100% power (III.A.1), IAW GP-5, Power Operation.

3. Prepare to collect data IAW Appendix I and Section IV.C.2.

B. Performance

NOTE: Each data collection interval need only be a few seconds in length; avoid collection times in excess of one minute. Be sure to name the datasets collected at each power level with a unique filename, and enter the name in the space provide below.

1. With the Simulator out of Freeze, take an set of data for the initial power level. Terminate data collection within one minute.

   Data filename: HB0105.DAT

2. Maneuver the Simulator IAW GP-5 and or GP-3 to the next lower power level as listed Section III.A.

3. Take a set of data for the interim power level

   Data filename: 75HB0105.DAT

4. Maneuver the Simulator IAW GP-5 and or GP-3 to the next lowest power level as listed Section III.A.

5. Take a set of data for the lowest power level

   Data filename: 50HB0105.DAT

6. When data for all three power levels is completed, place the simulator in Freeze.

7. Verify in the space provided in Section IX that the Real Time Criteria was/was not met.

8. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 01/15/90 Test Performer B. Haven

Date Analyzed 1/10/91 Analysis by B. Haven

Process the Stability and Mass Balance data by selecting the Heat Bal Data Processing Option from the Cert. Data Processing submenu. Review the results of the data processing for Unsat results (the data processing program will assign Sat/Unsat).

The Simulator met the real time acceptance criteria during this Performance Test

YES ✓ NO ______

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the Simulator Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. 100%, 75% - TSF, TFWF, recirc drive flows >2% (10%) WO 910031, P; WO 910032, P
2. 55% - TSF, recirc drive flows, CRD and hotwell T >2% (10%) WO 910033, P

C. If a complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Test Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ✓

Database updated ______ BR ______
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ✓ NO ____

2. All SDR's resolved, Test Sat:

________________ ________________
Test Operator Date

Database updated ________________
Data Entry

C. Test Reviewed:

________________ ________________
Lead Test Operator Date

D. Test Completed:

________________ ________________
Sim. Support Supv. Date

PEACH BOTTOM ATOMIC POWER STATION
UNIT 2 SIMULATOR MASS AND ENERGY BALANCE TEST RESULTS

MASS AND ENERGY BALANCE TEST CONDUCTED: 01/05/91
POWER LEVEL: 100 %

PARAMETER	SIMULATOR VALUES	REFERENCE VALUES	DEVIATION %	CRITICAL PARAMETER	SAT/ UNSAT
APRM	100.1538 %	100 %	0.15%	Y	S
CTP	3292.613 MWth	3288 MWth	0.14%	Y	S
CORE FL	1.0E+08 #/Hr	1.1E+08 #/Hr	1.06%	Y	S
RR A FL	5744.711 #/Sec	4930.555 #/Sec	16.51%	Y	U
RR B FL	5746.4 #/Sec	4930.555 #/Sec	16.55%	Y	U
TSF	13134757 #/Hr	13570000 #/Hr	3.21%	Y	U
TFWF	13120574 #/Hr	13230000 #/Hr	0.83%	Y	S
NR LVL	23.77023 "	23.8 "	0.13%	Y	S
NR PR	994.7634 psig	994 psig	0.08%	Y	S
FW TEMP	369.1809 deg F	371 deg F	0.49%	N	S
CRD FL	7.943158 #/Sec	8.333333 #/Sec	4.68%	N	S
CRD TEMP	99.78864 deg F	101 deg F	1.20%	N	S
CU FL	34.72217 #/Sec	36.66666 #/Sec	5.30%	N	S
CU IN T	528.6117 deg F	520 deg F	1.66%	N	S
CU OUT T	395.53 deg F	385 deg F	2.74%	N	S
MSL PR	941.6988 psig	948 psig	0.66%	Y	S
TUR SF	13113167 #/Hr	N/A #/Hr	ERR	N	ERR
MC VAC	28.31851 "HgV	28.6 "HgV	0.98%	Y	S
MC TEMP	97.89870 deg F	102 deg F	4.02%	N	S
MWE	1075.229 MWe	1095.5 MWe	1.85%	Y	S

PEACH BOTTOM ATOMIC POWER STATION
UNIT 2 SIMULATOR MASS AND ENERGY BALANCE TEST RESULTS

MASS AND ENERGY BALANCE TEST CONDUCTED: 01/05/91
POWER LEVEL: 75 %

PARAMETER	SIMULATOR VALUES	REFERENCE VALUES	DEVIATION %	CRITICAL PARAMETER	SAT/ UNSAT
APRM	74.78744 %	75 %	0.28%	Y	S
CTP	2464.823 MWth	2469.75 MWth	0.20%	Y	S
CORE FL	65951618 #/Hr	65800000 #/Hr	0.23%	Y	S
RR A FL	3656.590 #/Sec	2897.222 #/Sec	26.21%	Y	U
RR B FL	3665.777 #/Sec	2897.222 #/Sec	26.53%	Y	U
TSF	9092792. #/Hr	10610000 #/Hr	14.30%	Y	U
TFWF	9073730. #/Hr	11080000 #/Hr	18.11%	Y	U
NR LVL	23.86756 "	23.8 "	0.28%	Y	S
NR PR	995.6911 psig	996 psig	0.03%	Y	S
FW TEMP	336.3689 deg F	352 deg F	4.44%	N	S
CRD FL	8.090277 #/Sec	8.055555 #/Sec	0.43%	N	S
CRD TEMP	88.84081 deg F	91 deg F	2.37%	N	S
CU FL	34.72218 #/Sec	34.16666 #/Sec	1.63%	N	S
CU IN T	523.2 deg F	520 deg F	0.62%	N	S
CU OUT T	391.75 deg F	385 deg F	1.75%	N	S
MSL PR	967.87 psig	972 psig	0.42%	Y	S
T/R SF	9066625. #/Hr	N/A #/Hr	ERR	N	ERR
MC VAC	29.10947 "HgV	29 "HgV	0.38%	Y	S
MC TEMP	85.20413 deg F	92 deg F	7.39%	N	S
MWE	751.4481 MWe	740 MWe	1.55%	Y	S

PEACH BOTTOM ATOMIC POWER STATION
UNIT 2 SIMULATOR MASS AND ENERGY BALANCE TEST RESULTS

MASS AND ENERGY BALANCE TEST CONDUCTED: 01/05/91
POWER LEVEL: 55 %

PARAMETER	SIMULATOR VALUES	REFERENCE VALUES	DEVIATION %	CRITICAL PARAMETER	SAT/ UNSAT
APRM	56.05347 %	55 %	1.92%	Y	S
CTP	1880.13 MWth	1853 MWth	1.46%	Y	S
CORE FL	54352533 #/Hr	54500000 #/Hr	0.27%	Y	S
RR A FL	2751.488 #/Sec	2138.888 #/Sec	28.64%	Y	U
RR B FL	2746.866 #/Sec	2138.888 #/Sec	28.42%	Y	U
TSF	7029520 #/Hr	7270000 #/Hr	3.31%	Y	U
TFWF	7009102. #/Hr	7050000 #/Hr	0.58%	Y	S
NR LVL	23.37093 "	23.2 "	0.74%	Y	S
NR PR	995.6626 psig	997 psig	0.13%	Y	S
FW TEMP	304.4456 deg F	326 deg F	6.61%	N	S
CRD FL	8.323072 #/Sec	8.333333 #/Sec	0.12%	N	S
CRD TEMP	96.929 deg F	111 deg F	12.68%	N	U
CU FL	34.72261 #/Sec	34.44444 #/Sec	0.81%	N	S
CU IN T	521.85 deg F	513 deg F	1.73%	N	S
CU OUT T	393.27 deg F	380 deg F	3.49%	N	S
MSL PR	977.71 psig	973 psig	0.48%	Y	S
TUR SF	6999511. #/Hr	N/A #/Hr	ERR	N	ERR
MC VAC	28.52787 "HgV	28.3 "HgV	0.81%	Y	S
MC TEMP	95.87416 deg F	115 deg F	16.63%	N	U
MWE	559.7058 MWe	568.4 MWe	1.53%	Y	S

PBAPS SIMULATOR PERFORMANCE TEST

SIMULATOR MALFUNCTIONS PERFORMANCE TEST

Rev. 1
Date: 12-27-90

Prepared by: B. H vens
Simulator Test Operator

Approved by: R.W. Tyler
Lead Test Operator

Date: 1/2/91

I. TEST REQUIREMENT
MALFUNCTION TESTS. ANS-3.5, A3.4
Test and document simulator response to each generic Malfunction utilizing a procedure that predicts simulator response based on analytical or best estimate data.

II. TEST ABSTRACT
This Performance Test Procedure is to be used to conduct all Simulator Performance tests that test generic Malfunctions for which Reference Plant Data is not available.

III. TEST DESCRIPTION

A. Test Conditions

1. The test conditions of each the test will be those for which response is described in the Malfunction Cause and Effects. If response descriptions encompass more than one initial condition, all listed will be tested.

2. If experience indicates that additional conditions, generic components, or severities should be tested, each requirement will be listed in the Test Conditions and will be tested.

B. Test References
References to other Simulator Performance Test that can or should be performed in conjunction with each Malfunction test are to be listed in the Test References Section of the Summary Sheet.

C. Effects
The Simulator response to each generic Malfunction Tested under this procedure will match the response expected in the Effects section of the Cause and Effects for the Malfunction.

1. Significant Parameters to be Collected
Each Malfunction Performance Test that results in a change in any of the parameters listed in any of the first 4 data sets in Appendix I is to have data collected by the GINDAC method of Appendix I using an appropriate data set. Those parameters changing and addressed in the Malfunction Cause and Effects are to be listed on the Summary Sheet as Significant Parameters.
Other required data collection in accordance with Appendix I is to be entered on the Summary Sheet.

2. Other Required Documents:
A copy of the current Malfunction Cause and Effects for the Malfunction being tested.

D. Terminating Condition:
Simulator response to a Malfunction must be capable of being carried out until: 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures; or 2) a simulator operating limitation is reached.

IV. ACCEPTANCE CRITERIA
The following Criteria are to be used to judge the acceptability of the results of this test:

A. General Criteria Applicable to all Tests

1. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

2. Significant Parameters Acceptance Criteria
The parameters listed as Significant Parameters for each Malfunction Performance Test (III.C.1 above), will match the expected response as given in the Effects section of the Cause and Effects Sheet.

3. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

B. Malfunction Performance Test Acceptance Criteria

1. For those Malfunctions resulting in a transient similar to reference plant startup tests and or restart power tests, acceptance criteria will be the same as reference plant acceptance criteria.

2. For those Malfunction Tests resulting in a transient, observed changes in parameters are in a direction and magnitude predicted by analytical, best estimate or similar plant data for the transient.

3. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures, or 2) a simulator operating limitation is reached.

V. PROCEDURE

A. Preparation:

1. Reset the Simulator to a protected IC to which the response in the Cause and Effects for the Malfunction being tested were written.

2. Ensure that a Terminal is set up in ISD.

3. Place the Simulator in RUN and perform any additional manipulations required to meet the Cause and Effects conditions.

4. Obtain a copy of the current Cause and Effects Sheet and mark it "Simulator Certification Copy".

5. Prepare to collect data for Significant Parameters as specified in III.C, Documentation.

6. Insert the Malfunction. For data collection using GINDAC, first place the Simulator in Freeze, then enter the Malfunction with a 30 sec. time delay to allow collecting initial steady-state data.

B. Performance:

1. Take the simulator out of freeze.

2. List any allowed operator/test manipulations during the test. Malfunction Performance Tests that result in a transient are normally run with no operator action until the terminating conditions are reached.

3. Observe the Simulator response to verify the occurrences listed in Effects.

   a. Document satisfactory response by initialling each required response in the margin of the Simulator Certification copy of the Cause and Effects sheet.

   b. Document unsatisfactory response by underlining the response description and providing a brief description of the actual response on the Simulator Certification copy of the Cause and Effects sheet.

4. When the Termination Conditions are reached, place the simulator in freeze.

5. Complete and terminate Data Collection in accordance with Appendix I and Significant Parameters.

6. If other Simulator Performance Tests are to be performed from the conditions that exist at this time, take the simulator out of freeze as necessary to perform those tests.

7. Verify in the space provided on the Summary Sheet that the Real Time Criteria was/was not met.

8. Assemble Test Data for Analysis.

C. If required, repeat steps V.A and V.B as necessary to complete the test at other required conditions logged on the Summary Sheet.

D. Analyze the test results, initiate required corrective action and submit the completed test for data entry and review.

PBAPS SIMULATOR MALFUNCTION PERFORMANCE TEST
SUMMARY SHEET

SMPT-________________

I. TEST CONDITIONS:

A. ________________________________

B. ________________________________

II. TEST REFERENCES
Other Simulator Perfo[illegible]nce Tests recommended for performance with this test.

1. ________ 2. ________ 3. ________

III. DOCUMENTATION

A. Significant Parameters requiring data collection are:

1. ________ 2. ________ 3. ________
4. ________ 5. ________ 6. ________
7. ________ 8. ________ 9. ________
10. ________ 11. ________ 12. ________

B. Other Required Documentation:

1. ________________________________

2. ________________________________

IV. RESULTS ANALYSIS
Date of Test ________ Test Performer ____________

A. General Criteria Applicable to all Tests

1. The response of the Simulator resulting from operator action ... ________

2. The Simulator met the real time acceptance criteria during this Performance Test ________

3. Significant Parameters Acceptance Criteria ____ ____
   The Significant Parameters listed above match the response in the Cause and Effects Sheet.

B. Malfunction Performance Test Acceptance Criteria

1. For those Malfunctions resulting in a transient similar to reference plant startup tests ... ________

2. For those Malfunction Tests resulting in a transient, observed changes in parameters are ... ________

3. Transient operation can be carried on until the termination conditions are achieved. ________

V. CORRECTIVE ACTION

A. For any of the Criteria analyzed in IV as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the Performance Test Database as Unsat.

B. List all Unsat's or the assigned Work Order Number:

1.

2.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Test Completion section.

VI. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ____

Database updated ____________________
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ____ NO ____

2. All SDR's resolved, Test Sat:

____________________ ____________________
Test Operator Date

Database updated ____________________
Data Entry

C. Test Reviewed:

____________________ ____________________
Lead Test Operator Date

D. Test Completed:

____________________ ____________________
Sim. Support Supv. Date

PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-SCRAM

MANUAL SCRAM

Prepared by: Bud Havens
Simulator Test Operator
Date: 12/26/90

Approved by: [signature]
Lead Test Operator
Date: 1/5/91

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix B, Section B1.2
Run this transient test from an initial condition of approximately 100% power, steady-state xenon and decay heat with no operator followup action.

II. TEST ABSTRACT
This performance test will test simulator response to a reactor scram caused by insertion of a manual scram by the operator. The result will be the deenergization of the CRD HCU scram pilot valves for all 185 control rod drives, and the rapid insertion of the drives into the core. The reactor core fission reaction will be shutdown from this scram action, and APRM power will rapidly decrease. Vessel level will shrink from the void collapse in the core, causing the feedwater control system to attempt to increase feedwater flow to recover level. As the core and vessel thermal power decreases, reactor pressure will decrease and the EHC system will throttle the Main Turbine Control Valves to control pressure. In regaining vessel level, the feedwater control system will overfeed the vessel and trip the Main Turbine and RFPT's on high water level. The Main Turbine Bypass valves will open as necessary to control pressure at the EHC pressure setpoint following the trip of the Main Turbine.

III. TEST REFERENCES

A. Other Performance Tests

1. SSPT T-100.

B. Reference Plant Performance Data

IV. TEST DESCRIPTION

A. Initial Conditions

- IC 14

B. The transient will be initiated by inserting a manual scram in both RPS channels.

C. Effects

The insertion of a manual scram will cause a trip of both manual trip channels in the RPS. With both trip channels tripped, the scram pilot solenoid valves for all CRD's and the scram discharge volume (SDV) vent and drain valves will be deenergized; venting the air from the scram inlet and outlet valves, and the SDV vent and drain valves. The control rods will scram and the SDV will isolate. Times given in the discussion below are referenced to time of insertion of the manual trip in the second RPS trip channel.

1. The immediate results in the RPS are:

   - triggering of the A CHANNEL REACTOR MANUAL SCRAM, B CHANNEL REACTOR MANUAL SCRAM annunciators on Annunciator Panel 205R.

   - deenergization of the scram pilot valves for both RPS channels as evidenced by the extinguishing of the eight CONTROL ROD GROUP SOLENOID indicating lights (4 per channel) on Panels 20C015 and 20C017. This causes the air supply to be isolated and vented for all 185 control rods, whose scram inlet an outlet valves will open to scram the drive. The scram inlet and outlet valves opening can be confirmed by 1) blue scram indicating lights for each rod on the full core display (energize when both scram valves are not full open) and 2) rapid insertion of each individual control rod.

   - deenergization of the pilot valves for the SDV instrument volume. This causes the air supply to be isolated and vented for the instrument volume vent and drain valves, which will close. The closure of these valves can be confirmed by observing the indicating lights for these valves on Panels 20C005 and 20C003-01.

- energization of the backup scram valves. This causes isolation and venting of the air supply header supplying the pilot valves listed above. This action can be confirmed by observing a rapid decrease in pressure on the SCRAM AIR HEADER PRESSURE indicator on Panel 20C124.

2. Immediately following the start of control rod scram motion, the following RPS and CRDHS actions should occur:

   - an automatic scram signal from SDV instrument volume high level; this can be confirmed by the triggering of the Scram Discharge Vol Hi Water Level Trip annunciator on Annunciator Panel 205L.

   - energizing of the CRD Accumulator Trouble and Rod Drift lights for all control rods on the full core display (and corresponding annunciators).

   - a decrease in CRDH charging pressure due to the opening of the scram inlet valves; an increase in indicated CRDH flow as flow is diverted to the charging header; opening of the CRDH Flow Control valve in an attempt to maintain system flow; a decrease in the Drive Water and Cooling Water D/P as flow through those portions of the system decrease; and an increase in CRD pump Amps. These can be confirmed by CRDH System indicators and controllers on Panel 20C005.

   - triggering of annunciator MODE SWITCH IN SHUTDOWN SCRAM BYPASS on Annunciator Panel 205R (at 10 sec.), indicating this scram signal has been automatically bypassed.

3. All control rods should be fully inserted within 7 sec. due to the scram, with an average time of approximately 3.5 sec. The result of the rapid insertion of the control rods will be a shutdown of the reactor core. This will cause the following parameter and system response:

- the APRM's will drop rapidly from 100% to < 3% immediately, and will indicate full downscale shortly thereafter. Neutron flux will continue to decrease into the Intermediate and then the Source Range. This can be confirmed by inserting the IRM and SRM detectors and observing that the SRM's come onscale when fully inserted.

- as fission power decreases due to core shutdown, reactor thermal power will decrease, but more slowly than neutron flux. Over the initial 35 to 40 sec. following the scram, thermal power will decrease following approximately a 7 sec. time constant, then will decrease more slowly due to decay heat. This can be confirmed by analysis of Total Steam Flow, Turbine Steam Flow, 1st Stage Pressure, Main Steam Line Pressure, Reactor Pressure and Main Generator MWe response on GINDAC plots prior to the high level trips due to feedwater injection.

- as core power decreases, the void content of the water in the core will rapidly decrease, causing vessel level to shrink. Level will drop rapidly following the scram to a minimum of -10 to -15", and will then be restored by the FWCS. FWCS will see the initial decrease in vessel level and respond by increasing feedwater flow to the maximum allowed by the 90% limiter ($\approx 13 \times 10^6$ Lbm/Hr) until the recovery level recovers to near the level setpoint. FWCS will then attempt to reduce feedwater flow and attempt to maintain level at the setpoint. Typically, if left unattended in the plant, FWCS cannot reduce feedwater flow sufficiently to prevent overfeeding and causing the high level trips at > +48" at approximately 40 sec. These events can be confirmed by analysis of the respective parameters on GINDAC plots.

- when this level is reached; automatic trips of the RFPT's and Main Turbine will occur, also causing a Main Generator trip and auxiliary power fast transfer. When the turbine trips, the bypass valves will automatically open as necessary to control reactor pressure. This can be confirmed by analysis of Turbine Steam Flow, 1st Stage Pressure, Total Feedwater Flow, and Recirc Pump Flows on GINDAC plots.

- reactor pressure will begin to decrease following the scram as core thermal power decreases. The pressure decrease is controlled by the EHC System; using initially the Control Valves, and, following the Main Turbine trip on high level, the Bypass Valves. Due to the injection of cooler feedwater as FWCS attempts to control level, pressure will drop below the EHC setpoint shortly after the high level trips, but will recover and reopen the bypass valves as decay heat overcomes the feedwater effects and raises pressure. This can be confirmed by panel observation and analysis of GINDAC plots.

- at the time of the scram, core flow will increase as the core flow resistance decreases on void collapse to approximately 107% ($\approx 110 \times 10^6$ Lbm/Hr). It will remain at this value until the fast transfer of auxiliary power occurs following the high level trips, when the recirc pumps will trip on fast transfer. Core flow will then drop rapidly to post-scram natural circulation levels ($\approx 15 \times 10^6$ Lbm/Hr). Recirculation pump flows will see little or no change until the pumps trip, and will then drop rapidly to 0. These events can be confirmed by analysis of the respective parameters on GINDAC plots.

D. Documentation

1. Significant Parameters to be Collected

a. Analog Parameters:

(1) Reactor Power(% Flux)
(2) Total Steam Flow
(3) Total Feedwater Flow
(4) WR Reactor Pressure
(5) NR Reactor Pressure
(6) WR Reactor Vessel Water Level
(7) NR Reactor Vessel Water Level
(8) Main Generator MWe
(9) Main Turbine Steam Flow
(10) Total Core Flow
(11) Total Recirculation Loop Flow (Sum)

b. Annunciators, Indications, Interlocks:

(1) Annunciators:
(a) A CHANNEL REACTOR MANUAL SCRAM
(b) B CHANNEL REACTOR MANUAL SCRAM
(c) SCRAM DISCHARGE VOL HI WATER LEVEL
(d) CRD ACCUMULATOR TROUBLE
(e) ROD DRIFT

(2) Indications:
(a) Control Rod Group Solenoid indicating lights deenergize
(b) blue scram indicating lights light
(c) closure of the scram discharge instrument volume vent and drain valves
(d) CRD Accumulator Trouble and Rod Drift lights energize
(e) Scram air header pressure decrease
(f) Observation of approximate scram time
(g) CRD charging pressure decrease
(h) CRD system flow and pump Amps increase

(i) CRD cooling water flow and D/P decrease

(j) Neutron Flux decrease to IRM and SRM Range

(3) Interlocks;
(a) automatic trips of the RFPT's and Main Turbine at >+48"
(b) Main Generator trip and auxiliary power fast transfer
(c) recirc pumps trip on fast transfer

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 4 and the DATA1 dataset.

b. Significant annunciators, alarms and interlocks are to be collected using the attached Data Form for this Performance Test.

E. Terminating Condition

This Performance Test may be terminated when the simulated plant conditions are such that a stable, controllable and safe condition has been attained which could be continued to cold shutdown conditions. In addition, the following must be observed as a minimum:

- Bypass Valves reopen to control pre' ure after high level trips, and
- Source Range instrumentation comes on scale after SRM detectors are fully inserted to confirm shutdown.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test.

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the description in Section IV.C. Where parameter versus time values are specified, parameter response within ±10% of the specified value is acceptable, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

C. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

D. Transient operation can be carried on until:

1. a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or

2. a simulator operating limitation is reached.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. Take the simulator out of Freeze, insert the SRM and IRM detectors, then place the simulator in Freeze.

RPS037.DAT

3. Prepare to collect data IAW Appendix I and Section IV.D.2.a.

4. Check the data form attached to this procedure for all the items listed in IV.D.1.b; make additions

or deletions as necessary.

B. Performance

1. While collecting data in accordance with Appendix I and Significant Parameters, take the simulator out of freeze, noting the time.

2. At approximately 30 sec. after taking the simulator out of freeze, depress both the A & B Manual Scram buttons on panel 20C005.

3. Observe the Simulator response to generally verify the occurrences listed in Effects and log the occurrence of the Annunciators, Indications and Interlocks on the data form, marking each item as Sat or Unsat as appropriate.

4. Take only the following action on the control boards.

   a. When APRM's indicate off scale low, and the APRM DOWNSCALE Annunciator is in, place the APRM/IRM Selector Switches to IRM.

   b. Position the IRM Range Switches for the "A" IRM to maintain on scale readings as neutron flux decreases.

5. When the Termination Conditions are reached, place the simulator in freeze.

6. Complete and terminate Data Collection in accordance with Appendix I and Significant Parameters.

7. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/5/91 Test Performer B. Havens

Date Analyzed 1/9/91 Analysis by B. Kum

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters:	
a. Reactor Power(% Flux)	Sat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. WR Reactor Pressure	Sat
e. NR Reactor Pressure	Sat
* f. WR Reactor Vessel Water Level	Sat
* g. NR Reactor Vessel Water Level	Sat
h. Main Generator MWe	Sat
i. Main Turbine Steam Flow	Sat
j. Total Core Flow	Sat
k. Total Recirculation Loop Flow (Sum)	Sat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

* Vessel level response on initial shrink and after RFP Trips are identified SOR's (W.O.). This response does not violate the acceptance criteria for this test, but will be corrected. BW

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1.

2.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ✓ Unsat ____

Database updated BA
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ____ NO ____

2. All SDR's resolved, Test Sat:

______________________ ______________________
Test Operator Date

Database updated ______________________
Data Entry

C. Test Reviewed:

R.W. Tyler 1/28/91
Lead Test Operator Date

D. Test Completed:

M.A. Rosenberg 30 JAN 91
Sim. Support Supv. Date

TRANSIENT PERFORMANCE TEST
DATA SHEET - RPS03
MANUAL SCRAM

PERFORMANCE CRITERIA

The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B Haver DATE: 1/5/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (1)(a)	A CHANNEL REACTOR MANUAL SCRAM Annunciator	Sat
IV.D.1.b. (1)(b)	B CHANNEL REACTOR MANUAL SCRAM Annunciator	Sat
IV.D.1.b. (1)(c)	SCRAM DISCHARGE VOL HI WATER LEVEL Annunciator	Sat
IV.D.1.b. (1)(d)	CRD ACCUMULATOR TROUBLE Annunciator	Sat
IV.D.1.b. (1)(e)	ROD DRIFT Annunciator	Sat
IV.D.1.b. (2)(a)	CONTROL ROD GROUP SOLENOID indicating lights deenergize	Sat
IV.D.1.b. (2)(b)	blue SCRAM indicating lights on the full core energize	Sat
IV.D.1.b. (2)(c)	Scram Discharge Volume vent and drain valves close (20C005 & 20C003-01)	Sat
IV.D.1.b. (2)(d)	CRD Accumulator Trouble & Rod Drift indicating lights on the full core display energize	Sat

PERFORMANCE CRITERIA

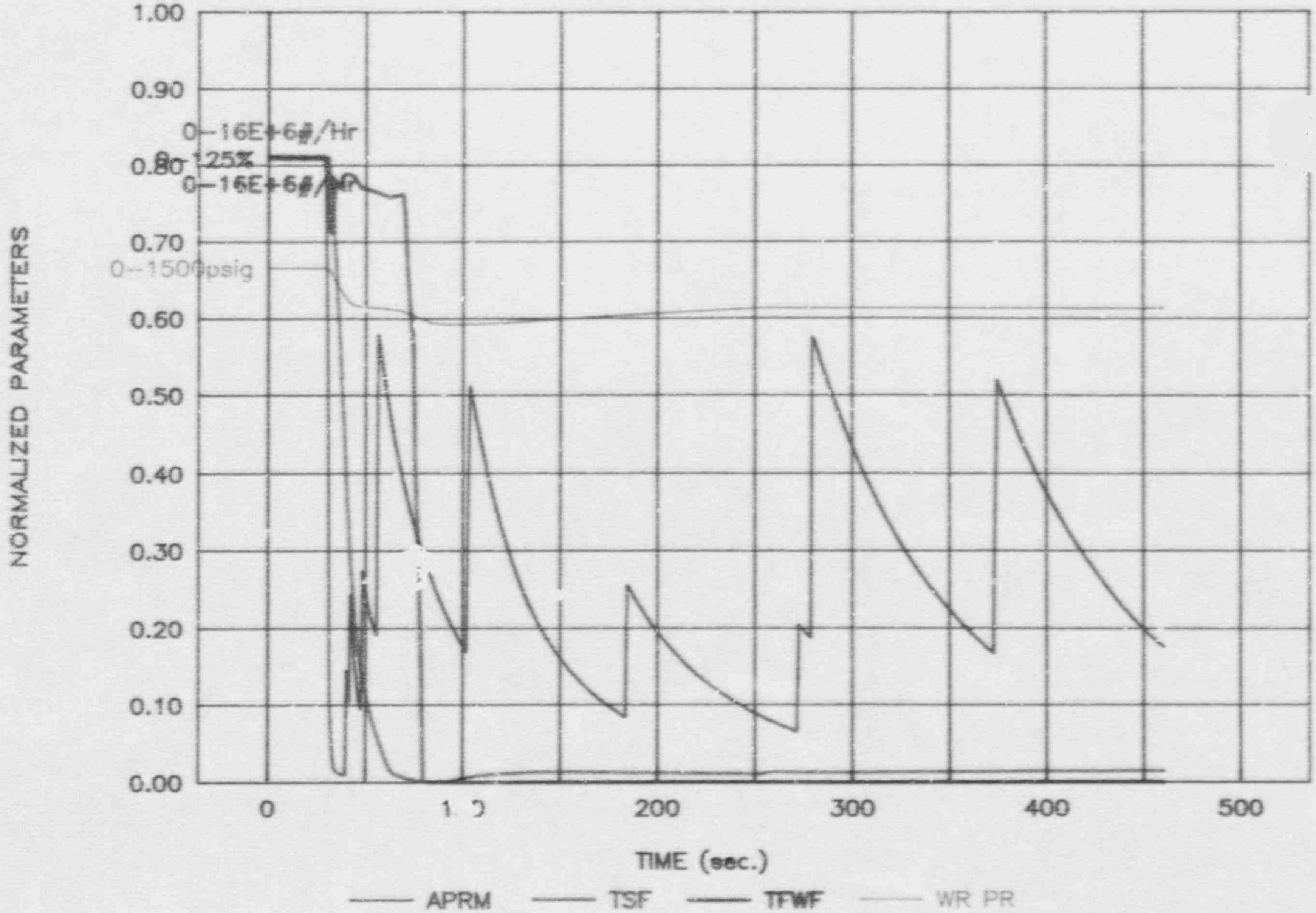
The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

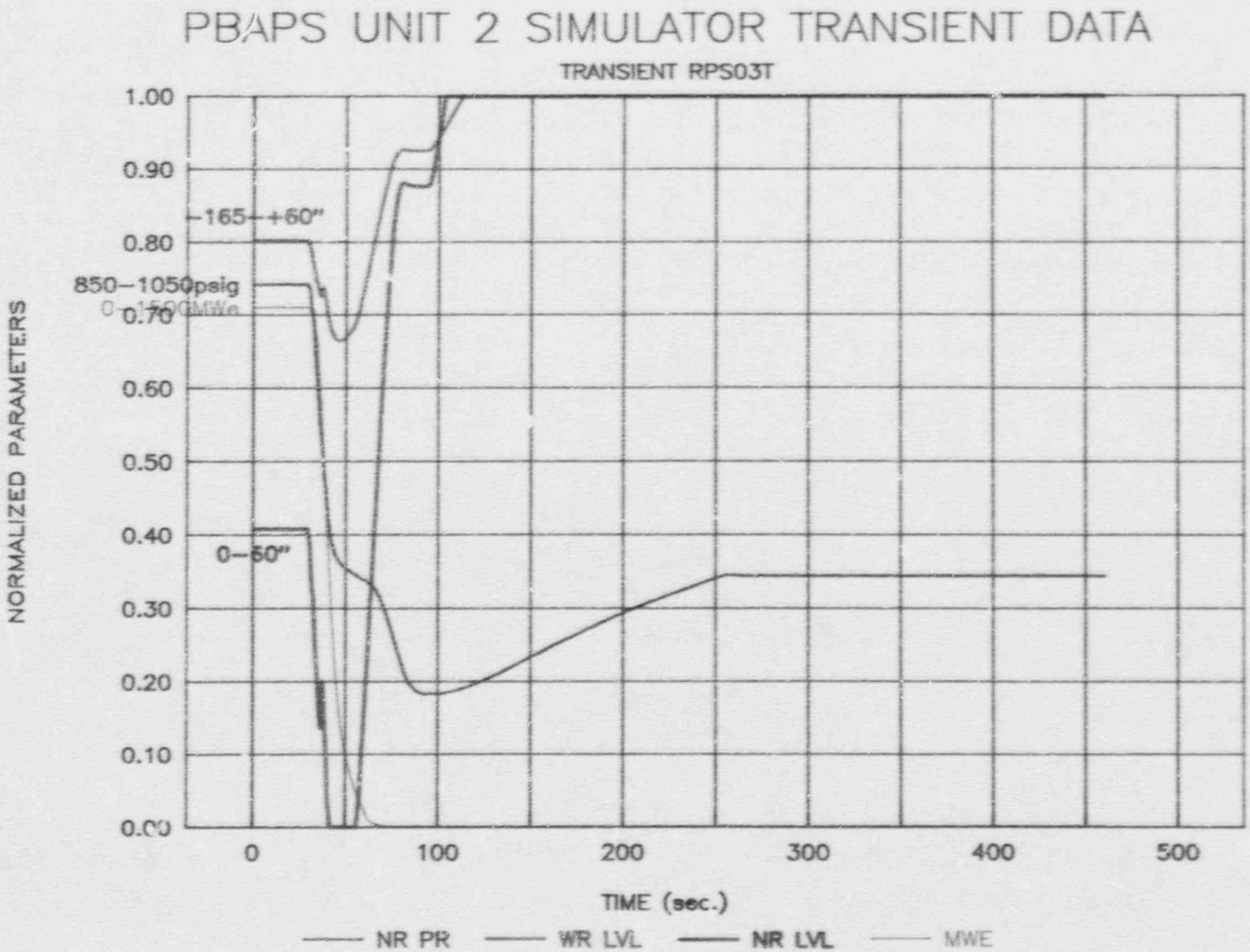
DATA TAKEN BY: B Haves DATE: 1/5/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (2)(e)	Scram air header pressure decreases	Sat
IV.D.1.b. (2)(f)	Approximate scram time; all rods inserted within approximately 7 sec. ≈5sec	Sat
IV.D.1.b. (2)(g)	CRD charging pressure decreases	Sat
IV.D.1.b. (2)(h)	CRD system flow and pump amps. increase	Sat
IV.D.1.b. (2)(i)	CRD cooling water flow and D/P decrease	Sat
IV.D.1.b. (2)(j)	Neutron flux decreases into the Source Range Source range indication began to decrease as IRM's came into Range 2 BH	Sat
IV.D.1.b. (3)(a)	RFPT's & Main Turbine trip at +48"	Sat
IV.D.1.b. (3)(b)	Main Generator trips on Turbine trip, and initiates auxiliary power fast transfer	Sat
IV.D.1.b. (3)(c)	Recirc Pumps trip on auxiliary power fast transfer	Sat
Real Time Operation	The Simulator operated in real time as indicated by completion of the test without a suspension of Simulation, and the ISD/IST status was not FAIL.	Sat

PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

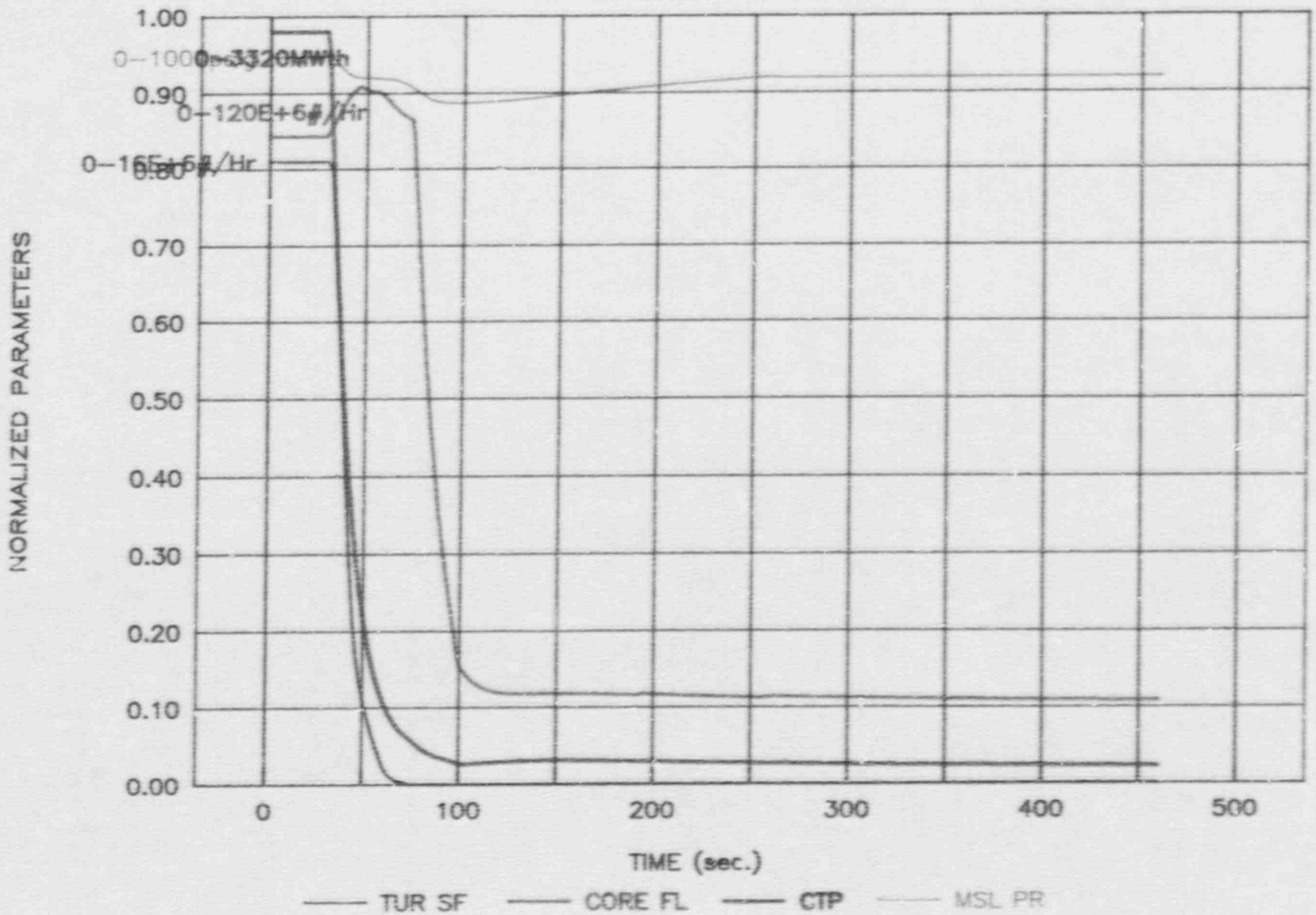
TRANSIENT RPS03T

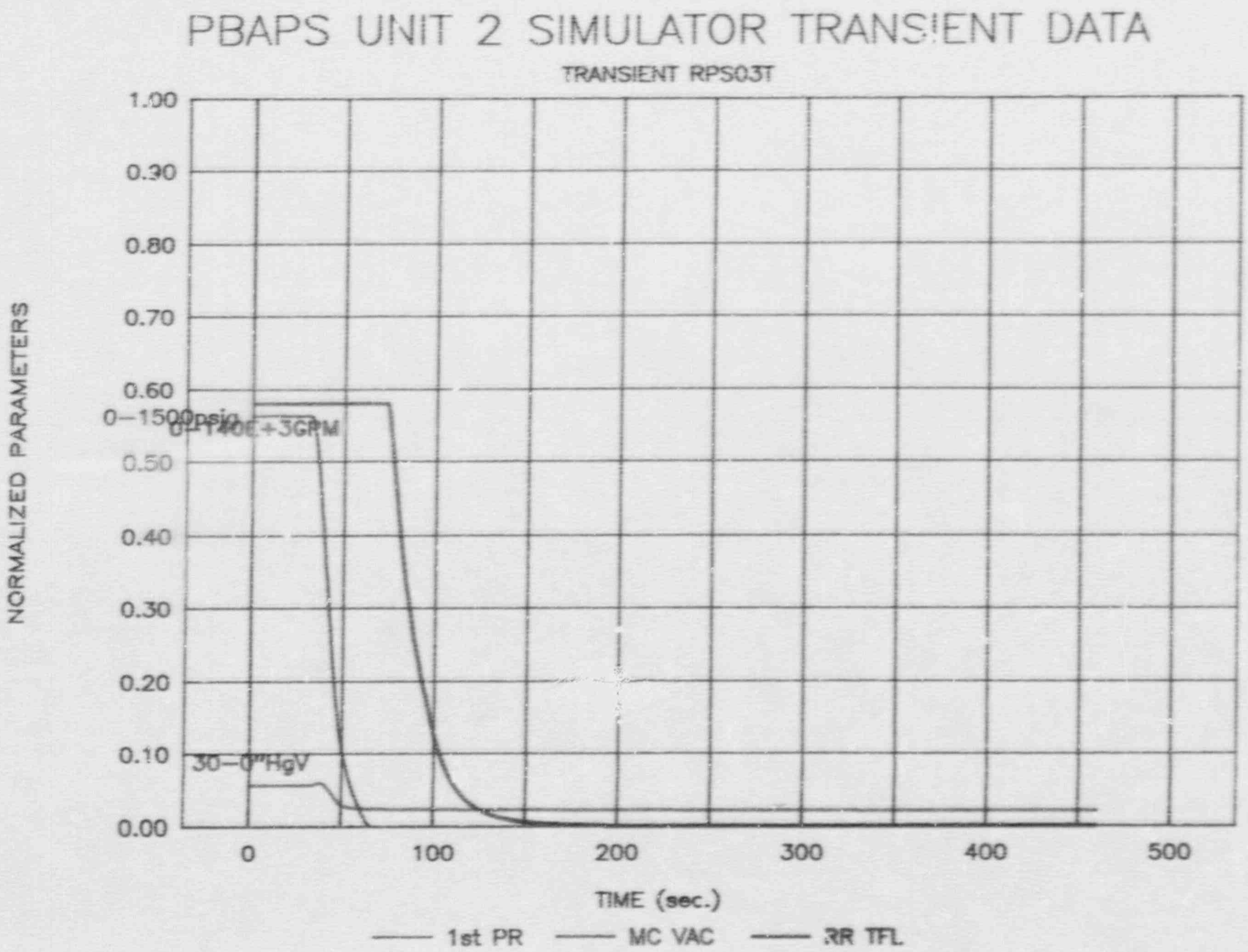



PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT RPS03T
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-165-+60"
850-1050psig
0-1500MWe
0-60"
0
100
200
300
400
500
TIME (sec.)
NR PR
WR LVL
NR LVL
MWE

PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT RPS03T

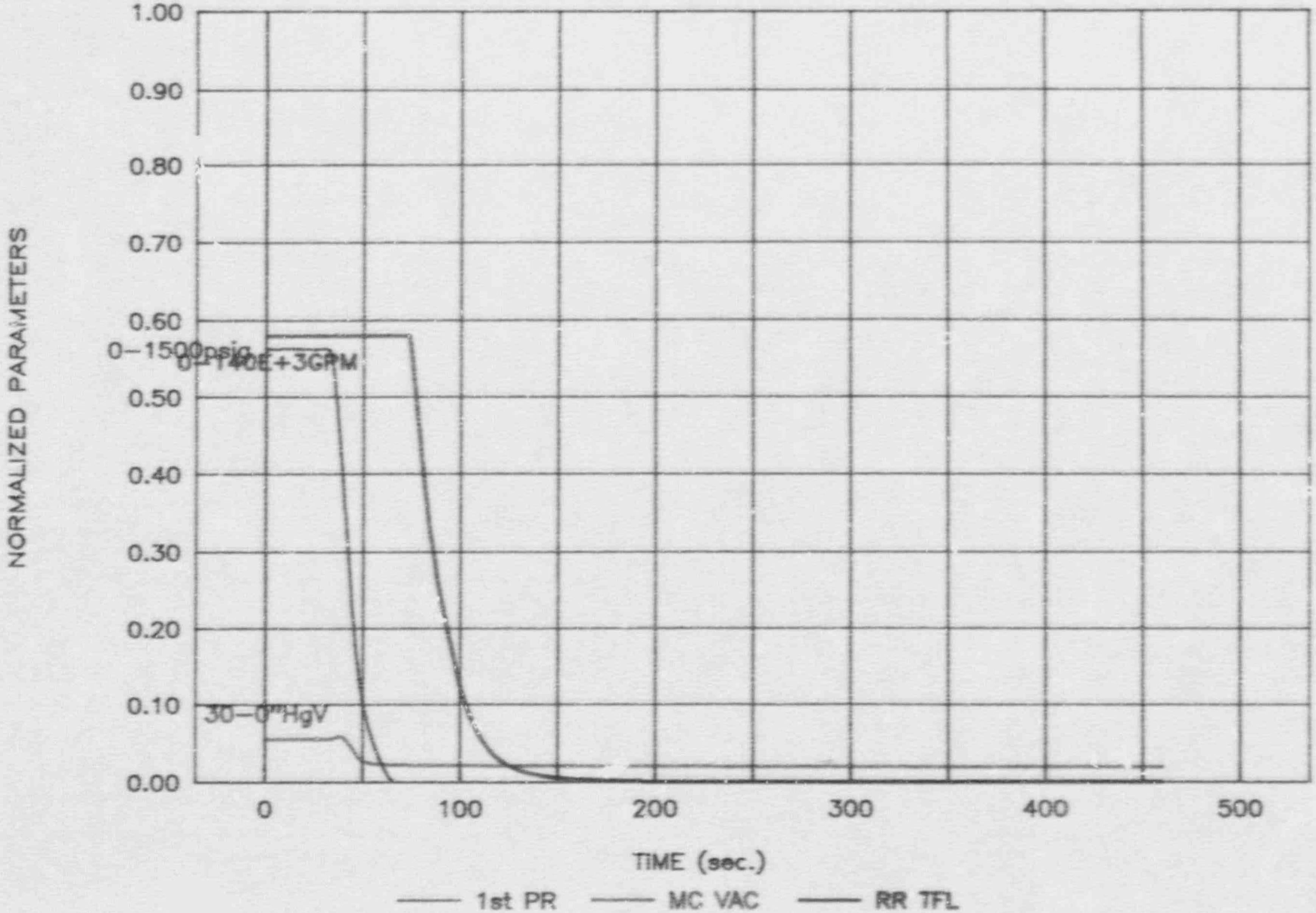




PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT RPS03T
1.00
0.30
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
NORMALIZED PARAMETERS
0−1500psig
0−T40E+3GPM
30−0"HgV
0
100
200
300
400
500
TIME (sec.)
1st PR
MC VAC
RR TFL

PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT RPS03T



PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-MFS02

SIMULTANEOUS TRIP OF ALL FEED PUMPS

Prepared by: Bud Havens
Simulator Test Operator
Date: 12/27/90

Approved by: ______________________
Lead Test Operator
Date: ________

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix B, Section B1.2
Run this transient test from an initial condition of approximately 100% power, steady-state xenon and decay heat with no operator followup action.

II. TEST ABSTRACT
This performance test will test simulator response to a complete loss of normal high pressure feedwater. All operating Reactor Feedwater Pumps will be simultaneously tripped on low suction pressure via Simulator Malfunction. A loss of all operating feedwater pumps will cause a rapid decrease in Reactor Vessel Water Level. The decrease in vessel level will in turn cause a low level Reactor Scram and Containment Isolation, followed by a low-low level HPCI/RCIC initiation and Containment Isolation. Following the scram, Reactor pressure will be reduced to, and maintained at, the EHC setpoint by the Main Turbine, then the Bypass Valves. Vessel level will be restored to the high level trip by HPCI/RCIC injection after their initiation.

III. TEST REFERENCES

A. Other Performance Tests

1. SSPT T-101

2. SSPT GP-8

3. SMPT MFS02

B. Reference Plant Performance Data

IV. TEST DESCRIPTION

A. Initial Conditions

- IC 14

B. Malfunctions used:

- Malfunction No.: MFS02A, B & C at 100% severity

C. Effects

Simultaneous insertion of Malfunctions MFS02A, B & C at 100% severity will cause all three Reactor Feedwater Pumps (RFP's) to trip on high vibration. Times given in the discussion below are referenced to time of insertion of the Malfunctions unless otherwise indicated. Parameter response can be confirmed by analysis of GINDAC plots. The resulting loss of normal feedwater to the Reactor Vessel will cause:

- feedwater flow to the vessel will drop rapidly to 0 Lbm/Hr.

- a rapid decrease in vessel level will occur until the scram occurs within ≈ 15 sec. Group II and Group III isolation will also occur at 0".

- following the scram shrink will cause level to decrease very rapidly due to void collapse, and it will continue to drop due to inventory loss. ARI, HPCI and RCIC initiate at -48 inches within ≈ 30 sec. from the RFP trip. When they have established flow, HPCI/RCIC injection will increase level at ≈ 25"/minute. They will continue to inject until level reaches the high level trip point, where they will automatically trip. Level will then swell as the colder water from HPCI/RCIC injection continues to heat to reactor temperatures and expands. Level will begin to decrease when the Bypass valves or SRV's open to control pressure.

- reactor power will decrease slowly due to decreasing inlet subcooling during the RFP coastdown, then more rapidly after feedwater flow stops to the time of the scram, then will follow a normal post-scram decrease.

- total steam flow from the reactor vessel will initially follow reactor power until the time of the scram. After the scram has occurred, steam flow will decrease more slowly than reactor power (neutron flux) as decay heat and stored heat from the fuel and reactor components are removed. The excess stored heat is dissipated within ≈ 30 seconds after the scram, then decrease controlled by the 6 to 7 second fuel time constant.

- reactor pressure will initially follow the changes in reactor power until the scram occurs, then will decrease rapidly to the EHC setpoint controlled by the Main Turbine Control valves until the turbine trips on reverse power, then by the Bypass valves. During HPCI/RCIC injection, pressure will drop below the EHC setpoint due to steam flow and cold water injection, but will increase following HPCI/RCIC trip on high level; in this case (were the transient allowed to continue), pressure will increase to the EHC setpoint and be controlled by the Bypass valves at that point. Depending on decay heat input, pressure may decrease below the low steam line pressure Group I isolation due to the pressure decrease effects; in this case (were the transient allowed to continue), pressure will increase to the lowest SRV setpoint and be controlled at that point.

- main generator MWe and main turbine steam flow will follow main steam flow until the main generator trips on reverse power; this will trip the main turbine.

- recirculation pump loop flow will begin to decrease as soon as vessel level is below the low level alarm point (17"), as the recirculation pumps run back to 60% speed on loss of a RFP with low level. 15 seconds after total feedwater flow is < 20%; the recirculation pumps will begin a full runback to < 30% speed. When ARI initiates at -48", both recirculation pumps will trip.

- reactor core and recirculation loop flow will decrease as the recirculation pumps begin their runback(s); when the recirc. pumps trip on ARI initiation, core flow will drop rapidly to post-scram natural circulation levels (≈ 12-15 X 10^6).

D. Documentation

1. Significant Parameters to be Collected

a. Analog Parameters:

(1) Reactor Power(% Flux)
(2) Total Steam Flow
(3) Total Feedwater Flow
(4) WR Reactor Pressure
(5) NR Reactor Pressure
(6) WR Reactor Vessel Water Level
(7) NR Reactor Vessel Water Level
(8) Main Generator MWe
(9) Main Turbine Steam Flow
(10) Total Core Flow
(11) Total Recirculation Loop Flow (Sum)

b. Annunciators, Indications, Interlocks:

Interlocks
(1) All RFPT's trip on insertion of Malfunction MFS02A, B, & C
(2) Scram occurs on low level at 0"
(3) Group II and III Primary Containment Isolation occur at 0"
(4) ARI, HPCI and RCIC initiate at -48"
(5) Recirc. Pumps trip on ARI initiation
(6) Main Turbine trips on reverse power
(7) HPCI and RCIC trip/isolate at +48"

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 4 and the DATA1 dataset.

b. Significant interlocks are to be collected using the attached Data Form for this Performance Test.

E. Terminating Condition

This Performance Test may be terminated when the simulated plant conditions are such that a stable, controllable and safe condition has been attained which could be continued to cold shutdown conditions. In addition, the following must be observed as a minimum:

- Pressure increase is observed following the trip of HPCI/RCIC at +48", or following the Group I isolation on low steam line pressure.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test.

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the description in Section IV.C. Where parameter versus time values are specified, parameter response within ±10% of the specified value is acceptable, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

C. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

D. Transient operation can be carried on until:

1. a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or

2. a simulator operating limitation is reached.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. Insert Malfunction MFS02 at 100% severity with a 30 sec. time delay for the A, B and C RFP's.

3. Prepare to collect data IAW Appendix I and Section IV.D.2. MFS02CT.DAT

4. Check the form attached to this procedure for all the items listed in IV.D.1.b; make additions or deletions as necessary.

B. Performance

1. While collecting data in accordance with Appendix I and Significant Parameters, take the simulator out of freeze.

2. Observe the Simulator response to generally verify the occurrences listed in Effects and log the occurrence of the Annunciators, Indications and Interlocks on the data form marking each item as Sat or Unsat as appropriate.

3. When the Termination Conditions are reached, terminate data collection and place the simulator in freeze.

4. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/11/91 Test Performer B. Havens

Date Analyzed 1/11/91 Analysis by B Havens

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters:	
a. Reactor Power(% Flux)	Sat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. WR Reactor Pressure	Sat
e. NR Reactor Pressure	Sat
f. WR Reactor Vessel Water Level	Sat
g. NR Reactor Vessel Water Level	Sat
h. Main Generator MWe	Sat
i. Main Turbine Steam Flow	Sat
j. Total Core Flow	Sat
k. Total Recirculation Loop Flow (Sum)	Sat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1.

2.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ✓ Unsat ___

Database updated ______ BA ______
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ____ NO ____

2. All SDR's resolved, Test Sat:

______________________ ____________________
Test Operator Date

Database updated ____________________
Data Entry

C. Test Reviewed:

R. W. Tyler ____________ 1/14/91 ____________
Lead Test Operator Date

D. Test Completed:

M. Q. [illegible] ____________ 30 JAN 91 ____________
Sim. Support Supv. Date

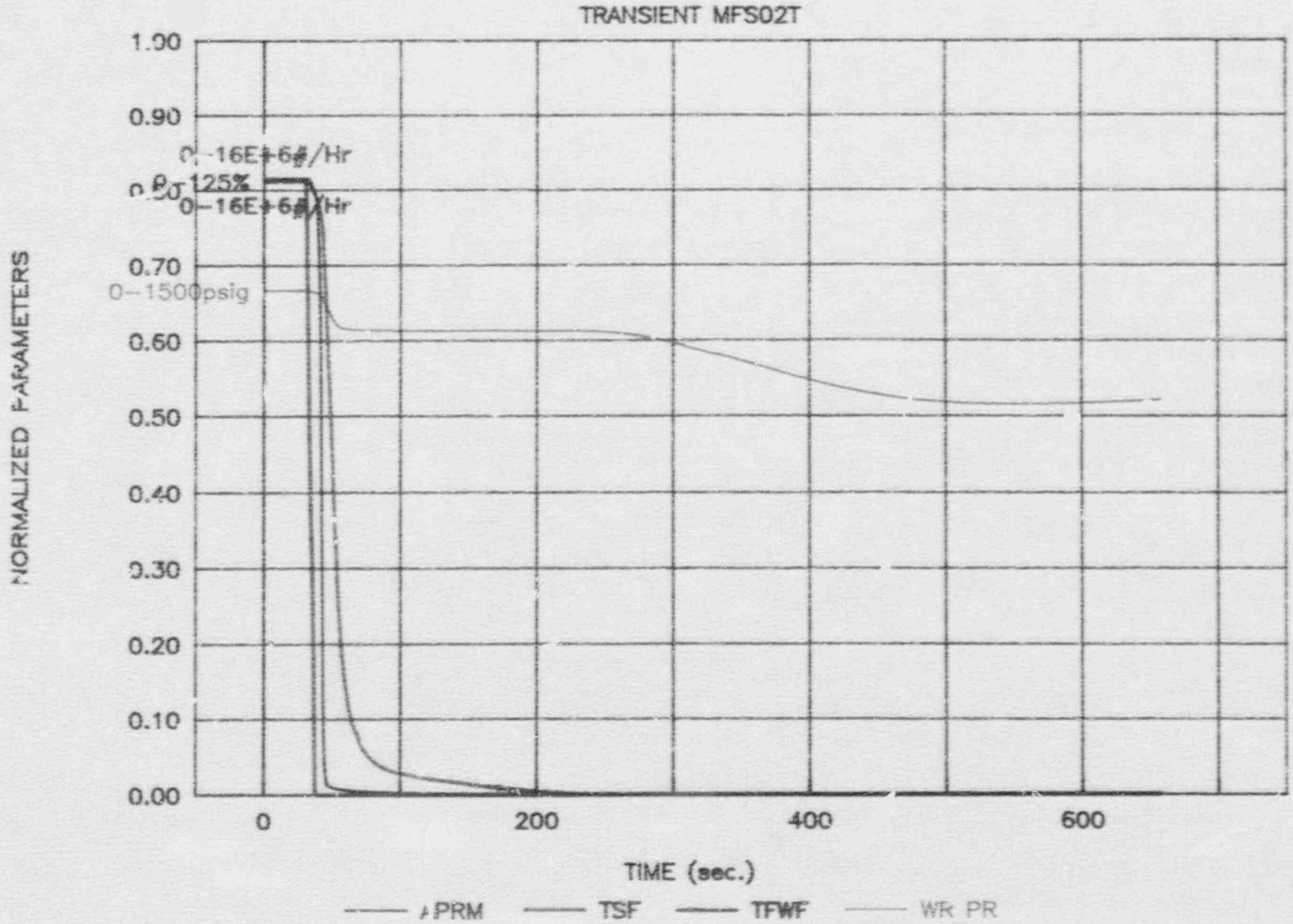
TRANSIENT PERFORMANCE TEST
DATA SHEET - MFS02
SIMULTANEOUS TRIP OF ALL FEEDWATER PUMPS

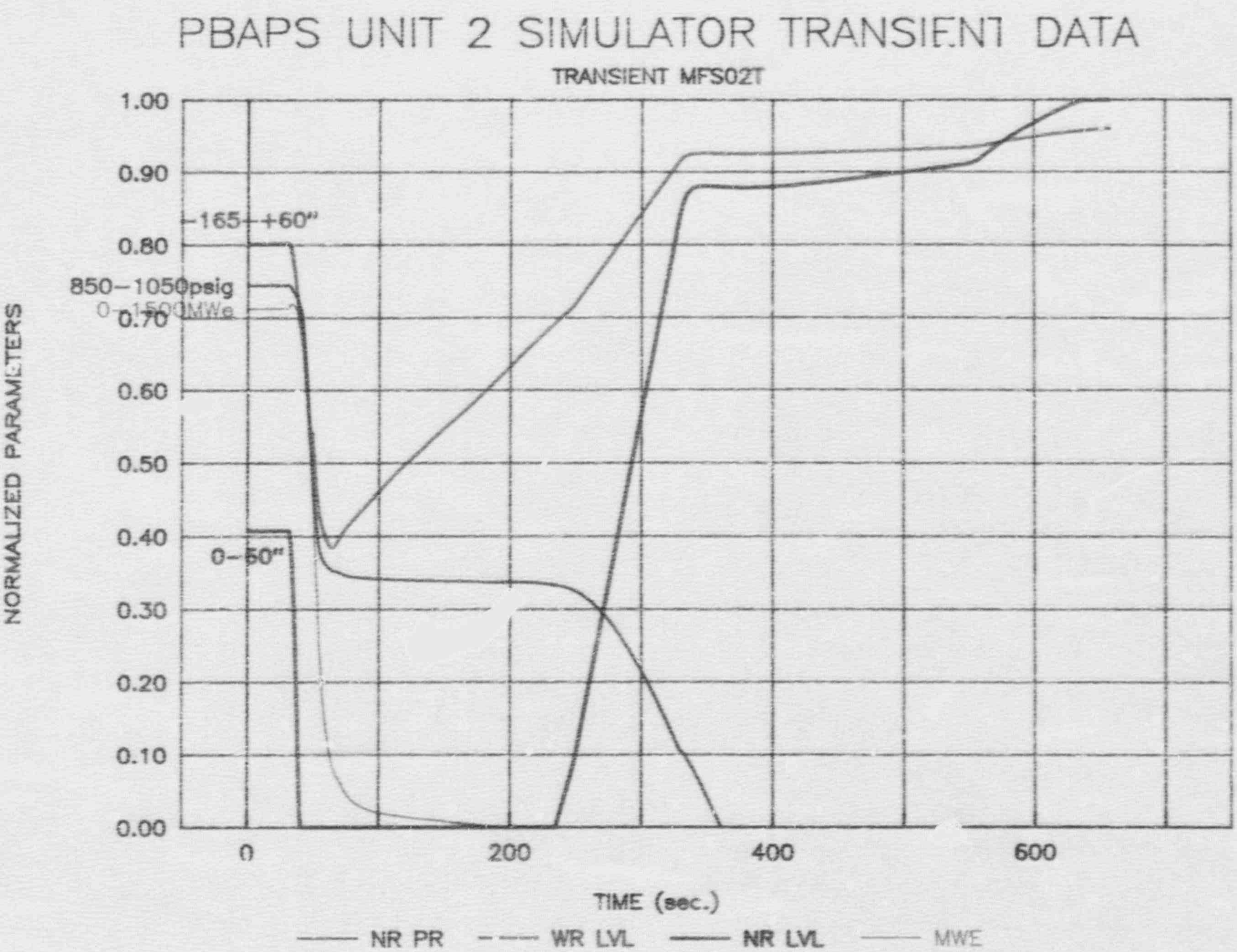
PERFORMANCE CRITERIA
The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B. Havens DATE: 1/11/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (1)	All RFP's trip on insertion of Malfunctions MFS02A, B & C	Sat
IV.D.1.b. (2)	Scram occurs on low level at 0"	Sat
IV.D.1.b. (3)	Group II & III Primary Contianment Isolations occur at 0"	Sat
IV.D.1.b. (4)	Recirc. pumps trip on ARI initiation	Sat
IV.D.1.b. (5)	ARI, HPCI & RCIC initiate at -48"	Sat
IV.D.1.b. (6)	Main Turbine trips on reverse power approx. 4 min after RFP trip	Sat
IV.D.1.b. (7)	HPCI and RCIC trip/isolate at +48"	Sat
Real Time Operation	The Simulator operated in real time as indicated by completion of the test without a suspension of Simulation, and the ISD/IST status was not FAIL.	Sat

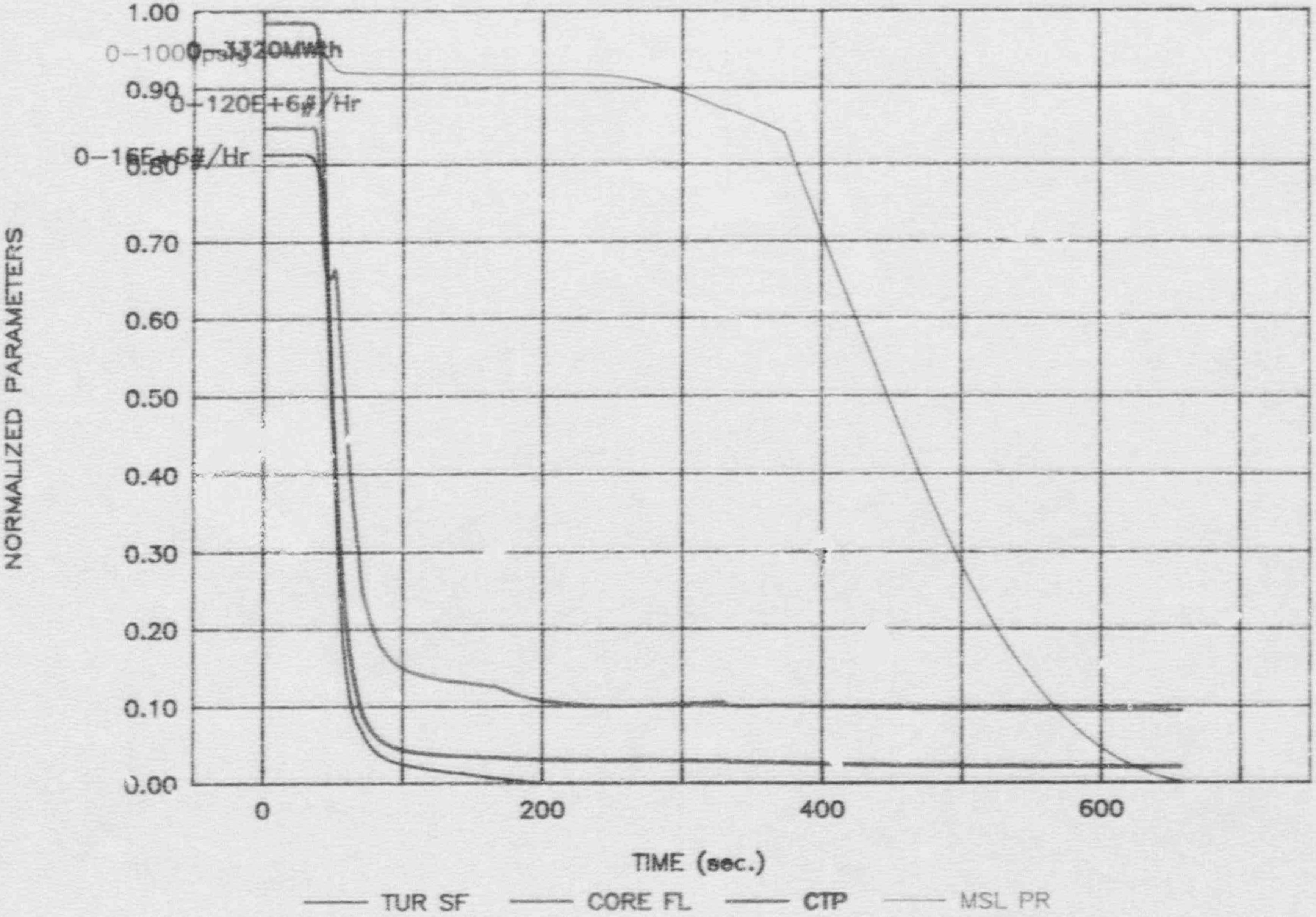
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA




PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT MFS02T
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-165 - +60"
850-1050psig
0-1500MWe
0-60"
0
200
400
600
TIME (sec.)
NR PR
WR LVL
NR LVL
MWE

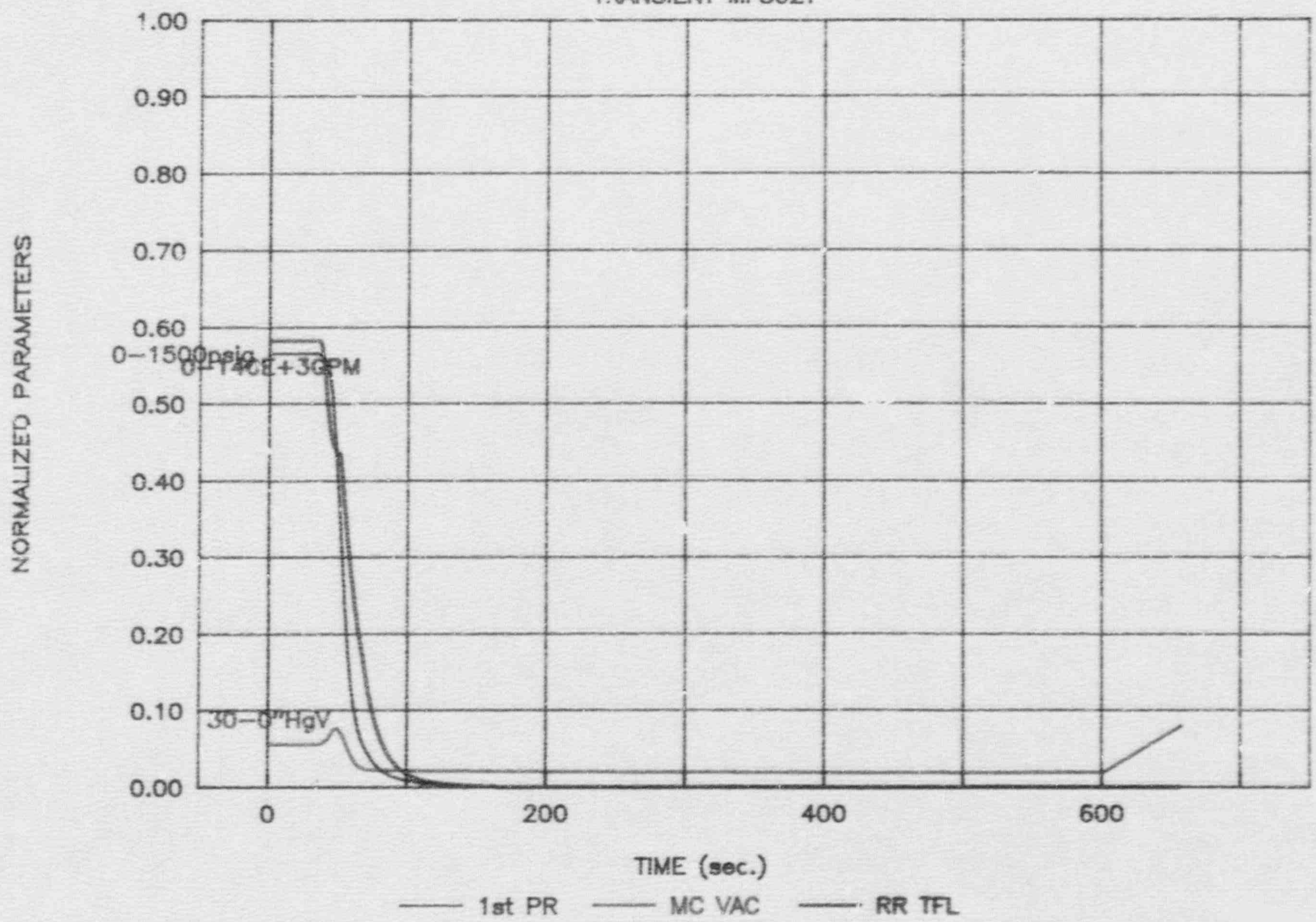
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT MFS02T



PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT MFS02T



PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-MSS06

SIMULTANEOUS CLOSURE OF ALL MSIV's

Prepared by: Bud Havens — Date: 12/27/90
Simulator Test Operator

Approved by: R.W. Tyler — Date: 1/3/91
Lead Test Operator

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix B, Section B1.2
Run this transient test from an initial condition of approximately 100% power, steady-state xenon and decay heat with no operator followup action.

II. TEST ABSTRACT
This performance test will test simulator response to a simultaneous closure of the eight Main Steam Isolation Valves (MSIV's). All MSIV's will close due to a loss of air supply to each individual valve via Simulator Malfunction. The result will be a rapid reduction in Steam Flow from the reactor vessel and a reactor scram on MSIV Closure. The cessation of steam flow will cause a rapid pressure increase, which is arrested and controlled by the Safety/Relief Valves (SRV's); and a loss of the Reactor Feed Pump Turbines, which results in a loss of normal feedwater flow. The scram will shutdown the reactor core with little or no spike observed in neutron flux. Vessel level will sharply decrease due to the pressurization and scram, then will decrease more slowly as the SRV's cycle to control pressure. Level will eventually reach the initiation point for HPCI and RCIC; which will start and restore level to the high level trip point.

III. TEST REFERENCES

A. Other Performance Tests

1. SSPT T-101

2. SSPT GP-8

B. Reference Plant Performance Data

IV. TEST DESCRIPTION

A. Initial Conditions

- IC 14

B. Malfunctions used:

- Malfunction No.: MSS06A through H

C. Effects

Simultaneous insertion of Malfunctions MSS06A through H will cause all 8 MSIV's to close due to loss of air pressure to the valve operating controls. Times given in the discussion below are referenced to time of insertion of the Malfunction unless otherwise indicated. Parameter response can be confirmed by analysis of GINDAC plots.
The resulting valve closure will cause:

- a reactor scram due to MSIV Closure (< 90% full open) in the Run Mode, causing power to drop rapidly to 0.

- a rapid loss of steam flow from the reactor vessel as the valves close in < 5 sec. Thus, Total Steam Flow will rapidly decrease to 0, as will Turbine Steam Flow and Main Generator MW electric.

- because of the anticipatory valve position scram, the APRM's will see a very small (<5%) or no flux increase due to the scram action even though the pressure increase would tend to cause such an increase.

- reactor pressure will rapidly increase as the normal heat removal from the reactor is stopped. Pressure will rise to the SRV setpoint, and lift all SRV's. The [illegible]s should be able to limit the maximum pressure [illegible] less than 1150 psig. As pressure increases above 1090 psig, ARI is initiated which will trip the Recirculation Pumps and backup the RPS scram. Following the initial lift, the SRV's will reseat after lowering pressure to ≈ 1050 psig. Pressure will then increase to the setpoint of the lowest set SRV, which will lift to control pressure. This lowest set SRV will cycle to control pressure until (if the transient is continued) HPCI/RCIC injection reduces pressure.

- Reactor vessel level will initially decrease rapidly due to void collapse on the pressure increase and scram. The RFP's will lose driving steam on the isolation and Total Feedwater Flow will decrease to 0 somewhat more slowly than Total Steam Flow, but will have little effect in level restoration. Some level swelling effect on the void increase due to the initial multiple SRV lift may be observed, then alternate swell/shrink will be observed on the subsequent lowest set SRV lifts. After the initial lift, each subsequent lift should result in a decreasing trend in level as the SRV removes inventory from the reactor vessel. If the transient is continued, HPCI and RCIC will automatically initiate at -48" to restore level.

- The Recirculation Pumps will trip, and loop flows will drop to 0 as the pumps coast down, on ARI initiation as pressure initially increases. Total Core Flow may show a slight increase initially then will drop rapidly to post-scram natural circulation levels when the Recirculation Pumps trip. Due to void formation on SRV lifts, an increase then decrease in core flow should be observed on subsequent SRV lifts.

D. Documentation

1. Significant Parameters to be Collected

a. Analog Parameters:

(1) Reactor Power(% Flux)
(2) Total Steam Flow
(3) Total Feedwater Flow
(4) WR Reactor Pressure
(5) NR Reactor Pressure
(6) WR Reactor Vessel Water Level
(7) NR Reactor Vessel Water Level

(8) Main Generator MWe
(9) Main Turbine Steam Flow
(10) Total Core Flow
(11) Total Recirculation Loop Flow (Sum)

b. Annunciators, Indications, Interlocks:

(1) Annunciators

(a) MAIN STEAM ISO VALVES NOT FULL OPEN TRIP
(b) REACTOR HI PRESSURE
(c) A CHANNEL ARI TRIP
(d) B CHANNEL ARI TRIP
(e) SAFETY RELIEF VALVE OPEN

(2) Indications

(a) Initial SRV lift, all SRV's
(b) Subsequent SRV lifts, one valve

(3) Interlocks

(a) Scram occurs on MSIV Closure
(b) ARI initiated at ≈ 1090 psig
(c) Recirc. Pumps trip on ARI initiation

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 4 and the DATA1 dataset.

b. Significant interlocks are to be collected using the attached Data Form for this Performance Test.

E. Terminating Condition

This Performance Test may be terminated when the simulated plant conditions are such that a stable, controllable and safe condition has been attained which could be continued to cold shutdown conditions. In addition, the following must be observed as a minimum:

- Level trending downward after several SRV lifts.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test.

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the description in Section IV.C. Where parameter versus time values are specified, parameter response within ±10% of the specified value is acceptable, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

C. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

D. Transient operation can be carried on until:

1. a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or

2. a simulator operating limitation is reached.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. Insert Malfunction MSS06 A through H with a 30 sec. time delay.

MSSD6T.SAT

3. Prepare to collect data IAW Appendix I and Section IV.D.2.

4. Check the form attached to this procedure for all the items listed in IV.D.1.b; make additions or deletions as necessary.

B. Performance

1. While collecting data in accordance with Appendix I and Significant Parameters, take the simulator out of freeze.

2. Observe the Simulator response to generally verify the occurrences listed in Effects and log the occurrence of the Annunciators, Indications and Interlocks on the data form marking each item as Sat or Unsat as appropriate.

3. When the Termination Conditions are reached, terminate data collection and place the simulator in freeze.

4. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/5/91 Test Performer B Havens

Date Analyzed 1/9/91 Analysis by B Havens

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters	
a. Reactor Power(% Flux)	Sat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. WR Reactor Pressure	Unsat
e. NR Reactor Pressure	Unsat
f. WR Reactor Vessel Water Level	Sat
g. NR Reactor Vessel Water Level	Sat
h. Main Generator MWe	Sat
i. Main Turbine Steam Flow	Sat
j. Total Core Flow	Sat
k. Total Recirculation Loop Flow (Sum)	Sat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. VII B.1 d & e. Pressure increase too slowly after initial lift of SRV's and/or on subsequent lifts decreases.
2. WO 910014 Pri 2

C If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ✓

Database updated ____BL____
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ✓ NO ____

2. All SDR's resolved, Test Sat:

________________________ ____________________
Test Operator Date

Database updated ____________________
Data Entry

C. Test Reviewed:

________________________ ____________________
Lead Test Operator Date

D. Test Completed:

________________________ ____________________
Sim. Support Supv. Date

TRANSIENT PERFORMANCE TEST
DATA SHEET - MSS06
SIMULTANEOUS CLOSURE OF ALL MSIV'S

PERFORMANCE CRITERIA

The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B. Havens DATE: 1/5/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (1)(a)	MAIN STEAM ISO VALVES NOT FULL OPEN TRIP Annunciator	Sat
IV.D.1.b. (1)(b)	REACTOR HI PRESSURE Annunciator	Sat
IV.D.1.b. (1)(c)	A CHANNEL ARI TRIP Annunciator	Sat
IV.D.1.b. (1)(d)	B CHANNEL ARI TRIP Annunciator	Sat
IV.D.1.b. (1)(e)	SAFETY RELIEF VALVE OPEN Annunciator	Sat
IV.D.1.b. (2)(a)	All SRV's lift initially	Sat
IV.D.1.b. (2)(b)	One SRV lifts one subsequent lifts	Sat
IV.D.1.b. (3)(a)	Scram occurs on MSIV Closure	Sat
IV.D.1.b. (3)(b)	ARI initiated at $\approx$ 1090 psig	Sat
IV.D.1.b. (3)(c)	Recirc. Pumps trip on ARI initiation	Sat

TRANSIENT PERFORMANCE TEST
DATA SHEET - MSS06
SIMULTANEOUS CLOSURE OF ALL MSIV'S

PERFORMANCE CRITERIA

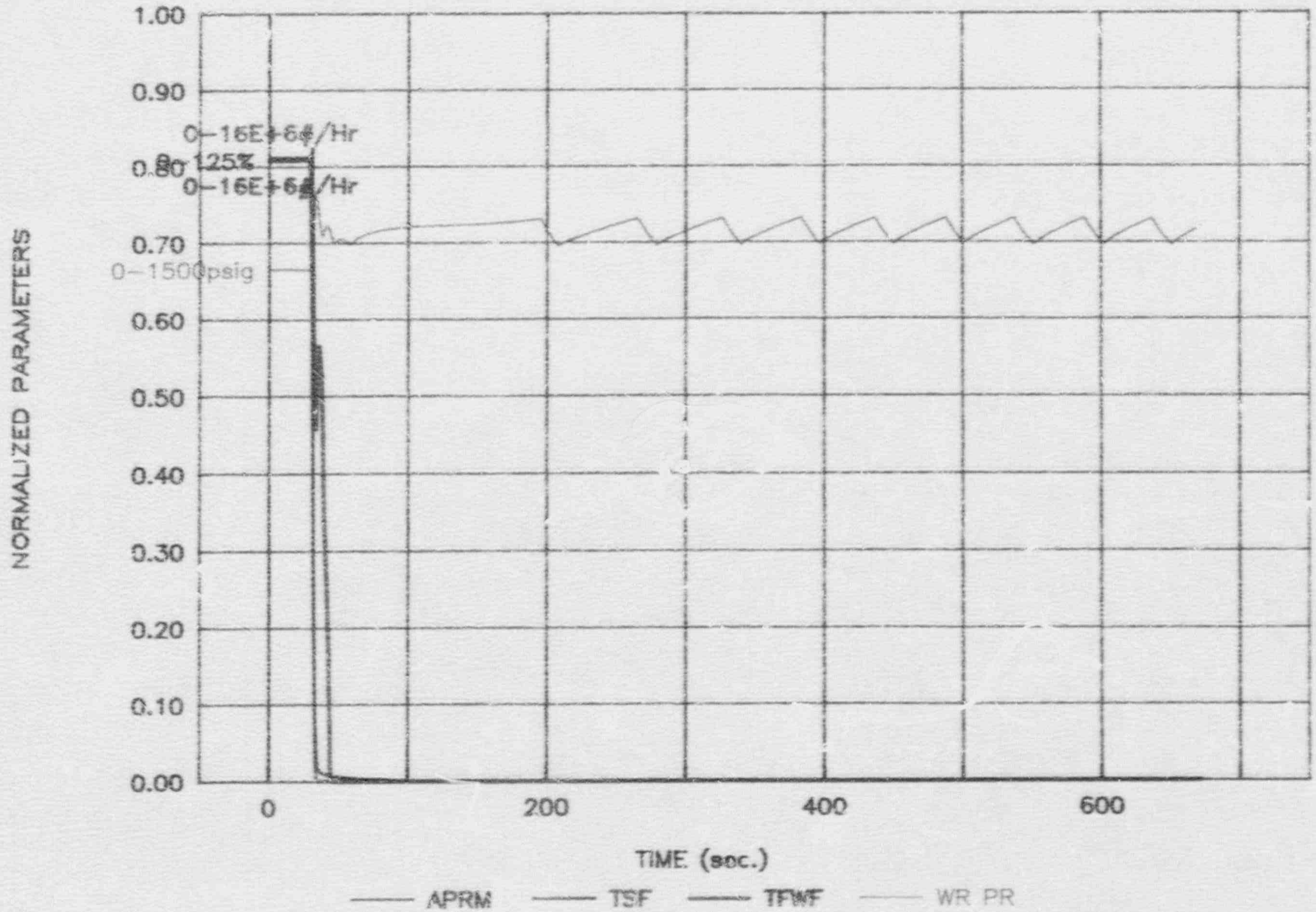
The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B Ahrens DATE: 1/5/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
Real Time Operation	The Simulator operated in real time as indicated by completion of the test without a suspension of Simulation, and the ISD/IST status was not FAIL.	Sat

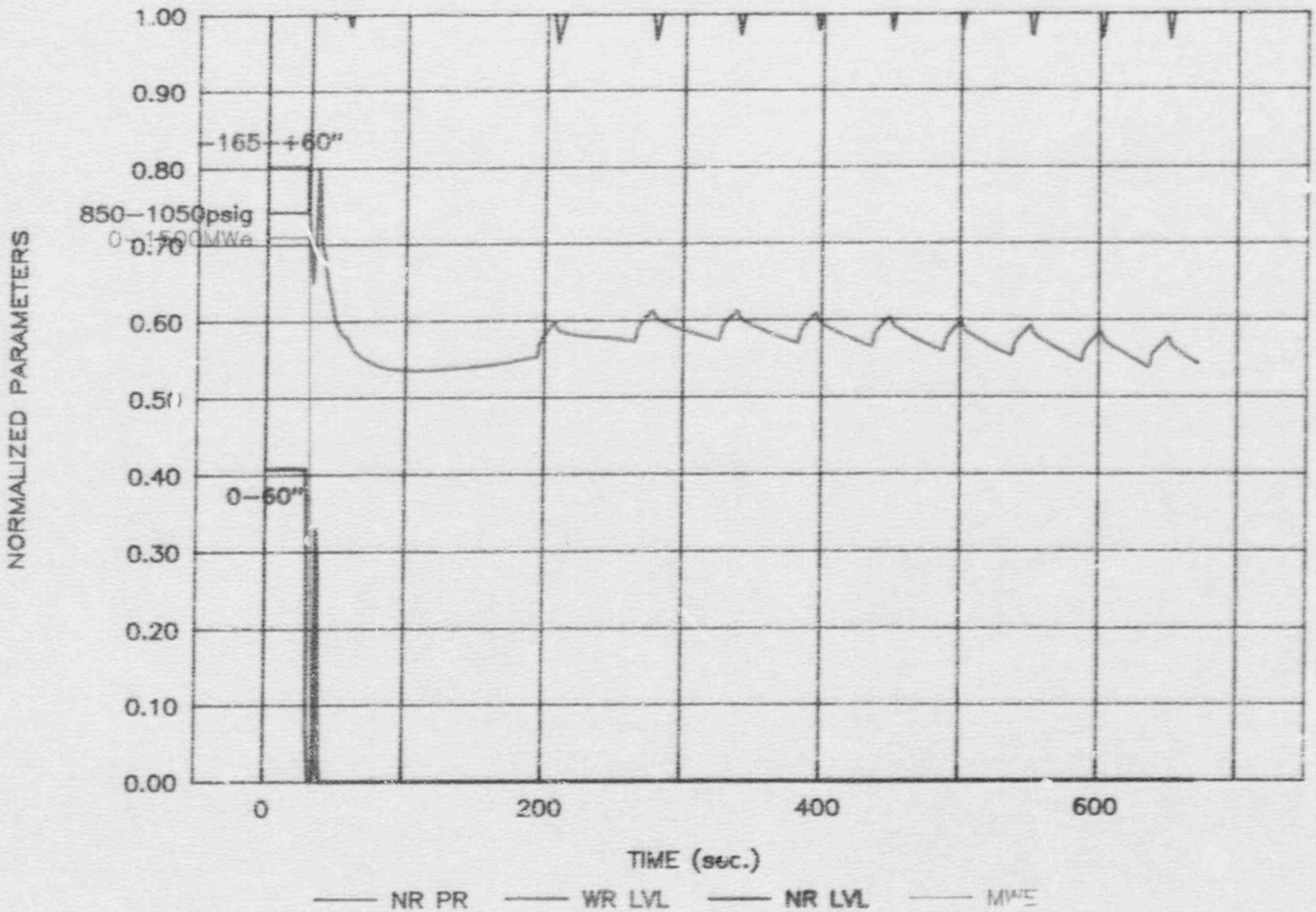
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

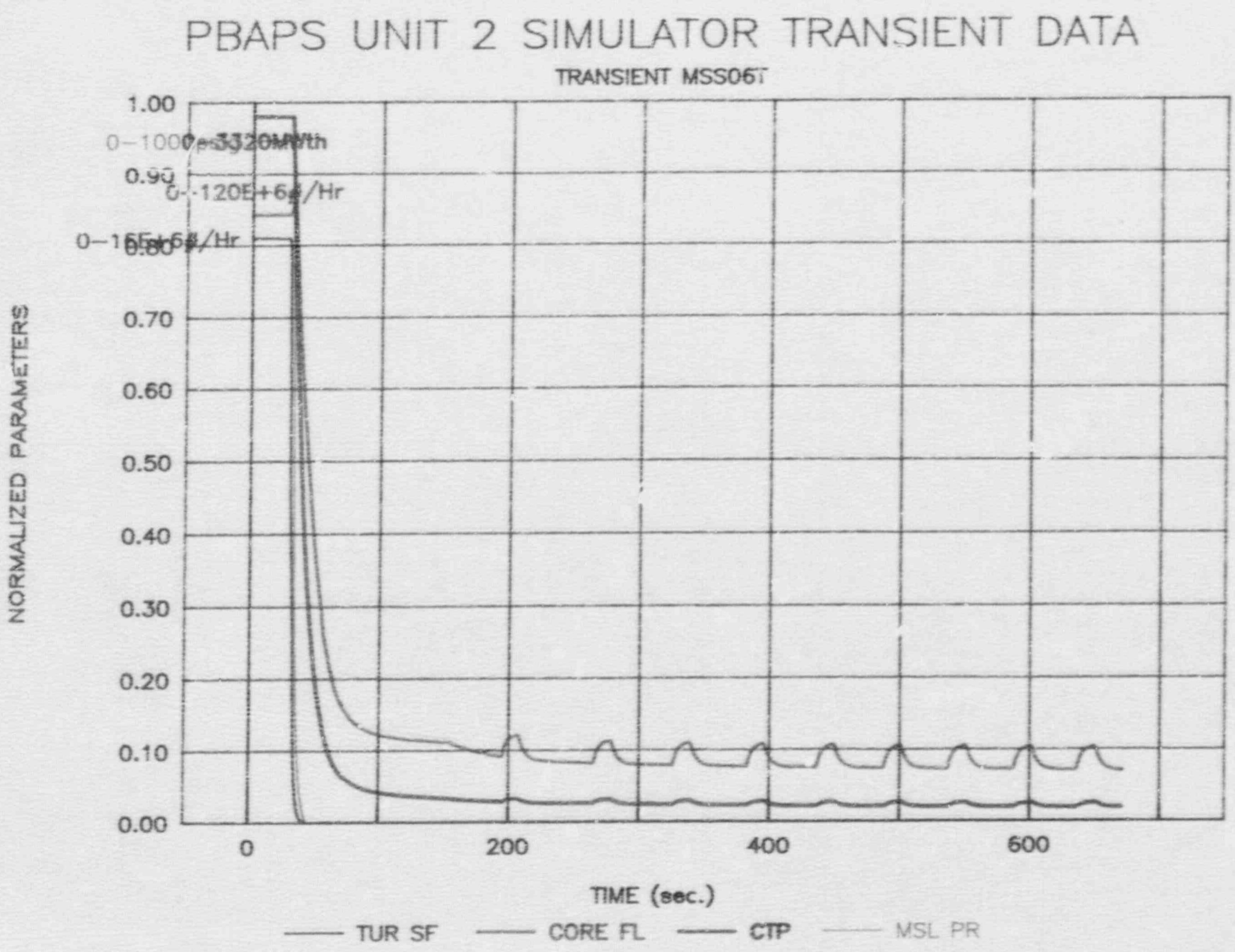
TRANSIENT MSS06T



PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT MSS06T

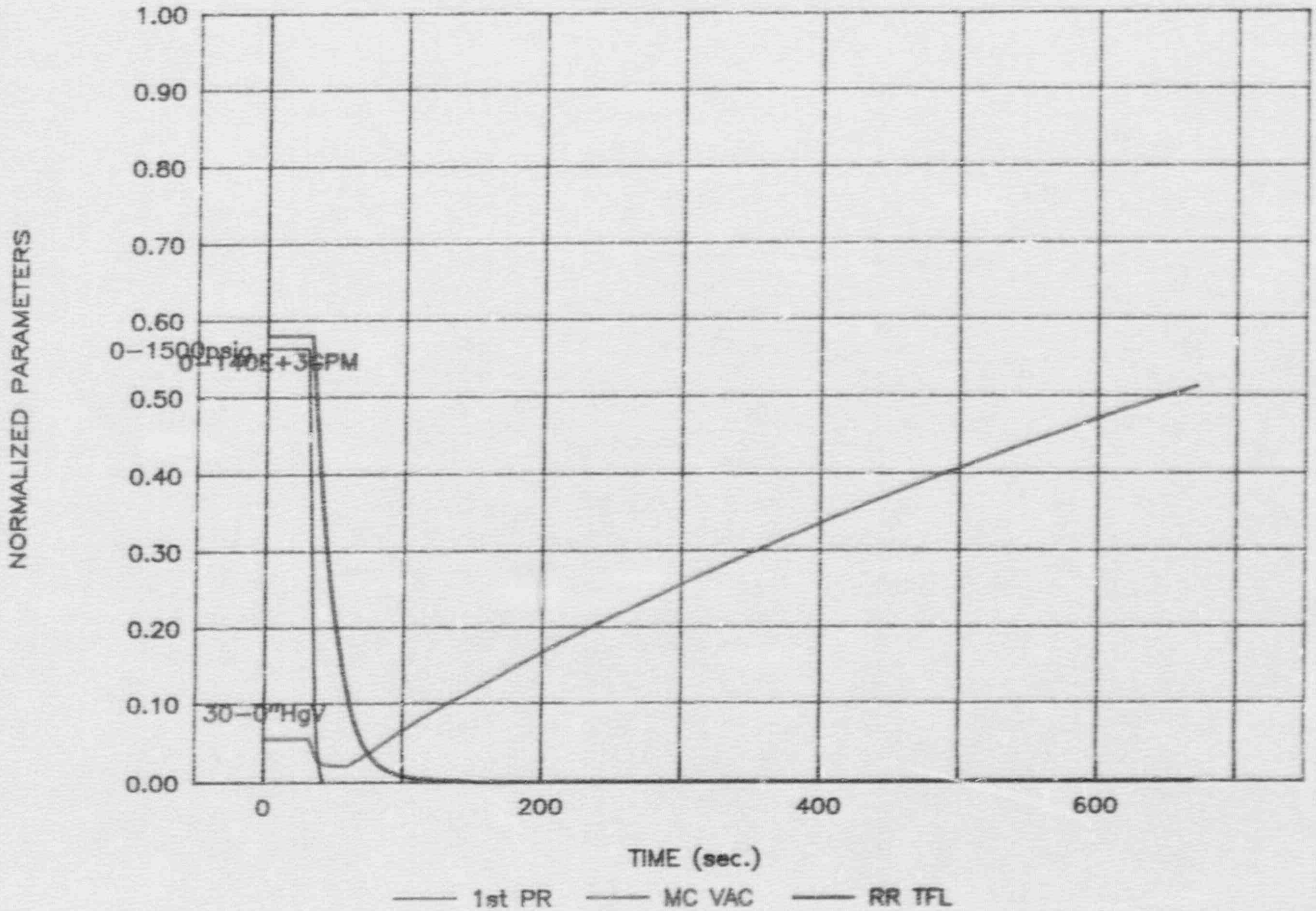




PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT MSS06T
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
NORMALIZED PARAMETERS
0
200
400
600
TIME (sec.)
TUR SF
CORE FL
CTP
MSL PR

PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT MSS06T



PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-RRS08

RECIRC MG SET DRIVE MOTOR BREAKER TRIP
(Simultaneous Trip of all Recirculation Pumps)

Prepared by: Bud Havens
Simulator Test Operator
Date: 12/26/90

Approved by: R.W. T...
Lead Test Operator
Date: 1/2/91

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix B, Section B1.2
Run this transient test from an initial condition of approximately 100% power, steady-state xenon and decay heat with no operator followup action.

II. TEST ABSTRACT
This performance test will test simulator response to a simultaneous trip of a both Recirculation Pump Drive Motor Breakers caused by an instantaneous overcurrent trip via Simulator Malfunction. The result will be a reduction in flow from the Recirculation Pumps, causing a reduction in drive flow to the jet pumps in the reactor vessel. This will cause reactor core flow and thereby reactor power to decrease. The reduction in power will be accompanied by a reduction in pressure and steam flow as the EHC System reacts to control pressure. Vessel level will swell as flow drops and the void fraction in the core increases, then will be returned to normal by the Feedwater Control System. Reactor power, steam flow and feedwater flow initially will stabilize at approximately 45%, then slowly increase over a period of several minutes as feedwater temperature decreases.

III. TEST REFERENCES

A. Other Performance Tests

1. SSPT-OT 112

B. Reference Plant Performance Data

1. SP 1231, Recirculation Pump Trip

IV. TEST DESCRIPTION

A. Initial Conditions

- IC 14

B. Malfunctions used:

- Malfunction No.: RRS08 A & B

C. Effects

The insertion of Malfunctions RRS08 A & B simulates an instantaneous overcurrent condition for both Recirculation Pump MG Set Drive Motor Breakers. This causes a protective trip and lockout of the MG sets.

1. Expected parameter response given below is based on best estimate data, Reference Plant Data from OT-112 and extrapolated from the results of SP 1231, Recirculation Pump Trip. Any time values are referenced to time of insertion of the Malfunctions unless otherwise indicated.

2. The immediate results for the MG Sets are:

   - an increase in both MG set drive motors current to full scale, accompanied by an increase in both MG Sets generator power and current. This drive motor overcurrent will trip the drive motor breakers and generate an MG Set L/O, which in turn will trip the generator field breakers. Drive motor current and voltage, and generator current, voltage, speed and power will then drop to 0. The breaker trips and L/O's will be annunciated. These actions can be confirmed by observing indicators for the MG Sets on panel 20C004 and annunciators on panel Annunciator panel 204.

   - following the field breaker trips, both Recirculation Pumps will rapidly coast down as evidenced by decreasing pump flows and differential pressures indicated on panel 20C004, and decreasing pump speed indicated on panel 20C008B. The change in pump flows can also be confirmed by analysis of GINDAC plots.

3. The following changes in jet pump loop and total core flow will result from the loss of flow from tripped Recirculation Pumps:

   - the decreasing jet pump drive flows from the Recirculation loops will cause the indicated calibrated and loop jet pump flows associated with both loops to decrease on panel 20C004. This can be confirmed by analysis of the GINDAC plots.

   - the decreasing jet pump loop flows will result in a decrease in core flow. Approximately 20 sec. after the field breaker trips, the jet pump loop flows will reach 17 MLbm/Hr, and will stabilize at approximately 18 MLb/Hr over the next 30 sec. This can be confirmed by analysis of the GINDAC plots.

   - indicated total core flow will remain a summation of the individual jet pump loop flows throughout the transient; thus it will decrease quickly during the first 15 to 20 sec. to a minimum value of approximately 34 MLbm/Hr, then will stabilize over the next 30 sec. at approximately 35 to 36 MLbm/Hr. This can be confirmed by analysis of the GINDAC plots.

4. The decrease in total core flow will have the following parameter and system response:

   - APRM indicated power will drop rapidly over the 8 to 10 sec. following the field breaker trips, and will then stabilize at approximately 42% over the next 30 sec. Beginning approximately 2 min. following the field breaker trip, APRM power will begin to slowly increase due to the reduction in feedwater heating.

   - core thermal power will decrease more slowly than APRM power, and will decrease to approximately 50% over the first 30 sec. following the field breaker trip, then slowly decrease over the next 30 sec. to approximately 45%. Approximately 2 min. after the field breaker trip, core thermal power will begin to increase as APRM's increase (see discussion above). Total Steam Flow should follow the same trend as thermal power, stabilizing at initially at approximately 7 MLbm/Hr, then slowly increasing.

- Reactor pressure should decrease as core thermal power decreases due to EHC System action to control pressure. The values should respond in approximately the same manner as core thermal power and total steam flow.

- vessel level will swell during the coastdown of the Recirculation Pump due to loss of flow out of the vessel annulus and the increased core void fraction as core flow decreases. The maximum level should be experienced at 30 to 35 sec. following the field breaker trips, and should not result in high level turbine trips. Level should stabilize at the setpoint at approximately the 2 min. mark.

- total feedwater flow will respond to the decreasing total steam flow in combination with the increasing vessel level by initially decreasing at the same rate as steam flow for the initially, will drop less rapidly than steam flow as level reaches its peak; and will then drop below total steam flow to restore level; then stabilize at near the same value as steam flow.

2

IMAGE EVALUATION TEST TARGET (MT-3)

150mm

6"

D. Documentation

1. Significant Parameters to be Collected

a. Analog Parameters:

(1) Reactor Power(% Flux)
(2) Total Steam Flow
(3) Total Feedwater Flow
(4) NR Reactor Pressure
(5) NR Reactor Vessel Water Level
(6) Total Core Flow
(7) Recirculation Pump A Flow
(8) Recirculation Pump B Flow
(9) Jet Pump 1 Flow
(10) Jet Pump 6 Flow
(11) Jet Pump 11 Flow
(12) Jet Pump 16 Flow

b. Annunciators, Indications, Interlocks:

(1) Annunciators;
(a) RECIRC DRIVE MOTOR TRIP (A & B)
(b) RECIRC GEN LOCKOUT TRIP (A & B)
(c) RECIRC GEN AUXILIARY LOCKOUT TRIP (A & B)
(d) RECIRC PUMP LO DIFF PRESS (A & B)
(e) 2 GEN VOLT REG AUTO TO MAN UNBALANCED
(f) REACTOR HI-LOW WATER LEVEL

(2) Indications;
(a) MG set drive motor currents go full scale, then to 0 on breaker trip.
(b) increase in the MG Sets generator power and current, then to 0 on field breaker trips.
(c) field breaker closed indicating lights on panel 20C004 deenergize.
(d) drive motor voltages, and generator voltages, speeds and power drop to 0 on breaker trips.
(e) decreasing pump differential pressures on panel 20C004 following field breaker trips.

(f) decreasing pump speeds as indicated on panel 20C008B following field breaker trips.

(g) decreasing feedwater injection temperature after 2 min.

(3) Interlocks;

(a) MG Generator L/O on Drive Motor Breaker overcurrent trips.

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 4 and the DATA2 dataset.

b. Significant annunciators, alarms and interlocks are to be collected using the attached Data Form for this Performance Test.

E. Terminating Condition

This Performance Test may be terminated when the simulated plant conditions are such that a stable, controllable and safe condition has been attained which could be continued to cold shutdown conditions. In addition, the following must be observed as a minimum:

- APRM power is observed to be increasing due to decreasing feedwater injection temperature.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test.

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the description in Section IV.C. Where parameter versus time values are specified, parameter response within ±10% of the specified value is acceptable, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

C. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

D. Transient operation can be carried on until:

1. a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or

2. a simulator operating limitation is reached.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14 RRS08TT.DAT

2. Prepare to collect data IAW Appendix I and Section IV.D.2.a.

3. Insert Malfunction RRS08 A & B with a 30 sec. time delay.

4. Check the data form attached to this procedure for all the items listed in IV.D.1.b; make additions or deletions as necessary.

B. Performance

1. While collecting data in accordance with Appendix I and Significant Parameters, take the simulator out of freeze.

2. Observe the Simulator response to generally verify the occurrences listed in Effects and log the occurrence of the Annunciators, Indications and Interlocks on the data form, marking each item as Sat or Unsat as appropriate.

3. When the Termination Conditions are reached, terminate data collection and place the Simulator in freeze.

4. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/5/91 Test Performer B. Havens

Date Analyzed 1/10/91 Analysis by B Havens

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters:	
a. Reactor Power(% Flux)	Unsat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. NR Reactor Pressure	Sat
e. NR Reactor Vessel Water Level	Sat
f. Total Core Flow	Sat
g. Recirculation Pump A Flow	Sat
h. Recirculation Pump B Flow	Sat
i. Jet Pump 1 Flow	Sat
j. Jet Pump 6 Flow	Sat
k. Jet Pump 11 Flow	Sat
l. Jet Pump 16 Flow	Sat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. APRM undershoot excessively, then increase too fast WO 910023 Pri 2
2. Drive motor breaker response, does not spike WO 900656 Pri 3

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ✓

Database updated ______BR______
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ✓ NO ____

2. All SDR's resolved, Test Sat:

____________________ ____________________
Test Operator Date

Database updated ____________________
Data Entry

C. Test Reviewed:

____________________ ____________________
Lead Test Operator Date

D. Test Completed:

____________________ ____________________
Sim. Support Supv. Date

TRANSIENT PERFORMANCE TEST
DATA SHEET - RRS08
SIMULTANEOUS TRIP OF BOTH RECIRC MG SET DRIVE MOTOR BREAKERS

PERFORMANCE CRITERIA

The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B. Haver DATE: 1/5/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (1)(a)	RECIRC DRIVE MOTOR TRIP Annunciator	SAT
IV.D.1.b. (1)(b)	RECIRC GEN LOCKOUT TRIP Annunciator	SAT
IV.D.A.b. (1)(c)	RECIRC GEN AUXILIARY LOCKOUT TRIP Annunciator	SAT
IV.D.1.b. (1)(d)	RECIRC PUMP LO DIFF PRESS Annunciator	SAT
IV.D.1.b. (1)(e)	2 GEN VOLT REG AUTO TO MAN UNBALANCE Annunciator	SAT
IV.D.1.b. (2)(a)	MG Set drive motor current response	UNSAT
IV.D.1.b. (2)(b)	MG Set generator power and current response	Sat
IV.D.1.b. (2)(c)	field breaker indication response	SAT
IV.D.1.b. (2)(d)	drive motor voltage; generator voltage, speed and power response	SAT
IV.D.1.b. (2)(e)	pump differential pressure indication response	SAT

PERFORMANCE CRITERIA

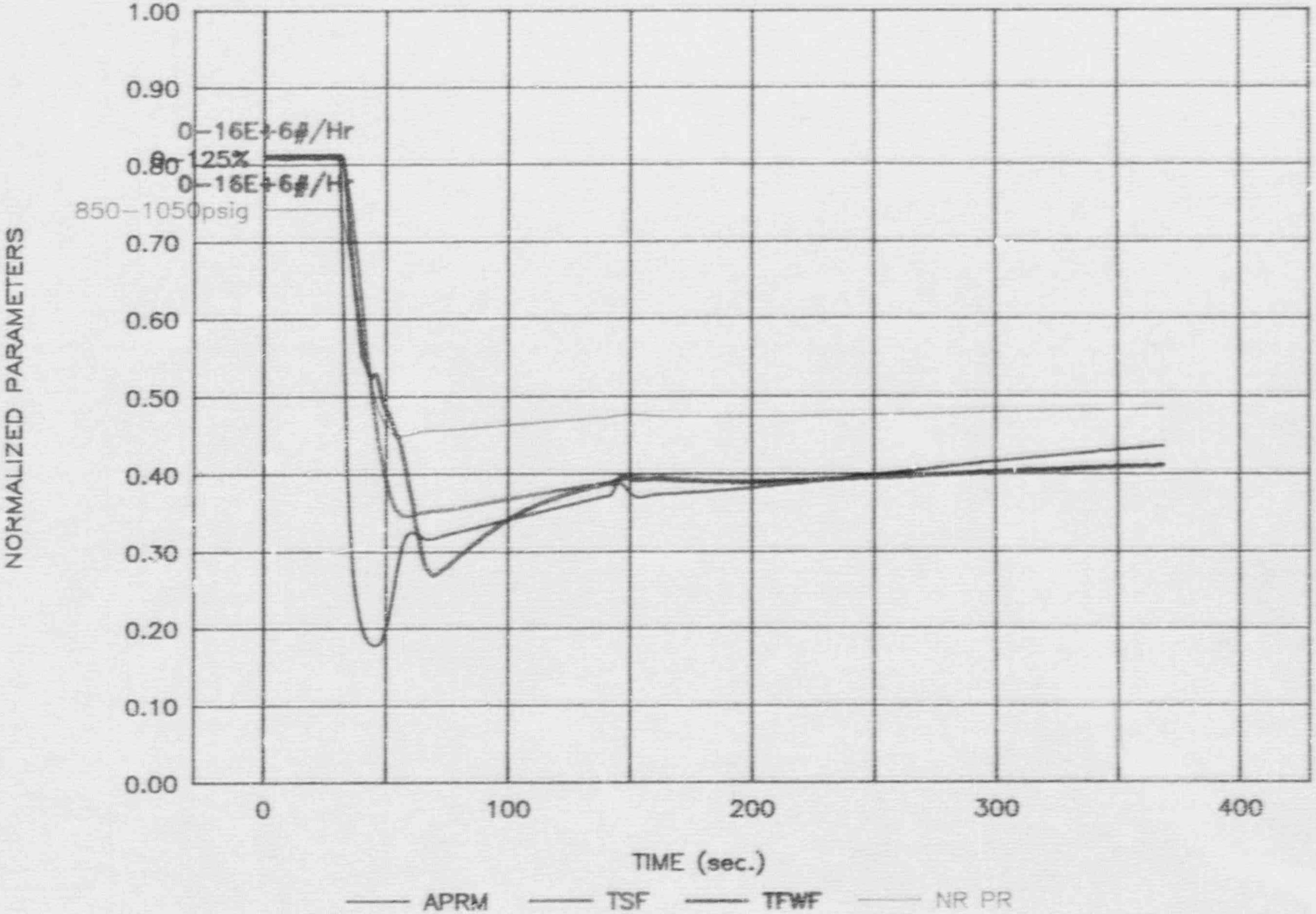
The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B Hawn DATE: 1/5/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (2)(f)	pump speed indication response	SAT
IV.D.1.b. (2)(g)	feedwater temperature response	SAT
IV.D.1.b. (3)(a)	MG Set generator L/O on drive motor breaker overcurrent trip	SAT
Real Time Operation	The Simulator operated in real time as indicated by completion of the test without a suspension of Simulation, and the ISD/IST status was not FAIL.	SAT

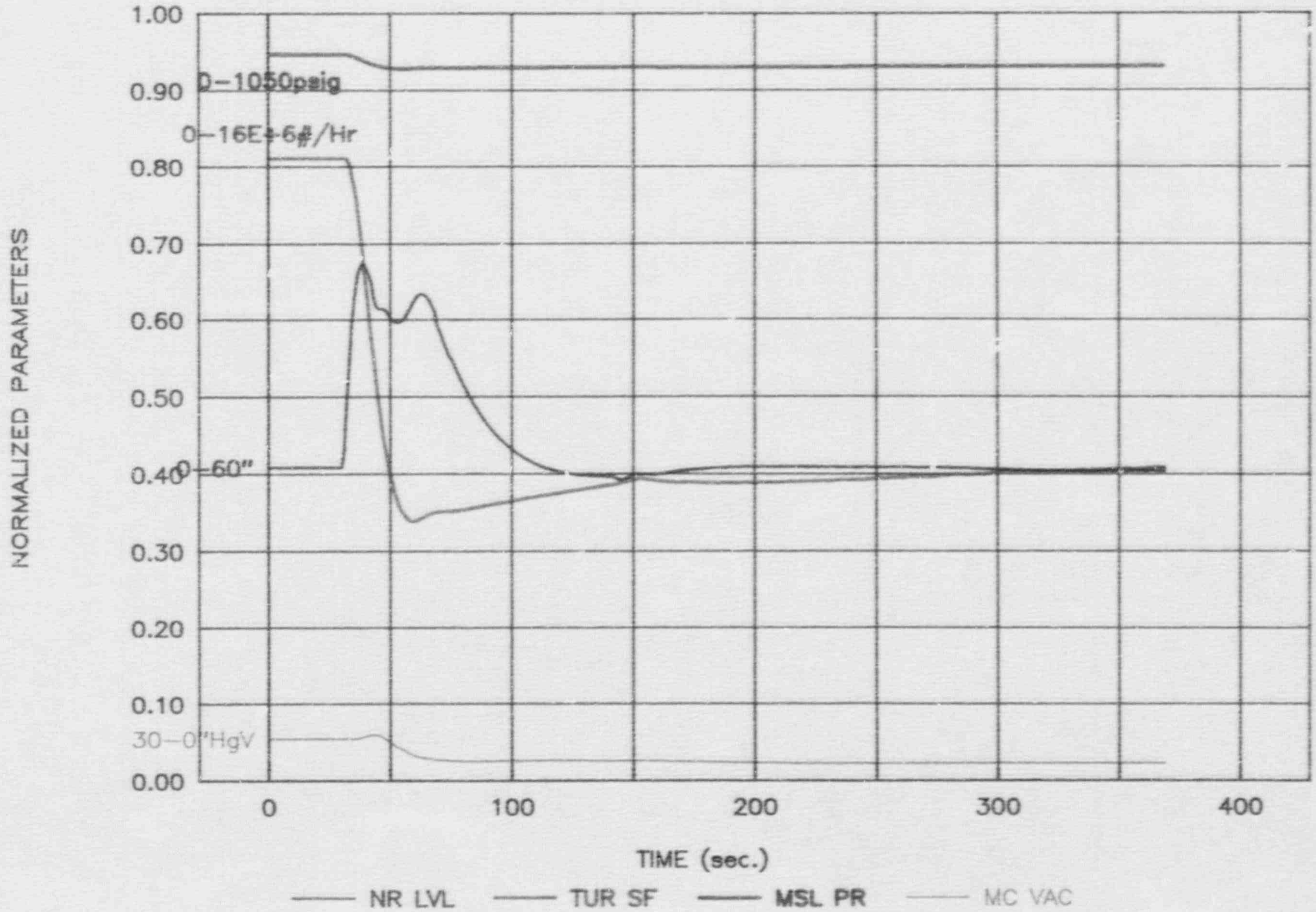
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

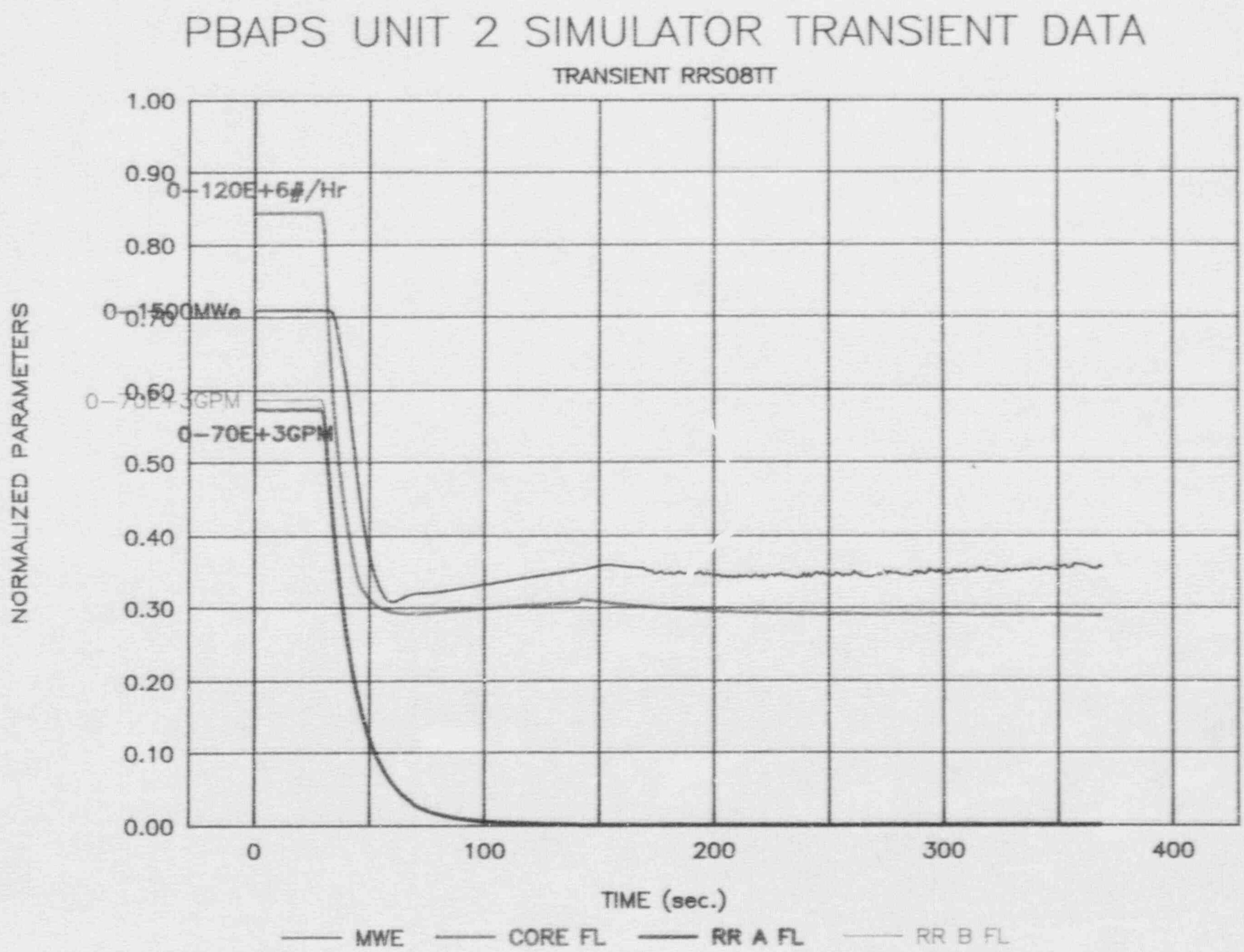
TRANSIENT RRS08TT



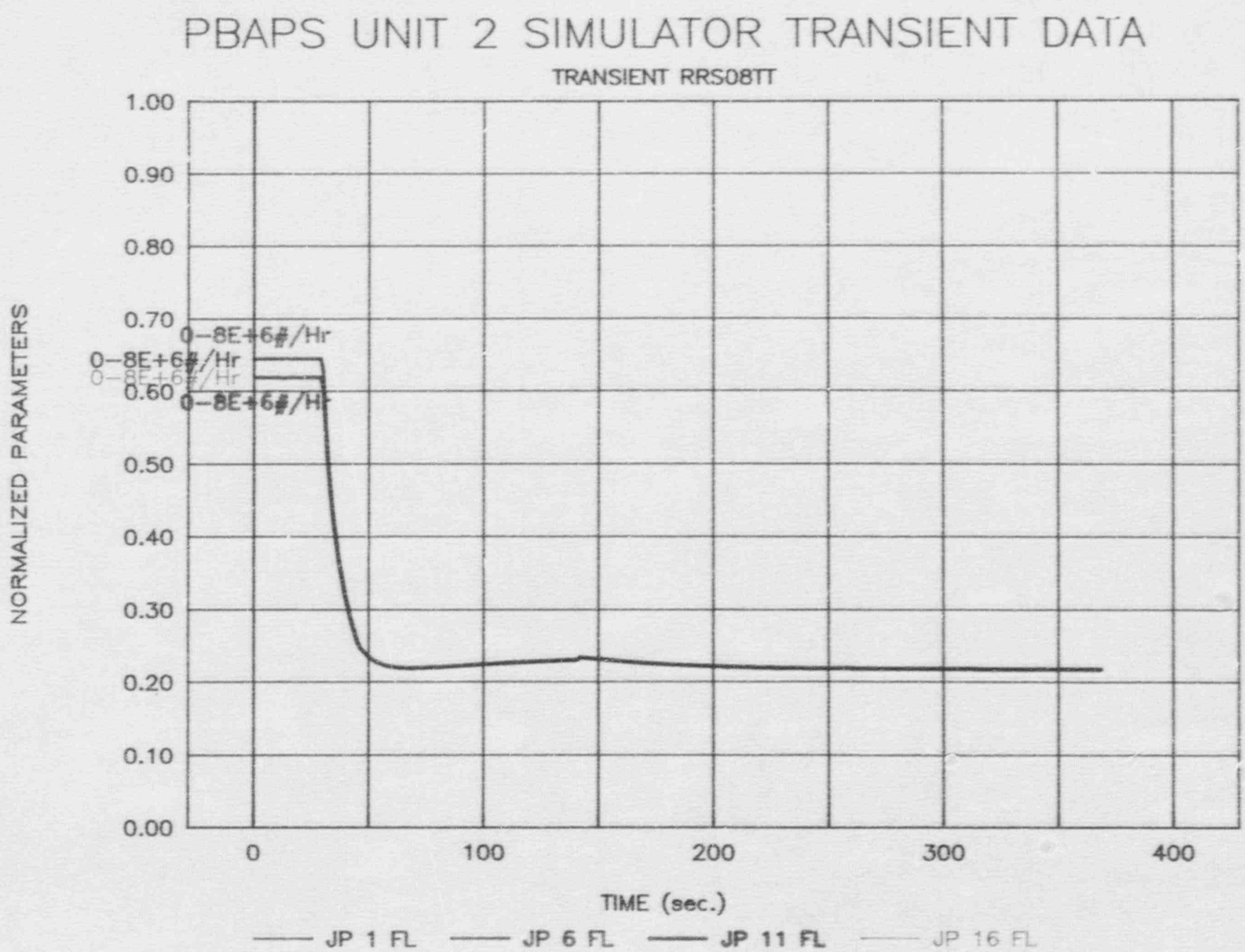
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT RRS08TT





PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT RRS08TT
0-120E+6#/Hr
0-1500MWe
0-70E+3GPM
0-70E+3GPM
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
100
200
300
400
NORMALIZED PARAMETERS
TIME (sec.)
MWE
CORE FL
RR A FL
RR B FL


PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT RRS08TT
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0-8E+6#/Hr
0-8E+6#/Hr
0-8E+6#/Hr
0-8E+6#/Hr
0
100
200
300
400
TIME (sec.)
JP 1 FL
JP 6 FL
JP 11 FL
JP 16 FL

PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

SMPTT-RRS08

RECIRC MG SET DRIVE MOTOR BREAKER TRIP

Prepared by: Bud Havens Date: 12/20/90
Simulator Test Operator

Approved by: R.W. Tyler Date: 1/3/91
Lead Test Operator

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix B, Section B1.2
Run this transient test from an initial condition of approximately 100% power, steady-state xenon and decay heat with no operator followup action.

II. TEST ABSTRACT
This performance test will test simulator response to a trip of a single Recirculation Pump Drive Motor Breaker caused by an instantaneous overcurrent trip. The result will be a reduction in flow from the selected Recirculation Pump, causing a reduction in drive flow to the associated jet pumps in the reactor vessel. This will cause reactor core flow and thereby reactor power to decrease. The reduction in power will be accompanied by a reduction in pressure and steam flow as the EHC System reacts to control pressure. Vessel level will swell as flow drops and the void fraction in the core increases, then will be returned to normal by the Feedwater Control System. Reactor power, steam flow and feedwater flow initially will stabilize at approximately 65%, then slowly increase over a period of several minutes as feedwater temperature decreases.

III. TEST REFERENCES

A. Other Performance Tests

1. SSPT-OT 112

2. STPT-SP 1231

B. Reference Data

- SP 1231, Recirculation Pump Trip

IV. TEST DESCRIPTION

A. Initial Conditions

- IC 14

B. Malfunctions used:

- Malfunction No.: RRS08

  - Components to be tested: Alternate A and B Recirc MG Set Drive Motor Breakers on each test.

  - Options used in this test: A.

C. Effects

The insertion of Malfunction RRS08 simulates an instantaneous overcurrent condition for the selected Recirculation Pump MG Set Drive Motor Breaker. This causes a protective trip and lockout of the MG set.

1. Parameter values and times given below are based Reference Plant Performance Data extrapolated from the results of SP 1231, Recirculation Pump Trip. Times are referenced to time of insertion of the Malfunction unless otherwise indicated.

2. The immediate results for the selected MG Set are:

   - an increase in the selected MG set drive motor current to full scale, accompanied by an increase in the MG Set generator power and current. This drive motor overcurrent will trip the drive motor breaker and generate an MG Set L/O, which in turn will trip the generator field breaker. Drive motor current and voltage, and generator current, voltage, speed and power will then drop to 0. The breaker trips and L/O's will be annunciated. These actions can be confirmed by observing indicators for the selected MG Set on panel 20C004 and annunciators on panel Annunciator panel 204.

- following the field breaker trip, the selected Recirculation Pump will rapidly coast down as evidenced by decreasing pump flow and differential pressure on panel 20C004, and decreasing pump speed as indicated on panel 20C008B. The unaffected loop flow should increase to ≈ $43X10^3$ GPM. confirmed by analysis of GINDAC plots.

3. The following changes in jet pump loop and total core flow will result from the loss of flow from the selected Recirculation Pump:

   - the decreasing jet pump drive flow from the selected Recirculation loop will cause the indicated calibrated and loop jet pump flows associated with that loop to decrease on panel 20C004. This can be confirmed by analysis of the GINDAC plots.

   - the decreasing selected jet pump loop flow will result in a decrease in core flow. Approximately 10 sec. after the field breaker trip, the affected jet pump loop flow will reach 0, then will increase to approximately 16 MLbm/Hr over the next 30 sec. The unaffected jet pump loop flow will slowly increase as the affected loop flow decreases, then it will continue to increase to approximately 75 MLbm/Hr as the affected loop jet pump flow increases. This can be confirmed by analysis of the GINDAC plots for the calibrated jet pumps.

   - indicated total core flow will remain a summation of the individual jet pump loop flows throughout the transient; thus it will decrease quickly during the first 10 sec. to a minimum value of approximately 70 MLbm/Hr, then will increase over the next 30 sec. to approximately 88 MLbm/Hr. This can be confirmed by analysis of the GINDAC plots.

   - actual core flow is less than indicated because the increase in the affected jet pump loop flow after the 10 sec. point is due to flow reversal through the affected jet pumps. Actual core flow can be calculated by decreasing the total core flow by twice the affected jet pump loop flow. This value should be approximately 55 MLbm/Hr when the jet pump loop flows have stabilized. For confirmation, at this core flow on the 100% rod pattern line, power should stabilize at approximately 65%.

4. The decrease in total core flow will have the following parameter and system response:

- APRM indicated power will drop rapidly to approximately 70% over the 8 to 10 sec. following the field breaker trip. It will then slowly decrease to approximately 65% over the next 30 sec. Beginning approximately 2 min. following the field breaker trip, APRM power will begin to slowly increase due to the reduction in feedwater heating.

- core thermal power will decrease more slowly than APRM power, and will decrease to approximately 75% over the first 30 sec. following the field breaker trip, then slowly decrease over the next 30 sec. to approximately 65%. Approximately 2 min. after the field breaker trip, core thermal power will begin to increase as APRM's increase (see discussion above). Total Steam Flow should follow the same trend as thermal power, stabilizing at initially at approximately 9.1 MLbm/Hr, then slowly increasing.

- Reactor pressure should decrease as core thermal power decreases due to EHC System action to control pressure. The initial stable value at approximately 40 sec. following the field breaker trip should be approximately 960 respectively; then will slowly increase as core thermal power begins to increase at the 2 min. point.

- vessel level will swell during the coastdown of the Recirculation Pump due to loss of flow out of the vessel annulus and the increased core void fraction as core flow decreases. The maximum level should be experienced at 30 to 35 sec. following the field breaker trip, and should not exceed 10" above the initial level. Level should stabilize at the setpoint at approximately the 2 min. mark.

- total feedwater flow will respond to the decreasing total steam flow in combination with the increasing vessel level by initially decreasing at the same rate as steam flow for the initial 3 to 4 sec., will drop less rapidly than steam flow until approximately the 20 sec point; it will then drop slightly below total steam flow at 30 sec. and remain there for the next 60 sec., then stabilize at near the same value as steam flow.

D. Documentation

1. Significant Parameters to be Collected

a. Analog Parameters:

(1) Reactor Power(% Flux)
(2) Total Steam Flow
(3) Total Feedwater Flow
(4) NR Reactor Pressure
(5) NR Reactor Vessel Water Level
(6) Total Core Flow
(7) Recirculation Pump A Flow
(8) Recirculation Pump B Flow
(9) Jet Pump 1 Flow
(10) Jet Pump 6 Flow
(11) Jet Pump 11 Flow
(12) Jet Pump 16 Flow

b. Annunciators, Indications, Interlocks:

(1) Annunciators;
(a) RECIRC DRIVE MOTOR TRIP
(b) RECIRC GEN LOCKOUT TRIP
(c) RECIRC GEN AUXILIARY LOCKOUT TRIP
(d) RECIRC PUMP LO DIFF PRESS
(e) 2 GEN VOLT REG AUTO TO MAN UNBALANCED

(2 Indications;
(a) selected MG set drive motor current to full scale, then to 0 on breaker trip.
(b) increase in the MG Set generator power and current, then to 0 on field breaker trip.
(c) field breaker closed indicating light on panel 20C004 deenergizes.
(d) drive motor voltage, and generator voltage, speed and power will then drop to 0 on breaker trip.
(e) decreasing pump differential pressure on panel 20C004 following field breaker trip.
(f) decreasing pump speed as indicated on panel 20C008B following field breaker trip.
(g) decreasing feedwater injection temperature after 2 min.

(3) Interlocks;
(a) MG Generator L/O on Drive Motor Breaker overcurrent trip.

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 4 and the DATA2 dataset.

b. Significant annunciators, alarms and interlocks are to be collected using the attached Data Form for this Performance Test.

E. Terminating Condition

This Performance Test may be terminated when the simulated plant conditions are such that a stable, controllable and safe condition has been attained which could be continued to cold shutdown conditions. In addition, the following must be observed as a minimum:

- APRM power is observed to be increasing due to decreasing feedwater injection temperature.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test.

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the description in Section IV.C.
Where parameter versus time values are specified, parameter response within ±10% of the specified value is acceptable, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

C. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

D. Transient operation can be carried on until:

1. a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or

2. a simulator operating limitation is reached.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14 RRS08T.DAT

2. Prepare to collect data IAW Appendix I and Section IV.D.2.a.

3. Insert Malfunction RRS08 with a 30 sec. time delay.

4. If desired to perform the SSPT's referenced in III.A, obtain those test procedures and prepare to perform them.

5. Check the data form attached to this procedure for all the items listed in IV.D.1.b; make additions or deletions as necessary.

B. Performance

1. While collecting data in accordance with Appendix I and Significant Parameters, take the simulator out of freeze.

2. Observe the Simulator response to generally verify the occurrences listed in Effects and log the occurrence of the Annunciators, Indications and Interlocks on the data form, mark each item as Sat or Unsat as appropriate.

3. Take only the following action on the control boards.

4. When the Termination Conditions are reached, terminate GINDAC data collection. Simulation may continue for the purpose of completing the SSPT's referenced in III.A; then place the simulator in freeze.

5. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/5/91 Test Performer B. Havens

Date Analyzed 1/10/91 Analysis by B. Havens

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat\Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters:	
a. Reactor Power(% Flux)	Unsat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. NR Reactor Pressure	Sat
e. NR Reactor Vessel Water Level	Sat
f. Total Core Flow	Un Sat
g. Recirculation Pump A Flow	Sat
h. Recirculation Pump B Flow	Sat
i. Jet Pump 1 Flow	Un Sat
j. Jet Pump 6 Flow	UnSat
k. Jet Pump 11 Flow	Sat
l. Jet Pump 16 Flow	Sat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in V. or VI. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. Drive Motor Current low not spike on trip WO 900656 Pri 3
2. Apm response overshoot progressively on initial decrease, increase too fast at end (see curve) WO 900656 Pri 3 WO 910023 Pri 2

C. If complete retest is required following SDR resolution, indicate by signing the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ✓

Database updated ____Bh____
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ✓ NO ____

2. All SDR's resolved, Test Sat:

____________________ ____________________
Test Operator Date

Database updated ____________________
Data Entry

C. Test Reviewed:

____________________ ____________________
Lead Test Operator te

D. Test Completed:

____________________ ____________________
Sim. Support Supv. Date

3. Core flow and jet pump flows are too high after flow stabilizes. WO 910023 Pri 2

MALFUNCTION PERFORMANCE TEST
DATA SHEET - RRS08
RECIRC MG SET DRIVE MOTOR BREAKER TRIP

PERFORMANCE CRITERIA

The criteria for acceptable performance for the following data are listed in the Malfunction Performance Test Procedure.

DATA TAKEN BY: B. Havens DATE: 1/5/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (1)(a)	RECIRC DRIVE MOTOR TRIP Annunciator	Sat
IV.D.1.b. (1)(b)	RECIRC GEN LOCKOUT TRIP Annunciator	Sat
IV.D.A.b. (1)(c)	RECIRC GEN AUXILIARY LOCKOUT TRIP Annunciator	Sat
IV.D.1.b. (1)(d)	RECIRC PUMP LO DIFF PRESS Annunciator	Sat
IV.D.1.b. (1)(e)	2 GEN VOLT REG AUTO TO MAN UNBALANCE Annunciator	Sat
IV.D.1.b. (2)(a)	MG Set drive motor current response current drops to 0, did not increase	Unsat
IV.D.1.b. (2)(b)	MG Set generator power and current response	Sat
IV.D.1.b. (2)(c)	field breaker indication response	Sat
IV.D.1.b. (2)(d)	drive motor voltage; generator voltage, speed and power response	Sat
IV.D.1.b. (2)(e)	pump differential pressure indication response	Sat

MALFUNCTION PERFORMANCE TEST
DATA SHEET - RRS08
RECIRC MG SET DRIVE MOTOR BREAKER TRIP

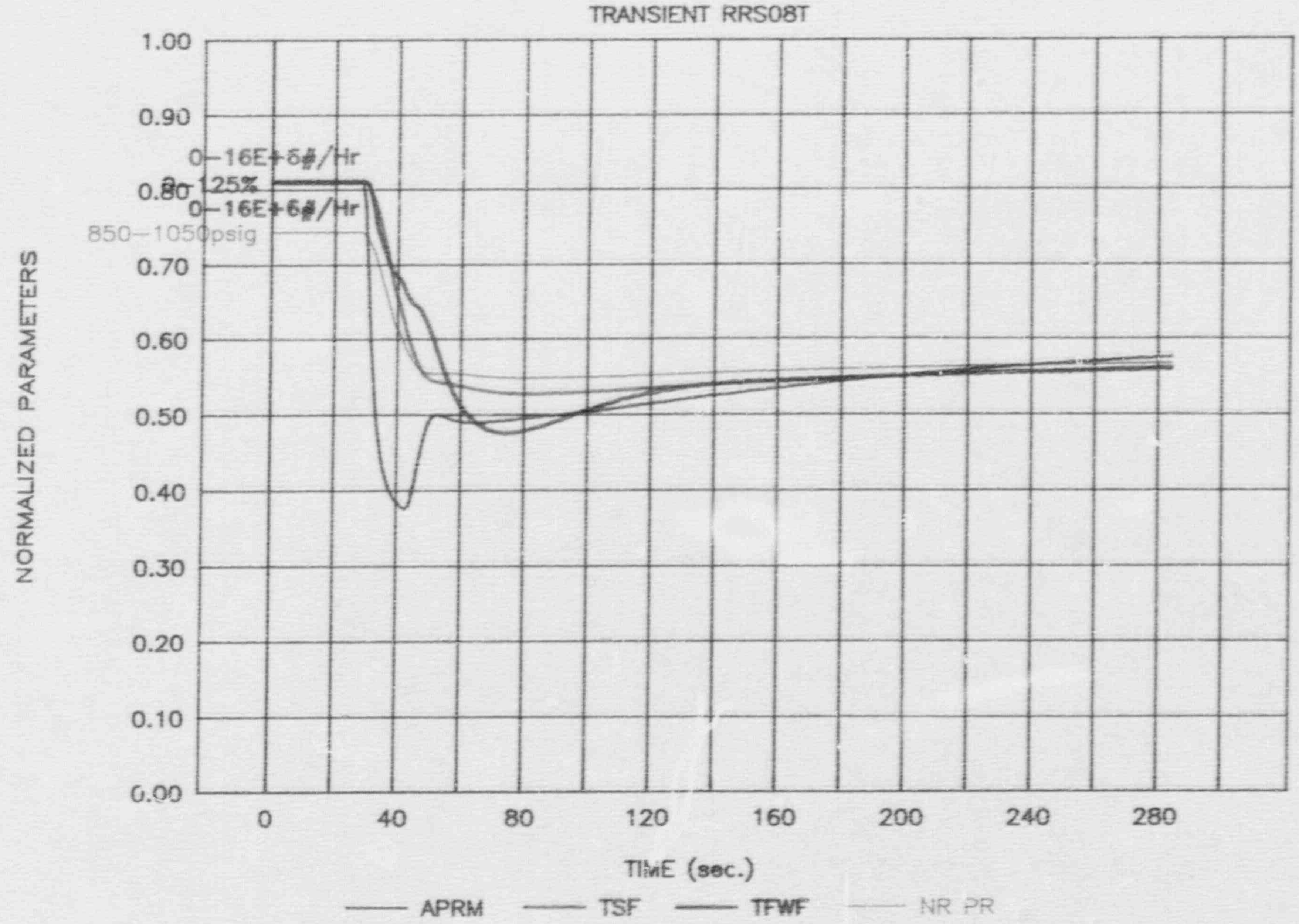
PERFORMANCE CRITERIA

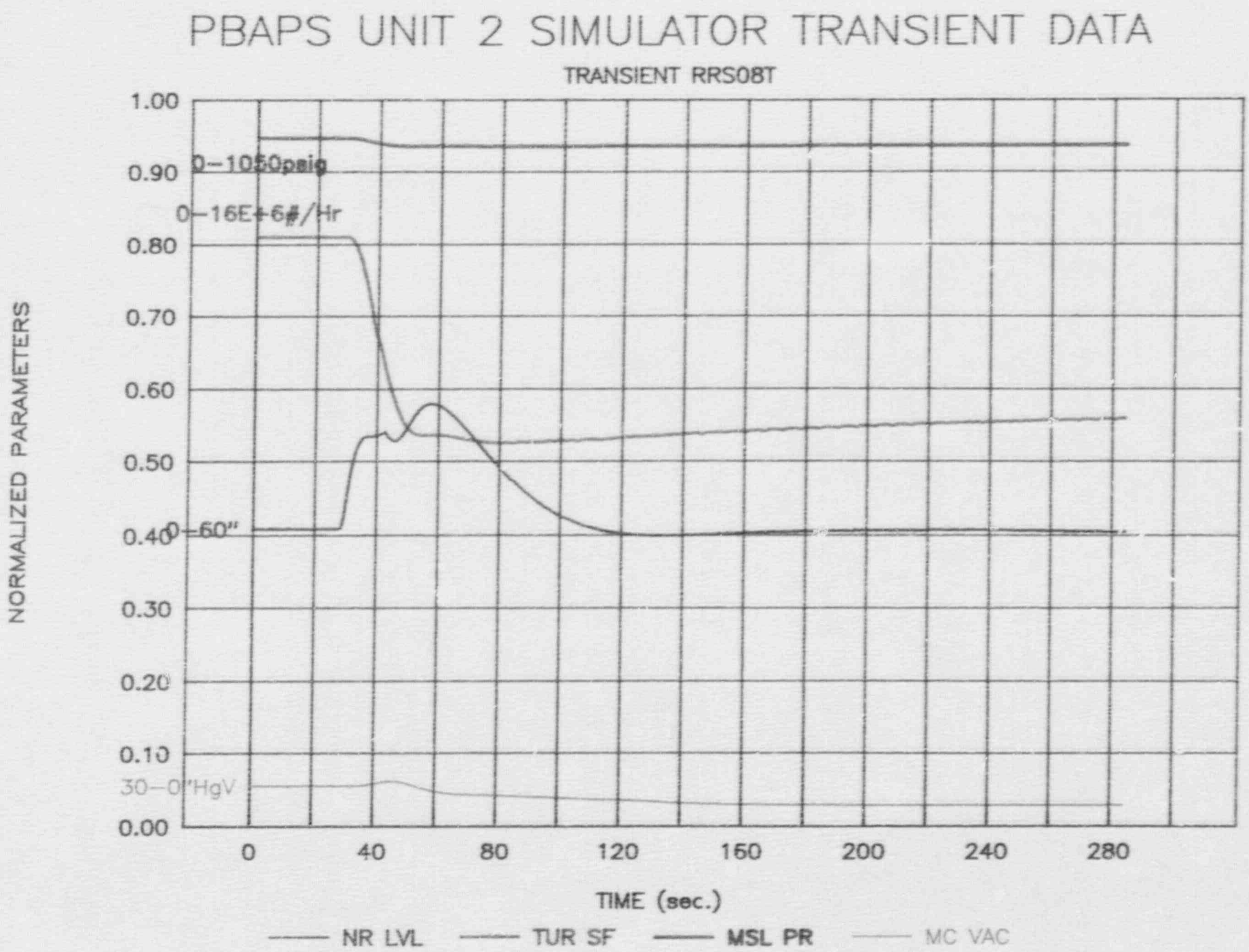
The criteria for acceptable performance for the following data are listed in the Malfunction Performance Test Procedure.

DATA TAKEN BY: R. Havens DATE: 1/5/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (2)(f)	pump speed indication response	Sat
IV.D.1.b. (2)(g)	feedwater temperature response	Sat
IV.D.1.b. (3)(a)	MG Set generator L/O on drive motor breaker overcurrent trip	Sat
Real Time Operation	The Simulator operated in real time as indicated by completion of the test without a suspension of Simulation, and the ISD/IST status was not FAIL.	Sat

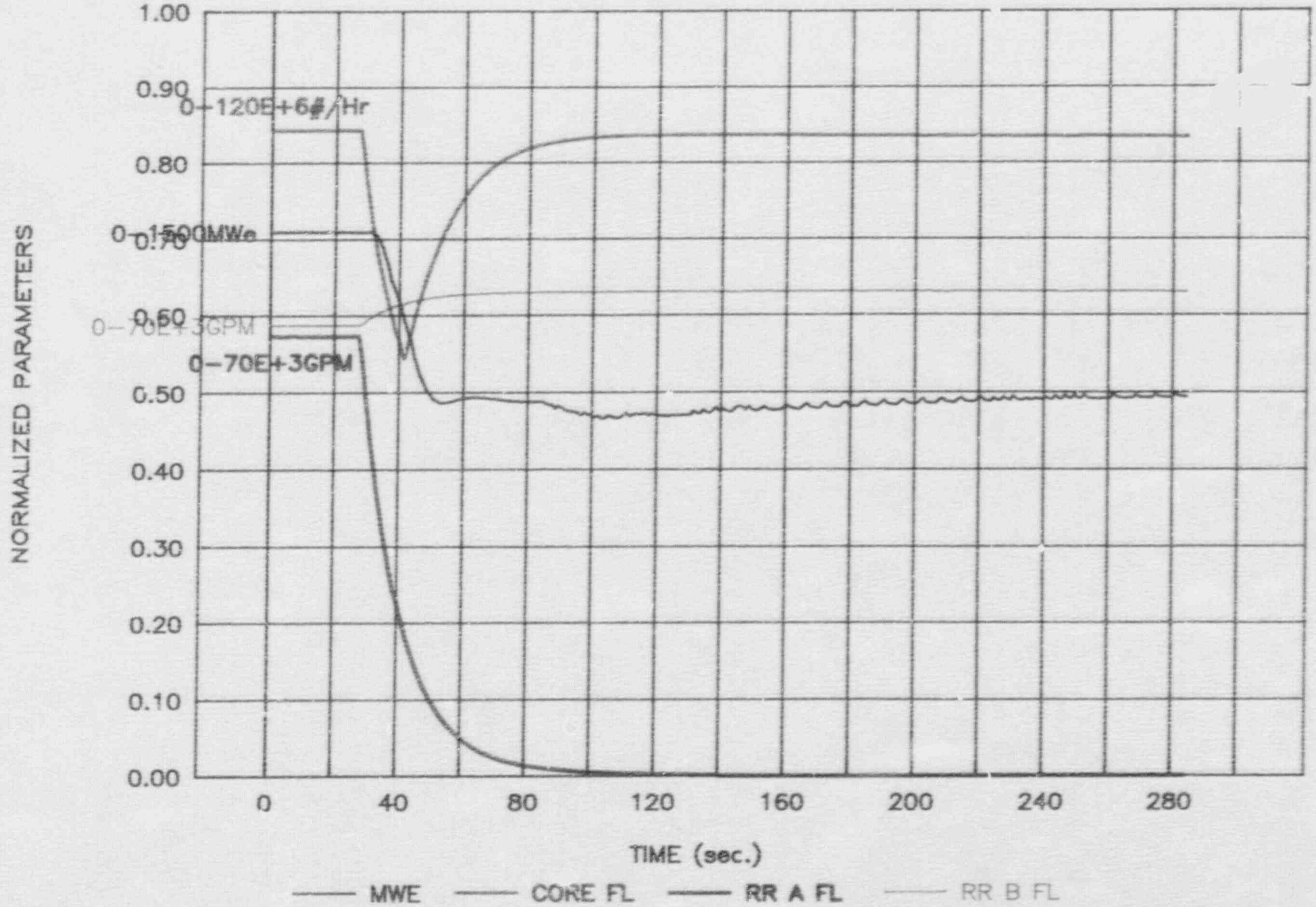
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA




PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT RRS08T
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0-1050psig
0-16E+6#/Hr
0-60"
30-0"HgV
0
40
80
120
160
200
240
280
TIME (sec.)
NR LVL
TUR SF
MSL PR
MC VAC

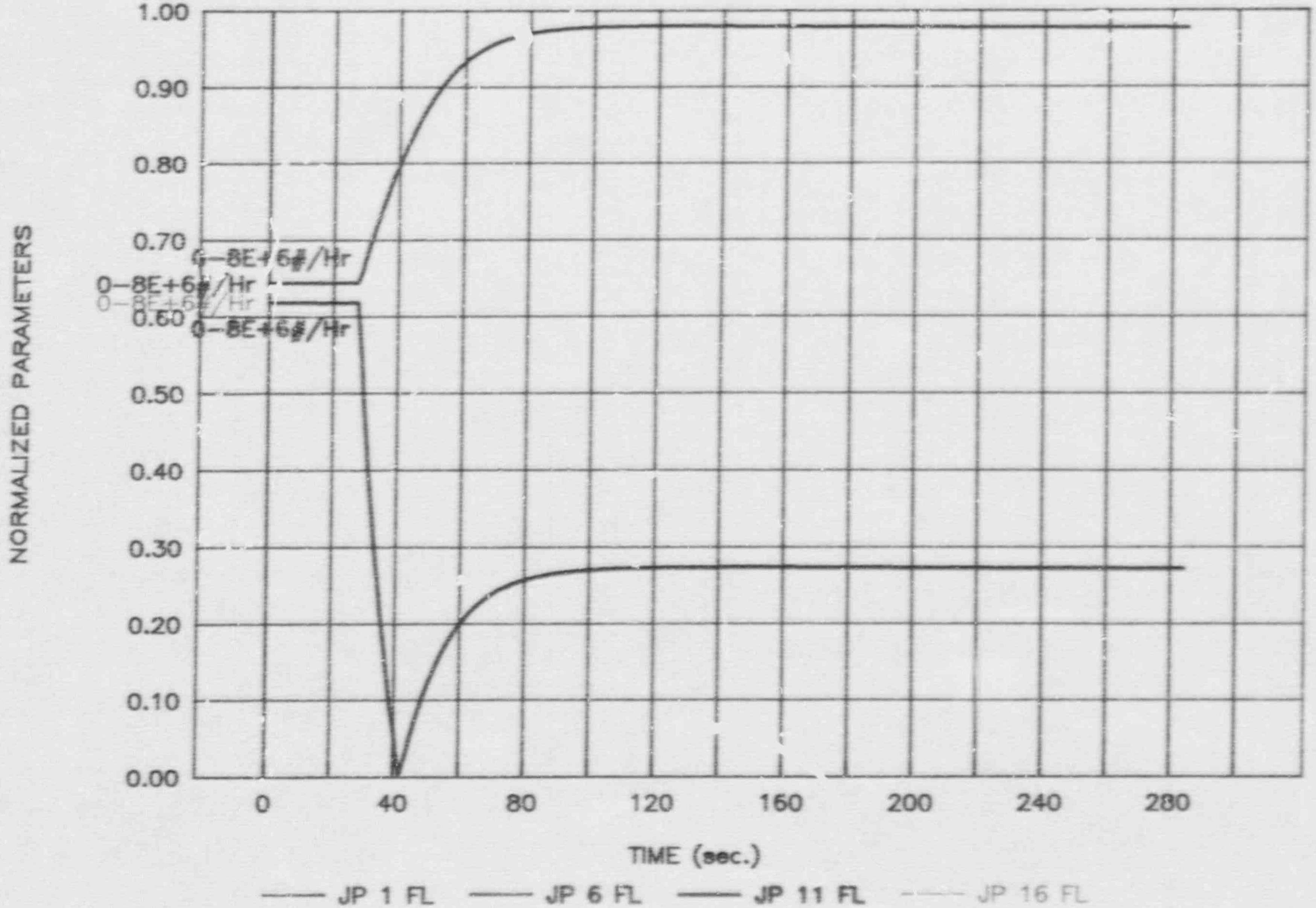
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT RRS08T



PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT RRS08T



PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-MTA04

TURBINE TRIP WITHIN BYPASS VALVE CAPACITY

Prepared by: Bud Havens   Date: 12/21/90
Simulator Test Operator

Approved by: [signature]   Date: 1/3/91
Lead Test Operator

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix B, Section B1.2
Run this transient test from an initial condition of approximately 30% power, steady-state xenon and decay heat with no operator followup action.

II. TEST ABSTRACT
This performance test will test simulator response to a Main Turbine Trip from below the power level at which the turbine trip scram is bypassed. The turbine will be tripped on high turbine vibration via Simulator [illegible] function. When the turbine trips, the reactor will not scram because of the bypass. The EHC system will automatically open the Bypass valves to control reactor pressure. Since the transient is initiated from within the capacity of the Bypass valves, reactor pressure should initially remain stable with little or no change. The turbine trip will trip the Main Generator, which will initiate a fast transfer of the 13KV busses and trip the Recirc. Pumps. After the trip of the Recirc. Pumps, reactor power will decrease due to the decreasing core flow, causing a corresponding decrease in steam flow, feedwater flow, and reactor pressure. Reactor level will increase due to swell on the trip of the Recirc. Pumps, then be restored to the setpoint by Feedwater Control.

III. TEST REFERENCES

A. Other Performance Tests

1. SSPT OT-112

2. STPT SP-1233

B. Reference Plant Performance Data

- SP-1233

IV. TEST DESCRIPTION

A. Initial Conditions

- IC 12 - ≈ 20% Power

B. Malfunctions used

- MTA04 - Main Turbine Trip

C. Effects

The insertion of Malfunction MTA04 will result in a trip of the Main Turbine on high vibration. With the turbine trip, the turbine Stop and Control Valves will be tripped hydraulically. This action will terminate the steam flow to the turbine and automatically trip the main generator.

1. Immediate effects on the turbine and turbine controls:

   - The turbine stop and control valves will trip closed as evidenced by valve position indication on the 20C008B panel.

   - The control valve demand signal will be gated to 0 by the turbine trip function. The bypass valves will receive an immediate open signal to open to the extent necessary to accommodate the steam demand sensed by the pressure controller; in this case they should open to near full capacity. The bypass valve position indication (meters and lights) are monitored on the 20C008B panel.

   - Turbine steam flow will decrease rapidly to 0.

   - Reactor pressure and steam line pressure should initially see only a slight perturbation due to the rapid closure of the turbine valves and opening of the Bypass valves.

2. Effects on RPS:

- Both the Turbine Stop Valve Closure Trip and the Turbine Control Valve Fast Closure Trip annunciators should come in, but no RPS trip should occur as evidenced by the A & B scram solenoid group lights remaining energized on panels 20C015 and 20C017, and the auto scram annunciators not coming in.

3. Effects on other system/parameters

- the turbine trip will automatically cause a main generator trip, which will trip the field breaker and cause the generator output to drop to 0.

- the Recirc. Pumps will trip as a result of the 13KV system fast transfer that is initiated by a main generator trip. The recirc. loop flows and core flow will decrease to 0 and natural circulation levels ($\approx 25 \times 10^6$ Lbm/Hr) respectively.

- As a result of the decrease in core flow, reactor power, total steam flow, total feedwater flow, reactor pressure, and steam line pressure should decrease with reactor power as EHC closes the Bypass valves to control pressure, and feedwater control adjusts the RFP's to control vessel level.

D. Documentation

1. Significant Parameters to be Collected

a. Analog Parameters:

(1) Reactor Power(% Flux)
(2) Total Steam Flow
(3) Total Feedwater Flow
(4) WR Reactor Pressure
(5) NR Reactor Pressure

(6) WR Reactor Vessel Water Level
(7) NR Reactor Vessel Water Level
(8) Main Generator MWe
(9) Main Turbine Steam Flow
(10) Total Core Flow
(11) Total Recirculation Loop Flow (Sum)

b. Annunciators, Indications, Interlocks:

(1) Annunciators;

(a) TURBINE HI VIBRATION TRIP
(b) OVERSPEED TRIP
(c) MAIN STEAM LINE BYPASS VALVE OPEN
(d) TURBINE STOP VALVE CLOSURE TRIP
(e) TURBINE CONTROL VALVE FAST CLOSURE TRIP
(f) 2 GEN BACK UP RELAYS
(g) "A" CHANNEL REACTOR AUTO SCRAM does not come in
(h) "B" CHANNEL REACTOR AUTO SCRAM does not come in

(2) Indications;

(a) Turbine Stop Valves position on 20C008B indicates closed
(b) Turbine Control Valves position on 20C008B indicates closed
(c) Turbine Bypass Valves position on 20C008B indicates open for > 4 valves (meter indication)
(d) Turbine Bypass Valves position on 20C008B indicates open for > 4 valves (light indication)
(e) "A" Group Solenoid lights on 20C015 remain energized
(f) "B" Group Solenoid lights on 20C017 remain energized

(3) Interlocks;

(a) Main Generator Field Breaker trips as indicated on 20C009
(b) 13KV Buses 20A001 and 20A002 fast transfer to off-site power
(c) Recirc. Pumps trip on 13KV fast transfer

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 4 and the DATA1 dataset.

b. Significant annunciators, indications, and interlocks are to be collected using the attached Data Form for this Performance Test.

E. Terminating Condition

This Performance Test may be terminated when the simulated plant conditions are such that a stable, controllable and safe condition has been attained which could be continued to cold shutdown condition. In addition, the following must be observed as a minimum:

- Vessel level has stabilized at the FWC setpoint.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test.

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the description in Section IV.C. Where parameter versus time values are specified, parameter response within ±10% of the specified value is acceptable, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

C. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simula ion is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

D. Transient operation can be carried on until:

1. a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or

2. a simulator operating limitation is reached.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 12 MTA04T.DAT

2. Prepare to collect data IAW Appendix I and Section IV.D.2.a.

3. Insert Malfunction MTA04 with a 30 sec. time delay.

4. Check the data form attached to this procedure for all the items listed in IV.D.1.b; make additions or deletions as necessary.

B. Performance

1. While collecting data in accordance with Appendix I and Significant Parameters, take the simulator out of freeze.

2. Observe the Simulator response to generally verify the occurrences listed in Effects and log the occurrence of the Annunciators, Indications and Interlocks on the data form, marking each item as Sat or Unsat as appropriate.

3. When the Termination Conditions are reached, place the simulator in freeze.

4. Complete and terminate Data Collection in accordance with Appendix I and Significant Parameters.

5. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/5/91 Test Performer B. Kavev

Date Analyzed 1/5/91 Analysis by B. Kavvna

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters:	
a. Reactor Power(% Flux)	Sat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. WR Reactor Pressure	Sat
e. NR Reactor Pressure	Sat
f. WR Reactor Vessel Water Level	Sat
g. NR Reactor Vessel Water Level	Sat
h. Main Generator MWe	Sat
i. Main Turbine Steam Flow	Sat
j. Total Core Flow	Unsat
k. Total Recirculation Loop Flow (Sum)	Unsat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. VII B.1.J + K - time delay for Recirc pump trip is excessive WO # 910021 PKI 2

2.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ✓

Database updated ____Sh____ Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ✓ NO ____

2. All SDR's resolved, Test Sat:

________________ ________________
Test Operator Date

Database updated ________________ Data Entry

C. Test Reviewed:

________________ ________________
Lead Test Operator Date

D. Test Completed:

________________ ________________
Sim. Support Supv. Date

TRANSIENT PERFORMANCE TEST
DATA SHEET - MTA04
TURBINE TRIP WITHIN BYPASS VALVE CAPACITY

PERFORMANCE CRITERIA

The criteria for acceptable performance for the following data are listed in the Malfunction Performance Test Procedure.

DATA TAKEN BY: B. Haver DATE: 1/5/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (1)(a)	TURBINE HI VIBRATION TRIP annunciator comes in	Sat
IV.D.1.b. (1)(b)	OVERSPEED TRIP annunciator comes in	Sat
IV.D.1.b. (1)(c)	MAIN STEAM LINE BYPASS VALVE OPEN annunciator comes in	Sat
IV.D.1.b. (1)(d)	TURBINE STOP VALVE CLOSURE TRIP annunciator comes in	Sat
IV.D.1.b. (1)(e)	TURBINE CONTROL VALVE FAST CLOSURE TRIP annunciator comes in	Sat
IV.D.1.b. (1)(f)	2 GEN BACK UP RELAYS annunciator comes in	Sat
IV.D.1.b. (1)(g)	"A" CHANNEL REACTOR AUTO SCRAM annunciator does not come in	Sat
IV.D.1.b. (1)(h)	"B" CHANNEL REACTOR AUTO SCRAM annunciator does not come in	Sat
IV.D.1.b. (2)(a)	Turbine stop valves position on 20C008B indicate closed	Sat
IV.D.1.b. (2)(b)	Turbine control valves position on 20C008B indicate closed	Sat

TPANSIENT PERFORMANCE TEST
DATA SHEET - MTA04
TURBINE TRIP WITHIN BYPASS VALVE CAPACITY

PERFORMANCE CRITERIA

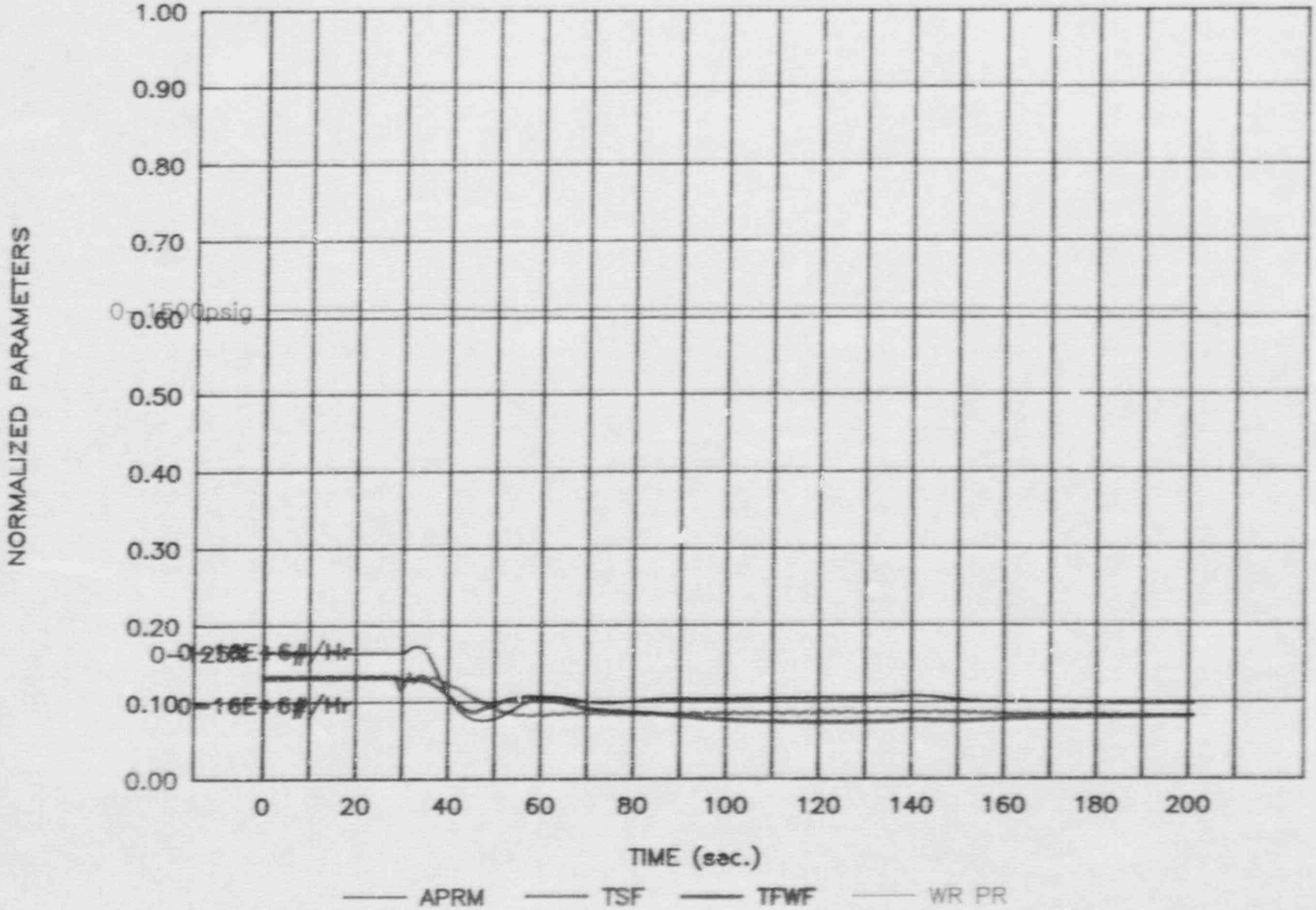
The criteria for acceptable performance for the following data are listed in the Malfunction Performance Test Procedure.

DATA TAKEN BY: B. Havens DATE: 1/8/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (2)(c)	Turbine bypass valves position on 20C008B indicate open for > 4 valves (meter indication) Initially 5 ½ valves indicated open, then closed to 3 ½ as power was reduced on RR Pump trip	Sat
IV.D.1.b. (2)(d)	Turbine bypass valves position on 20C008B indicate open for > 4 valves (light indicction) See above	Sat
IV.D.1.b. (2)(e)	"A" group solenoid lights (4) on 20C015 remain energized	Sat
IV.D.1.b. (2)(f)	"B" group solenoid lights (4) on 20C017 remain energized	Sat
IV.D.1.b. (3)(a)	Main Generator Field Breaker trips as indicated on 20C009	Sat
IV.D.1.b. (3)(b)	13KV Buses 20A001 and 20A002 fast transfer to off-site power as indicated on 20C009	Sat
IV.D.1.b. (3)(c)	Recirc. Pumps trip on 13KV fast transfer as indicated on 20C004A	Sat
Real Time Operation	The Simulator operated in real time as indicated by completion of the test without a suspension of Simulation, and the ISD/IST status was not FAIL.	Sat

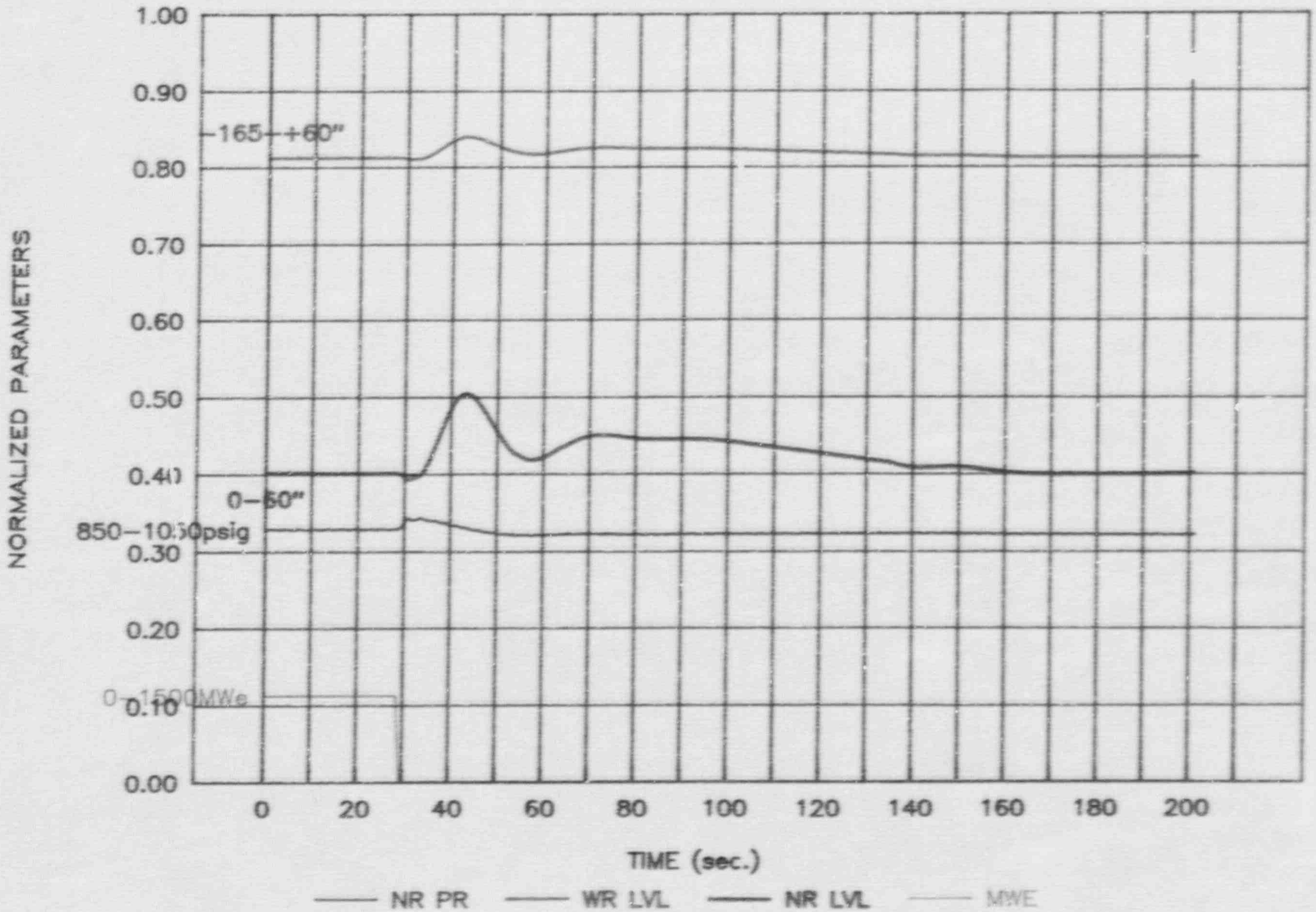
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT MTA04T

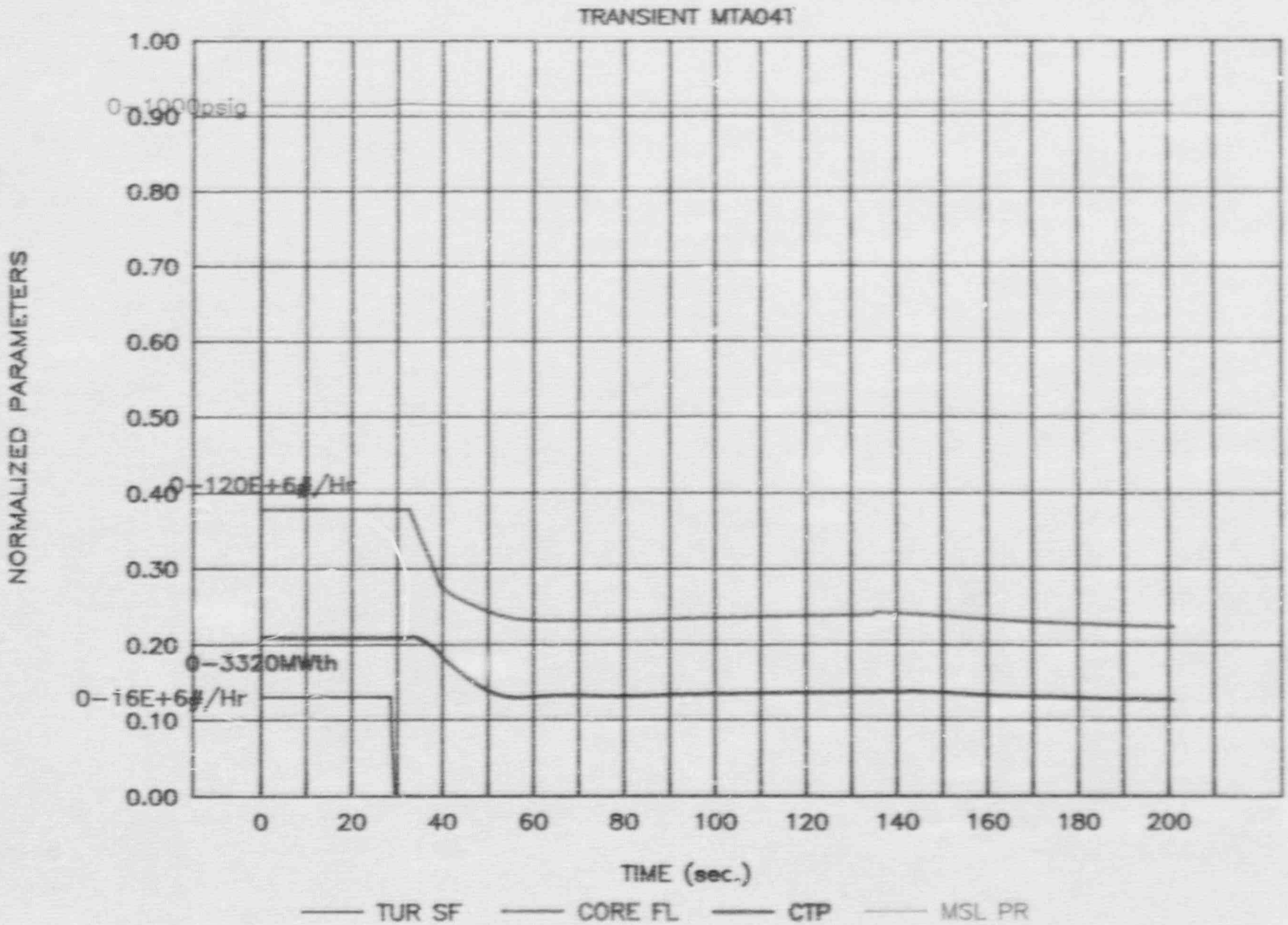


PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT MTA04T

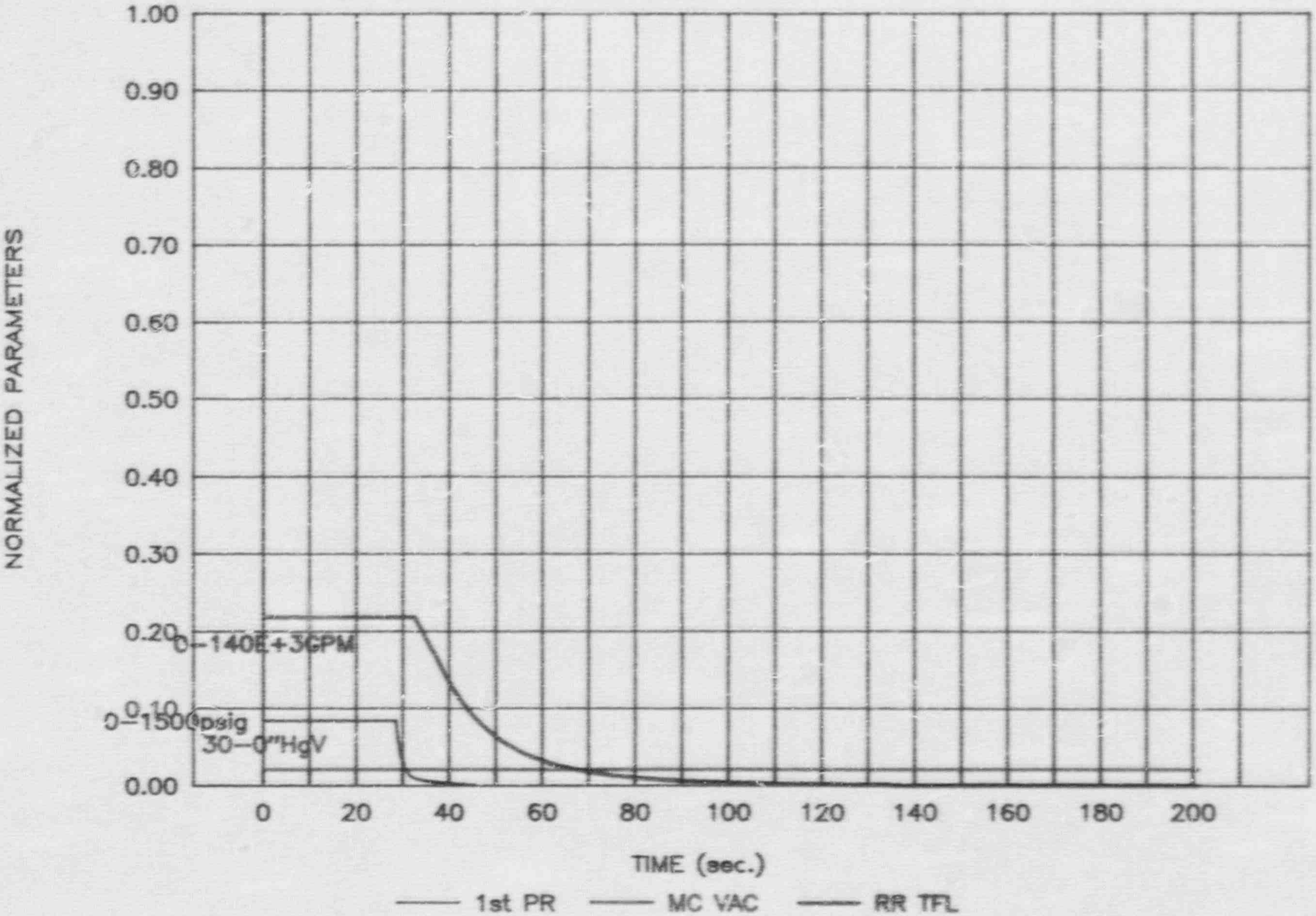


PBAPS UNIT 2 SIMULATOR TRANSIENT DATA



PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT MTA04T



PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-PWRRAMP

MAXIMUM RATE POWER RAMP FROM
100% TO 75% TO 100%

Prepared by: Bud Havens, Simulator Test Operator — Date: 12/21/90

Approved by: [signature], Lead Test Operator — Date: 1/2/91

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix B, Section B1.2
Run this transient test from an initial condition of approximately 30% power, steady-state xenon and decay heat with no operator followup action.

II. TEST ABSTRACT
This performance test will test simulator response to a rapid decrease in power level followed by a rapid increase. The power change will be accomplished via manual operation of the Recirculation Flow Controllers at approximately 0.5%/sec. or 30%/min. This rate is the NSSS design rate of power change, and is in excess of the maximum procedural rate of change (13 MWe/min., or ≈ 1.08%/min.). Power is reduced to 75%, held for 30 seconds, then increased back to the initial flow demand for full power. As recirculation flow is decreased, the vessel level will swell and the FWC System will adjust feedwater flow to maintain vessel level at the setpoint; the opposite will occur on recirculation flow increase. The changing recirculation flow will change reactor core flow, which in turn will cause first a reduction, then an increase in power. As power is reduced, reactor pressure will decrease, and the EHC System will reduce turbine steam flow to maintain pressure; on power increase, the opposite will occur. After the flow increase to the original core flow, all parameters should stabilize and trend toward initial full power values.

III. TEST REFERENCES

A. Other Performance Tests

1. SSPT GP-5

2. STPT GP-2

3. SSPT GP-3

B. Reference Plant Performance Data

IV. TEST DESCRIPTION

A. Initial Conditions

- IC 14

B. Malfunctions used - none

C. Effects

1. Power reduction effects

- The initial manual reduction in recirculation flow demand will result in a decrease in recirc. loop flows, and a corresponding decrease in total core flow. The reduction in core flow will result in a decrease in core power.

- The decreasing flows, and increase in core voiding during the flow decrease will cause an increase in vessel level (swell). The Feedwater Control System will adjust total feedwater flow to return and maintain vessel level at its setpoint.

- The decreasing core power will cause a reduction in vessel pressure which will be sensed by the EHC System. EHC will reduce turbine (and thereby total) steam flow to control and maintain reactor pressure. The reduction in turbine steam flow will decrease Main Generator power.

2. Interim power level (before increase)

- The values reached at the interim power level for APRM's, total steam flow, feedwater flow, turbine steam flow, and Generator MWe should be ≈75-80% of the initial values. Reactor pressure should decrease from its initial value by ≈20-25 psi. Reactor vessel level should be approximately at the FWC setpoint by the time the power increase is begun.

3. Power increase effects

- Power increase should have approximately the opposite effects on all parameters as those listed above for the power decrease.

- All parameters should stabilize at their initial full power values within 2 minutes of the time that recirculation flow demand is returned to the full power value. Due to the relatively short duration of the power reduction, there should be little overshoot as power approaches 100% (less than 10% on the APRM's).

D. Documentation

1. Significant Parameters to be Collected

a. Analog Parameters:

(1) Reactor Power(% Flux)
(2) Total Steam Flow
(3) Total Feedwater Flow
(4) WR Reactor Pressure
(5) NR Reactor Pressure
(6) WR Reactor Vessel Water Level
(7) NR Reactor Vessel Water Level
(8) Main Generator MWe
(9) Main Turbine Steam Flow
(10) Total Core Flow
(11) Total Recirculation Loop Flow (Sum)

b. Annunciators, Indications, Interlocks:

- initial, interim, and final Recirculation MG Set Speed Demand values

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 4 and the DATA1 dataset.

b. Significant annunciators, indications, and interlocks are to be collected using the attached Data Form for this Performance Test.

E. Terminating Condition

This Performance Test may be terminated when the simulated plant conditions are such that a stable, controllable and safe condition has been attained which could be continued to cold shutdown conditions. In addition, the following must be observed as a minimum:

- Vessel level has stabilized at the FWC setpoint.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test.

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the description in Section IV.C.
Where parameter versus time values are specified,

parameter response within ±10% of the specified value is acceptable, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

C. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

D. Transient operation can be carried on until:

1. a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or

2. a simulator operating limitation is reached.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. Check the data form attached to this procedure for all the items listed in IV.D.1.b; make additions or deletions as necessary.

3. Take the simulator out of freeze;

a. log the initial speed demand for each recirculation MG Set from the speed controllers on panel 20C004A on the Dataform.

b. Slowly reduce the speed demand for both recirc. pumps until a steady power of 75±3% is achieved. Log this speed demand for each MG Set on the Dataform.

4. Reset the Simulator to IC 14 PWRRAMP.DAT

5. Prepare to collect data IAW Appendix I and Section IV.D.2.a.

B. Performance

1. While collecting data in accordance with Appendix I and Significant Parameters, take the simulator out of freeze, noting the time.

2. Approximately 30 sec. after coming out of freeze, begin a steady decrease of the speed demand on both recirculation pumps to the value logged on the Dataform for 75%, so that:

   a. The pump speeds are matched during the decrease, and;

   b. the time interval to reach the interim power level speed demand is ≈ 50 sec.

3. Approximately 30 sec. after reaching the interim power level, begin a steady increase of the speed demand on both recirculation pumps to the initial value logged on the Dataform, so that:

   a. The pump speeds are matched during the decrease, and;

   b. the time interval to reach the final power level speed demand is ≈ 50 sec.

   c. log the actual final speed demand value on the dataform.

4. When the Termination Conditions are reached, place the simulator in freeze.

5. Complete and terminate Data Collection in accordance with Appendix I and Significant Parameters.

6. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/5/91 Test Performer B. Havens

Date Analyzed 1/9/91 Analysis by B. Havens

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters:	
a. Reactor Power(% Flux)	Sat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. WR Reactor Pressure	Sat
e. NR Reactor Pressure	Sat
f. WR Reactor Vessel Water Level	Sat
g. NR Reactor Vessel Water Level	Sat
h. Main Generator MWe	Sat
i. Main Turbine Steam Flow	Sat
j. Total Core Flow	Sat
k. Total Recirculation Loop Flow (Sum)	Sat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1.

2.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ✓ Unsat ____

Database updated ____BA____
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ____ NO ____

2. All SDR's resolved, Test Sat:

____________ ____________
Test Operator Date

Database updated ____________
Data Entry

C. Test Reviewed:

R.W. Tyler 1/28/91
Lead Test Operator Date

D. Test Completed:

M.A. Rosales 30 Jan 91
Sim. Support Supv. Date

TRANSIENT PERFORMANCE TEST
DATA SHEET - PWRRAMP
MAXIMUM RATE POWER RAMP FROM 100% TO 75% TO 100%

PERFORMANCE CRITERIA

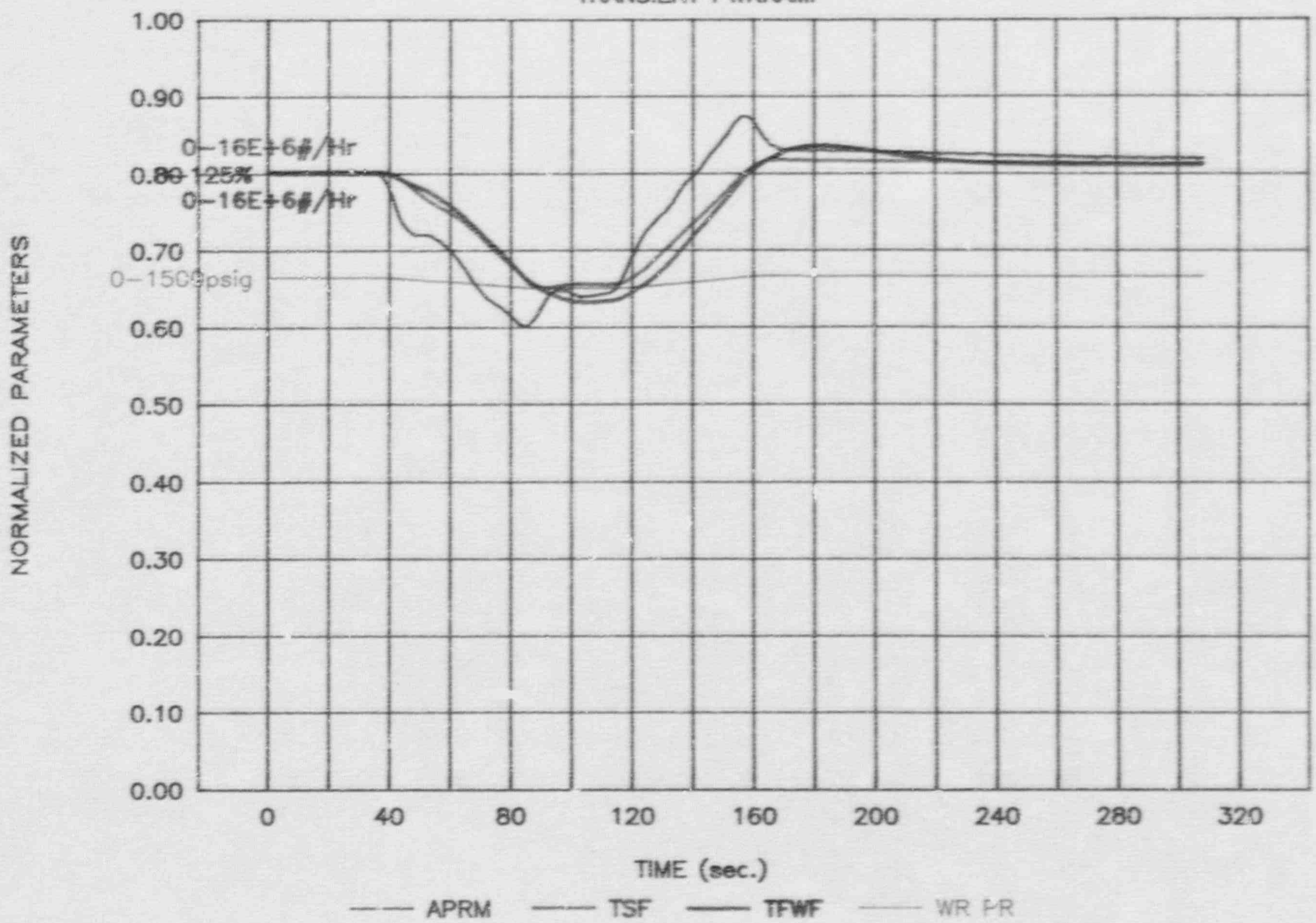
The criteria for acceptable performance for the following data are listed in the Malfunction Performance Test Procedure.

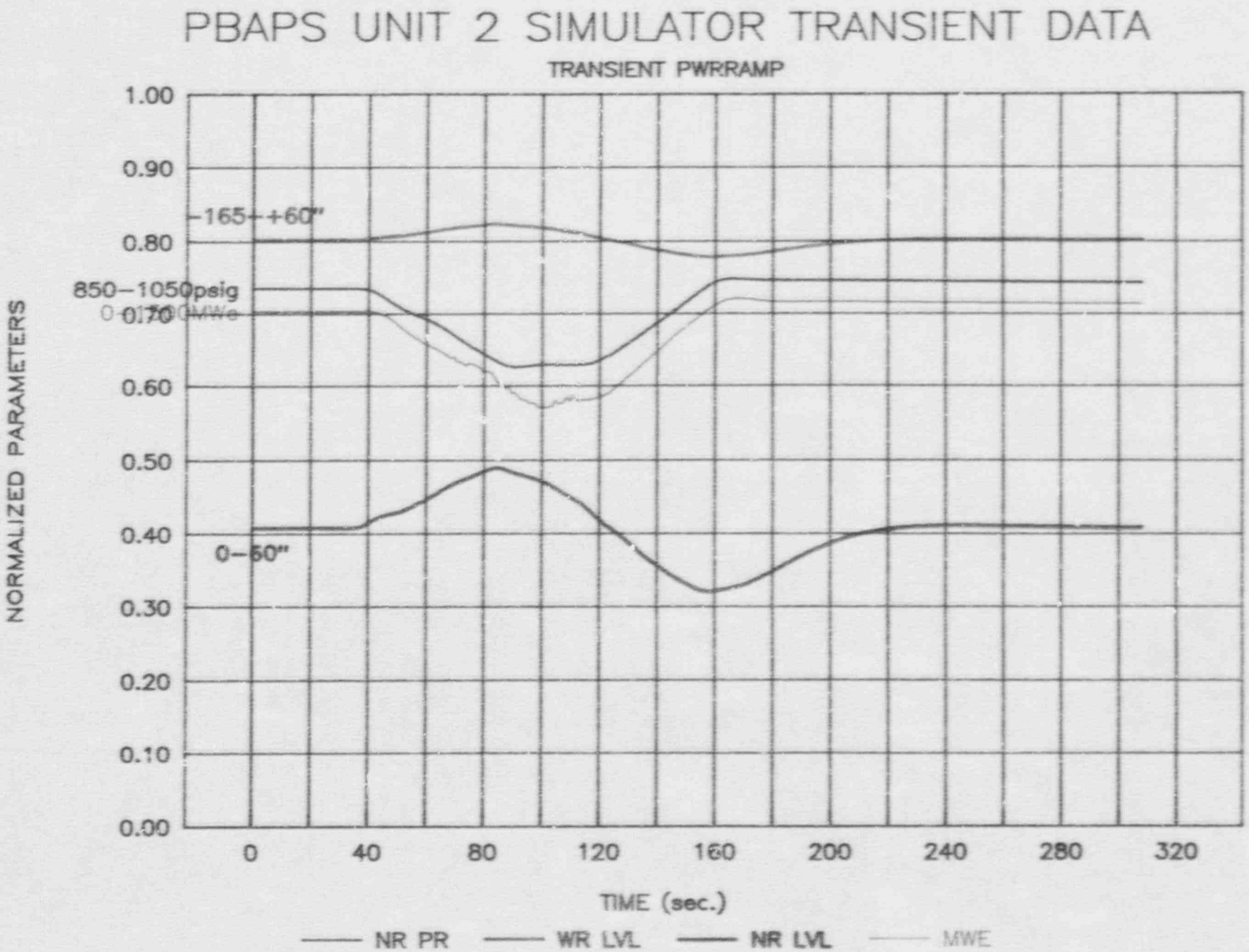
DATA TAKEN BY: B Havens   DATE: 1/5/91

ITEM NUMBER	DESCRIPTION		% Speed Demand
IV.D.1.b.	Initial 100% power speed demand for MG Set:	A	81
		B	81
IV.D.1.b.	Interim 75% power speed demand for MG Set:	A	61
		B	60
VI.B.3.c.	Actual final 100% power speed demand for MG Set:	A	81
		B	80
Real Time Operation	The Simulator operated in real time as indicated by completion of the test without a suspension of Simulation, and the ISD/IST status was not FAIL.		SAT/ UNSAT

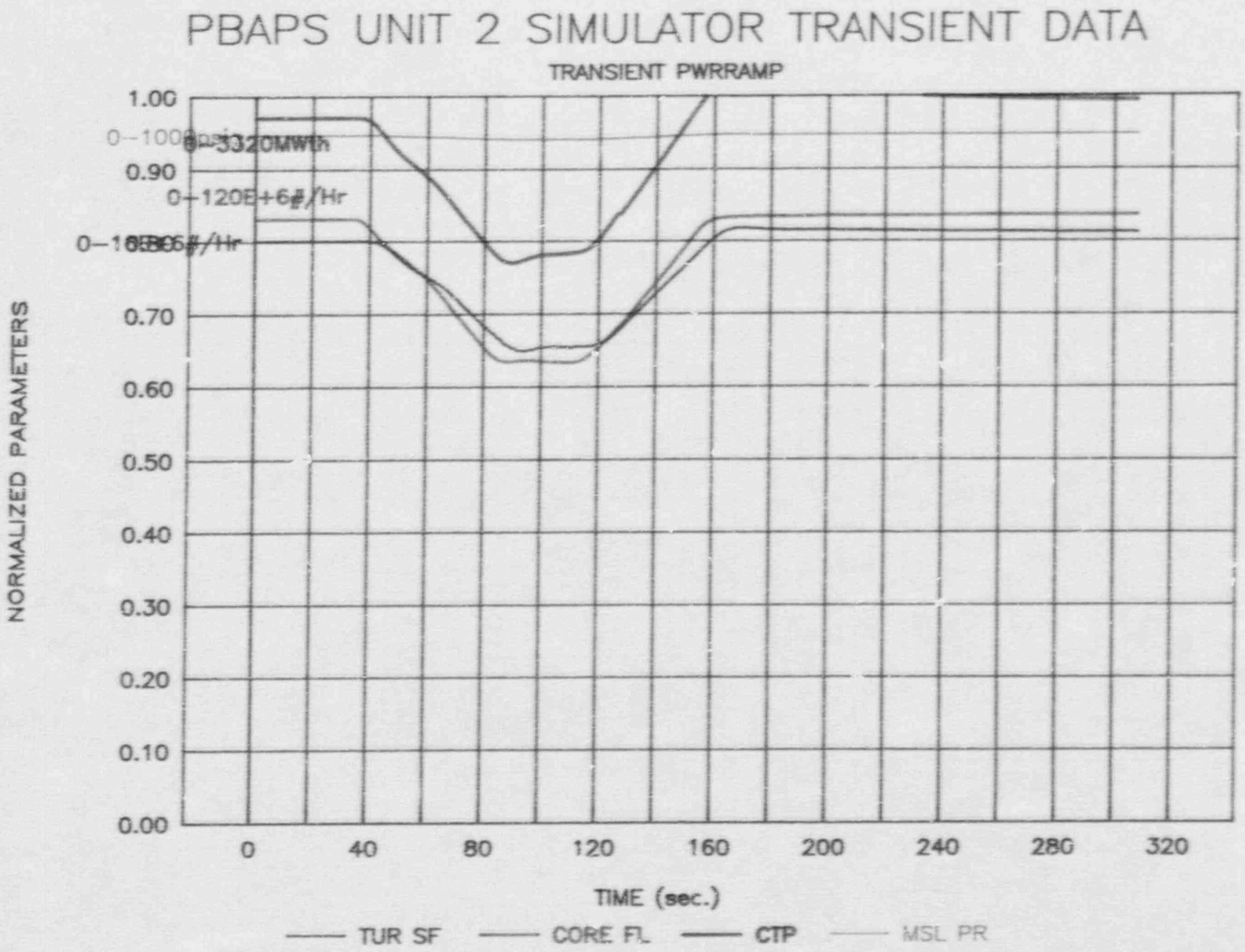
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT PWRRAMP



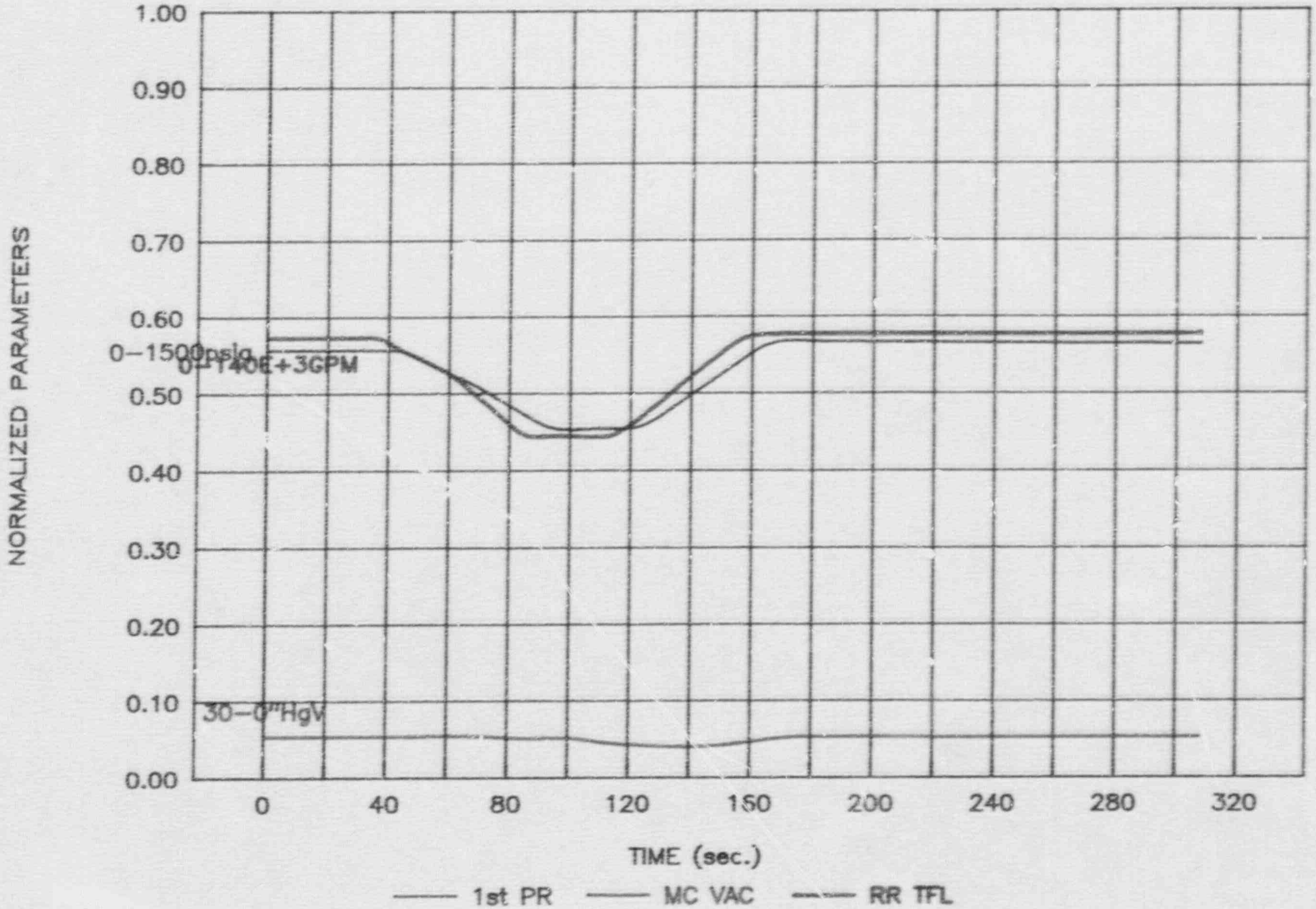


PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT PWRRAMP
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-165-+60"
850-1050psig
0-1200MWe
0-60"
0
40
80
120
160
200
240
280
320
TIME (sec.)
NR PR
WR LVL
NR LVL
MWE


PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT PWRRAMP
NORMALIZED PARAMETERS
1.00
0.90
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0--1000psi
0--3320MWth
0--120E+6#/Hr
0--105E6#/Hr
0
40
80
120
160
200
240
280
320
TIME (sec.)
TUR SF
CORE FL
CTP
MSL PR

PBAPS UNIT 2 SiMULATOR TRANSIENT DATA

TRANSIENT PWRRAMP



PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-RRS20

MAXIMUM RECIRCULATION SUCTION BREAK WITH
LOSS OF OFF-SITE POWER

Prepared by: Bud Havens — Date: 12/26/90
Simulator Test Operator

Approved by: R.W. Tyler — Date: 1/2/91
Lead Test Operator

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix B, Section B1.2
Run this transient test from an initial condition of approximately 100% power, steady-state xenon and decay heat with no operator followup action.

II. TEST ABSTRACT
This performance test will test simulator response to a major Loss of Coolant Accident (LOCA) with a Loss of Off-Site Power (LOP). The LOP will momentarily interrupt all AC power buses except those backed by DC, until the Diesel Generators close onto the emergency buses. The loss of power will immediately trip the Main Generator and the Condensate pumps, which will in turn trip the RFP's. The recirculation suction break will result in release of steam into the primary containment, and loss of inventory from the reactor vessel. The drywell will rapidly pressurize and blowdown to the torus, suppressing the rise in drywell pressure by condensing steam in the suppression pool. The reactor vessel will depressurize, and vessel level will decrease rapidly due to the loss of inventory. As drywell pressure increases and vessel level decreases, the ECCS and RCIC will automatically start and pump water to the reactor to restore vessel inventory; with HPCI and RCIC tripping on high level, then isolating on low steam line pressure. Vessel level will begin to recover and will reflood the vessel annulus until the flow out the break matches the ECCS injection flow.

III. TEST REFERENCES

A. Other Performance Tests

1. SSPT T-101

2. SSPT T-102

B. Reference Plant Performance Data

C. Design Analysis Performance Data

1. Updated Final Safety Analysis Report, PBAPS Units 2 & 3, Chapter 14

IV. TEST DESCRIPTION

A. Initial Conditions

- IC 14

B. Malfunctions used:

1. RRS20 at 100% severity

2. MAP02A

3. MAP02C

4. MAP02D

5. MAP02E

C. Effects
Times given in the discussion below are referenced to time of insertion of the Malfunction unless otherwise indicated. Parameter response can be confirmed by analysis of GINDAC plots.

1. Initial response due to the LOP

- The Main Generator will trip immediately

- all AC buses except those powered from 20Y050 (Uniterruptible Power Supply) will lose power

- the Diesel Generators will receive an auto start on bus undervoltage, DG's will close on the bus within 10 sec.

- the Condensate pumps will trip on loss of power, tripping the RFP's on low suction pressure.

- RPS MG sets will lose power, and will deenergize the RPS buses within a 3 to 4 sec.; this will cause all RPS and RPS controlled PCIS trips to occur regardless of any other trip signal inputs.

2. Initial vessel parameter response to the Recirc. Suction break:

   - Vessel level will rapidly decrease, falling off scale on the wide range to the top of active fuel within ≈ 10 sec.

   - Vessel pressure will decrease rapidly due to the loss of level and inventory.

   - The reactor will scram on the Turbine Trip associated with the Main Generator trip on the LOP, on high drywell pressure, or on low vessel level prior to the RPS buses deenergizing.

   - Total steam flow will drop to 0 quickly on the Turbine trip and MSIV's closure (low level/loss of RPS) within the first 4 sec.

   - total feedwater flow will decrease to 0 on the trip of the RFP's on low suction pressure.

3. Initial containment response to the Recirc. Suction break:

   - The initial blowdown to the drywell will be water flashing to steam as it exits the break, causing drywell pressure and temperature to increase very rapidly. Drywell pressure should peak at ≈ 40 psig within the first 10 sec. then decreases to 25 psig over the next 15 to 20 sec., and will decrease steadily after 2 min. due to water spilling from the break into the steam atmosphere of the drywell. Drywell temperature will increase to ≈ 300°F. over the first 10 sec., drop to ≈ 275°F. over the next 15 to 20 sec., and will decrease steadily after 2 min. due to water spilling into the drywell steam atmosphere.

- Suppression pool pressure will increase following drywell pressure, to a maximum of ≈ 25 psig at 50 sec.; it will hold at this pressure with a slow decrease until drywell pressure drops below it at 200 to 250 sec., when it will again follow drywell pressure down while remaining slightly higher as non-condensible gases are vented back into the drywell.

4. ECCS, RCIC and Feedwater response to the steam line rupture:

- HPCI will initiate on high drywell pressure immediately, and will receive a redundant initiation on low level at -48". HPCI will continue to inject until it isolates on low steam line pressure as the vessel depressurizes.

- As level drops to -48", RCIC will initiate on low vessel level; and RCIC will inject until isolating on low steam line pressure.

- RHR and Core Spray will receive an initiation on low vessel level, and on high drywell pressure when vessel pressure drops below 500 psig. The systems will start and run on min. flow if necessary until vessel pressure drops below their shutoff head at ≈ 300 psig. After pressure is below this value, they will inject, increasing flow as vessel pressure decreases.

- ADS will receive signals to start timing for ADS SRV blowdown, but vessel level will recover in time to prevent a blowdown.

- With HPCI, RCIC, RHR, and CS injecting, vessel level will be recovered and will increase to until the injection flow matches the water flow out the break as the vessel annulus attempts to reflood. Due to the size of the break, complete annulus reflood to normal level is not possible; level will stop increasing after it has been restored to ≈ -83". Some of the non-compensated fuel zone level instruments will read a higher level due to the flow effects of RHR injection.

D. Documentation

1. Significant Parameters to be Collected

a. Analog Parameters:

(1) Reactor Power(% Flux)
(2) Total Steam Flow
(3) Total Feedwater Flow
(4) WR Reactor Pressure
(5) WR Reactor Vessel Water Level
(6) Fuel Zone Reactor Vessel Level
(7) Drywell Pressure
(8) Suppression Pool Pressure
(9) Drywell Temperature
(10) Suppression Pool Temperature
(11) RHR Total Flow
(12) CS Total Flow
(13) HPCI/RCIC Total Flow

b. Annunciators, Indications, Interlocks:

(1) Annunciators

(a) E12 (E22, E32, E42, E13, E23, E33, E43) BUS UNDERVOLTAGE
(b) E1 (E2, E3, E4) DIESEL RUNNING
(c) REACTOR VESSEL LO WATER LEVEL TRIP
(d) DRYWELL HI PRESS TRIP
(e) SYSTEM I (II) REAC VESSEL LO PRESS

(f) SYSTEM I (II) ECCS REAC VESSEL WATER LO-LO-LO LEVEL
(g) A (B,C,D) CORE SPRAY PUMP AUTO START
(h) A (B,C,D) RHR PUMP AUTO START
(i) SYSTEM I (II) RHR RELAYS NOT RESET
(j) HPCI RELAYS NOT RESET
(k) DRYWELL HI PRESS SIGNAL SEALED IN
(l) BLOWDOWN TIMERS INITIATED
(m) RCIC RELAYS NOT RESET

(2) Indications

(a) Diesel Generators reenergize Emergency buses within 10 sec.
(b) Condensate pumps trip on LOP.

(3) Interlocks

(a) RHR and CS start on low vessel level (when power is avail.) and run on min. flow if necessary until vessel pressure is less than 300 psig.
(b) HPCI and RCIC isolate on low steam line pressure

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 7 and the DATA3 dataset.

b. Significant annunciators, indications, and interlocks are to be collected using the attached Dataform for this Performance Test.

E. Terminating Condition

This Performance Test may be terminated when the simulated plant conditions are such that a stable, controllable and safe condition has been attained which could be continued to cold shutdown conditions. In addition, the following must be observed as a minimum:

- Vessel level has stabilized on reflood

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test.

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the description in Section IV.C. Where parameter versus time values are specified, parameter response within ±10% of the specified value is acceptable, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

C. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

D. Transient operation can be carried on until:

1. a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or

2. a simulator operating limitation is reached.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. Insert the following Malfunctions with a 30 sec. time delay:

   a. RRS20 at 100% severity

   b. MAP02A

   c. MAP02C

   d. MAP02D

   e. MAP02E

RRS20T.DAT

3. Prepare to collect data IAW Appendix I and Section IV.D.2.

4. Check the form attached to this procedure for all the items listed in IV.D.1.b; make additions or deletions as necessary.

B. Performance

1. While collecting data in accordance with Appendix I and Significant Parameters, take the simulator out of freeze.

2. Observe the Simulator response to generally verify the occurrences listed in Effects and log the occurrence of the Annunciators, Indications and Interlocks on the data form marking each item as Sat or Unsat as appropriate.

3. When the Termination Conditions are reached, terminate data collection and place the simulator in freeze.

4. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/6/91 Test Performer B. Haven

Date Analyzed 1/11/91 Analysis by B Haven

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters:	
a. Reactor Power(% Flux)	Sat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. WR Reactor Pressure	Sat
e. WR Reactor Vessel Water Level	Sat
f. Fuel Zone Reactor Vessel Level	Sat
g. Drywell Pressure	Sat
h. Suppression Pool Pressure	Sat
i. Drywell Temperature	Unsat
j. Suppression Pool Temperature	Unsat
k. RHR Total Flow	Sat
l. CS Total Flow	Sat
m. HPCI/RCIC Total Flow	Sat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. III B i, j D/W and Supp pool temp increase too slowly, is not [illegible] end of blowdown effect. WO 910016 Pr. 2

2.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ✓

Database updated ______ [illegible] ______
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ✓ NO ____

2. All SDR's resolved, Test Sat:

____________________ ____________________
Test Operator Date

Database updated ____________________
Data Entry

C. Test Reviewed:

____________________ ____________________
Lead Test Operator Date

D. Test Completed:

____________________ ____________________
Sim. Support Supv. Date

TRANSIENT PERFORMANCE TEST
DATA SHEET - RRS20
MAXIMUM RECIRCULATION SUCTION BREAK WITH LOSS OF OFFSITE POWER

PERFORMANCE CRITERIA

The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B. Hewens DATE: 1/6/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (1)(a)	E12 (E22, E32, E42, E13, E23, E33, E43) BUS UNDERVOLTAGE Annunciator	Sat
IV.D.1.b. (1)(b)	E1 (E2, E3, E4) DIESEL RUNNING Annunciator	Sat
IV.D.1.b. (1)(c)	REACTOR VESSEL LO WATER LEVEL TRIP Annunciator Scram Signal	Sat
IV.D.1.b. (1)(d)	DRYWELL HI PRESSURE TRIP Annunciator	Sat
IV.D.1.b. (1)(e)	SYSTEM I (II) REAC VESSEL LO PRESS Annunciator	Sat
IV.D.1.b. (1)(f)	SYSTEM I (II) ECCS REAC VESSEL WATER LO-LO-LO LEVEL Annunciator	Sat
IV.D.1.b. (1)(g)	A (B,C,D) CORE SPRAY PUMP AUTO START Annunciator	Sat
IV.D.1.b. (1)(h)	A (B,C,D) RHR PUMP AUTO START Annunciator	Sat
IV.D.1.b. (1)(i)	SYSTEM I (II) RHR RELAYS NOT RESET Annunciator	Sat
IV.D.1.b. (1)(j)	HPCI RELAYS NOT RESET Annunciator	Sat

TRANSIENT PERFORMANCE TEST
DATA SHEET - RRS20
MAXIMUM RECIRCULATION SUCTION BREAK WITH LOSS OF OFFSITE POWER

PERFORMANCE CRITERIA

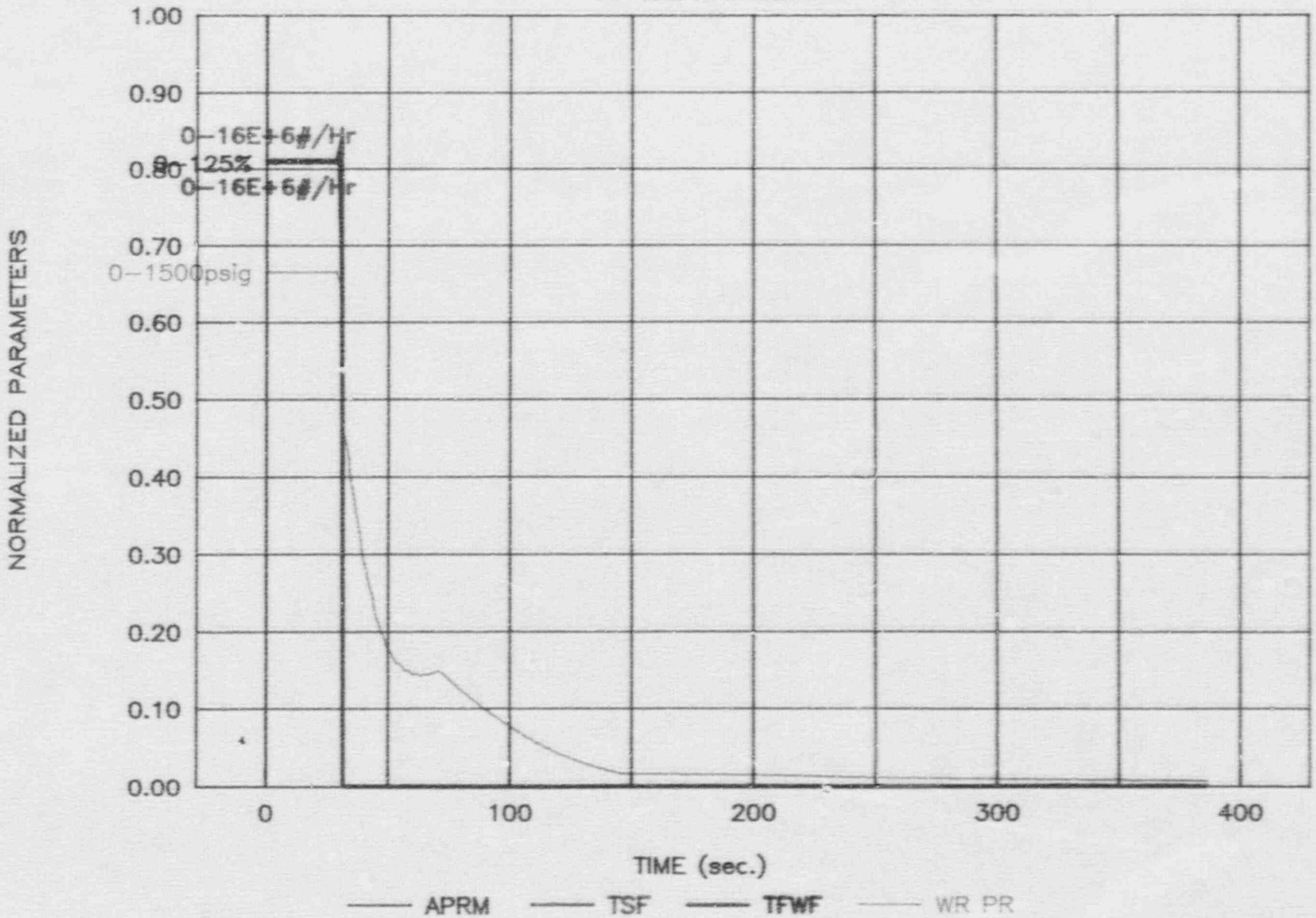
The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B Havens   DATE: 1/6/91

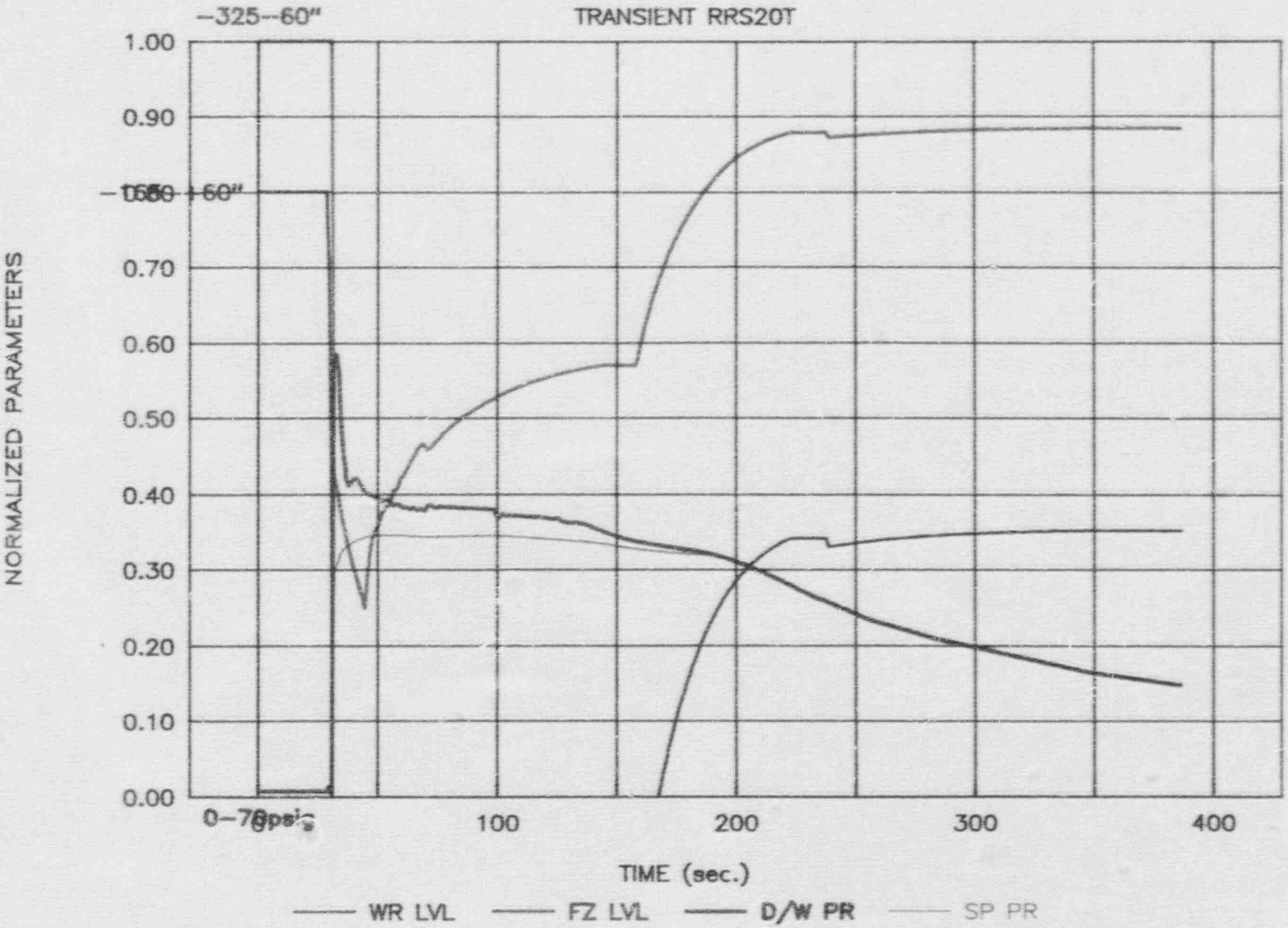
ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (1)(k)	DRYWELL HI PRESS SIGNAL SEALED IN Annunciator	Sat
IV.D.1.b. (1)(l)	BLOWDOWN TIMERS INITIATED Annunciator	Sat
IV.D.1.b. (1)(m)	RCIC RELAYS NOT RESET Annunciator	Sat
IV.D.1.b. (2)(a)	Diesel Generators reenergize Emergency buses within 10 sec. of LOP	Sat
IV.D.1.b. (2)(b)	Condensate Pumps trip in LOP	Sat
IV.D.1.b. (3)(a)	RHR and CS start at vessel pressure < 500 psig and run on min. flow until vessel pressure is < 300 psig.	Sat
IV.D.1.b. (3)(b)	HPCI and RCIC isolate on low steam line pressure	Sat
Real Time Operation	The Simulator operated in real time as indicated by completion of the test without a suspension of Simulation, and the ISD/IST status was not FAIL.	Sat

PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT RRS20T

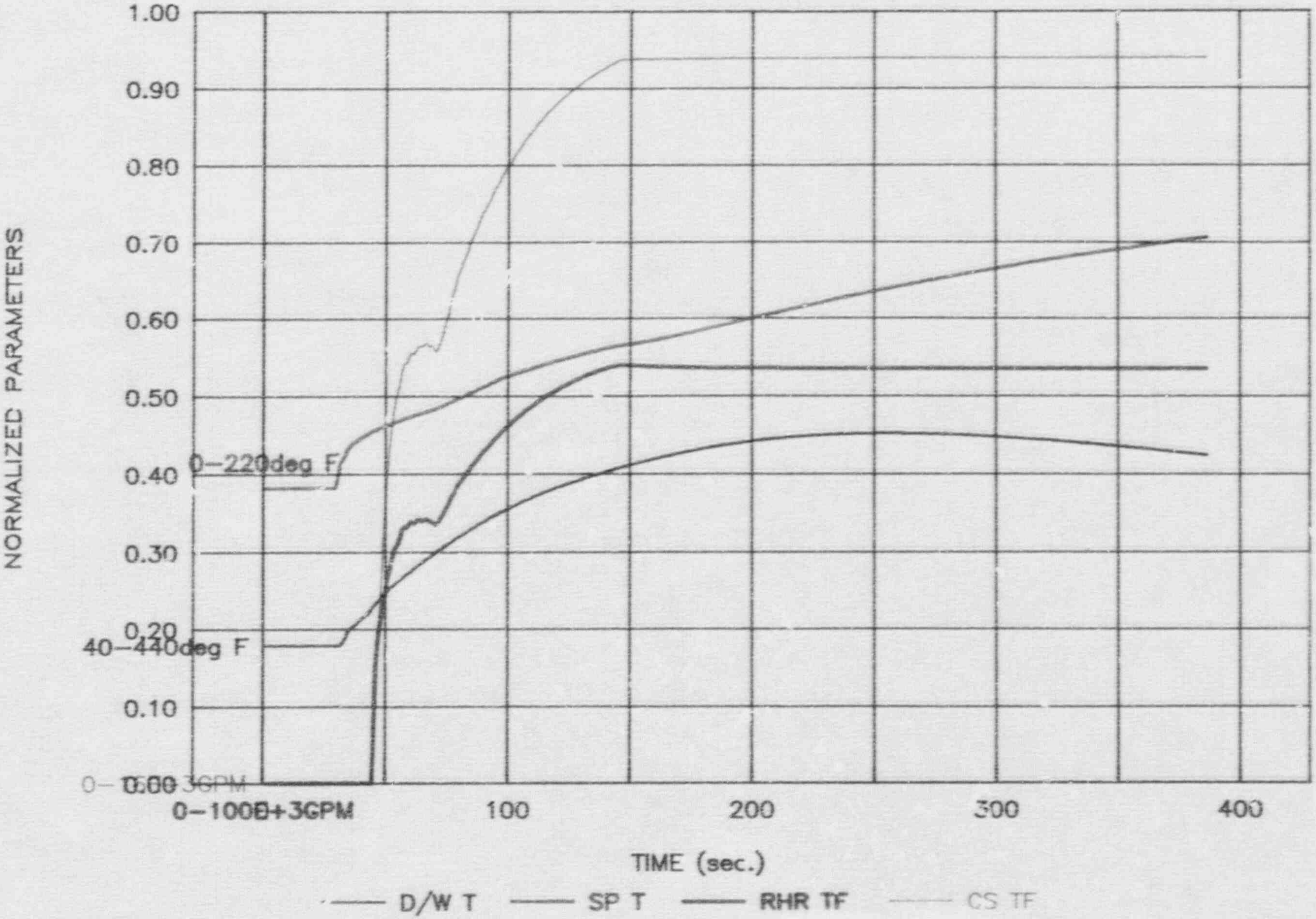


PBAPS UNIT 2 SIMULATOR TRANSIENT DATA



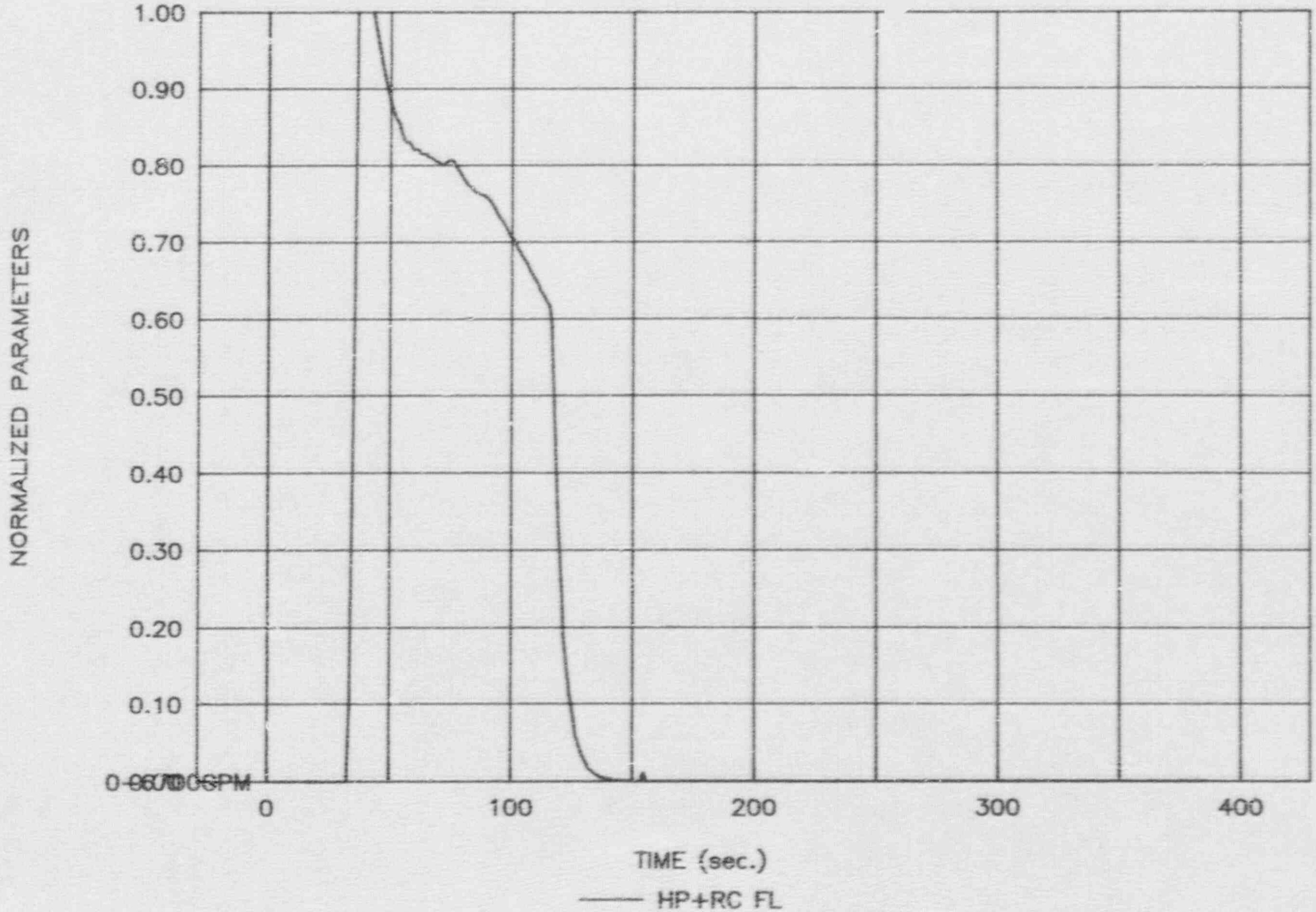
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT RRS20T



PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT RRS20T



PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

SMPTT-MSS02

MAXIMUM UNISOLABLE STEAM LINE RUPTURE

Prepared by: Bud Havens
Simulator Test Operator
Date: 12/20/90

Approved by: R.C. Tyler
Lead Test Operator
Date: 1/3/91

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix B, Section B1.2
Run this transient test from an initial condition of approximately 100% power, steady-state xenon and decay heat with no operator followup action.

II. TEST ABSTRACT
This performance test will test simulator response to the rupture of the A Main Steam Line between the flow restrictor and the inboard MSIV. Rupturing this line will result in release of steam into the primary containment, and loss of inventory from the reactor vessel. The drywell will rapidly pressurize and blowdown to the torus, suppressing the rise in drywell pressure by condensing steam in the suppression pool. The reactor vessel will rapidly depressurize, and vessel level will decrease due to the loss of inventory. As drywell pressure increases and vessel level decreases, the ECCS and RCIC will automatically start and pump water to the reactor to restore vessel level, with HPCI and RCIC tripping on high level, or isolating on low steam line pressure. The condensate system will also inject once reactor pressure drops below ≈ 600 psig due to the condensate pumps. The reactor vessel will be reflooded by condensate and ECCS.

III. TEST REFERENCES

A. Other Performance Tests

1. SSPT T-101

2. SSPT T-102

B. Reference Plant Performance Data

- Peach Bottom Atomic Power Station Units 2 and 3 Updated Final Safety Analysis Report, Chapter 14.

IV. TEST DESCRIPTION

A. Initial Conditions

- IC 14

B. Malfunctions used:

1. MSS02 at 100% severity

C. Effects

Times given in the discussion below are referenced to time of insertion of the Malfunction unless otherwise indicated. Parameter response can be confirmed by analysis of GINDAC plots.

1. Initial vessel parameter response to the Steam Line rupture:

   - Steam line flow for the ruptured line will increase, as well as that for the other lines, thus causing an increase in total steam flow.

   - Vessel pressure will begin to decrease rapidly due to the excessive steam flow, and will continue to decrease as vessel inventory blowsdown to the drywell.

   - The high steam line flow will result in a Group I isolation on high steam flow, isolating the reactor vessel from the rupture except through the broken line.

   - following the Group I isolation, total steam flow will drop to ≈ 50% rated, hold until pressure drops below 300 psig, then decrease to 0 as vessel level is restored above the steam lines.

   - total feedwater flow will increase to follow total steam flow, but will drop rapidly to 0 as steam pressure drops after the isolation, or on a high vessel level trip.

- Vessel level will initially swell due to the increased steam flow and depressurization. Level may reach +48" on the initial swell, tripping the Main and RFP Turbines on high level. It will then drop rapidly until the condensate pumps and ECCS restore vessel inventory

- Reactor power (APRM'S) will decrease rapidly on the depressurization, then go to 0 on a scram signal generated from MSIV Closure or Turbine Stop Valve Closure.

2. Initial containment response to the Steam Line rupture:

   - The initial steam blowdown to the drywell will cause drywell pressure and temperature to increase very rapidly. Drywell pressure should peak at ≈ 35 psig within the first 10 sec. then decreases to 25 psig over the next 15 to 20 sec., and will decrease steadily after 2 min. due to water spilling from the break into the steam atmosphere of the drywell. Drywell temperature will increase to ≈ 300°F. over the first 10 sec., drop to ≈ 275°F. over the next 15 to 20 sec., and will decrease steadily after 2 min. due to water spilling into the drywell steam atmosphere.

   - Suppression pool pressure will increase following drywell pressure, to a maximum of ≈ 25 psig at 50 sec.; it will hold at this pressure with a slow decrease until drywell pressure drops below it at 200 to 250 sec., when it will again follow drywell pressure down while remaining slightly higher as non-condensible gases are vented back into the drywell. Suppression Pool temperature will increase rapidly during the vessel blowdown and reach ≈ 130°F. at 100 sec., then increase more slowly after the blowdown is complete.

3. ECCS, RCIC and Feedwater response to the steam line rupture:

- HPCI will initiate on high drywell pressure immediately, and will receive a redundant initiation on low level if level drops to -48". HPCI will continue to inject until it isolates on low steam line pressure as the vessel depressurizes, or trips on high level as vessel level is recovered.

- If level drops to -48", RCIC will initiate on low vessel level, otherwise RCIC will not be initiated and will not inject on this transient.

- RHR and Core Spray will receive an initiation signal on high drywell pressure when vessel pressure drops below 500 psig. The systems will start and run on min. flow until vessel pressure drops below their shutoff head at ≈ 300 psig. After pressure is below this value, they will inject, increasing flow as vessel pressure decreases.

- The feedwater pumps will lose driving steam as the MSIV's close on high steam flow. The condensate pumps will maintain system pressure at ≈ 600 psig, and will begin to inject when vessel pressure drops below this value.

- With HPCI, RHR, CS, and feedwater injecting, vessel level will be recovered and increased to fill the vessel above the steam lines. Once above the steam lines, the break flow will turn to water vice steam. Continued injection will eventually fill the vessel, at this time vessel pressure will increase, and injecting systems flow will decrease until the injecting systems flow equals the flow out the rupture. If continued, the injection from the hotwell (via feedwater) will empty the hotwell, and the condensate pumps will cavitate and trip on overload. When this happens, vessel pressure and other systems injection flow will fluctuate (during pump cavitation), then pressure will decrease and flows from other systems will increase until a new equilibrium is reached.

D. Documentation

1. Significant Parameters to be Collected

a. Analog Parameters:

(1) Reactor Power(% Flux)
(2) Total Steam Flow
(3) Total Feedwater Flow
(4) WR Reactor Pressure
(5) WR Reactor Vessel Water Level
(6) Fuel Zone Reactor Vessel Level
(7) Drywell Pressure
(8) Suppression Pool Pressure
(9) Drywell Temperature
(10) Suppression Pool Temperature
(11) RHR Total Flow
(12) CS Total Flow
(13) HPCI/RCIC Total Flow

b. Annunciators, Indications, Interlocks:

(1) Annunciators

(a) SYSTEM I MAIN STEAM LINE HI FLOW
(b) SYSTEM II MAIN STEAM LINE HI FLOW
(c) MSIV CLOSURE TRIP
(d) TURBINE STOP VALVE CLOSURE TRIP
(e) DRYWELL HI PRESS TRIP
(f) A (B,C,D) CORE SPRAY PUMP AUTO START
(g) A (B,C,D) RHR PUMP AUTO START
(h) HPCI RELAYS NOT RESET

(2) Indications

(a) B steam line flow indication increases and continues to indicate flow after the isolation until the vessel blowdown is completed.

(b) Condensate pumps trip on overload > 3 min. after hotwell indicates empty on 20C007A.

(c) Vessel level indicates > 300" on 20C003-03 before vessel pressure increases on reflood.

(3) Interlocks

(a) RHR and CS start at vessel pressure < 500 psig and run on min. flow until vessel pressure is less than 300 psig.

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 7 and the DATA3 dataset.

b. Significant annunciators, indications, and interlocks are to be collected using the attached Dataform for this Performance Test.

E. Terminating Condition

This Performance Test may be terminated when the simulated plant conditions are such that a stable, controllable and safe condition has been attained which could be continued to cold shutdown conditions. In addition, the following must be observed as a minimum:

- Vessel pressure increases and injection flows decrease after the vessel is reflooded.

V. ACCEPTANCE CRITERIA
The following Criteria are to be used to judge the acceptability of the results of this test.

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the description in Section IV.C. Where parameter versus time values are specified, parameter response within ±10% of the specified value is acceptable, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

C. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

D. Transient operation can be carried on until:

1. a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or

2. a simulator operating limitation is reached.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. Insert Malfunction MS802 at 100% severity and with a 30 sec. time delay

3. Prepare to collect data IAW Appendix I and Section IV.D.2. MSSØ2.DAT

4. Check the form attached to this procedure for all the items listed in IV.D.1.b; make additions or deletions as necessary.

B. Performance

1. While collecting data in accordance with Appendix I and Significant Parameters, take the simulator out of freeze.

2. Observe the Simulator response to generally verify the occurrences listed in Effects and log the occurrence of the Annunciators, Indications and Interlocks on the data form marking each item as Sat or Unsat as appropriate.

3. When the Termination Conditions are reached, terminate data collection and place the simulator in freeze.

4. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/8/91   Test Performer B. Havens

Date Analyzed 1/11/91   Analysis by B. Haven

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters:	
a. Reactor Power(% Flux)	Sat
b. Total Steam Flow	Unsat
c. Total Feedwater Flow	Unsat
d. WR Reactor Pressure	Unsat
e. WR Reactor Vessel Water Level	Sat
f. Fuel Zone Reactor Vessel Level	Sat
g. Drywell Pressure	Unsat
h. Suppression Pool Pressure	Sat
i. Drywell Temperature	Unsat
j. Suppression Pool Temperature	Unsat
k. RHR Total Flow	Sat
l. CS Total Flow	Sat
m. HPCI/RCIC Total Flow	Sat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. E12, E32 transfer on 2502 BKR trip — WO 910022 Pri 2

2. Feedwater flow response - condensate pumps trip when Hotwell level go bel. → 0 within 1 min. — WO 910013 Pri 2 (see attached sheet)

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ✓

Database updated ____Dlo____
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ✓ NO ____

2. All SDR's resolved, Test Sat:

____________________ ____________________
Test Operator Date

Database updated ____________________
Data Entry

C. Test Reviewed:

____________________ ____________________
Lead Test Operator Date

D. Test Completed:

____________________ ____________________
Sim. Support Supv. Date

VIII. B. (continued)

3. total steam flows should respond to water flows when vessel is flooded — WO 910015 pri 2

4. WR pressure should not restore to normal on MSIV closure.

5. Drywell pressure, temperature increase is too slow; does not respond to water flows into Drywell.

6. Supp. Pool temp increases too slowly, continues to increase at same rate when blowdown is complete

MALFUNCTION PERFORMANCE TEST
DATA SHEET - MSS02
MAXIMUM UNISOLABLE MAIN STEAM LINE RUPTURE

PERFORMANCE CRITERIA

The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B Havens   DATE: 1/8/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (1)(a)	SYSTEM I MAIN STEAM LINE HI FLOW Annunciator	Sat
IV.D.1.b. (1)(b)	SYSTEM II MAIN STEAM LINE HI FLOW Annunciator	Sat
IV.D.1.b. (1)(c)	MAIN STEAM ISO VALVES NOT FULL OPEN TRIP Annunciator	Sat
IV.D.1.b. (1)(d)	TURBINE STOP VALVE CLOSURE TRIP Annunciator (Scram)	Sat
IV.D.1.b. (1)(e)	DRYWELL HI PRESSURE TRIP Annunciator	Sat
IV.D.1.b. (1)(f)	A (B,C,D) CORE SPRAY PUMP AUTO START Annunciator	Sat
IV.D.1.b. (1)(g)	A (B,C,D) RHR PUMP AUTO START Annunciator	Sat
IV.D.1.b. (1)(h)	HPCI RELAYS NOT RESET Annunciator	Sat
IV.D.1.b. (2)(a)	A steam line flow indication increases, then continues to indicate after the isolation until vessel blowdown is complete	Sat
IV.D.1.b. (2)(b)	Condensate pumps trip on overload > 3 min. after hotwell level indicates empty on 20C007A ~ 1 min	Unsat

MALFUNCTION PERFORMANCE TEST
DATA SHEET - MSS02
MAXIMUM UNISOLABLE MAIN STEAM LINE RUPTURE

PERFORMANCE CRITERIA

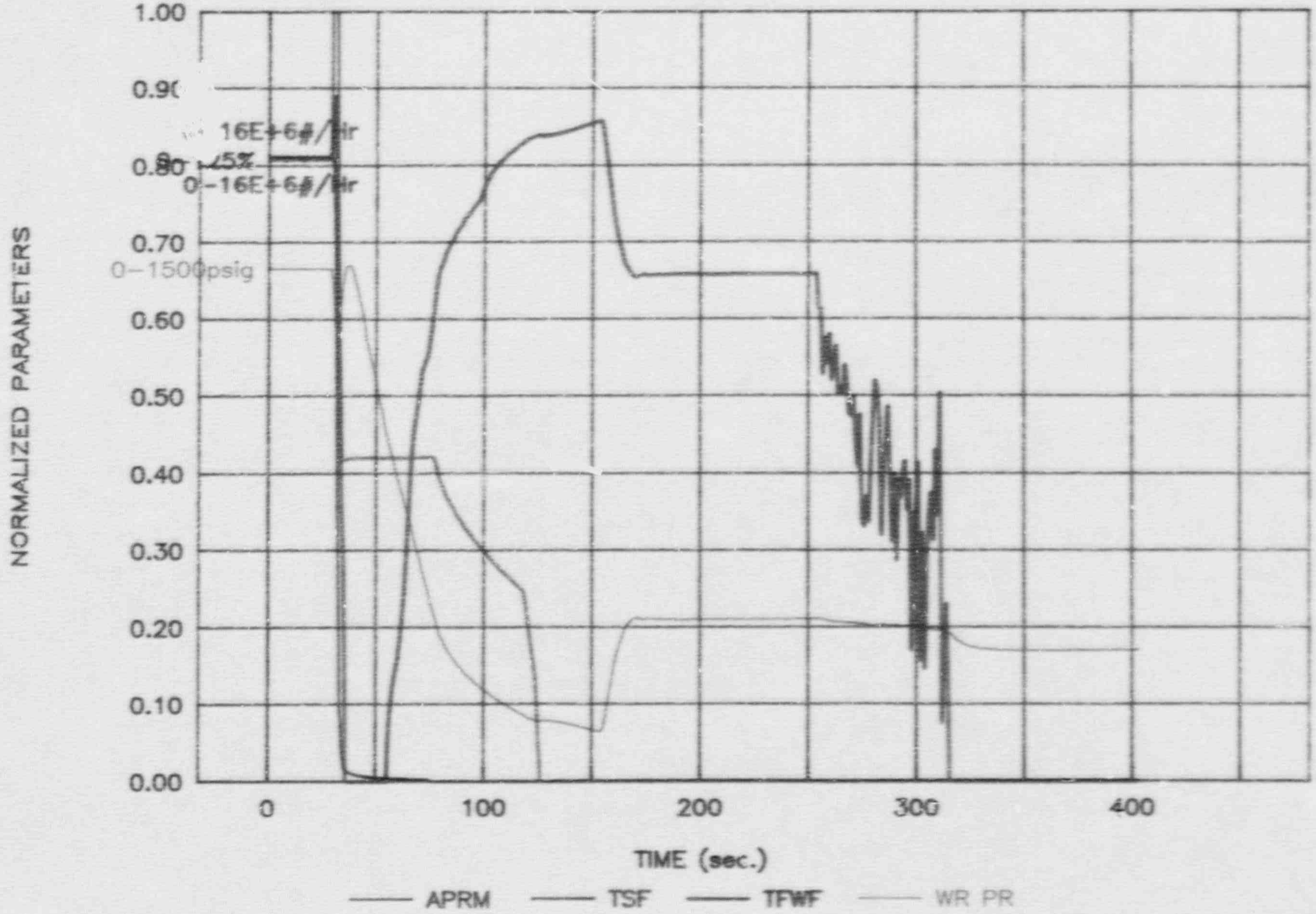
The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B. Havens DATE: 1/6/91

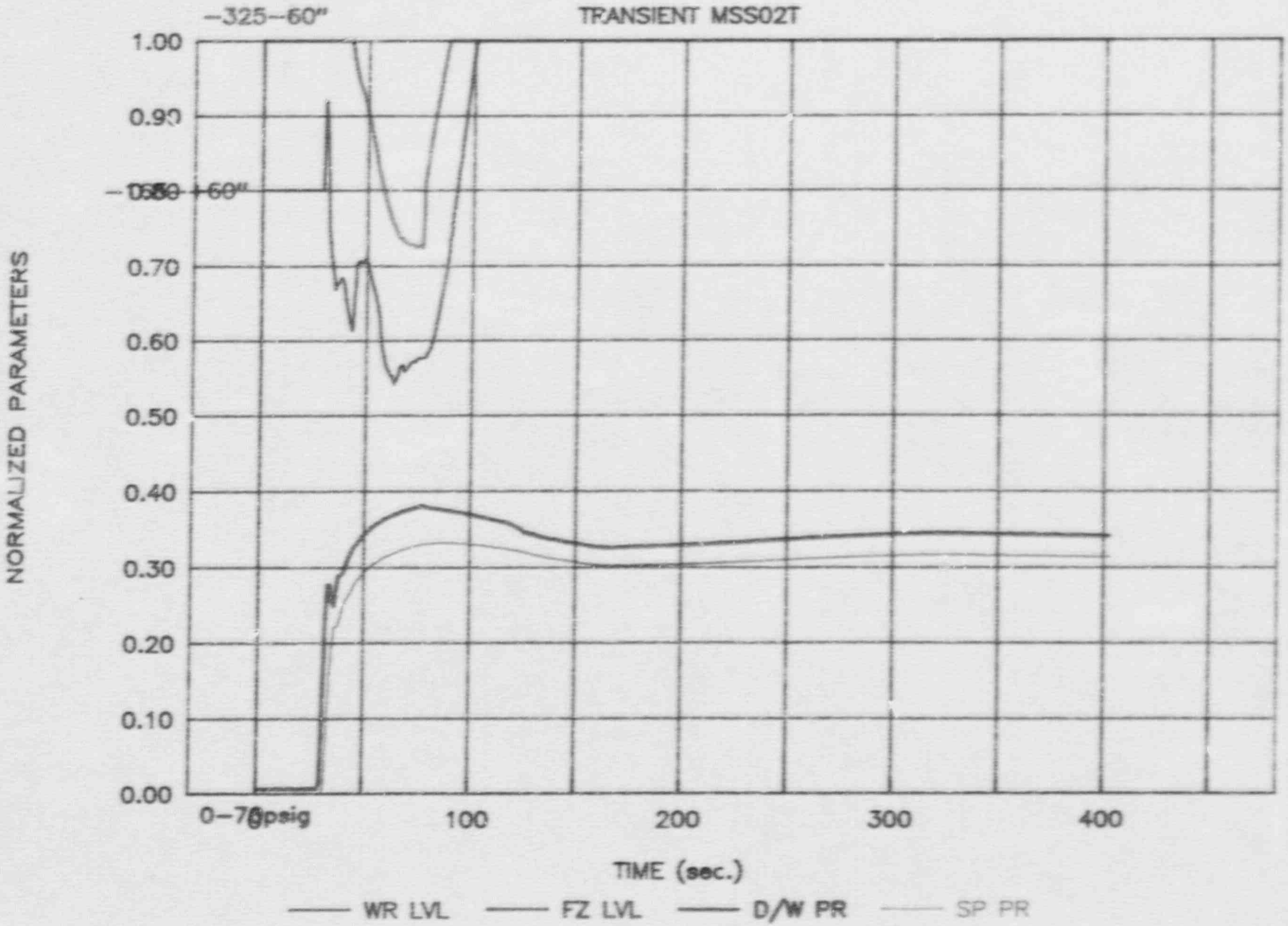
ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (2)(c)	Vessel level indicates > 300" on 20C003-03 before vessel pressure increases on reflood	Sat
IV.D.1.b. (3)(a)	RHR and CS start at vessel pressure < 500 psig and run on min. flow until vessel pressure is < 300 psig.	Sat
Real Time Operation	The Simulator operated in real time as indicated by completion of the test without a suspension of Simulation, and the ISD/IST status was not FAIL.	Sat

PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT MSS02T

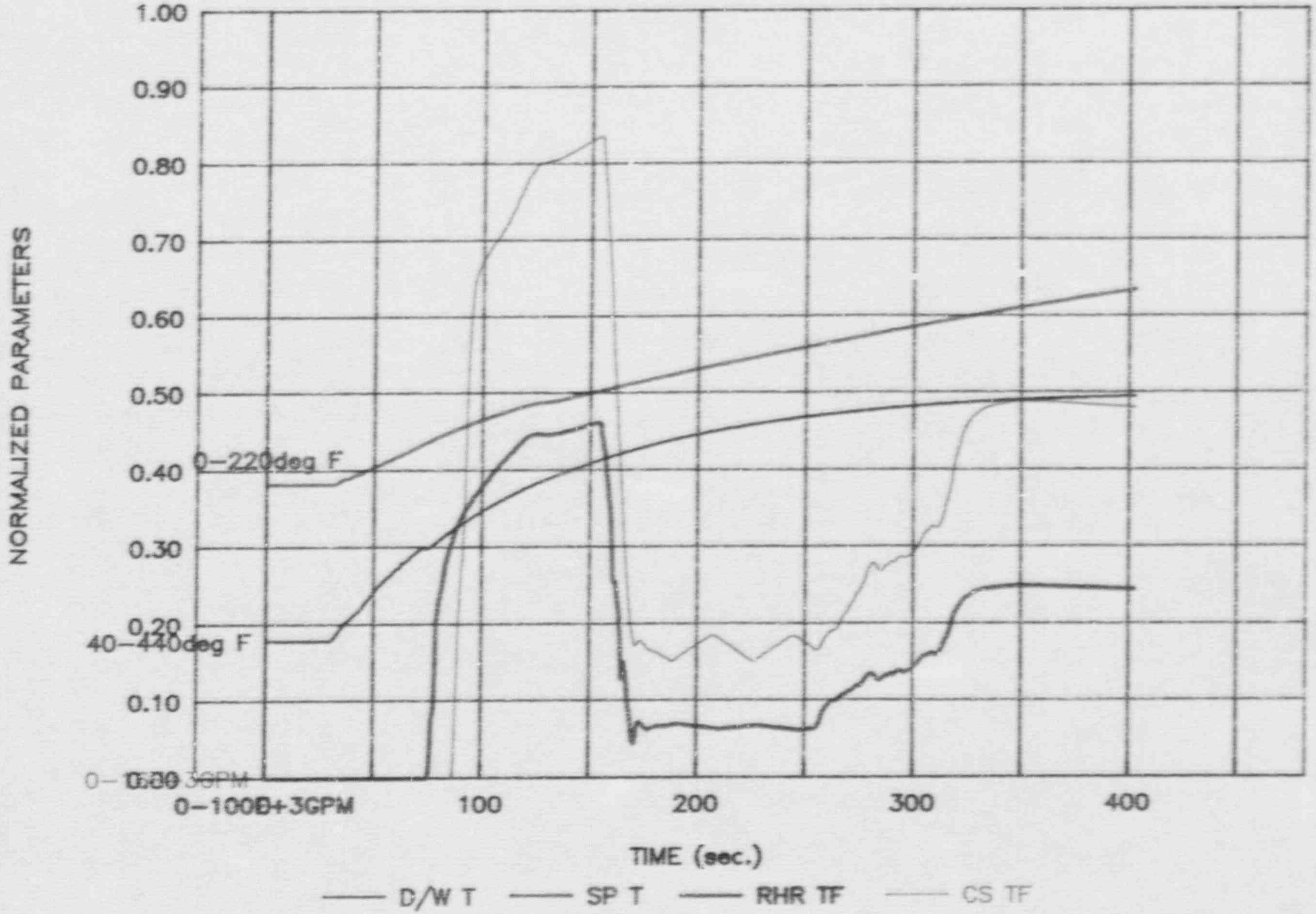


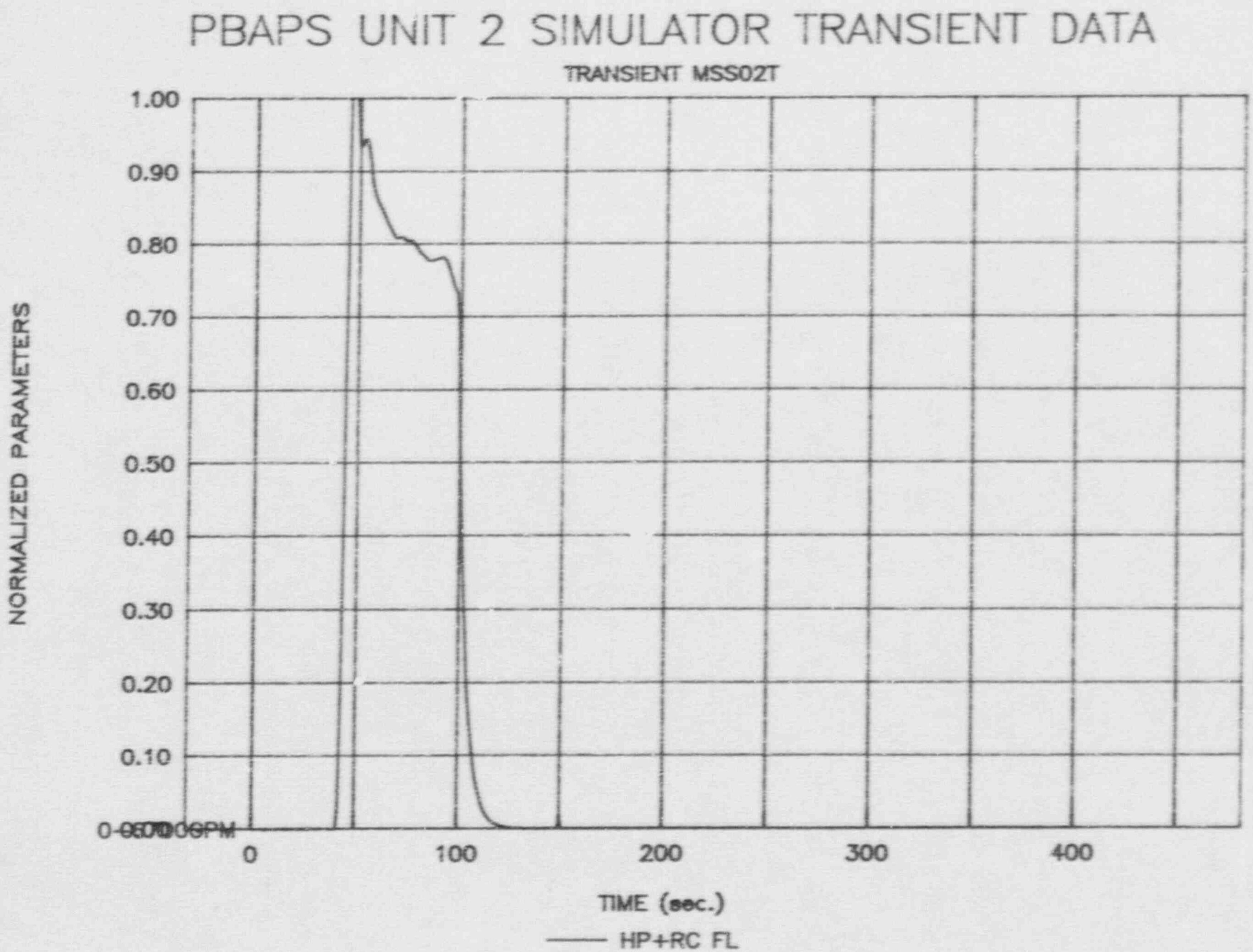
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA



PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT MSS02T




PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT MSS02T
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0-8000GPM
0
100
200
300
400
TIME (sec.)
HP+RC FL

PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-MSS06T

MSIV CLOSURE WITH FAILED OPEN SRV
AND NO HIGH PRESSURE ECCS

Prepared by: Bud Havens Date: 12/26/90
Simulator Test Operator

Approved by: [signature] Date: [handwritten date]
Lead Test Operator

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix B, Section B1.2
Run this transient test from an initial condition of approximately 100% power, steady-state xenon and decay heat with no operator followup action.

II. TEST ABSTRACT
This performance test will test simulator response to a simultaneous closure of the Main Steam Isolation Valves (MSIV's), followed by an SRV sticking open when it opens to control pressure. HPCI and RCIC will fail to respond to an initiation signal when called on; thus depriving the reactor of normal feedwater and high pressure emergency feedwater. The result of the MSIV closure will be a rapid reduction in Steam Flow from the reactor vessel and a reactor scram on MSIV Closure. The cessation of steam flow will cause: a rapid pressure increase, which is arrested and controlled by the Safety/Relief Valves (SRV's); and a loss of the Reactor Feed Pump Turbines, which results in a loss of normal feedwater flow. The scram will shutdown the reactor core with little or no spike observed in neutron flux. Vessel level will sharply decrease due to the pressurization and scram. The SRV's will lift to control the initial pressure increase, with one remaining open when pressure decreases to its reset point. The stuck open SRV will cause pressure to continuously decrease after the initial pressure spike. vessel level will decrease more slowly as the SRV reduces pressure, eventually reaching the initiation point for HPCI and RCIC which fail to start. Vessel pressure and level will continue to decrease until pressure falls below feedwater line pressure which is being maintained by the condensate pumps at slightly above 600 psig. Condensate will then be injected via the feedwater lines and begin restoring vessel level.

III. TEST REFERENCES

A. Other Performance Tests

1. SSPT T-101

2. SSPT GP-8

B. Reference Plant Performance Data

IV. TEST DESCRIPTION

A. Initial Conditions

- IC 14

B. Malfunctions used:

1. MSS06A through D

2. MSS09B

3. HPC01

4. RCI02

C. Effects
Times given in the discussion below are referenced to time of insertion of the Malfunction unless otherwise indicated. Parameter response can be confirmed by analysis of GINDAC plots.

1. Initial response due to MSIV closure:

Simultaneous insertion of Malfunctions MSS06A through D will cause all 4 Inboard MSIV's to close due to loss of air pressure to the valve operating controls.
The resulting valve closure will cause:

- a reactor scram due to MSIV Closure (< 90% full open) in the Run Mode.

- a rapid loss of steam flow from the reactor vessel as the valves close in < 5 sec. Thus, Total Steam Flow will rapidly decrease to 0.

- because of the anticipatory valve position scram, the APRM's will see a very small (<5%) or no flux increase due to the scram action even though the pressure increase would tend to cause such an increase.

- reactor pressure will rapidly increase as the normal heat removal from the reactor is stopped. Pressure will rise to the SRV setpoint, and lift all SRV's. The SRV's should be able to limit the maximum pressure to less than 1150 psig. As pressure increases above 1090 psig, ARI is initiated which will trip the Recirculation Pumps and backup the RPS scram.

- Reactor vessel level will initially decrease rapidly due to void collapse on the pressure increase and scram. The RFP's will lose driving steam on the isolation and Total Feedwater Flow will decrease to 0 somewhat more slowly than Total Steam Flow, but will have little effect in level restoration. Level swell will occur on the void increase due to the initial multiple SRV lift and Recirculation pump trip.

2. Response after the isolation and scram due to the failed open SRV:

   - Following the initial lift, the SRV's will reseat after lowering pressure to ≈ 1050 psig, except SRV 2-71B.

   - Pressure will then decrease over a period of ≈ 7 to 9 minutes to feedwater header pressure at ≈ 600 psig.

   - As inventory is removed by the SRV, vessel level will slowly decrease to < -48"; at this level HPCI and RCIC would normally inject, but fail to start due to the Malfunctions.

   - Level continues to decrease below the -48" due to inventory loss from the stuck open SRV.

3. Response during feedwater (condensate) injection:

   - Once pressure drops below 600 psig, condensate will begin to inject through the feedwater lines, and total feedwater flow will increase as pressure continues to decrease.

   - As condensate restores vessel inventory, vessel level will begin to recover, eventually going off scale high.

4. Other parameter response:

   - Drywell pressure and temperature will have little response to the transient; a small decrease might be expected due to the cooldown associated with vessel depressurization.

   - Suppression pool temperature will increase due to the SRV discharge steam being delivered to the pool; a faster increase might be expected during the initial SRV lift with multiple valves open. Suppression pool pressure may also respond with a slight increase due to heating from the SRV discharge.

   - RHR and CS flow should show no increase; vessel level should be restored well before the initiation of these systems, they will never start.

D. Documentation

1. Significant Parameters to be Collected

   a. Analog Parameters:

      (1) Reactor Power(% Flux)
      (2) Total Steam Flow
      (3) Total Feedwater Flow
      (4) WR Reactor Pressure
      (5) WR Reactor Vessel Water Level
      (6) Fuel Zone Reactor Vessel Level

(7) Drywell Pressure
(8) Suppression Pool Pressure
(9) Drywell Temperature
(10) Suppression Pool Temperature
(11) RHR Total Flow
(12) CS Total Flow
(13) HPCI/RCIC Total Flow

b. Annunciators, Indications, Interlocks:

(1) Annunciators

(a) MAIN STEAM ISO VALVES NOT FULL OPEN TRIP
(b) REACTOR HI PRESSURE
(c) A CHANNEL ARI TRIP
(d) B CHANNEL ARI TRIP
(e) SAFETY RELIEF VALVE OPFN
(f) REACTOR LO WATER LEVEL - 48 IN
(g) 'PCI RELAYS NOT RESET

(2) Indications

(a) Initial SRV lift, all SRV's
(b) All SRV's reseat except the 2-71B SRV.

(3) Interlocks

(a) HPCI/RCIC do not start at -48"
(b) RHR and CS do not receive an initiation signal and do not start

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 7 and the DATA3 dataset.

b. Significant annunciators, indications, and interlocks are to be collected using the attached Data Form for this Performance Test.

E. Terminating Condition

This Performance Test may be terminated when the simulated plant conditions are such that a stable, controllable and safe condition has been attained which could be continued to cold shutdown conditions. In addition, the following must be observed as a minimum:

- Level increases off scale after condensate injection.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test.

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the description in Section IV.C.
Where parameter versus time values are specified, parameter response within ±10% of the specified value is acceptable, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

C. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

D. Transient operation can be carried on until:

1. a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or

2. a simulator operating limitation is reached.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. Insert Malfunctions:

a. HPC01, MSS09B, and RCI02

b. MSS06 A through D with a 30 sec. time delay.

MSS06T.DAT

3. Prepare to collect data IAW Appendix I and Section IV.D.2.

4. Check the form attached to this procedure for all the items listed in IV.D.1.b; make additions or deletions as necessary.

B. Performance

1. While collecting data in accordance with Appendix I and Significant Parameters, take the simulator out of freeze.

2. Observe the Simulator response to generally verify the occurrences listed in Effects and log the occurrence of the Annunciators, Indications and Interlocks on the data form marking each item as Sat or Unsat as appropriate.

3. When the Termination Conditions are reached, terminate data collection and place the simulator in freeze.

4. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/3/91 Test Performer B. Sarver

Date Analyzed 1/11/91 Analysis by B. Sarver

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters:	
a. Reactor Power(% Flux)	Sat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. WR Reactor Pressure	Sat
e. WR Reactor Vessel Water Level	Sat
f. Fuel Zone Reactor Vessel Level	Sat
g. Drywell Pressure	Sat
h. Suppression Pool Pressure	Sat
i. Drywell Temperature	Sat
j. Suppression Pool Temperature	Sat
k. RHR Total Flow	Sat
l. CS Total Flow	Sat
m. HPCI/RCIC Total Flow	Sat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1.

2.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ✓ Unsat ___

Database updated ___BG___ ______
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ___ NO ___

2. All SDR's resolved, Test Sat:

______________________ ______________
Test Operator Date

Database updated ______________________
Data Entry

C. Test Reviewed:

R.W. Tyler 1/14/91
Lead Test Operator Date

D. Test Completed:

M.A. Rosseling 30 JAN 91
Sim. Support Supv. Date

TRANSIENT PERFORMANCE TEST
DATA SHEET - MSS06T
MSIV CLOSURE WITH FAILED OPEN SRV AND NO HIGH PRESSURE ECCS

PERFORMANCE CRITERIA

The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B Havens DATE: 1/6/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (1)(a)	MAIN STEAM ISO VALVES NOT FULL OPEN TRIP Annunciator	Sat
IV.D.1.b. (1)(b)	REACTOR HI PRESSURE Annunciator	Sat
IV.D.1.b. (1)(c)	A CHANNEL ARI TRIP Annunciator	Sat
IV.D.1.b. (1)(d)	B CHANNEL ARI TRIP Annunciator	Sat
IV.D.1.b. (1)(e)	SAFETY RELIEF VALVE OPEN Annunciator	Sat
IV.D.1.b. (1)(f)	REACTOR LO WATER LEVEL -48 IN Annunciator	Sat
IV.D.1.b. (1)(g)	HPCI RELAYS NOT RESET Annunciator	Sat
IV.D.1.b. (2)(a)	All SRV's lift initially	Sat
IV.D.1.b. (2)(b)	All SRV's except 2-71B reseat	Sat
IV.D.1.b. (3)(a)	HPCI/RCIC do not start at -48"	Sat

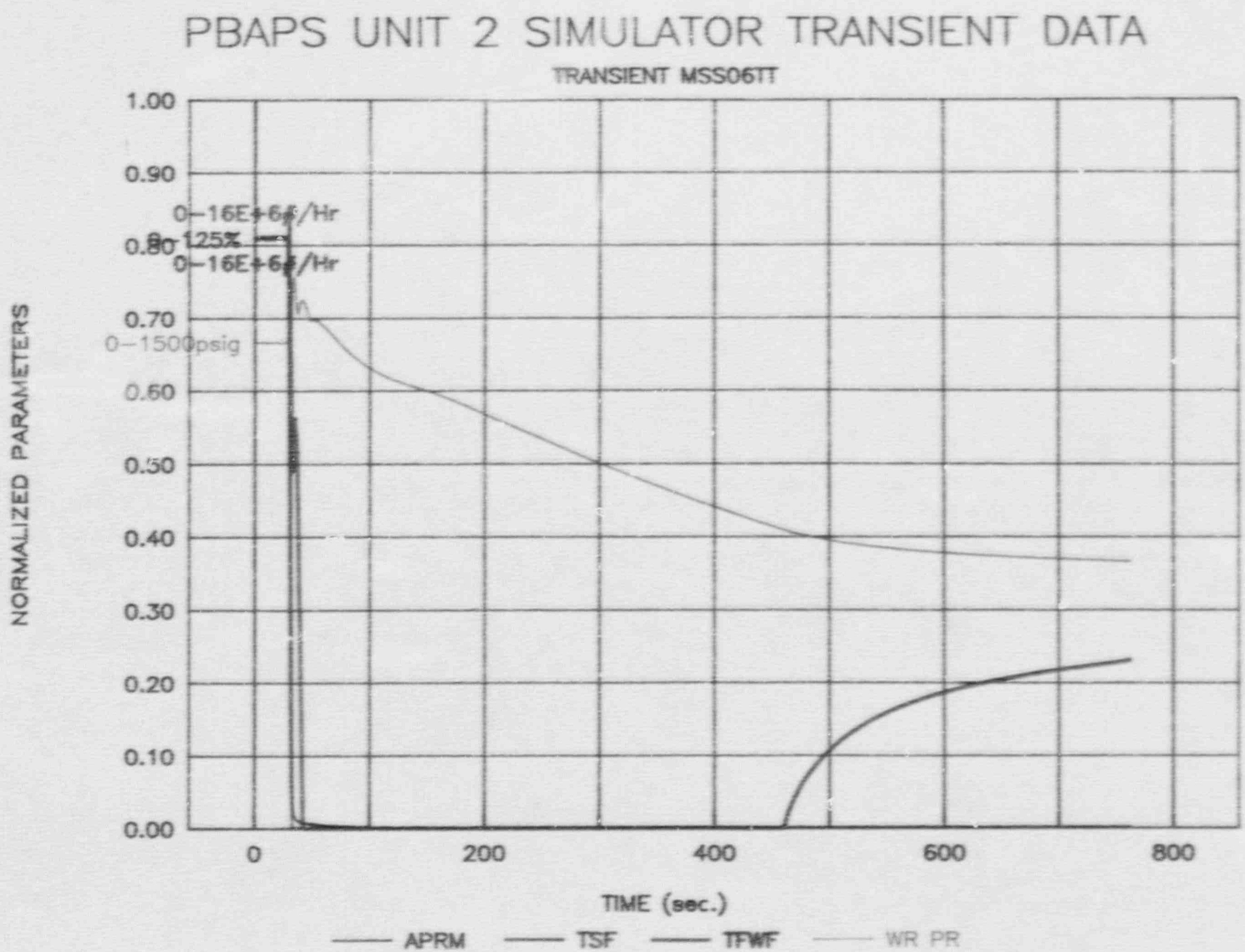
TRANSIENT PERFORMANCE TEST
DATA SHEET - MSS06T
MSIV CLOSURE WITH FAILED OPEN SRV AND NO HIGH PRESSURE ECCS

PERFORMANCE CRITERIA

The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

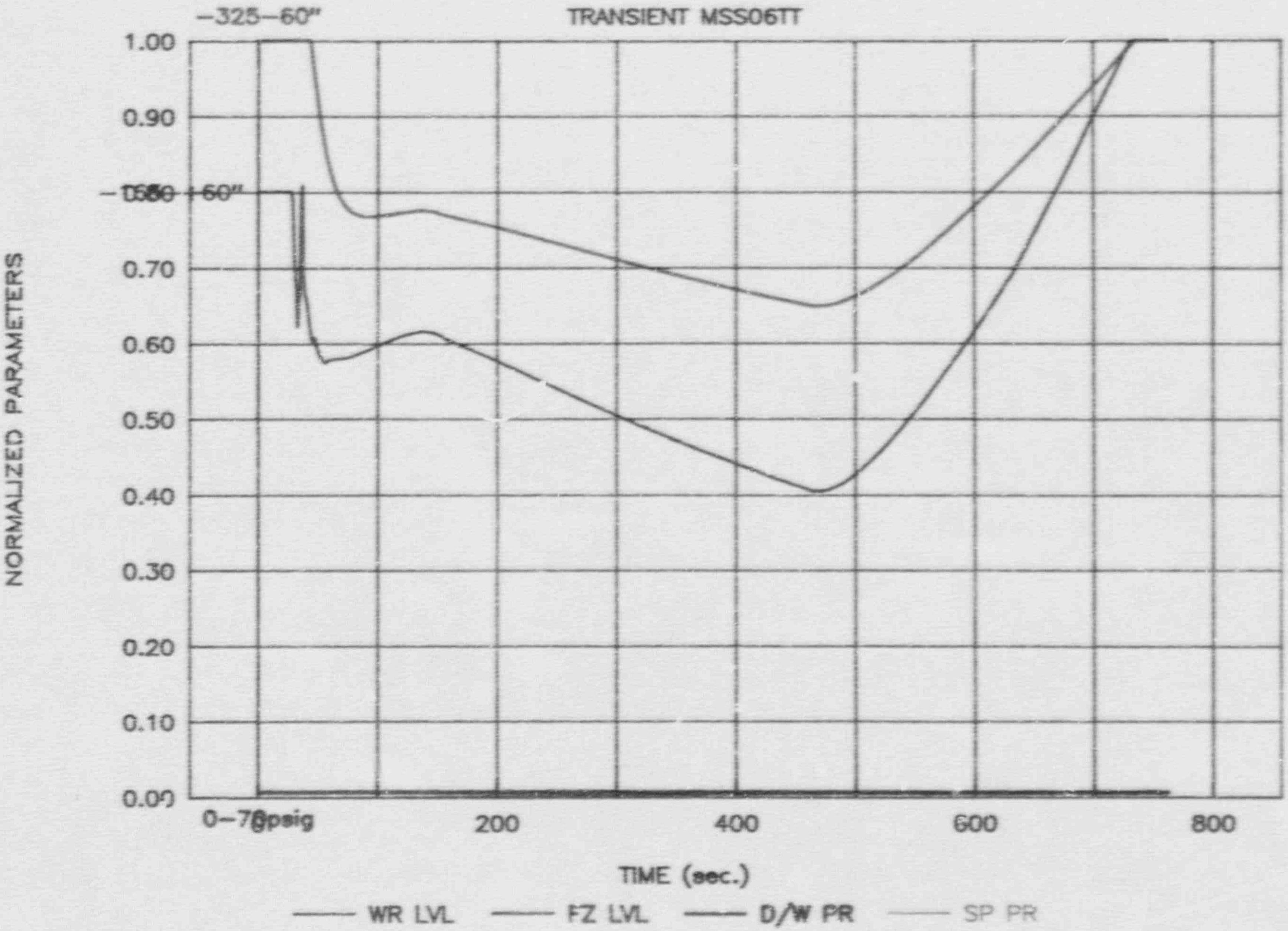
DATA TAKEN BY: B Stevens DATE: 1/6/91

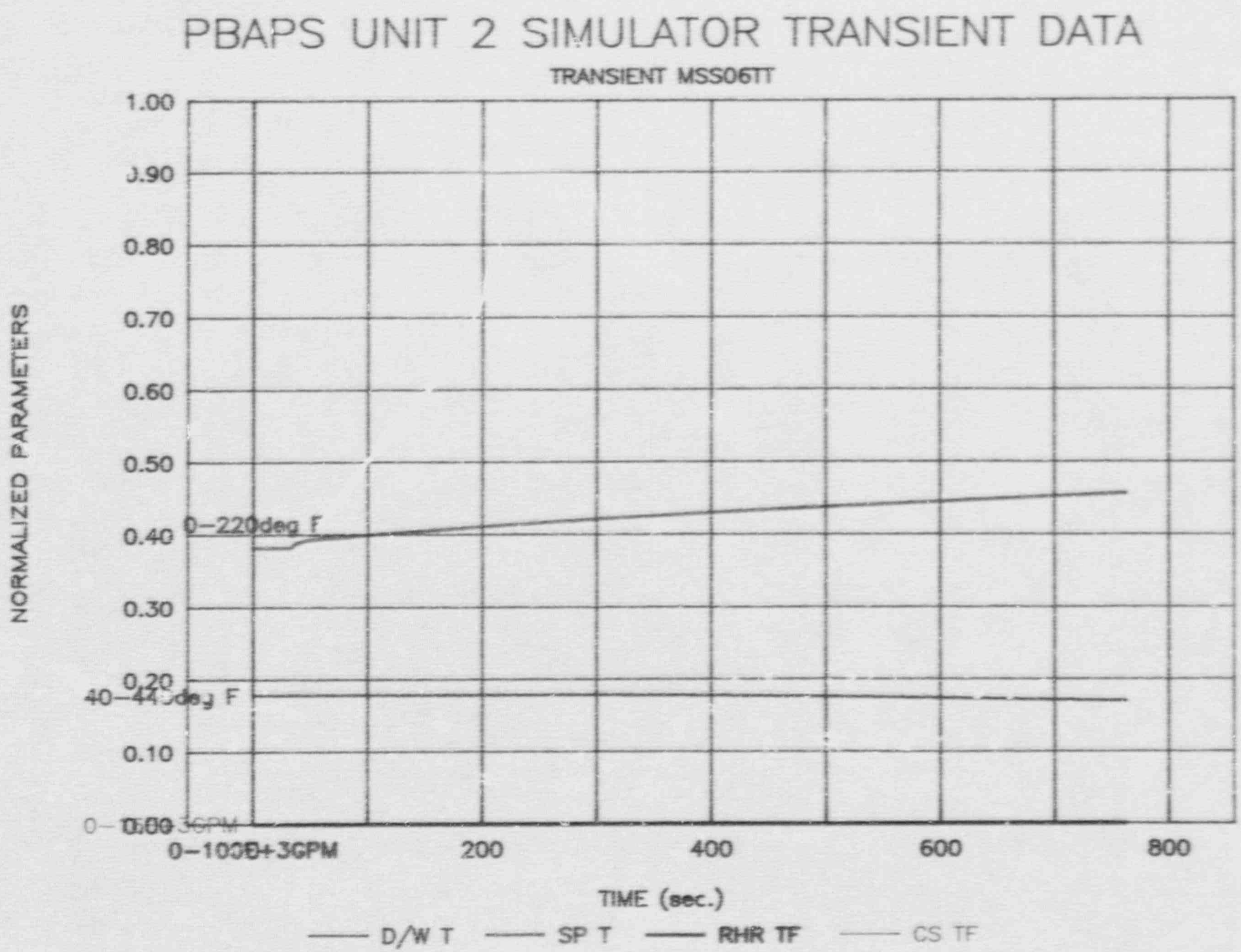
ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b.(3)(b)	RHR and CS do not receive an initiation signal and do not start	Sat
Real Time Operation	The Simulator operated in real time as indicated by completion of the test without a suspension of Simulation, and the ISD/IST status was not FAIL.	Sat



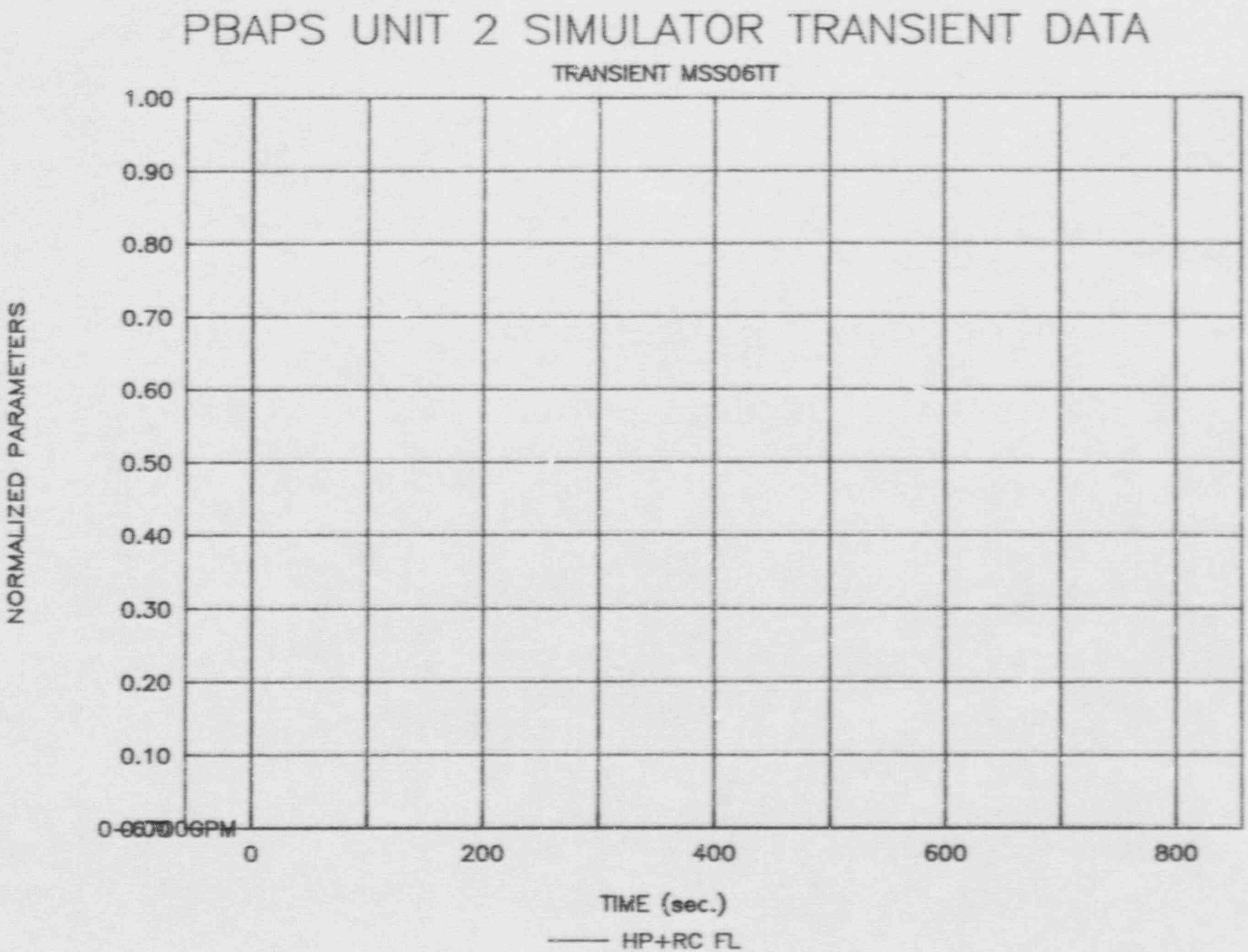
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT MSS06TT
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0-16E+6#/Hr
0-125%
0-16E+6#/Hr
0-1500psig
0
200
400
600
800
TIME (sec.)
APRM
TSF
TFWF
WR PR

PBAPS UNIT 2 SIMULATOR TRANSIENT DATA





PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT MSS06TT
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0-220deg F
40-440deg F
0-10000+3GPM
200
400
600
800
TIME (sec.)
D/W T
SP T
RHR TF
CS TF



PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT MSS06TT
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
NORMALIZED PARAMETERS
0
200
400
600
800
TIME (sec.)
HP+RC FL

PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-IPM03

ANTICIPATED TRANSIENT WITHOUT SCRAM

Prepared by: Bud Havens Date: 12/26/90
Simulator Test Operator

Approved by: [signature] Date: 1/2/91
Lead Test Operator

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix B, Section B1.2
Run this transient test from an initial condition of approximately 100% power, steady-state xenon and decay heat with no operator followup action.

II. TEST ABSTRACT
This performance test will test simulator response to a transient (main turbine trip) that challenges the Reactor Protection System (RPS) to initiate a scram, with a failure of the RPS function. In addition, the Alternate Rod Insertion (ARI) system, which normally would backup the RPS and cause a control rod scram independently, fails to operate. The turbine trip will also cause a main generator trip, initiating a fast transfer of the 13KV buses which in turn trips the recirculation pumps. Reactor power will increase rapidly on the turbine trip without the scram action of the control rods. Reactor pressure will increase even though the bypass valves open fully, opening the SRV's. Increased core voiding due to the increase in steam flow as the SRV's open and decrease in core flow from the recirculation pump trip will reduce reactor power to sufficiently to allow the bypass valves and the lowest set group of SRV's to control pressure. Reactor level will initially start to decrease as pressure in increasing, then will swell on the first lift of the SRV's and the trip of the recirculation pumps, tripping the RFP's on high vessel level. With the bypass valves and SRV's open vessel level will decrease steadily, initiating HPCI and RCIC on low level. HPCI/RCIC cold water injection will tend to increase reactor power; but their injection capacity will not be enough to stop the decrease in vessel level. As level continues to decrease, core flow will decrease reducing reactor power further. The power reduction at this point will be sufficient to allow the bypass valves alone to control reactor pressure. As the steam flow is reduced to

within the capacity of HPCI/RCIC, vessel level stops decreasing, and stabilize along with reactor power at a value just above the low level Group I isolation point.

III. TEST REFERENCES

A. Other Performance Tests

1. SSPT T-101

2. SSPT T-117

IV. TEST DESCRIPTION

A. Initial Conditions

- IC 14

B. Malfunctions used:

- IPM03

C. Trip Override Functions used:

1. ARI01

2. ARI02

D. Effects
Times given in the discussion below are referenced to time of insertion of the Malfunction unless otherwise indicated. Parameter response can be confirmed by analysis of GINDAC plots. Any RPS Scram or ARI signal initiated during the following discussion will fail to cause the control rods to scram.

1. Initial response due to the Turbine Trip without scram:

   - The Main Generator will trip and Lockout.

   - The 13KV buses will fast transfer to offsite power, tripping the recirculation pumps.

   - The Bypass Valves will open to control reactor pressure; total steam flow will drop to indicate Bypass valve and auxiliary steam flows.

- Reactor pressure will increase rapidly due to the loss of turbine steam flow; all SRV's should open. The Bypass valves and SRV's should be able to limit pressure to < 1200 psig.

- APRM power should increase rapidly due to the void collapse on the pressure increase; then decrease to approximately 35% to 40% as voids reform when the SRV's lift and the recirculation pumps trip.

- Vessel level will decrease rapidly as voids collapse on the pressure increase; then swell as the SRV's lift to control pressure and core flow decreases on the recirculation pump trip.

- Total Feedwater Flow will attempt to follow the decreasing steam flow, then reverse to restore decreasing level. The RFP's will trip on high level on the level swell following the SRV lift. Total Feedwater Flow will then go to 0 and remain there for the rest of the transient.

- Suppression Pool Temperature will increase on the lift of the SRV's.

2. Response following the initial SRV lift:

- Pressure will decrease due to Bypass valve and SRV flow, sequentially closing groups of SRV's until only the lowest set group and the Bypass are open and remain stable at approximately 1050 psig.

- APRM power will stabilize at approximately 40%; Total Steam Flow will stabilize at ≈ 3.5 X 10^6 Lbm/Hr (BPV capacity). When HPCI/ RCIC inject, APRM's will begin to slowly increase due to injection of colder water; Total Steam Flow will remain constant.

- Vessel level will begin a steady decrease as SRV,s and Bypass valves continue to remove inventory, falling to -48" and initiating HPCI and RCIC at approximately 70 to 75 sec. Level will continue to decrease more slowly following HPCI/RCIC injection.

- Suppression Pool Temperature will continue to increase, but at a slower rate as the higher set SRV's close.

3. Response as level continues to decrease:

   - As level decreases, the driving head for natural circulation through the core will decrease, and core flow will begin to decrease. When core flow decreases, core power and APRM power will decrease.

   - As power decreases, the SRV's that are open and the Bypass valves will begin to decrease pressure. When pressure drops below 1050 psig, the lowest set SRV's will close, and pressure will be controlled by the Bypass valves - they will close as necessary to maintain pressure.

   - As steam flow decreases, HPCI/RCIC flow will be able to restore vessel level. Level will stop decreasing and will begin to increase.

   - As level begins to increase, core flow will begin to increase and increase power; this will cause pressure to increase, and the Bypass valves will open to control pressure. An equilibrium should be established with: level very low (≈ -140") and power just below the Bypass valve capacity (15 to 20%).

   - Suppression Pool Temperature will stop increasing and stabilize when the SRV's close. Total increase in Pool temperature should be ≈ 10°F.

E. Documentation

1. Significant Parameters to be Collected

a. Analog Parameters:

(1) Reactor Power(% Flux)
(2) Total Steam Flow
(3) Total Feedwater Flow
(4) WR Reactor Pressure
(5) WR Reactor Vessel Water Level
(6) Fuel Zone Reactor Vessel Level
(7) Drywell Pressure
(8) Suppression Pool Pressure
(9) Drywell Temperature
(10) Suppression Pool Temperature
(11) RHR Total Flow
(12) CS Total Flow
(13) HPCI/RCIC Total Flow

b. Annunciators, Indications, Interlocks:

(1) Annunciators

(a) REAC VESSEL HIGH PRESS TRIP
(b) REACTOR VESSEL LO WATER LEVEL TRIP
(c) REACTOR WATER HI LEVEL TRIP
(d) HPCI RELAYS NOT RESET
(e) RCIC RELAYS NOT RESET

(2) Indications

(a) Bypass valve indication (lights) on 20C008B go to full open on initial pressurization, then to partially open after power drops below 25%

(b) SRV's all open on the initial pressurization, then all but the lowest set valves close as pressure and power decrease to ≈ 40%, then all close when power drops below 25%.

(3) Interlocks

(a) Main Generator trips on Main Turbine trip
(b) 13KV buses fast transfer and recirculation pumps trip on Main Generator trip
(c) RFP's trip on high vessel water level

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 5 and the DATA3 dataset.

b. Significant annunciators, indications, and interlocks are to be collected using the attached Dataform for this Performance Test.

F. Terminating Condition

This Performance Test may be terminated when the simulated plant conditions are such that a stable, controllable and safe condition has been attained which could be continued to cold shutdown conditions. In addition, the following must be observed as a minimum:

- Vessel level/APRM power has st ized at ≈ 15 - 20%

V. ACCEPTANCE CRITERIA
The following Criteria are to be used to judge the acceptability of the results of this test.

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. Significant Parameters Acceptance Criteria

For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the description in Section IV.C. Where parameter versus time values are specified, parameter response within ±10% of the specified value is acceptable, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

C. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

D. Transient operation can be carried on until:

1. a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or

2. a simulator operating limitation is reached.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. Insert the foll[illegible]:

a. Malfunction IPM03 with a 30 sec. time delay:

b. Trip Overrides ARI01 and ARI02

IPM03T.DAT

3. Prepare to collect data IAW Appendix I and Section IV.D.2.

4. Check the form attached to this procedure for all the items listed in IV.D.1.b; make additions or deletions as necessary.

B. Performance

1. While collecting data in accordance with Appendix I and Signi icant Parameters, take the simulator out of freeze.

2. Observe the Simulator response to generally verify the occurrences listed in Effects and log the occurrence of the Annunciators, Indications and Interlocks on the data form marking each item as Sat or Unsat as appropriate.

3. When the Termination Conditions are reached, terminate data collection and place the simulator in freeze

4. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/6/91 Test Performer B. Havens

Date Analyzed 1/11/91 Analysis by B. Havens

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters:	
a. Reactor Power(% Flux)	Unsat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. WR Reactor Pressure	Sat
e. WR Reactor Vessel Water Level	Sat
f. Fue[illegible]ne Reactor Vessel Level	Sat
g. Dr[illegible] Pressure	Sat
h. Suppression Pool Pressure	Sat
i. Drywell Temperature	Sat
j. Suppression Pool Temperature	Sat
k. RHR Total Flow	Sat
l. CS Total Flow	Sat
m. HPCI/RCIC Total Flow	Sat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. [illegible]

2.

WO 9100[illegible]

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ✓

Database updated ____ Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ✓ NO ____

2. All SDR's resolved, Test Sat:

____ Test Operator ____ Date

Database updated ____ Data Entry

C. Test Reviewed:

____ Lead Test Operator ____ Date

D. Test Completed:

____ Sim. Support Supv. ____ Date

VII. RESULTS ANALYSIS

Date of Test 1/6/91 Test Performer B Ayers

Date Analyzed 1/11/91 Analysis by B. Havens

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. Significant Parameters Acceptance Criteria	
1. Analog Parameters:	
a. Reactor Power(% Flux)	Unsat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. WR Reactor Pressure	Sat
e. WR Reactor Vessel Water Level	Sat
f. Fuel Zone Reactor Vessel Level	Sat
g. Drywell Pressure	Sat
h. Suppression Pool Pressure	Sat
i. Drywell Temperature	Sat
j. Suppression Pool Temperature	Sat
k. RHR Total Flow	Sat
l. CS Total Flow	Sat
m. HPCI/RCIC Total Flow	Sat
C. Transient operation can be carried on until 1) a stable, controllable, safe plant condition is achieved which can be continued in accordance with plant operating procedures to cold shutdown conditions, or 2) a simulator operating limitation is reached.	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. VII B.1.a APRM too much undershoot on initial decrease, increasing too fast relative to steam flow at end
2.

WO 910023 Pri 2

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ✓

Database updated BR ____________ ____________
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ✓ NO ____

2. All SDR's resolved, Test Sat:

____________________ ____________________
Test Operator Date

Database updated ____________ ____________
Data Entry

C. Test Reviewed:

____________________ ____________________
Lead Test Operator Date

D. Test Completed:

____________________ ____________________
Sim. Support Supv. Date

TRANSIENT PERFORMANCE TEST
DATA SHEET - IPM03
ANTICIPATED TRANSIENT WITHOUT SCRAM

PERFORMANCE CRITERIA

The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

DATA TAKEN BY: B Savers DATE: 1/1/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
IV.D.1.b. (1)(a)	REAC VESSEL HI PRESS TRIP Annunciator	Sat
IV.D.1.b. (1)(b)	REACTOR VESSEL LO WATER LEVEL TRIP Annunciator	Sat
IV.D.1.b. (1)(c)	REACTOR WATER HI LEVEL TRIP Annunciator	Sat
IV.D.1.b. (1)(d)	HPCI RELAYS NOT RESET Annunciator	Sat
IV.D.1.b. (1)(e)	RCIC RELAYS NOT RESET Annunciator	Sat
IV.D.1.b. (2)(a)	Bypass valve indication (lights) on 20C008B: full open on initial pressurization; partial open when power drops < 25%	Sat
IV.D.1.b. (2)(b)	SRV's: indicate full open on initial pressurization; all close but lowest set group on power decrease to < 40%; all close when power drops < 25%	Sat
IV.D.1.b. (3)(a)	Main Generator trips on Main Turbine Trip	Sat
IV.D.1.b. (3)(b)	13KV buses transfer and recirculation pumps trip on Main Generator trip	Sat
IV.D.1.b. (3)(b)	RFP's trip on high vessel water level	Sat

TRANSIENT PERFORMANCE TEST
DATA SHEET - IPM03
ANTICIPATED TRANSIENT WITHOUT SCRAM

PERFORMANCE CRITERIA

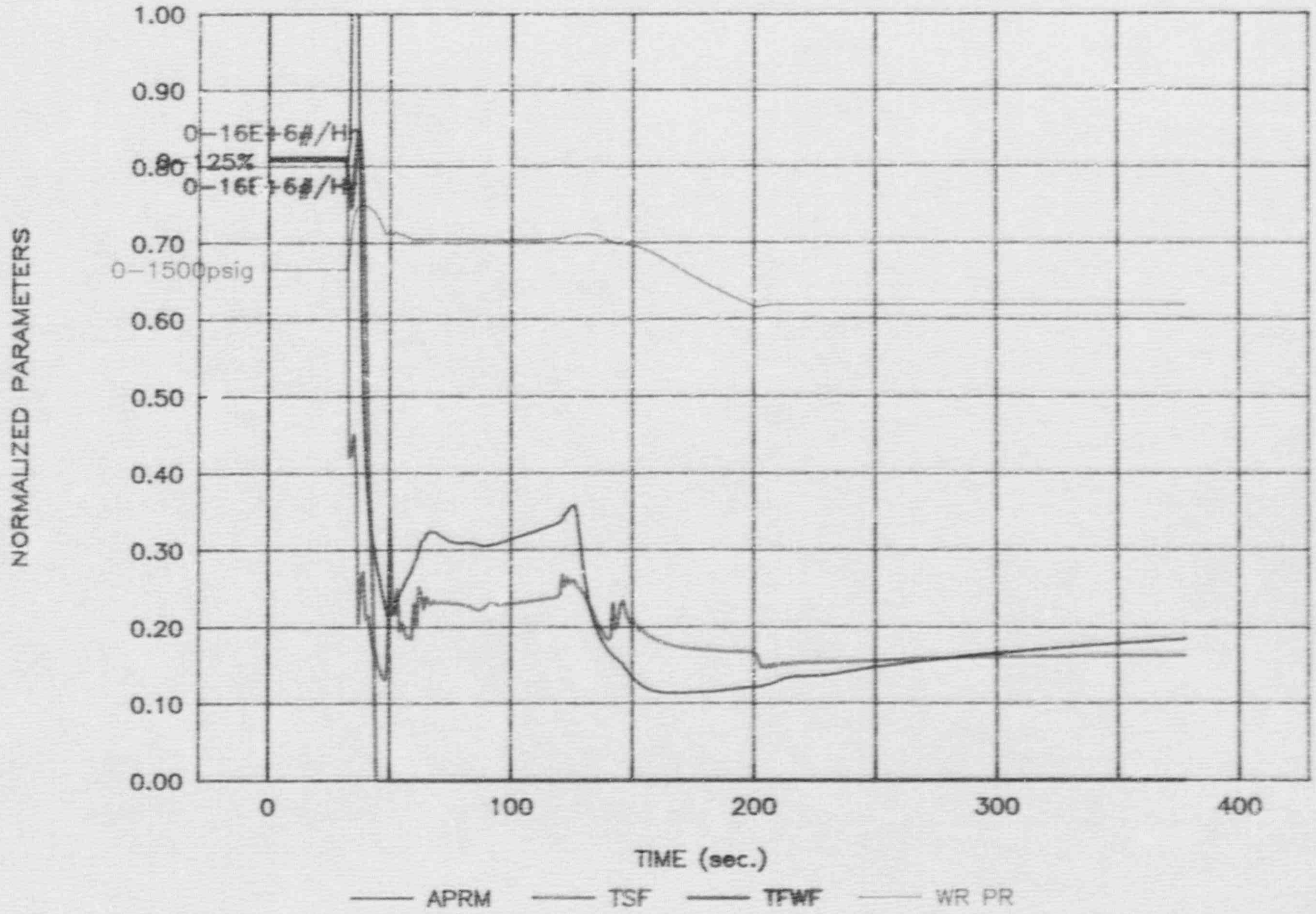
The criteria for acceptable performance for the following data are listed in the Transient Performance Test Procedure.

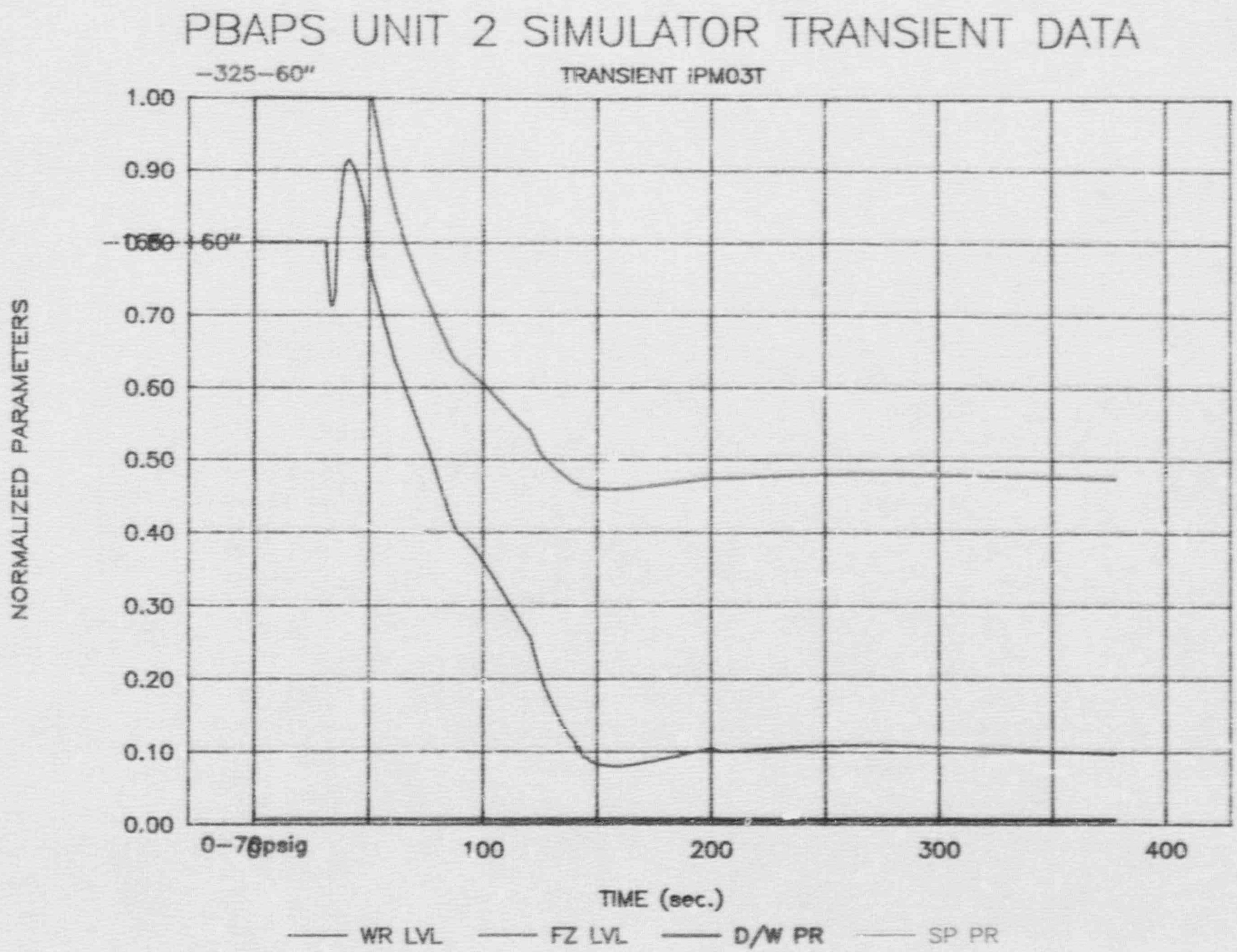
DATA TAKEN BY: B Havers DATE: 1/6/91

ITEM NUMBER	DESCRIPTION	SAT / UNSAT
Real Time Operation	The Simulator operated in real time as indicated by completion of the test without a suspension of Simulation, and the ISD/IST status was not FAIL.	Sat

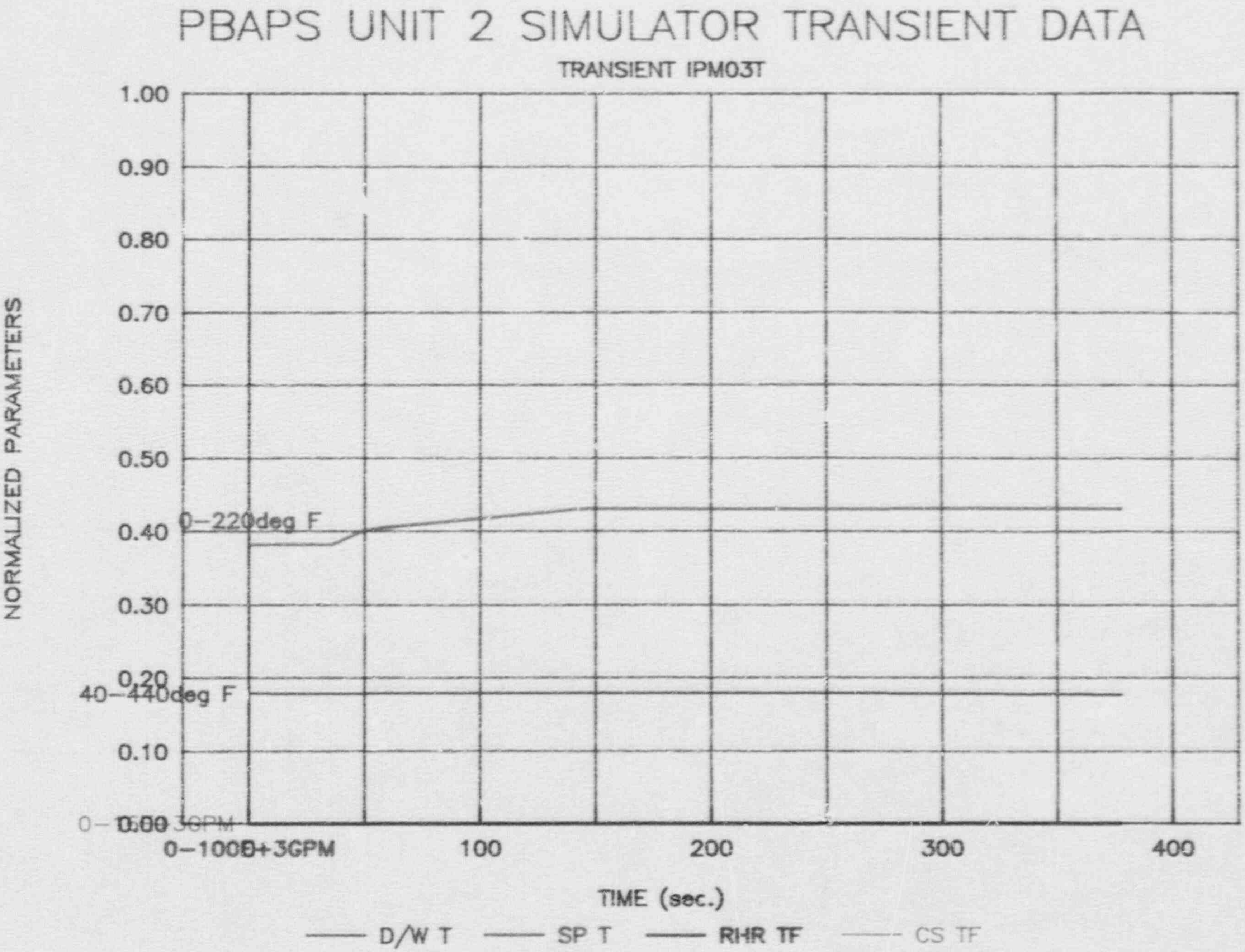
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT IFM03T

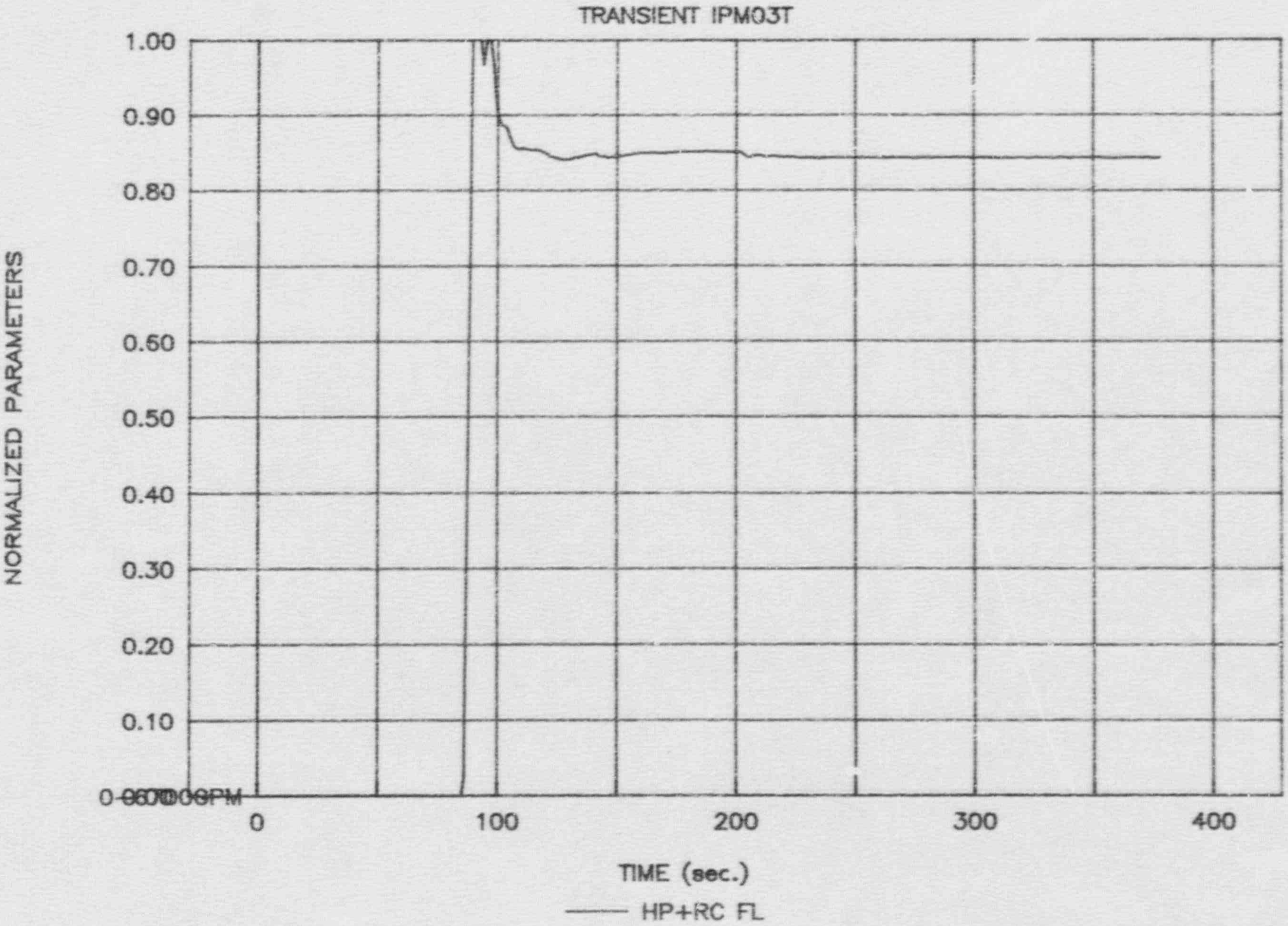




PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
-325-60"
TRANSIENT iPM03T
NORMALIZED PARAMETERS
1.00
0.90
-0.80 +60"
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0-70psig
100
200
300
400
TIME (sec.)
WR LVL
FZ LVL
D/W PR
SP PR


PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT IPM03T
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
NORMALIZED PARAMETERS
0-220deg F
40-440deg F
0-1000+3GPM
0-1000+3GPM
100
200
300
400
TIME (sec.)
D/W T
SP T
RHR TF
CS TF

PBAPS UNIT 2 SIMULATOR TRANSIENT DATA



PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-SP-1230

SPECIAL PROCEDURE - RECIRCULATION RUNBACK

Prepared by: Bud Havens
Simulator Test Operator
Date: 12/21/90

Approved by: R. W. T[illegible]
Lead Test Operator
Date: 1/4/91

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix A, Section A3.3
Perform transient test and compare transient test results to those transients which have occurred in the Reference Plant and for which data is available.

II. TEST ABSTRACT
This performance test will duplicate the test performed during Unit 2 restart, SP-1230 Recirculation Runback on the Simulator. Since the Reference Plant test was run as an operating procedure, the Simulator Performance Test will be done as a operating procedure performance test.

III. Test References

A. Other Performance Tests

B. Reference Data

1. SP-1230, Recirculation Runback

IV. TEST DESCRIPTION

A. Initial Conditions - IC 14 modified to meet the prerequisites and initial conditions of SP-1230

B. Malfunctions used: none

C. Effects

The Simulator will be capable of simulating the response of the Reference Plant to an extent that step-by-step performance of operating procedures will be possible without deleting, skipping, or omitting steps unless they would have been under similar circumstances in the plant. The expected response of the parameters required by the procedure to be observed during the performance of the procedure are considered to be a part of the Reference Plant Performance Data.

D. Documentation

1. Significant Parameters to be Collected

The Significant Parameters for this test are those parameters, indications, and interlocks required by the procedure to be observed during the performance of the procedure; and the following for which transient data was taken during the Reference Plant performance:

a. APRM
b. Total Steam Flow
c. Total Feedwater Flow
d. Narrow Range Level
e. Narrow Range Pressure
f. Total Core Flow
g. RFPT A Flow
h. RFPT C Flow
i. Recirculation Loop A Flow
j. Recirculation Loop B Flow
k. Recirculation MG Set A Speed
l. Recirculation MG Set B Speed

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 4 and the DATA1230 dataset.

b. Significant annunciators, indications, and interlocks requiring observation by SP-1230 are to be logged and initialled on the certification copy of the procedure.

E. Terminating Condition:

This test may be terminated when all steps in the procedure which can be performed in the control room have been tested and documented.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test:

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D) the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

C. Significant Para ters Acceptance Criteria

1. For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the Reference Plant data collected for that parameter within ±10%, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

2. The Simulator displayed values of all other parameters noted in the procedure having an expected response will meet the expectations of the procedure.

3. The requirements in Section IV.C., EFFECTS, will be met.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. Maneuver the Simulator IAW GP-5, Power Operation to meet the applicable prerequisite conditions of SP-1230, as modified below:

   a. APRM power 69±2%

   b. Total Core Flow 100±2 MLbm/Hr

   c. Secure 'B' RFPT

3. Obtain a copy of the controlled procedure from the Simulator Controlled Procedures and mark it "Simulator Certification Copy".

B. Performance

1. Perform the operating procedure

   a. Instead of step 14:

      (1) place the Simulator in freeze,

      SP1230 DAT

      (2) Prepare to collect data IAW Appendix I and Section IV.D.2,

      (3) On an IST screen (separate from that to be used for data collection), call up the variables "RR:K8(1)" and "RR:K8(2)".

      (4) While collecting data IAW Appendix I, take the Simulator out of freeze, allowing it to run for approximately 30 sec., then place the Simulator in freeze.

NOTE: The following step will set the Simulator to cause a recirculation intermediate runback as soon as the Simulator is taken out of freeze.

(5) Set the two variables in VI.B.1.a.(3) above to 00.

(6) Take the Simulator out of freeze.

b. SP-1230 steps which are not applicable to the scope of simulation should be marked "N/A".

c. Document the satisfactory performance of SP-1230 steps by initialling the step on the Simulator Certification Copy of the procedure.

d. Steps which result in unsatisfactory performance should be marked in a conspicuous manner indicating the reason, without initials.

e. On any steps requiring the observation of specific parameter or instrument response, log the observed simulator value next to the requirement.

2. The test may be terminated when all procedural steps which can be performed in the control room at this plant condition have been completed.

3. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/5/91 Test Performer B. Havens

Date Analyzed 1/11/91 Analysis by B. Havens

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observatic notes taken, mark Sat or Unsat to indicate that each Accep ance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automacic plant controls and inherent operating characteristics will be such that...	Sat
B. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation...	Sat
C. Significant Parameters Acceptance Criteria	
1. Parameters	
a. APRM	Unsat
b. Total Steam Flow	Unsat
c. Total Feedwater Flow	Unsat
d. Narrow Range Level	Unsat
e. Narrow Range Pressure	Unsat
f. Total Core Flow	Unsat
g. RFPT A Flow	Unsat
h. RFPT C Flow	Unsat
i. Recirculation Loop A Flow	Unsat
j. Recirculation Loop B Flow	Unsat
k. Recirculation MG Set A Speed	Unsat
l. Recirculation MG Set B Speed	Unsat
2. The Simulator will be capable of simulating the response of the Reference Plant to an extent that step-by step performance ...	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. Simulator runback setpoint is too low, rate is too fast - account for all unsat. WO 90017-Bn2

2.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ✓

Database updated ______BA______
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ✓ NO ____

2. All SDR's resolved, Test Sat:

______________________ ______________________
Test Operator Date

Database updated ______________________
Data Entry

C. Test Reviewed:

______________________ ______________________
Lead Test Operator Date

D. Test Completed:

______________________ ______________________
Sim. Support Supv. Date

G Gray
9/15/89
Simulator Certification
Copy

PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM UNIT 2
SP 1230 RECIRCULATION RUNBACK

TECHNICAL SPECIFICATION:

TEST RESULTS:

A. All of the steps were completed SATISFACTORILY.

PERFORMED BY: ______________________ SIGNATURE ______________ TIME/DATE

PERFORMED BY: ______________________ SIGNATURE ______________ TIME/DATE

INFORMED OF COMPLETION: ______________________ SIGNATURE (A.C.O. or C.O.) ______________ TIME/DATE

REVIEWED BY: ______________________ SIGNATURE (SHIFT MANAGEMENT) ______________ TIME/DATE

B. One or more of the steps were completed UNSATISFACTORILY.

MRF No. ______________

______________________ SIGNATURE ______________ TIME/DATE

______________________ SIGNATURE (A.C.O. or C.O.) ______________ TIME/DATE

______________________ SIGNATURE (SHIFT MANAGEMENT) ______________ TIME/DATE

OPTIONAL AT DISCRETION OF SSV: NOTIFY STATION MANAGER OR ALTERNATE OR OTHERS

______________________ NAME OF PERSON NOTIFIED ______________ TIME/DATE

______________________ SIGNATURE (SHIFT MANAGEMENT) ______________ TIME/DATE

Additional action required if other portions of test did not function properly or other discrepancies were noted during test.

1. MRF submitted: MRF No. ______________
2. Other:

______________________ SIGNATURE ______________ DATE

REVIEWED BY:

______________________ PLANT STAFF MANAGEMENT ______________ DATE

PURPOSE:

The purposes of this test are: (1) to obtain recirculation system performance data during a recirc pump runback, (2) to verify that the feedwater control system can control reactor water level following a runback of two reactor recirculation pumps, and (3) to provide an opportunity to augment operator training on plant response and procedures during this transient.

While the reactor is operating at 70% reactor power (±5%) and 90 - 100% core flow both recirc pumps will runback to the 60% speed limiter by removing power from the limiter logic.

REFERENCES:

1. S.2.3 - Recirculation System, BWR Discussion
2. P&ID-M-353 - Reactor Recirc Pump System
3. GEK-9675 - Reactor Recirc. System
4. S.2.3.1.F - Resetting A Recirculation System Runback
5. SP-1166 - Program Controls for Restart Power Testing Post Cycle 7
6. M1-EE-221 - 20C18 Internal Diagram
7. M1-S-2 Sheets 5 & 5 - Reactor Recirc Pump Logic

PREREQUISITES: INITIAL/DATE

1. The following tests will have been conducted at the 70% plateau prior to conducting this test:

   A. ST-26.6-2 - Recirculation Flow Controller Stability Test — N/A / ____ RE

   B. ST 26.1-2 - Feedwater Control Loop Stability Test — N/A / ____ RE

   C. ST 26.7-2 - Pressure Regulator Stability Test — N/A / ____ RE

   D. ST 3.3.2 - APRM Gain Calibration — N/A / ____ RE

2. Rx Power (PCTPWR) is between 65 & 75% and Core Flow is between 90-100%, per OD-3 Option 2. — N/A / ____ RE

3. Acceptable PC envelope stored in process computer. — N/A / ____ RE

4. Ensure that, as a minimum, PECo Data Acquisition System (DAS) is loaded with signal ID's listed in Appendix A, calibrated, and is ready to record data. — GINDAL DATA 1230 — GK / 1/5/91 RE

5. Obtain permission from the Shift Manager to perform this test. — N/A / ____ SM

6. Obtain permission from the Shift Supervisor to perform this test. N/A / SSV

7. Obtain permission from the Unit #2 Reactor Operator to perform this test. N/A / RO

8. Verify a Reactor Engineer is available for the performance of this test. N/A / RE

9. Obtain a release from the Load Dispatcher for the impending power reduction of about 150-180 MWe. N/A / CO

10. A shift briefing has been performed by the test sponsor engineer for the shift that is doing the test. N/A / SSV

11. To avoid entry into the unstable region as defined in the OT 112 bases this test will be done from the 70% rod line and 90% to 100% core flow, with control rods in Table 1 GP 9-2 Appendix 1 at full in position (00). / RE

EQUIPMENT:

1. PECo Data Acquisition System (DAS)

RESPONSIBILITIES:

1. The daily schedule of testing will be performed at the direction of the Shift Manager.

2. The Test Sponsor engineer will conduct briefings, provide in plant direction of test performance, and prepare test results.

PRECAUTION:

1. If an abnormal condition is encountered during the performance of this test, place the system in a safe condition, terminate the test and investigate the cause.

   OT's that may have to be used in case of an abnormal condition are: Reactor High Level OT 110, Reactor Low Level OT 100, Recirc Pump Trip OT 112, Scram T-100, Reactor Low Pressure OT-111.

PROCEDURE:

1. Run Process Computer Program P1. BM / 1/5/91 RE

2. Record PCTPWR from P1 2237/3293 = 67.9% BM / 1/5/91 RE

3. Record PCTWTR from P1 101.4/102.5 = 98.9% BM / 1/5/91 RE

4. Verify no base critical codes exist at the limiting MCPR core location - resolve with Reactor Engineering if necessary. NA / RE

5. Obtain an Initial Conditions Histogram output from the transient recorder and attach the output to this procedure as Data Sheet 1. GINDAC PRE-TRIP SSTATE BM / 1/5/91 RE

6. Obtain a Process Computer P1 output (OD-17, Opt. 4). Attach to this procedure as Data Sheet 2. BM / 1/5/91 RE

7. Request the following Process Computer edits:

   A. Block P1 (OD-14, Opt. 8). NA / RE

   B. OD-3, Opt. 2. Attach to this procedure as Data Sheet 3. BM / 1/5/91 RE

   C. OD-6 in limiting MCPR bundle (Opt. 2 long edit). Attach to this procedure as Data Sheet 4. NA / RE

8. Verify and record actual scram margin greater than 20%. Perform following calculation on APRM's A & D. BM / 1/5/91 RE

$$\text{Actual SM} = \frac{\text{APRM Scram Setpoint} - \text{APRM Indicated Reading}}{\text{Indicated APRM Reading/PCTPWR}}$$

$$\text{Actual SM (A)} = \frac{(120) - (68)}{(68)\,/\,(67.9)} = 51.92$$

$$\text{Actual SM (D)} = \frac{(120) - (69.5)}{(69.5)\,/\,(67.9)} = 49.34$$

9. Complete Data Sheet 5. BA / 1/5/91 RE

10. Notify load dispatcher of impending load reduction of about 150 MWe to 180 MWe. NA / CO

11. Verify and record normal water level LI-2-06-94A or B on 20C05A23 (20 to 25 inches)

24" Level 94A Instrument BA / 1/5/91 RE

12. Start the transient recorder and obtain at least 10 seconds of steady state data prior to the recirc pump runback. Record required data after the test in Data Sheet 6. BA / 1/5/91 RE

13. Notify plant personnel over the PA system that recirc. pumps will be runback. N/A / RE

NOTE:
THE NEXT STEP WILL CAUSE TWO RECIRC PUMPS TO RUN BACK TO 60% SPEED AND APPROXIMATELY A 15% DECREASE IN REACTOR POWER. THE REMOVAL OF FUSES MUST BE DONE UNDER THE DIRECTION OF A LICENSED REACTOR OPERATOR.

14. Simultaneously remove fuses DDF14 and DDF13 at panel 20C18. Annunciator "Recirc Flow Limit A(B)" on 20C204M will light. See Figure 1. BA / 1/5/91 RE; BA DV

15. When stable conditions are reached, with reactor water level, reactor power and recirc pump speed, stop the transient recorder. Record data in Data Sheet 6 and mark the charts on the transient recorder with time, date, step # and initials. BA / 1/5/91 RE

16. Run process computer program P1. BA / 1/5/91 RE

17. Request process computer output OD-6, option 2 for the limiting MCPR core location and attach it to this procedure as Data Sheet 7. N/A / RE

18. Reinstall fuses DDF14 and DDF13 at panel 20C13. (Independent Verif. Required) "Upper Recirc Flow Limit" light will come on panel C04A.

NR / ______
RE

______ / ______
IV

```
****************************************************
*                  CAUTION:                        *
*VERIFY THE M/A STATION CONTROLLERS ARE TURNED TO   *
*RUNBACK SETPOINT SO THERE IS NO INCREASE IN PUMP   *
*SPEED WHEN THE RUNBACK IS RESET.                  *
****************************************************
```

19. Reset the runback in accordance with S.2.3.1.F.

BN / 1/3/91
RO

NOTE
Return to power per the Power Ascension Program.

ACCEPTANCE CRITERIA:

1. Verify that Reactor Water Level did not cause a main turbine or feedwater pump trip during the recirc runback. Margin to trip was greater than 3 inches. Record turbine trip setpoints. ______

   Record maximum level obtained 35.1. Margin to trip was greater than 3".

   | SAT | UNSAT |

   BN / 1/11/91
   RE

2. Water level (*) stabilized within 5 minutes of initiation of runback. (Mark chart at stable point.)

   BN / 1/11/91
   RE

   * NOTE: Stabilized means reactor water level returned to a steady state condition as was observed during operation prior to the transient.

3. Recirc Pump runback to 60% speed limiter occurred in ≥ 1%/second.

   4.815 ~~2.566~~ %/sec BN

   BN / 1/11/91
   RE

RECIRC RUNBACK

DATA SHEET 1

HISTOGRAM

STEP 4

DATA SHEET 2

P1 OD-17 OPTION 4

PERIODIC NSS CORE PERFORMANCE

STEP 6

DATA SHEET 3

OD-3 OPTION 2

CORE THERMAL POWER AND APRM CALIBRATION

STEP 7.B

DATA SHEET 4

OD-6

THERMAL DATA IN LIMITING FUEL ASSEMBLY

STEP 7.C

DATA SHEET 5

Sheet 1 of 2

STEP 9

Recirc Valve Position	OPEN	CLOSED
MO-2-43A/20C04A (A Suction)	[illegible]	
MO-2-53A/20C04A (A Discharge)	[illegible]	
MO-2-43B/20C04A (B Suction)	[illegible]	
MO-2-53B/20C04A (B Discharge)	[illegible]	

Double-Tapped Jet Pump Flow

A JP-11/20C04A	5.1 MLB/HR
A-JP-16/20C04A	[illegible] MLB/HR
B-JP-1/20C04A	5.25 MLB/HR
B-JP-6/20C04A	5.1 MLB/HR

Jet Pump Total Flow

FI-92B/20C04A	57.5 MLB/HR
FI-92A/20C04A	[illegible] MLB/HR

Recirc. Drive Flow Indicator

FI-159A/20C04A	[illegible] KGPM
FI-159B/20C04A	[illegible] KGPM

Recirc. Pump Speed

A-2-184-16A/20C04A	78.5 %
B-2-184-16B/20C04A	78.5 %

Recirc. Water Temp. (Suction)

A-Red: TR-2-02-165/20C04A	525 Degrees F.
B-Blk: TR-2-02-165/20C04A	527 Degrees F.

DATA SHEET 5

SHEET 2 of 2

Core Delta P
Red: DPFR-2-02-3-095/20C05A — 18 PSID

Recirc Pump Delta P
A Pump Delta Press. DPI-156A/20C04A — 107 PSID
B Pump Delta Press. DPI-156B/20C04A — 90 PSID

Plant Oper. Data

Core Thermal Power (Max. reading APRM/20C05A) — 0 APRM — 69.5 %

Total Core Flow (Black Pen: DPFR-2-02-3-095/20C05A) — 100 MLB/HR

Reactor Pressure
A-PI-2-06-90A/20C05A — 980 PSIG
B-PI-2-06-90B/20C05A — 960 PSIG

Feedwater Flow Blk. TR-2-06-98/20C05A — 3.5 MLB/HR

Feedwater Temp.
A-TR-2151 Red/20C06C — 336 Degrees F.
B-TR-2151 Blk/20C06C — 338 Degrees F.
C-TR-2151 Grn/20C06C — 336 Degrees F.

Reactor Water Clean-up System Flow
RWCU A FI-141A/20C04A — 150 GPM
RWCU B FI-141B/20C04A — 140 GPM

Reactor Water Clean-up System Return Temp.
TE-109 20C04A Position TI 137 — 400 Degrees F.

Shaft Vibration Pump A VBIS 8133A — .1 mil
Shaft Vibration Pump B VBIS 8133B — .1 mil

DATA SHEET 6

TRANSIENT RECORDER
INITIAL/FINAL CONDITIONS - RECIRC RUNBACK

Step 12 | Step 15

PARAMETER DESCRIPTION	TRANSIENT RECORDER INITIAL VALUE	TRANSIENT RECORDER FINAL VALUE
Feed Flow A		
Feed Flow B		
Feed Flow C		
Narrow Range Pressure		
Total Core Flow		
Recirc. Drive Flow A		
Recirc. Drive Flow B		
Total STM Flow		
Total Feedwater Flow		
APRM A		
APRM C		
Narrow Range Level		
Recirc. Pump Speed A		
Recirc. Pump Speed B		

DATA SHEET 7

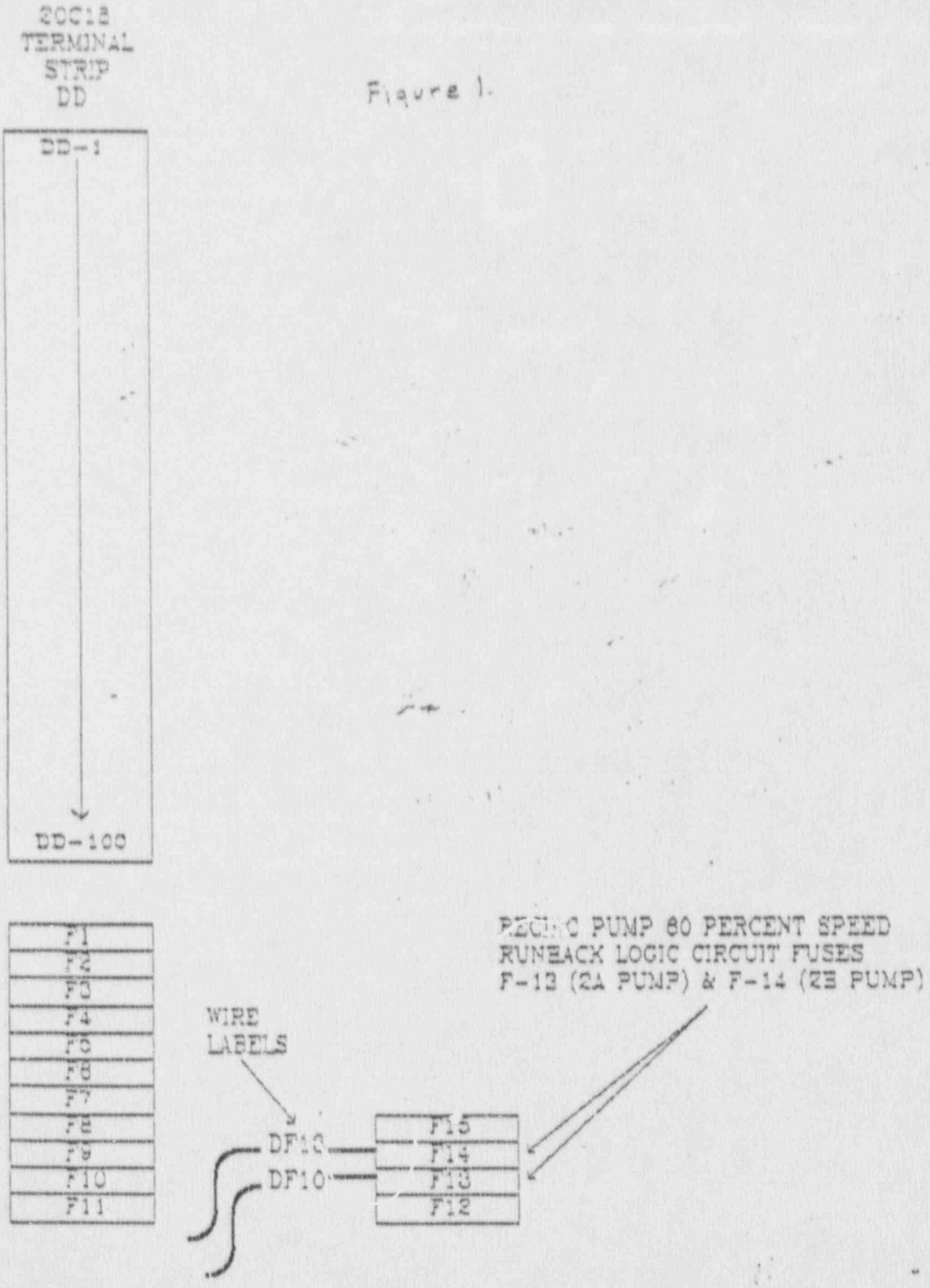
OD - 6
THERMAL DATA IN FUEL ASSEMBLY
STEP 17

APPENDIX A

DAS SAMPLE PLAN

losPoint ID.	Description
NR LVL	Narrow Range Level
TOT FW	Total Feedwater Flow
NR PR	Narrow Range Pressure
APRM A	APRM A
APRM C	APRM C
TOT WT	Total Core Flow
RPMPA SD	Recirc. Pump Speed A
RPMPB SD	Recirc. Pump Speed B
WD A	Recirc. Drive Flow A
WD B	Recirc. Drive Flow B
TDA	Turbine Driven Feed Pump Flow A
TDB	Turbine Driven Feed Pump Flow B
TDC	Turbine Driven Feed Pump Flow C
SPF	Total Steam Flow

Figure 1.


20C18
TERMINAL
STRIP
DD
DD-1
DD-100
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
F11
WIRE
LABELS
DF13
DF10
F15
F14
F13
F12
RECIRC PUMP 60 PERCENT SPEED
RUNBACK LOGIC CIRCUIT FUSES
F-13 (2A PUMP) & F-14 (2B PUMP)

0

01/05/91 0013   OD-15. COMPUTER OUTAGE RECOVERY MONITOR (C.O.R.M) STARTED.

OD-15. C.O.R.M.   TREF=REFERENCE TIME OF LOADED SECURITY LOG=01/05/91 0013.
                    TMSL=REFERENCE TIME OF MOST RECENT SECURITY LOG=01/05/91 0013.
                    TO ACKNOWLEDGE USE OF TREF, DEMAND OD-15 OPTION 99.
                    TO INSERT TREF MANUALLY, DEMAND OD-15 OPTION 00.
                    TIMER ABORT IN FIVE MINUTES

OD-15. C.O.R.M.   UPDATE COMPUTER CLOCK IF REQUIRED. WHEN CLOCK IS CORRECT, DEMAND OD-15 OPTION 99.
                    TIMER ABORT IN FIVE MINUTES.

OD-15. C.O.R.M.   PRESENT TIME = 0000
                    REFERENCE TIME = 01/05/91 0013
                    OUTAGE HOURS = 1033
                    TO ACKNOWLEDGE DEMAND OD-15 OPTION 99.
                    TIMER ABORT IN FIVE MINUTES

P01420 P1 IN PROGRESS MISODE=1
P1 3 STARTED TIER=2

DATE   01/05/91   TIME   00:14   PEACH BOTTOM UNIT 2

PERIODIC NSS CORE PERFORMANCE LOG

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.57	1.06	1.03	0.97	0.89	0.81	0.74	0.65	0.56	0.49	0.44	0.22
REGION REL PWR	1.02	1.01	1.02	1.00	1.01	1.00	1.02	1.01	1.02			
RING REL PWR	0.59	1.11	1.02	1.07	1.05	1.19	0.97	0.65				
APRM GAF	0.99	0.96	0.91	0.96	0.92	0.94						

REGION	1	2	3	4	5	6	7	8	9
MFLCPR	0.541	0.560	0.541	0.560	0.536	0.560	0.541	0.560	0.541
LOC	5-44	27-58	55-44	3-28	27-24	57-34	5-18	27- 4	55-18
FLOW	0.1161	0.1147	0.1161	0.1147	0.1164	0.1147	0.1161	0.1147	0.1161
PKF	1.27	1.31	1.27	1.31	1.25	1.31	1.27	1.31	1.27
MFLPD	0.423	0.429	0.423	0.429	0.416	0.429	0.423	0.429	0.423
LOC	5-44- 1	27-58- 1	55-44- 1	3-28- 1	27-24- 1	57-34- 1	5-18- 1	27- 4- 1	55-18- 1
PKFL	1.03	1.05	1.03	1.05	1.02	1.05	1.03	1.05	1.03
MAXFQ	0.126	0.131	0.126	0.131	0.125	0.131	0.126	0.131	0.126
LOC	5-44	27-58	55-44	3-28	27-24	57-34	5-18	27- 4	55-18
FLOW	0.1239	0.1237	0.1239	0.1237	0.1229	0.1237	0.1239	0.1237	0.1239
PKF	1.2652	1.3103	1.2652	1.3105	1.2530	1.3105	1.2652	1.3103	1.2652

FAILED SENSORS

CM
GM
CM
CM
CM
CM
CA
CA
CA
CA
CR
CP
PR
DP
DP
RW
DH
WF
WD
WT

0

OUTAGE 8[illegible]TRY MONITOR (C.O.P.M) STARTED.

[illegible] TIME OF LOADED SECURITY LOG-01/05/91 0013.
[illegible] TIME OF MOST RECENT SECURITY LOG-01/05/91 0013.
[illegible] USE OF TEFF, DEMAND OD 15 OPTION 99.
[illegible] MANUALLY. DEMAND OD 15 OPTION 00.
IN FIVE MINUTES

[illegible] CLOCK IF REQUIRED. WHEN CLOCK IS CORRECT, DEMAND OD 15 OPTION 99.
IN FIVE MINUTES.

[illegible]T = 0000
[illegible]ME = 01/05/91 0013
[illegible]S = 1077
[illegible] DEMAND OD 15 OPTION 99.
IN FIVE MINUTES.

5

00:14 PEACH BOTTOM UNIT 2

3P
1230
initial

PERIODIC NSS CORE PERFORMANCE LOG

3	4	5	6	7	8	9	10	11	12
1.03	0.97	0.89	0.81	0.74	0.65	0.56	0.49	0.44	0.22
1.02	1.00	1.01	1.00	1.02	1.01	1.02			
1.09	1.07	1.09	1.19	0.97	0.65				
0.91	0.94	0.99	0.94						

3	4	5	6	7	8	9
0.541	0.560	0.536	0.560	0.541	0.560	0.541
55-44	3-28	27-24	57-34	5-18	27- 4	55-18
0.1161	0.1147	0.1164	0.1147	0.1161	0.1147	0.1161
1.27	1.31	1.25	1.31	1.27	1.31	1.27
0.423	0.429	0.416	0.429	0.423	0.429	0.423
55-44- 1	3-28- 1	27-24- 1	57-34- 1	5-18- 1	27- 4- 1	55-18- 1
1.03	1.05	1.02	1.05	1.03	1.05	1.03
0.126	0.131	0.125	0.131	0.126	0.131	0.126
55-44	3-28	27-24	57-34	5-18	27- 4	55-18
0.1239	0.1237	0.1229	0.1237	0.1239	0.1237	0.1239
1.2652	1.3105	1.2530	1.3105	1.2652	1.3103	1.2652

CMWT	2237.
MWE	699.6
CMFCP	0.560
CMFLPD	0.429
CMCF	1.049
CMC8	0.131
CAE0	0.079
CA9A	0.098
CAVF	0.325
CAPD	38.062
CRD	0.132
CRSYM	0.00
PR	974.39
DPC-M	18.23
DPC-C	18.23
BWL	23.405
DHS	17.586
WFW	8.61
WD	31.14
WTCMB	98.48
LEF	0.68

DATA SHEET
2

++=48

59	D						12	++	++	13	++	++	13	++	++	12	++	
	C						17			19			19			19		
	B						24			26			25			25		
55	A					++	29	++	40	30	++	8	30	++	40	29	++	++
51				15	++	++	25	++	++	25	++	++	26	++	++	24	++	++
				22			37			37			38			36		
				30			51			50			51			49		
47			++	37	++	++	62	++	0	60	++	0	60	++	0	59	++	++
43		++	++	23	++	++	25	++	++	25	++	++	27	++	++	25	++	++
				35			36			37			37			37		
				47			49			49			49			49		
39		++	40	54	++	0	59	++	0	36	++	14	37	++	0	37	++	0
35		++	++	24	++	++	25	++	++	27	++	++	25	++	++	27	++	++
				34			38			37			36			37		
				47			50			48			47			49		
31		++	8	55	++	0	60	++	14	58	++	0	57	++	14	59	++	0
27		++	++	24	++	++	25	++	++	25	++	++	25	++	++	25	++	++
				36			37			37			36			37		
				49			50			49			48			49		
23		++	40	55	++	0	59	++	0	58	++	14	58	++	0	59	++	0
19		++	++	22	++	++	26	++	++	25	++	++	25	++	++	25	++	++
				33			38			37			38			36		
				46			52			50			50			49		
15			++	56	++	++	63	++	0	59	++	0	60	++	0	59	++	++
11	D				++	++	22	++	++	24	++	++	24	++	++	23	++	++
	C						33			36			34			35		
	B						46			49			47			47		
07	A					++	56	++	40	55	++	8	55	++	40	54	++	++
03								++	++		++	++		++	++		++	
		02	06		10	14		18	22		26	30		34	38		42	46

			12	++	++	13	++	++	13	++	++	12	++						
			17			19			19			19							
			24			26			25			25							
		++	29	++	40	30	++	8	30	++	40	29	++	++					
15	++	++	25	++	++	25	++	++	26	++	++	24	++	++	25	++			
22			37			37			38			36			36				
30			51			50			51			49			50				
37	++	++	62	++	0	60	++	0	60	++	0	59	++	++	62	++	++		
23	++	++	25	++	++	25	++	++	27	++	++	25	++	++	24	++	++	12	++
35			36			37			37			37			36			19	
47			49			49			49			49			49			25	
54	++	0	59	++	0	36	++	14	37	++	0	37	++	0	37	++	40	36	++
24	++	++	25	++	++	27	++	++	25	++	++	27	++	++	26	++	++	13	++
34			38			37			36			37			38			19	
47			50			48			47			49			51			25	
55	++	0	60	++	14	58	++	0	57	++	14	59	++	0	60	++	8	30	++
24	++	++	25	++	++	25	++	++	25	++	++	25	++	++	25	++	++	13	++
36			37			37			36			37			37			19	
49			50			49			48			49			50			25	
55	++	0	59	++	0	58	++	14	58	++	0	59	++	0	60	++	40	30	++
22	++	++	26	++	++	25	++	++	25	++	++	25	++	++	25	++	++	12	++
33			38			37			38			36			37			17	
46			52			50			50			49			51			24	
56	++	++	63	++	0	59	++	0	60	++	0	59	++	++	62	++	++	29	
	++	++	22	++	++	24	++	++	24	++	++	23	++	++	15	++			
			33			36			34			35			22				
			46			49			47			47			30				
		++	56	++	40	55	++	8	55	++	40	54	++	++	37				
				++	++		++	++		++	++		++						
	10	14		18	22		26	30		34	38		42	46		50	54		58

0[illegible]1 P1 IN PROGRESS WTCODE=1
P1-3 STARTED ITER=2

DATE 01/05/91 TIME 00:32 PEACH BOTTOM UNIT 2

PERIODIC NSS CORE PERFORMANCE LOG

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.54	1.00	0.91	0.83	0.73	0.65	0.58	0.51	0.43	0.38	0.34	0.17
REGION REL PWR	1.02	1.01	1.02	1.00	1.01	1.00	1.02	1.0[illegible]	1.02			
RING REL PWR	[illegible].58	1.10	1.02	1.07	1.02	1.19	0.96	0.65				
APRM GAF	0.97	0.92	0.89	0.95	0.90	0.[illegible]3						

REGION	1	2	3	4	5	6	7	8	9
MFLCPR	0.343	0.355	0.343	0.355	0.338	0.355	0.343	0.355	0.343
LOC	5-44	27-58	55-44	3-28	27-24	57-34	5-18	27- 4	55-18
FLOW	0.0885	0.0875	0.0885	0.0875	0.0890	0.0875	0.0885	0.0875	0.0885
PKF	1.27	1.31	1.27	1.31	1.25	1.31	1.27	1.31	1.27
MFLPD	0.408	0.416	0.408	0.416	0.400	0.416	0.408	0.416	0.408
LOC	5-44- 1	27-58- 1	55-44- 1	3-28- 1	27-24- 1	57-34- 1	5-18- 1	27- 4- 1	55-18- 1
PKFL	1.00	1.02	1.00	1.02	0.98	1.02	1.00	1.02	1.00
MAXEQ	0.136	0.142	0.136	0.142	0.134	0.142	0.136	0.142	0.136
LOC	5-44	27-58	55-44	3-28	27-24	57-34	5-18	27- 4	55-18
FLOW	0.0946	0.0945	0.0946	0.0945	0.0939	0.0945	0.0946	0.0945	0.0946
PKF	1.2695	1.3141	1.2695	1.3144	1.2510	1.3144	1.2695	1.3141	1.2695

FAILED SENSORS

FAILED LPRM LIST BASE CRIT CODE

DATE 01/05/91 TIME 0032 PEACH BOTTOM UNIT 2

PERIODIC NSS CORE PERFORMANCE LOG

CONTROL ROD POSITIONS AND CALIBRATED LPRM READINGS

++=48

59 D 9 ++ ++ 10 ++ ++ 10 ++ ++ 9 ++
C 14 15 14 14

00:32 PEACH BOTTOM UNIT 2

PERIODIC NSS CORE PERFORMANCE LOG

3	4	5	6	7	8	9	10	11	12
0.91	0.83	0.73	0.65	0.58	0.51	0.43	0.38	0.34	0.17
1.02	1.00	1.01	1.00	1.02	1.01	1.02			
1.02	1.07	1.02	1.19	0.96	0.65				
0.89	0.95	0.90	0.93						

3	4	5	6	7	8	9
0.343	0.355	0.338	0.355	0.343	0.355	0.343
55-44	3-28	27-24	57-34	5-18	27- 4	55-18
0.0885	0.0875	0.0890	0.0875	0.0885	0.0875	0.0885
1.27	1.31	1.25	1.31	1.27	1.31	1.27
0.408	0.416	0.400	0.416	0.408	0.416	0.408
5-44- 1	3-28- 1	27-24- 1	57-34- 1	5-18- 1	27- 4- 1	55-18- 1
1.00	1.02	0.98	1.02	1.00	1.02	1.00
0.136	0.142	0.134	0.142	0.136	0.142	0.136
55-44	3-28	27-24	57-34	5-18	27- 4	55-18
0.0946	0.0945	0.0939	0.0945	0.0946	0.0945	0.0946
1.2695	1.3144	1.2510	1.3144	1.2695	1.3141	1.2695

CMWT	1860.
GMWE	564.9
CMFCP	0.355
CMFLPD	0.416
CMPF	1.017
CMEQ	0.142
CAEQ	0.086
CAQA	0.082
CAVF	0.351
CAPD	31.625
CRD	0.132
CRSYM	0.00
PR	963.72
DPC-M	10.64
DPC-C	10.64
RWL	23.325
DHS	19.916
WFW	7.07
WD	23.90
WTSUB	74.88
FRP	0.56
WT	77.41
WTFLAG	1.000
ITER	1.000
IREC	0.000
IEQL	0.000
IXYFLG	0.000

SP 1630 found BA

ST

BASE CRIT CODE

0032 PEACH BOTTOM UNIT 2

PERIODIC NSS CORE PERFORMANCE LOG

CONTROL ROD POSITIONS AND CALIBRATED LPRM READINGS

9 ++ ++ 10 ++ ++ 10 ++ ++ 9 ++

		++	++	18	++	++	[illegible]	++	++	20	++	++	19	++	++	[illegible]	++	++
				27						28			28					
				38			41			39			38			40		
31		++	8	51	++	0	56	++	14	54	++	0	53	++	14	55	++	0
27		++	++	18	++	++	19	++	++	19	++	++	19	++	++	19	++	++
				28			29			28			28			28		
				40			41			40			39			40		
23		++	40	52	++	0	55	++	0	54	++	14	54	++	0	55	++	0
19		++	++	17	++	++	20	++	++	19	++	++	19	++	++	19	++	++
				26			30			29			29			28		
				38			43			41			41			41		
15			++	52	++	++	59	++	0	55	++	0	56	++	0	55	++	++
11	D				++	++	17	++	++	18	++	++	18	++	++	18	++	++
	C						26			28			27			27		
	B						38			40			38			39		
07	A					++	52	++	40	52	++	8	51	++	40	51	++	++
03								++	++		++	++		++	++		++	
		02	06		10	14		18	22		26	30		34	38		42	46

```
18 ++     ++  9 ++   ++ 20 ++   ++ 19 ++   ++  1 ++   ++   19 ++   ++ 10 ++
27            29        28         28          9             30         14
38            41        39         38         40             42         21
51 ++      0  56 ++   14 54 ++    0 53 ++   14 55 ++    0   56 ++    8 28 ++

18 ++     ++  19 ++   ++ 19 ++   ++ 19 ++   ++ 19 ++   ++   19 ++   ++ 10 ++
28            29        28         28         28             29         15
40            41        40         39         40             41         19
52 ++      0  55 ++    0 54 ++   14 54 ++    0 55 ++    0   56 ++   40 28 ++

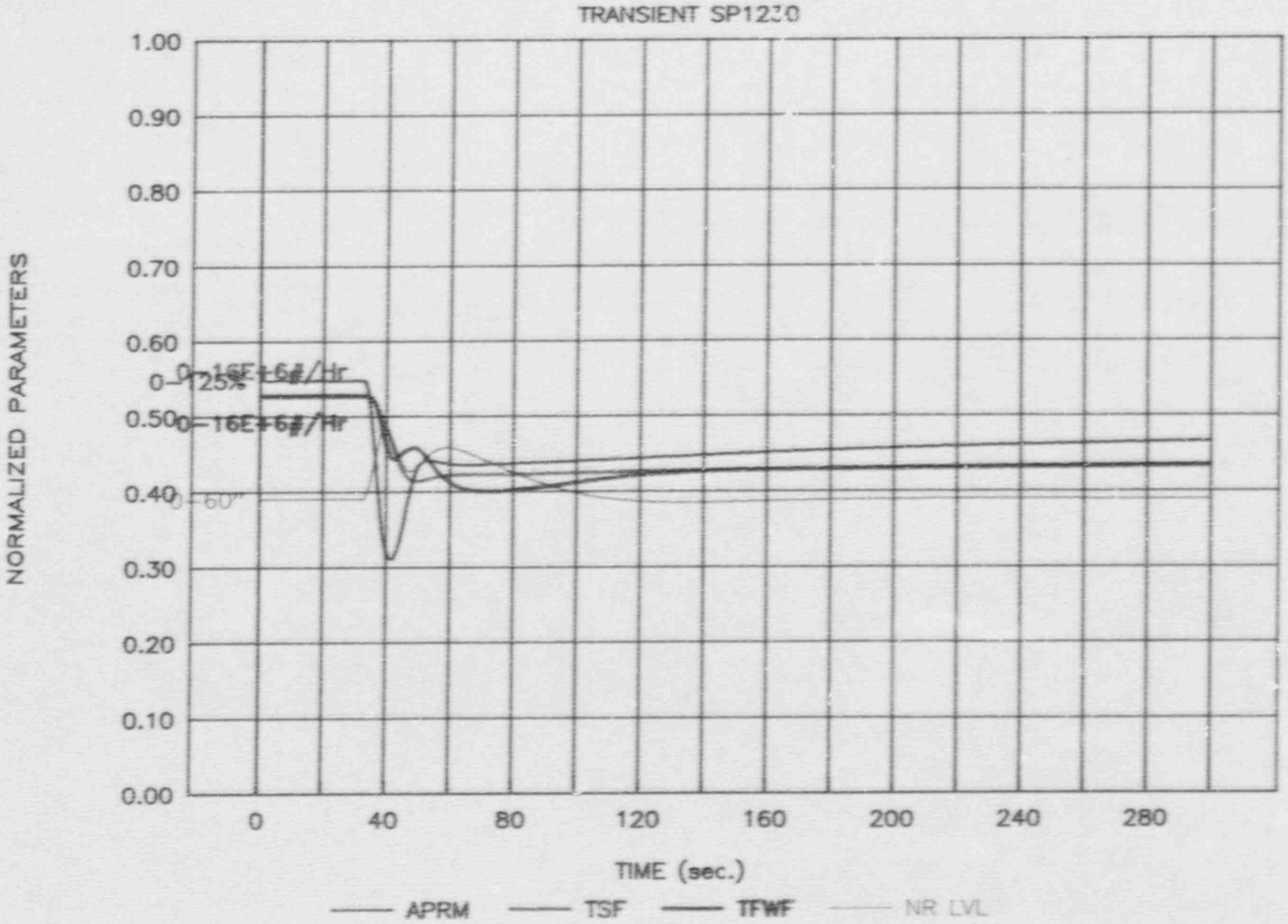
17 ++     ++  20 ++   ++ 19 ++   ++ 19 ++   ++ 19 ++   ++   19 ++   ++  9 ++
26            30        29         29         28             29         14
38            43        41         41         41             43         20
52 ++     ++  59 ++    0 55 ++    0 56 ++    0 55 ++   ++   58 ++   ++ 27

   ++     ++  17 ++   ++ 18 ++   ++ 18 ++   ++ 18 ++   ++   11 ++
              26        28         27         27             17
              38        40         38         39             25
          ++  52 ++   40 52 ++    8 51 ++   40 51 ++   ++   35

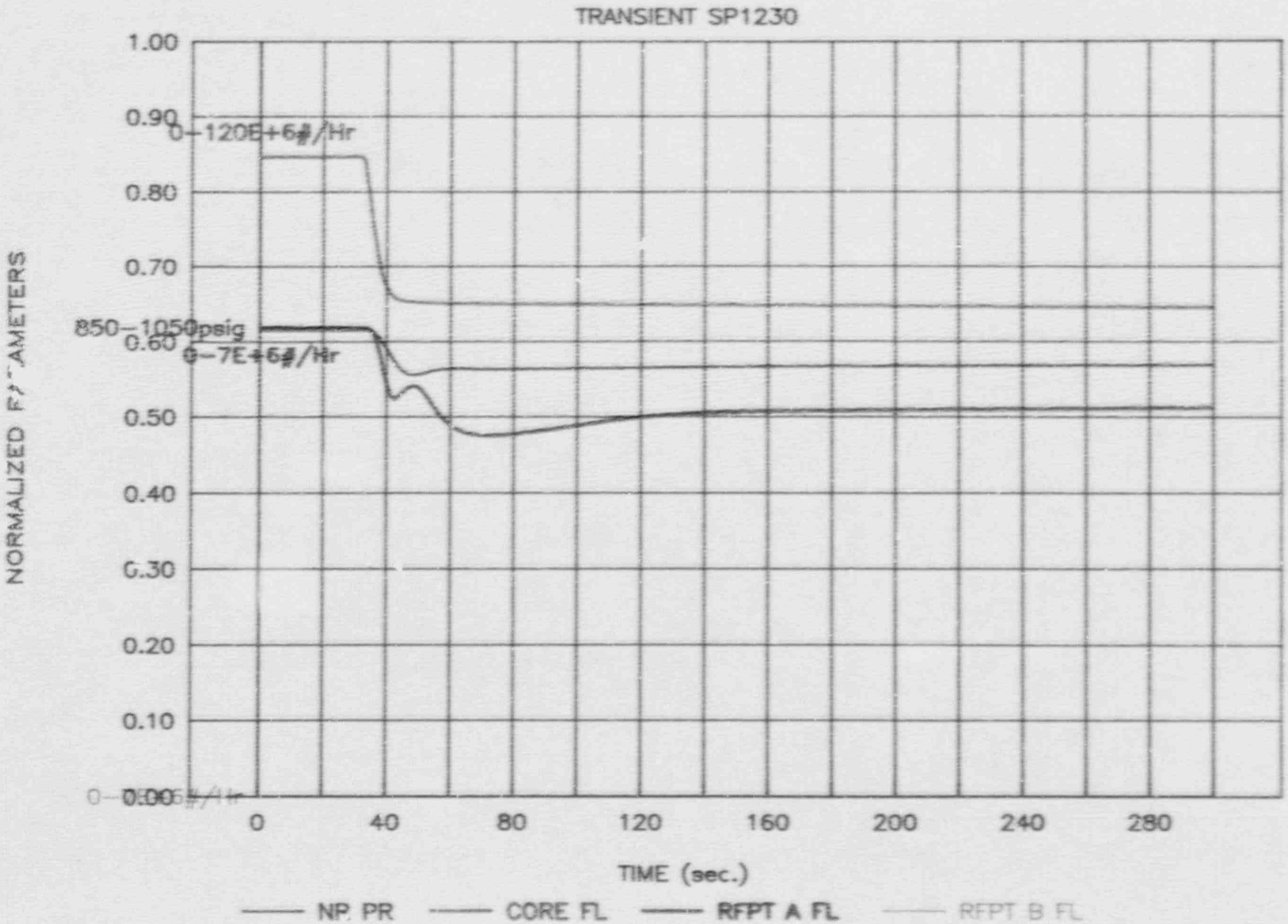
                 ++   ++    ++   ++    ++   ++    ++

   10     14     18   22    26   30    34   38    42   46      50   54     58
```

PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

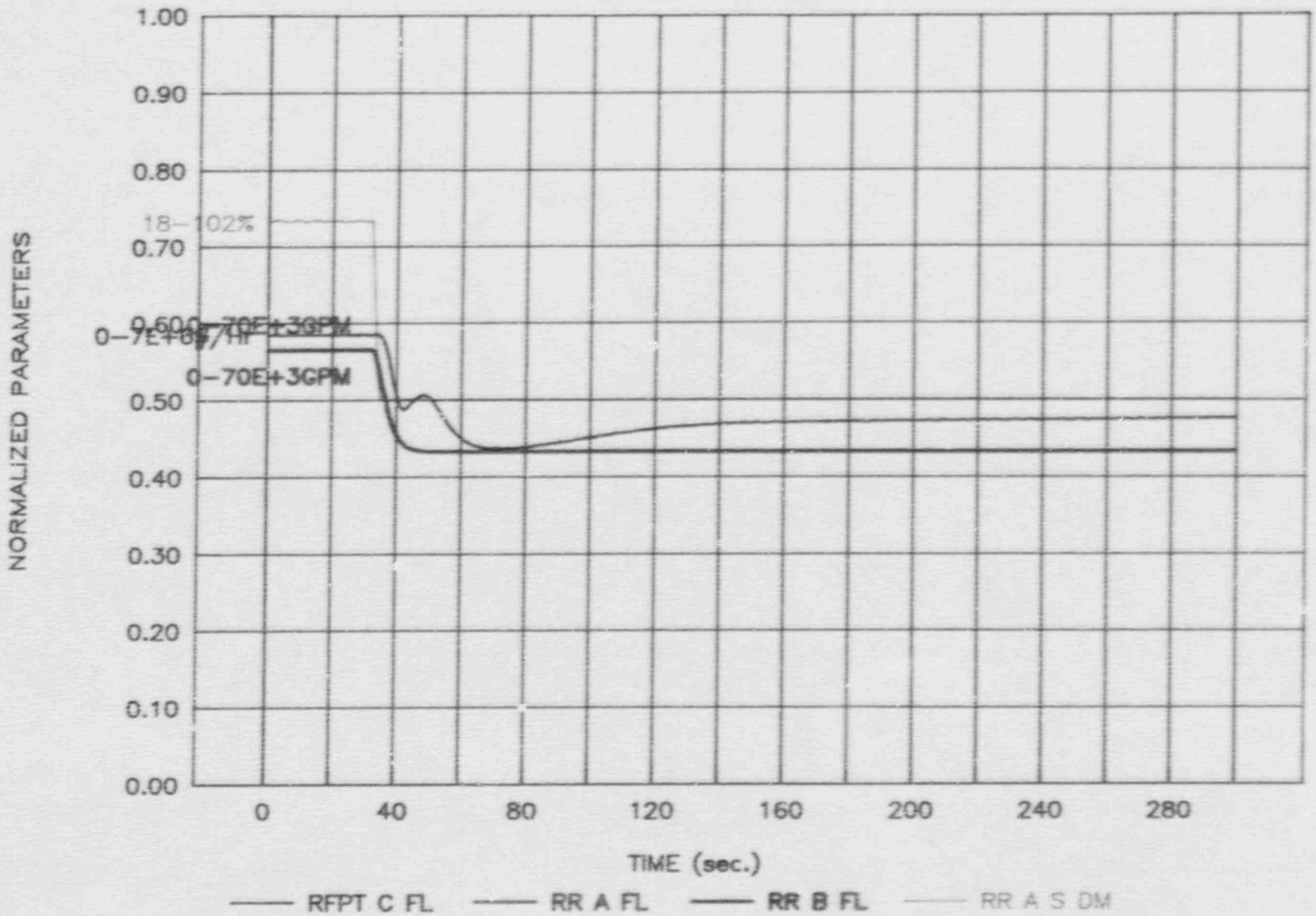


PBAPS UNIT 2 SIMULATOR TRANSIENT DATA



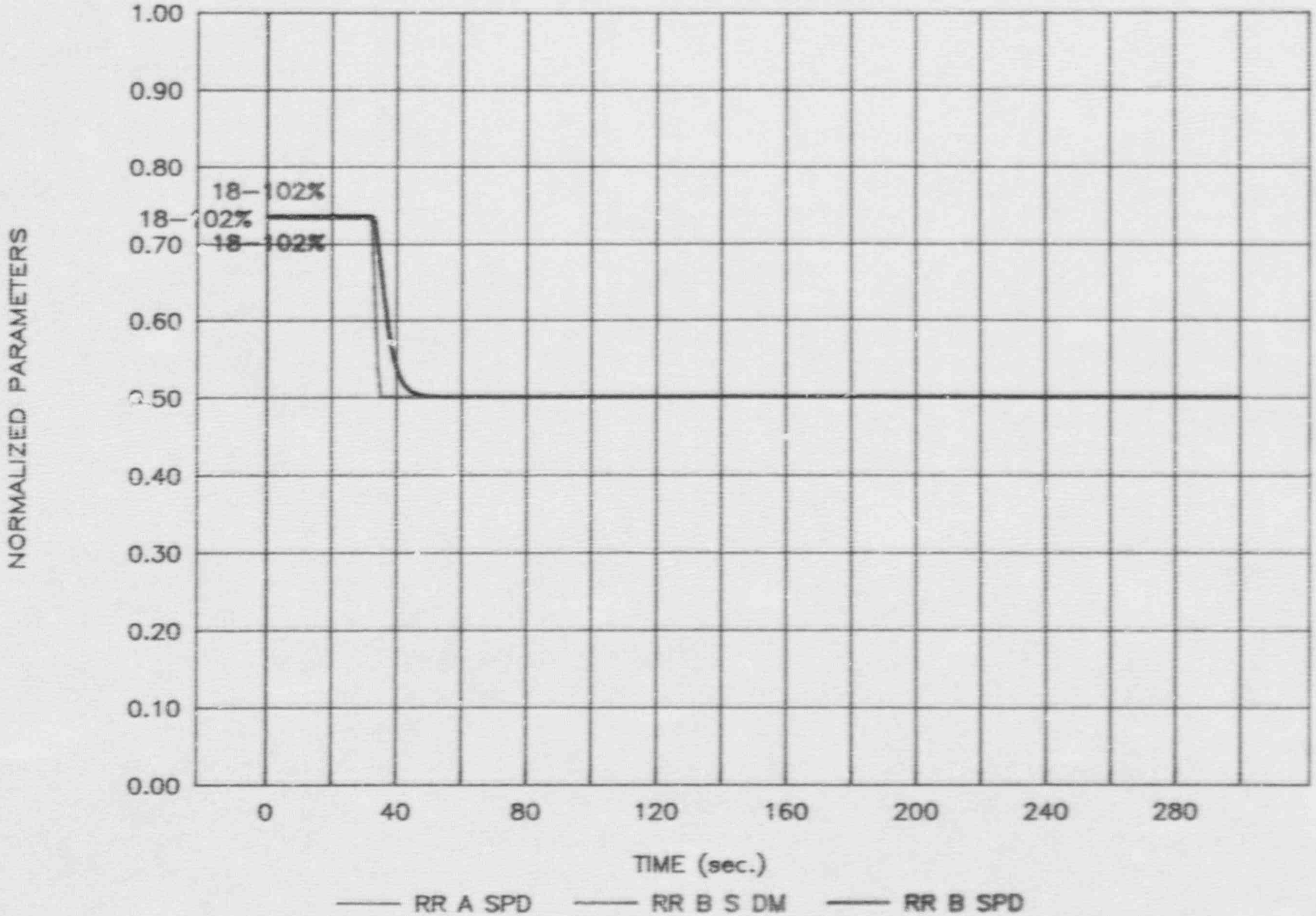
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT SP1230



PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT SP1230



PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-SP-1231

SPECIAL PROCEDURE - RECIRCULATION PUMP TRIP

Prepared by: Bud Havens Date: 12/21/90
Simulator Test Operator

Approved by: ____________________ Date: __________
Lead Test Operator

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix A, Section A3.3
Perform transient test and compare transient test results to those transients which have occurred in the Reference Plant and for which data is available.

II. TEST ABSTRACT
This performance test will duplicate the test performed during Unit 2 restart, SP-1231 Recirculation Pump Trip on the Simulator. Since the Reference Plant test was run as an operating procedure, the Simulator Performance Test will be done as a operating procedure performance test.

III. Test References

A. Other Performance Tests

- SSPT-OT 112

B. Reference Data

- SP-1231, Recirculation Pump Trip

IV. TEST DESCRIPTION

A. Initial Conditions - IC 14 modified to meet the prerequisites and initial conditions of SP-1231

B. Malfunctions used: none

C. Effects

The Simulator will be capable of simulating the response of the Reference Plant to an extent that step-by-step performance of operating procedures will be possible without deleting, skipping, or omitting steps unless they would have been under similar circumstances in the plant. The expected response of the parameters required by the procedure to be observed during the performance of the procedure are considered to be a part of the Reference Plant Performance Data.

D. Documentation

1. Significant Parameters to be Collected

The Significant Parameters for this test are those parameters, indications, and interlocks required by the procedure to be observed during the performance of the procedure; and the following for which transient data was taken during the Reference Plant performance:

a. APRM
b. Total Steam Flow
c. Total Feedwater Flow
d. Narrow Range Level
e. Narrow Range Pressure
f. Total Core Flow
g. RFPT A Flow
h. RFPT C Flow
i. Recirculation Loop A Flow
j. Recirculation Loop B Flow
k. Recirculation MG Set A Speed
l. Recirculation MG Set B Speed

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 4 and the DATA1230 dataset.

b. Significant annunciators, indications, and interlocks requiring observation by SP-1231 are to be logged and initialled on the certification copy of the procedure.

E. Terminating Condition:

This test may be terminated when all steps in the procedure which can be performed in the control room have been tested and documented.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test:

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

C. Significant Parameters Acceptance Criteria

1. For each of the Significant parameters listed in Section IV.D.1 above: the response of the parameter match the Reference Plant data collected for that parameter within ±10%, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

2. The Simulator displayed values of all other parameters noted in the procedure having an expected response will meet the expectations of the procedure.

3. The requirements in Section IV.c., EFFECTS, will be met.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. Maneuver the Simulator IAW GP-5, Power Operation to meet the applicable prerequisite conditions of SP 1231, as modified below:

   a. APRM power 69±2%

   b. Total Core Flow 100±2 MLbm/Hr

   c. Secure 'B' RFPT

3. Obtain a copy of the controlled procedure from the Simulator Controlled Procedures and mark it "Simulator Certification Copy".

B. Performance

1. Perform the operating procedure

   a. Prior to the actual trip of the recirculation pump:

      (1) place the Simulator in freeze,

      (2) Prepare to collect data IAW Appendix I and Section IV.D.2,

      (3) While collecting data IAW Appendix I, take the Simulator out of freeze - then trip the recirculation pump per SP-1231 at approximately 30 sec. after coming out of freeze.

   b. SP-1231 steps which are not applicable to the scope of simulation should be marked "N/A".

   c. Document the satisfactory performance of SP-1231 steps by initialling the step on the Simulator Certification Copy of the procedure.

d. Steps which result in unsatisfactory performance should be marked in a conspicuous manner indicating the reason, without initials.

e. On any steps requiring the observation of specific parameter or instrument response, log the observed simulator value next to the requirement.

2. The test may be terminated when all procedural steps which can be performed in the control room at this plant condition have been completed.

3. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test [illegible] Test Performer [illegible]

Date Analyzed [illegible] Analysis by [illegible]

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation...	Sat
C. Significant Parameters Acceptance Criteria	
1. Parameters	
a. APRM	Unsat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. Narrow Range Level	Sat
e. Narrow Range Pressure	Sat
f. Total Core Flow	Unsat
g. RFPT A Flow	Sat
h. RFPT C Flow	Sat
i. Recirculation Loop A Flow	Sat
j. Recirculation Loop B Flow	Sat
k. Recirculation MG Set A Speed	Sat
l. Recirculation MG Set B Speed	Sat
2. The Simulator will be capable of simulating the response of the Reference Plant to an extent that step-by step performance ...	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1. APRM increase after stabilization is too fast wo# 9100018 Pri 2
9100022 Pri 2
2. 9100023 Pri 2

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ____ Unsat ✓

Database updated ____ Sm ____
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ____ NO ✓

2. All SDR's resolved, Test Sat:

____________	____________
Test Operator	Date

Database updated ____________
Data Entry

C. Test Reviewed:

____________	____________
Lead Test Operator	Date

D. Test Completed:

____________	____________
Sim. Support Supv.	Date

PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM UNIT 2
SP 1231 RECIRCULATION PUMP TRIP

TECHNICAL SPECIFICATION: None
SOURCE OF TESTING REQUIREMENT: Restart Power Ascension

TEST RESULTS:

A. All of the steps were completed SATISFACTORILY.

PERFORMED BY: ____________________ SIGNATURE ____________ TIME/DATE

PERFORMED BY: ____________________ SIGNATURE ____________ TIME/DATE

INFORMED OF COMPLETION: ____________________ SIGNATURE (A.C.O. or C.O.) ____________ TIME/DATE

REVIEWED BY: ____________________ SIGNATURE (SHIFT MANAGEMENT) ____________ TIME/DATE

B. One or more of the steps were completed UNSATISFACTORILY.

MRF No. ____________

____________________ SIGNATURE ____________ TIME/DATE

____________________ SIGNATURE (A.C.O. or C.O.) ____________ TIME/DATE

____________________ SIGNATURE (SHIFT MANAGEMENT) ____________ TIME/DATE

OPTIONAL AT DISCRETION OF SSV: NOTIFY STATION MANAGER OR ALTERNATE OR OTHERS

____________________ NAME OF PERSON NOTIFIED ____________ TIME/DATE

____________________ SIGNATURE (SHIFT MANAGEMENT) ____________ TIME/DATE

Additional action required if other portions of test did not function properly or other discrepancies were noted during test.

1. MRF submitted: MRF No. ____________
2. Other:

____________________ SIGNATURE ____________ DATE

REVIEWED BY:

____________________ PLANT STAFF MANAGEMENT ____________ DATE

PURPOSE:

The purposes of this test are: (1) to obtain recirculation system performance data during a recirculation pump trip and pump restart, (2) to verify that the feedwater control system can satisfactorily control reactor water level without a resulting turbine trip/scram, (3) to provide an opportunity to augment operator training on plant response and procedures during this transient.

REFERENCES:

1. OT-112 - Recirculation Pump Trip
2. S.2.3. - Recirculation System, BWR Discussion
3. S.2.3.1.A - Start-up of a Recirc. Pump
4. P&ID M-353 - Reactor Recirc. Pump System
5. GEK-9675 - Reactor Recirc. System
6. PBAPS - Units 2 and 3, Updated FSAR Chapter 13.5 (Start-Up and Power Test Program)
7. ST 3.3.2A - Calibration of APRM System for Single Loop Operation
8. NEDO 24229-1 - Peach Bottom 2 & 3 Single Loop Operation
9. GP 9-2 - Fast Reactor Power Reduction

PREREQUISITES: INITIAL/DATE

1. The following tests will have been conducted at the 70% plateau prior to conducting this test:

A. ST-26.6-2 - Recirculation Flow Controller Stability Test

N/A / ______
RE

B. ST 26.1-2 - Feedwater Control Loop Stability Test

N/A / ______
RE

C. ST 26.7-2 - Pressure Regulatory Stability Test

N/A / ______
RE

D. ST 3.3.1 - APRM Gain Calibration

N/A / ______
RE

2. RX Power (PCTPWR) is between 65 & 75% and Core Flow is between 90-100%, (92.25 - 102.5 MLB/hr), per OD-3 Option 2.

BK / 1/5/91
RE

3. To avoid entry into the unstable region as defined in the OT 112 bases this test will be done from the 70% rod line and 90% to 100% core flow, with control rods in Table 1 GP 9-2 Appendix 1 at full in position (00).

N/A / ______
RE

4. Acceptable PC envelope stored in process computer.

N/A / ______
RE

5. Ensure that, as a minimum, PECo Data Acquisition System (DAS) is loaded with signal ID's listed in Appendix A, calibrated, and is ready to record data.

_____/_____ RE

6. Obtain permission from the Shift Manager to perform this test.

NA /_____ SM

7. Obtain permission from the Shift Supervisor to perform this test.

NA /_____ SSV

8. Obtain permission from the Unit #2 Reactor Operator to perform this test.

NA /_____ RO

9. Verify a Reactor Engineer is available for the performance of this test.

NA /_____ RE

10. Obtain release from the Load Dispatcher for the impending power reduction of N 30% (300-350 MWe).

_____/_____ CO

11. A shift briefing has been performed by the Test Sponsor Engineers for the shift that is doing the test.

NA /_____ SSV

12. The test sponsor will decide which pump to trip.

A	B
	✓

_____/_____ RE

EQUIPMENT:

1. PECo Data Acquisition System (DAS)

RESPONSIBILITIES:

1. The daily schedule of testing will be performed at the direction of the Shift Manager.

2. The Test Sponsor engineer will conduct briefings, provide in plant direction of test performance, and prepare test results.

PRECAUTION:

1. If an abnormal condition is encountered during the performance of this test, place the system in a safe condition, terminate the test and investigate the cause.

   OT's that may have to be used in case of an abnormal condition are Reactor High Level OT-110, Reactor Low Level OT-100, Scram T-100, Reactor Low Pressure OT-111.

2. Do not exceed the maximum number of starts per hour for the recirc. pump motors (2 starts/hr max. per GEK-9675).

3. The pump in an idle recirc. loop shall not be started unless the coolant temperature within the idle and operating recirc. loops are within 50 degrees F of each other (Tech. Spec. pg. 144, 3.6.A.4 and updated FSAR Chapter 12.5 pg. 16).

4. The reactor recirc. pumps shall not be started unless the coolant temperatures between the dome and the bottom head drain are within 145 degrees F. (Tech. Spec. pg. 144, 3.6.A.5 and updated FSAR Chapter 13.5, pg. 16).

5. Following one pump operation, the discharge valve of the low speed pump may not be opened unless the speed of the faster pump is less than 50% of its rated speed. (Tech. Spec. pg. 149, 3.6.F.1).

PROCEDURE:

1. Run Process Computer Program P1. ______ / ______ RE

2. Record PCTPWR from P1 ______ ______ / ______ RE

3. Record PCTWTR from P1 ______ ______ / ______ RE

4. Obtain an Initial Conditions Histogram output from the transient recorder and attach the output to this procedure as Data Sheet 1. ______ / 1/5/91 RE

5. Verify no base critical codes exist at the limiting MCPR core location - resolve with Reactor Engineering if necessary. NA / ______ RE

6. Obtain a Process Computer P1 output (OD-17, Opt. 4). Attach to this procedure as Data Sheet 2. ______ / 1/5/91 RE

7. Request the following Process Computer edits:

   A. Block P1 (OD-14, Opt. 8). NA / ______ RE

   B. OD-3, Opt. 2. Attach to this procedure as Data Sheet 3. ______ / 1/5/91 RE

   C. OD-6 in limiting MCPR bundle (Opt. 2 long edit). Attach to this procedure as Data Sheet 4. NA / ______ RE

8. Verify and record actual scram margin greater than 20%. Perform the following calculation on APRM's A & D.

$$\text{Actual SM} = \frac{\text{APRM Scram Setpoint} - \text{APRM Indicated Reading}}{\text{Indicated APRM Reading/PCTWR}}$$

$$\text{Actual SM (A)} = \frac{(120) - (67.9)}{(67.9) / (27.96)} = 52.15$$

$$\text{Actual SM (D)} = \frac{(120) - (69.5)}{(69.5) / (27.96)} = 99.38$$

BW / 11-5-91
RE

9. Complete Data Sheet 5. BW / 11-5-91
RE

10. Notify load dispatcher of impending load reduction of approximately 30%. (Approx. 300 - 350 MWe) NA /
CO

11. Verify and record normal water level LI-2-06-94A or B on 20C05A23 (20 to 25 inches).

22 Level 94A Instrument

BW / 11-5-91
RE

12. Start the transient recorder and obtain at least 10 seconds of steady state data prior to tripping the recirc. pump 2AP34(2BP34). Record data after the test in Data Sheet 6. SP1231.04

BW / 11-5-91
RE

13. Notify plant personnel over the PA system that recirc. pump 2AP34(2BP34) will be tripped. NA /
RO

> **NOTE:**
>
> The next step will require entry into procedure OT-112, recirculation pump trip.

14. Trip the power to recirc. pump 2AP34(2BP34) by placing the control switch A(B) Gen. Drive Motor Control/20C04A to stop, opening the MG set drive motor breaker. BW / 11-5-91
RO

15. Close the tripped pump discharge valve (MO-2-53A) (MO-2-53B). ____ /____ RO

16. When stable conditions are reached, stop the transient recorder. Attach histogram in data sheet 7 and record data in Data Sheet 6. Mark the transient recorder charts with time, date, step # and initials. BA / 1/5/91 RE

17. Record indicated loop flows and calculate true core flow.

Loop A jet pump flow ____ MLB/HR (FI-92A/20C04A)
Loop B jet pump flow ____ MLB/HR (FI-92B/20C04A)

True Core Flow = (Active loop jet pump flow) - .95 (Inactive loop jet pump flow)

True Core Flow = 41.475 MLB/HR

BA / 1/5/91 RE

18. Run Process Computer Program P1. BA / 1/5/91 RE

19. Request Process Computer output OD-6, option 2 for the limiting MCPR core location and attach it to this procedure as Data Sheet 8. ____ /____ RE

20. Verify the recirc. pump 2AP34(2BP34) is ready for restart. Start the transient recorder and obtain 10 seconds of steady state data prior to starting the pump. Record required data after the test in Data Sheet 9. 30 sec. BA / 1/5/91 RO

21. Notify plant personnel over the PA that recirc. pump 2AP34(2BP34) will be started. NA / ____ RO

22. Restart recirc pump 2AP34(2BP34) per Procedure S.2.3.1.A. BA / 1/5/91 RO

23. After steady state conditions are reached, stop the transient recorder to obtain a histogram. Attach it to this procedure as Data Sheet 10. Fill in the Final Conditions column of Data Sheet 9. Mark the transient recorder with time, date, step #, and initials. BA / 1/5/91 RE

Record margin to scram per Data Sheet 11. 40.02

| SAT | UNSAT |

NOTE
Return to power per the Power Ascension Program.

ACCEPTANCE CRITERIA:

1. Verify Reactor Water Level did not cause a main turbine or feedwater pump trip during recirc. pump trip. Record turbine trip setpoints. 45"

   Record maximum level attained 28.3 . Margin to trip was greater than 3".

   | SAT | UNSAT |

   ______ / ______
   RE

2. Water level stabilized within 5 minutes.

   ______ / ______
   RE

NOTE
Stabilize means reactor water level returned to a steady state condition as was observed during operation prior to the transient.

DATA SHEET 1

HISTOGRAM

STEP 4

DATA SHEET 2

OD 17 OPT. 4

PERIODIC NSS CORE PERFORMANCE
STEP 6

DATA SHEET 3

OD 3 OPT. 2

CORE THERMAL POWER AND APRM CALIBRATION
STEP 7.B

DATA SHEET 4

OD-6

THERMAL DATA IN LIMITING MCPR FUEL ASSEMBLY
STEP 7.C

DATA SHEET 5

PRE-TRIP PLANT CONDITIONS
OF 2AP34 (A RECIRC PUMP) 2BPA34 (B RECIRC PUMP)
STEP 9

Sheet 1 of 2

Recirc Valve Position	OPEN	CLOSED
MO-2-43A/20C04A (A Suction)	BW	___
MO-2-53A/20C04A (A Discharge)	BW	___
MO-2-43B/20C04A (B Suction)	BW	___
MO-2-53B/20C04A (B Discharge)	BW	___

Double-Tapped Jet Pump Flow
A JP-11/20C04A 5.1 MLB/HR
A-JP-16/20C04A 5.12 MLB/HR
B-JP-1/20C04A 5.25 MLB/HR
B-JP-6/20C04A 5.85 MLB/HR

Jet Pump Total Flow
FI-92B/20C04A 51.5 MLB/HR
FI-92A/20C04A 51 MLB/HR

Recirc. Drive Flow Indicator
FI-159A/20C04A 41 KGPM
FI-159B/20C04A 41 KGPM

Recirc. Pump Speed
A-2-184-16A/20C04A 78.5 %
B-2-184-16B/20C04A 78.5 %

Recirc. Water Temp. (Suction)
A-Red: TR-2-02-165/20C04A 525 Degrees F.
B-Blk: TR-2-02-165/20C04A 525 Degrees F.

DATA SHEET 5

PRE-TRIP PLANT CONDITIONS
OF 2AP34 (A RECIRC PUMP) 2BPA34 (B RECIRC PUMP)
SHEET 2 of 2

Core Delta P
Red: DPFR-2-02-3-095/20C05A — 18 PSID

Recirc Pump Delta P
A Pump Delta Press. DPI-156A/20C04A — 196 PSID
B Pump Delta Press. DPI-156B/20C04A — 190 PSID

Plant Oper. Data

Core Thermal Power (Max. reading APRM/20C05A) — 12 APRM — 69.5 %

Total Core Flow (Black Pen: DPFR-2-02-3-095/20C05A) — 100 MLB/HR

Reactor Pressure
A-PI-2-06-90A/20C05A — 980 PSIG
B-PI-2-06-90B/20C05A — 980 PSIG

Feedwater Flow Blk. TR-2-06-98/20C05A — 8.5 MLB/HR

Feedwater Temp.
A-TR-2151 Red/20C06C — 356 Degrees F.
B-TR-2151 Blk/20C06C — 356 Degrees F.
C-TR-2151 Grn/20C06C — 356 Degrees F.

Reactor Water Clean-up System Flow
RWCU A FI-141A/20C04A — 150 GPM
RWCU B FI-141B/20C04A — 140 GPM

Reactor Water Clean-up System Return Temp.
TE-109 20C04A Position TI 137 — 400 Degrees F.

Shaft Vibration Pump A VBIS 8133A — 1 mil
Shaft Vibration Pump B VBIS 8133B — mil

DATA SHEET 6

TRANSIENT RECORDER
INITIAL/FINAL CONDITIONS - TRIP OF 2AP34(A RECIRC PUMP) OR 2BP34(B RECIRC PUMP)

PARAMETER DESCRIPTION	STEP 11 TRANSIENT RECORDER INITIAL VALUE	STEP 15 TRANSIENT RECORDER FINAL VALUE
Feed Flow A		
Feed Flow B		
Feed Flow C		
Narrow Range Pressure		
Total Core Flow		
Recirc. Drive Flow A		
Recirc. Drive Flow B		
Total STM Flow		
Total Feedwater Flow		
APRM A		
APRM C		
Narrow Range Level		
Recirc. Pump Speed A		
Recirc. Pump Speed B		

DATA SHEET 7

HISTOGRAM

DATA SHEET 8

OD-6

THERMAL DATA IN LIMITING MCPR FUEL ASSEMBLY

STEP 18

DATA SHEET 9

TRANSIENT RECORDER
INITIAL/FINAL CONDITIONS - RESTART OF 2AP34 (A RECIRC PUMP) OR 2BP34 (B RECIRC PUMP)

	STEP 19	STEP 22
PARAMETER DESCRIPTION	TRANSIENT RECORDER INITIAL VALUE	TRANSIENT RECORDER FINAL VALUE
Feed Flow A		
Feed Flow B		
Feed Flow C		
Narrow Range Pressure		
Total Core Flow		
Recirc. Drive Flow A		
Recirc. Drive Flow B		
Total STM Flow		
Total Feedwater Flow		
APRM A		
APRM C		
Narrow Range Level		
Recirc. Pump Speed A		
Recirc. Pump Speed B		

DATA SHEET 10
HISTOGRAM
STEP 22

DATA SHEET 11

CALCULATION OF NEUTRON FLUX SCRAM MARGIN
RECIRC PUMP RESTART

T_1 = The time during the transient at which the selected APRM is at the top of its peak. 1142

W_A = A Loop Drive Flow (KGPM) at T_1 = 26.95

W_B = B Loop Drive Flow (KGPM) at T_1 = 20.5

W = % Drive Flow at T_1 = $\frac{WA + WB}{88\ KGPM}$ x 100 = 53.7%

Pe APRM reading 53.125 %

Calculate Scram Margin:

Neutron flux scram margin = (0.58w + 62) - Peak APRM (%) = 40.02%

NOTE: Criteria requires a neutron flux scram margin ≥ 7.5%.

APPENDIX A

DAS SAMPLE PLAN

Point ID.	Description
NR LVL	Narrow Range Level
TOT FW	Total Feedwater Flow
NR PR	Narrow Range Pressure
APRM A	APRM A
APRM C	APRM C
TOT WT	Total Core Flow
RPMPA SD	Recirc. Pump Speed A
RPMPB SD	Recirc. Pump Speed B
WD A	Recirc. Drive Flow A
WD B	Recirc. Drive Flow B
TDA	Turbine Driven FeedPump Flow A
TDB	Turbine Driven Feed Pump Flow B
TDC	Turbine Driven Feed Pump Flow C
STF	Total Steam Flow

OO[illegible]B P1 IN PROGRESS WTCODE=1
P1-3 STARTED ITER=2

DATE 01/05/91 TIME 00:03 PEACH BOTTOM UNIT 2

PERIODIC NSS CORE PERFORMANCE LOG

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.57	1.06	1.03	0.97	0.88	0.81	0.74	0.65	0.56	0.49	0.44	0.22
REGION REL PWR	1.02	1.01	1.02	1.00	1.01	1.00	1.02	1.01	1.02			
RING REL PWR	0.59	1.11	1.02	1.07	1.02	1.19	0.97	0.65				
APRM GAF	0.99	0.94	0.91	0.96	0.92	0.94						

REGION	1	2	3	4	5	6	7	8	9
MFLCPR	0.541	0.561	0.541	0.5[illegible]1	0.536	0.561	0.541	0.561	0.541
LOC	5-44	27-58	55-44	3-28	27-24	57-34	5-18	27- 4	55-18
FLOW	0.1160	0.1147	0.1160	0.1147	0.1164	0.1147	0.1160	0.1147	0.1160
PKF	1.27	1.31	1.27	1.31	1.25	1.31	1.27	1.31	1.27
MFLPD	0.423	0.429	0.423	0.429	0.416	0.429	0.423	0.429	0.423
LOC	5-44- 1	27-58- 1	55-44- 1	3-28- 1	27-24- 1	57-34- 1	5-18- 1	27- 4- 1	55-18- 1
PKFL	1.03	1.05	1.03	1.05	1.02	1.05	1.03	1.05	1.03
MAXEQ	0.126	0.131	0.126	0.131	0.125	0.131	0.126	0.131	0.126
LOC	5-44	27-58	55-44	3-28	27-24	57-34	5-18	27- 4	55-18
FLOW	0.1238	0.1237	0.1238	0.1237	0.1229	0.1237	0.1238	0.1237	0.1238
PKF	1.2652	1.3'03	1.2652	1.3105	1.2530	1.3105	1.2652	1.3103	1.2652

FAILED SENSORS

FAILED LPRM LIST BASE CRIT CODE

DATE 01/05/91 TIME 0003 PEACH BOTTOM UNIT 2

PERIODIC NSS CORE PERFORMANCE LOG

CONTROL ROD POSITIONS AND CALIBRATED LPRM READINGS

++=48

59 D 12 ++ ++ 13 ++ ++ 13 ++ ++ 12 ++
C 17 19 19 19

0

00:03 PEACH BOTTOM UNIT 2

PERIODIC NSS CORE PERFORMANCE LOG

3	4	5	6	7	8	9	10	11	12
1.03	0.97	0.88	0.81	0.74	0.65	0.56	0.49	0.44	0.22
1.02	1.00	1.01	1.00	1.02	1.01	1.02			
1.02	1.07	1.02	1.19	0.97	0.65				
0.91	0.96	0.92	0.94						

3	4	5	6	7	8	9
0.541	0.561	0.536	0.561	0.541	0.561	0.541
55-44	3-28	27-24	57-34	5-18	27- 4	55-18
0.1160	0.1147	0.1164	0.1147	0.1160	0.1147	0.1160
1.27	1.31	1.25	1.31	1.27	1.31	1.27
0.423	0.429	0.416	0.429	0.423	0.429	0.423
55-44- 1	3-28- 1	27-24- 1	57-34- 1	5-18- 1	27- 4- 1	55-18- 1
1.03	1.05	1.02	1.05	1.03	1.05	1.03
0.126	0.131	0.125	0.131	0.126	0.131	0.126
55-44	3-28	27-24	57-34	5-18	27- 4	55-18
0.1238	0.1237	0.1229	0.1237	0.1238	0.1237	0.1238
1.2652	1.3105	1.2530	1.3105	1.2652	1.3103	1.2652

CMWT	2238.
GMWE	700.0
CMFCP	0.561
CMFLPD	0.429
CMPF	1.050
CMEQ	0.131
CAEQ	0.079
CAQA	0.099
CAVF	0.325
CAPD	38.100
CRD	0.132
CRSYM	0.00
PR	974.44
DPC-M	18.23
DPC-C	18.23
RWL	23.399
DHS	17.609
WFW	8.62
WD	31.14
WTSUB	102.26
FRP	0.68
WT	101.4
WTFLAG	1.000
ITER	1.000
IREC	0.000
IEQL	0.000
IXYFLG	0.000

SP
1231
initial
BA

Data Sheet
2

ST BASE CRIT CODE

0003 PEACH BOTTOM UNIT 2

PERIODIC NSS CORE PERFORMANCE LOG

CONTROL ROD POSITIONS AND CALIBRATED LPRM READINGS

12 ++ ++ 13 ++ ++ 13 ++ ++ 12 ++

[illegible]		++	++	24	++	++	[illegible]	++	++	27	++	++	25	++	++	[illegible]	++
				34			[illegible]			37			36			[illegible]	
				47			50			48			47			49	
31		++	8	55	++	0	60	++	14	58	++	0	57	++	14	59	++	0
27		++	++	24	++	++	25	++	++	25	++	++	25	++	++	25	++	++
				36			37			37			36			37	
				49			50			49			48			49	
23		++	40	55	++	0	59	++	0	58	++	14	58	++	0	59	++	0
19		++	++	22	++	++	26	++	++	25	++	++	25	++	++	25	++	++
				33			38			37			38			36	
				46			52			50			50			49	
15			++	56	++	++	63	++	0	59	++	0	60	++	0	59	++	++
11	D				++	++	22	++	++	24	++	++	24	++	++	23	++	++
	C						33			36			34			35	
	B						46			49			47			47	
07	A					++	56	++	40	55	++	8	55	++	40	54	++	++
03								++	++		++	++		++	++		++	
		02	06		10	14		18	22		26	30		34	38		42	46

24	++	[illegible]	25	++	++	27	++	++	25	++	[illegible]	27	++	++	26	++	++	13	++
34			38			37			36			37			38			19	
47			50			48			47			49			51			25	
55	++	0	60	++	14	58	++	0	57	++	14	59	++	0	60	++	8	30	++
24	++	++	25	++	++	25	++	++	25	++	++	25	++	++	25	++	++	13	++
36			37			37			36			37			37			19	
49			50			49			48			49			50			25	
55	++	0	59	++	0	58	++	14	58	++	0	59	++	0	60	++	40	30	++
22	++	++	26	++	++	25	++	++	25	++	++	25	++	++	25	++	++	12	++
33			38			37			38			36			37			17	
46			52			50			50			49			51			24	
56	++	++	63	++	0	59	++	0	60	++	0	59	++	++	62	++	++	29	
	++	++	22	++	++	24	++	++	24	++	++	23	++	++	15	++			
			33			36			34			35			22				
			46			49			47			47			30				
		++	56	++	40	55	++	8	55	++	40	54	++	++	37				
				++	++		++	++		++	++		++						
	10	14		18	22		26	30		34	38		42	46		50	54		58

01/05/91

0

OD-3. CORE THERMAL POWER AND APRM CALIBRATION. 01/05/91 0002 PEACH BOTTOM UNIT 2

GMWE	CMWT	WT	WTHB	WTSUB	WD	WTFLAG	IREC	IEQL
701.04	2242.36	101.34	100.12	99.31	31.14	1.00	0	0

PR	RWL	DPC-M	WFW	HFW	HD	DHS	CAEQ	CAQA
974.51	23.41	18.23	8.63	307.70	523.24	17.68	0.0789	0.0987

	A	C	E	B	D	F
RAP	68.98	74.86	74.30	72.45	70.74	72.38
AGAF	0.987	0.910	0.916	0.940	0.963	0.941

IB 1

RAPL	-190.81	5.01	20.71	34.24	51.39	65.07
	76.32	90.19	103.55	107.62	128.46	190.81

FAILED SENSOR LIST.
0

QFW	QCR	QCU	QRAD	QPUMP	TFW
2233.18	9.72	6.09	0.60	6.99	335.92

HF	HFG	HG	HS	WCR	HCR
540.92	652.37	1193.29	1193.29	0.0300	84.40

WCU	HCU1	HCU2	TD	REFCTP	RATCTP
0.1500	529.87	391.39	529.82	3293.00	3293.00

PPW 3 .9 3.51

CAP	0.00987	0.00940	0.00910	0.00963	0.00917	0.00941
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00

WDC	14.50	25.00	30.50	35.50	37.00	42.50
WTC	46.50	64.00	76.00	86.50	95.00	102.5

0

APRM CALIBRATION. 01/05/91 0002 PEACH BOTTOM UNIT 2

WT	WTHB	WTSUB	WD	WTFLAG	TREC	IEQL
01.34	100.12	99.31	31.14	1.00	0	0

PC-M	WFW	HFW	HD	DHS	CAEQ	CAQA
18.23	8.63	307.70	523.24	17.68	0.0789	0.0987

E	B	D	F
74.30	72.45	70.74	72.38
0.916	0.940	0.963	0.941

20.71	34.24	51.39	65.07
03.55	107.62	128.46	190.81

QCU	QRAD	QPUMP	TFW
6.09	0.60	6.99	335.92

HG	HS	WCR	HCR
93.29	1193.29	0.0300	84.40

HCU2	TD	REFCTP	RATCTP
91.39	527.82	3293.00	3293.00

0.00910	0.00963	0.00917	0.00941
00.00	100.00	100.00	100.00

30.50	35.50	39.00	42.50
76.00	86.50	95.00	102.5

SP 1231
initial
Pre-reg
Bi

Data Sheet 3

[illegible] P1 IN PROGRESS RPCODE-1
[illegible] STARTED [illegible]

DATE 01/05/91 TIME [illegible] PEACH BOTTOM UNIT 2

PERIODIC NSS CORE PERFORMANCE LOG

LOCATION	1	2	3	4	5	6	7	8	9	10	11	12
AXIAL REL PWR	0.51	0.92	[illegible]	[illegible]	[illegible]	0.51	0.45	0.38	0.32	0.28	0.25	0.12
REGION REL PWR	1.03	1.01	1.0[illegible]	1.00	1.00	1.00	1.02	1.01	1.03			
RING REL PWR	0.59	1.10	1.01	1.0[illegible]	1.02	1.20	0.96	0.66				
APRM GAF	0.97	0.91	0.[illegible]	[illegible]	0.[illegible]	0.93						

REGION	1	2	3	4	5	6	7	8	9
MFLCPR	0.346	0.358	0.34[illegible]	0.358	0.339	0.358	0.346	0.358	0.346
LOC	5-44	27-58	55-[illegible]	3-29	27-24	57-34	5-18	27- 4	55-18
FLOW	0.1080	0.1068	0.1080	0.1069	0.1087	0.1068	0.1080	0.1068	0.1080
PRF	1.27	1.32	1.27	1.32	1.25	1.32	1.27	1.32	1.27
MFLPD	0.394	0.403	0.39[illegible]	0.40[illegible]	0.385	0.403	0.394	0.403	0.394
LOC	5-[illegible]- 1	27-58- 1	55-[illegible]- 1	[illegible]- 1	27-24- 1	57-34- 1	5-18- 1	27- 4- 1	55-18- 1
PKFL	0.96	0.99	0.9[illegible]	0.99	0.94	0.99	0.96	0.99	0.96
MAXFQ	0.091	0.095	0.0[illegible]	0.095	0.090	0.095	0.091	0.095	0.091
LOC	5-44	27-58	55-[illegible]	3-29	27-24	57-34	5-18	27- 4	55-18
FLOW	0.1155	0.1154	0.115[illegible]	0.1154	0.1147	0.1154	0.1155	0.1154	0.1155
PRF	1.2745	1.3189	1.27[illegible]	1.31[illegible]	1.2493	1.31[illegible]	1.2745	1.3189	1.2745

FAILED SENSORS

FAILED LPRM LIST BASE CRIT CODE

DATE 01/05/91 TIME 0020 PEACH BOTTOM UNIT 2

PERIODIC NSS CORE PERFORMANCE LOG

CONTROL ROD POSITIONS AND CALIBRATED LPRM READINGS

++-40

52-0 [illegible] ++ ++ 7 ++ ++ 7 ++ ++ 7 ++

0025 0 PEACH BOTTOM UNIT 2

PERIODIC HBS CORE PERFORMANCE LOG

	3	4	5	6	7	8	9	10	11	12
	0.79	0.[illegible]	0.52	0.51	0.45	0.38	0.32	0.[illegible]	0.[illegible]	0.12
	1.03	1.00	1.00	1.00	1.02	1.01	1.03			
	1.01	1.04	1.02	1.20	0.[illegible]	0.66				
	0.80	0.55	0.89	0.93						

3	4	5	6	7	8	9
0.344	0.358	0.319	0.358	0.344	0.358	0.344
55-44	3-28	27-24	57-34	5-18	27-4	55-18
0.1080	0.1068	0.1087	0.1068	0.1080	0.1068	0.1080
1.27	1.32	1.25	1.32	1.27	1.32	1.27
0.394	0.403	0.385	0.403	0.394	0.403	0.394
55-44 1	3-28 1	27-24 1	57-34 1	5-18 1	27-4 1	55-18 1
0.96	0.99	0.94	0.99	0.96	0.99	0.96
0.091	0.095	0.090	0.095	0.091	0.095	0.091
55-44	3-28	27-24	57-34	5-18	27-4	55-18
0.1155	0.1154	0.1147	0.1154	0.1155	0.1154	0.1155
1.2745	1.3193	1.2493	1.3193	1.2745	1.3193	1.2745

CMWT	1530.
QRWE	443.1
CMFCP	0.358
CMFLPD	0.403
CMPF	0.985
CMEQ	0.095
CAEQ	0.096
CAQA	0.067
CAVF	0.381
CAPD	26.011
CRD	0.132
CRSYM	0.00
HP	955.14
DPC-A	5.54
DPC-E	5.54
RWL	21.731
DHS	13.534
WFW	5.66
WD	16.79
WTSUR	91.62
FRP	3.46
WT	94.58
WTFLAG	1.000
ITER	1.000
IREC	0.000
IEQL	0.000
IXYFLG	0.000

1ST BASE CRIT COMP

4/3/85 DJS

0020 PEACH BOTTOM UNIT 2

PERIODIC HBS CORE PERFORMANCE LOG

CONTROL ROD POSITIONS AND CALIBRATED LPRM READINGS

6 ++ 44 7 ++ ++ 7 ++ ++ 7 ++

40 41 41 44

```
[illegible]        ++    ++ 13 ++     ++ [illegible]     ++ 15 ++     ++ 14 ++     ++ [illegible] ++    ++
                           20                              21           20              [illegible]
                           30                              31           30              32
31                 ++     0 47 ++      0 51 ++     44 45 ++      0 42 ++     14 50 ++     0

[illegible]        ++    ++ 13 ++     ++ 15 ++     ++ 14 ++     ++ 14 ++     ++ 14 ++     ++
                           21           21           24           21           21
                           32           32           31           31           32
[illegible]        ++    40 48 ++      0 51 ++      0 50 ++     44 49 ++      0 50 ++     0

15                 ++    ++ 12 ++     ++ 15 ++     ++ 14 ++     ++ 14 ++     ++ 13 ++     ++
                           20           [illegible]  21           22           21
                           31           34           32           33           32
15                       ++ 48 ++     ++ 54 ++      0 51 ++      0 51 ++      0 51 ++     ++

11 D                          ++      ++ 12 ++     ++ 12 ++     ++ 13 ++     ++ 13 ++     ++
   C                                     20           21           20           23
   B                                     31           32           30           31
07 A                                  ++ 40 ++     40 48 ++      8 47 ++     40 47 ++     ++

03                                       ++      ++      ++      ++      ++      ++      ++

                   02    06    10    14    18    22    26    30    34    38    42    46
```

002205 AHH A521 PBH   HIGH FLUX   HIGH   **********

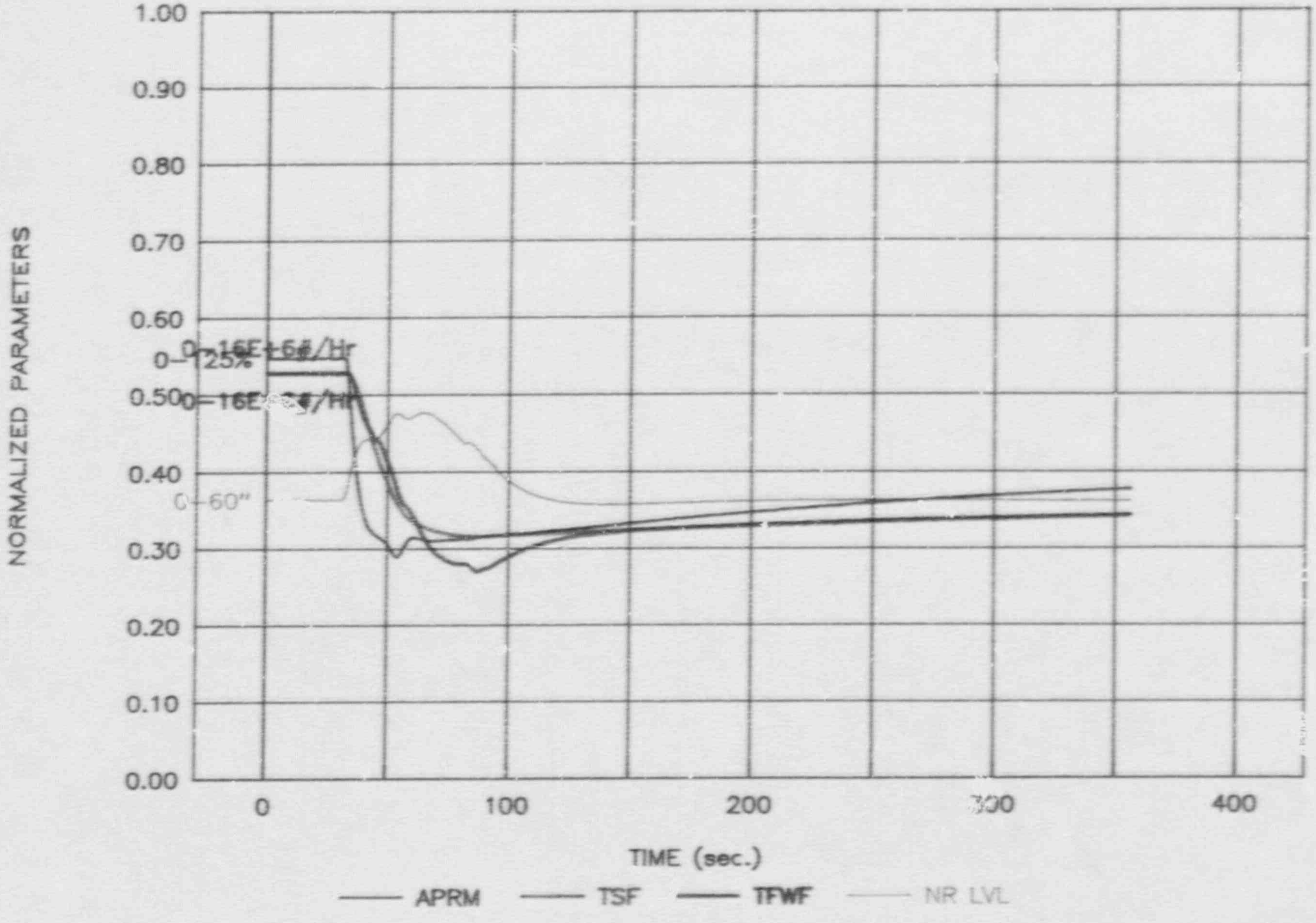
20 kit h c 50%

10 14 18 22 26 30 34 38 42 46 50 54 58

HIGH

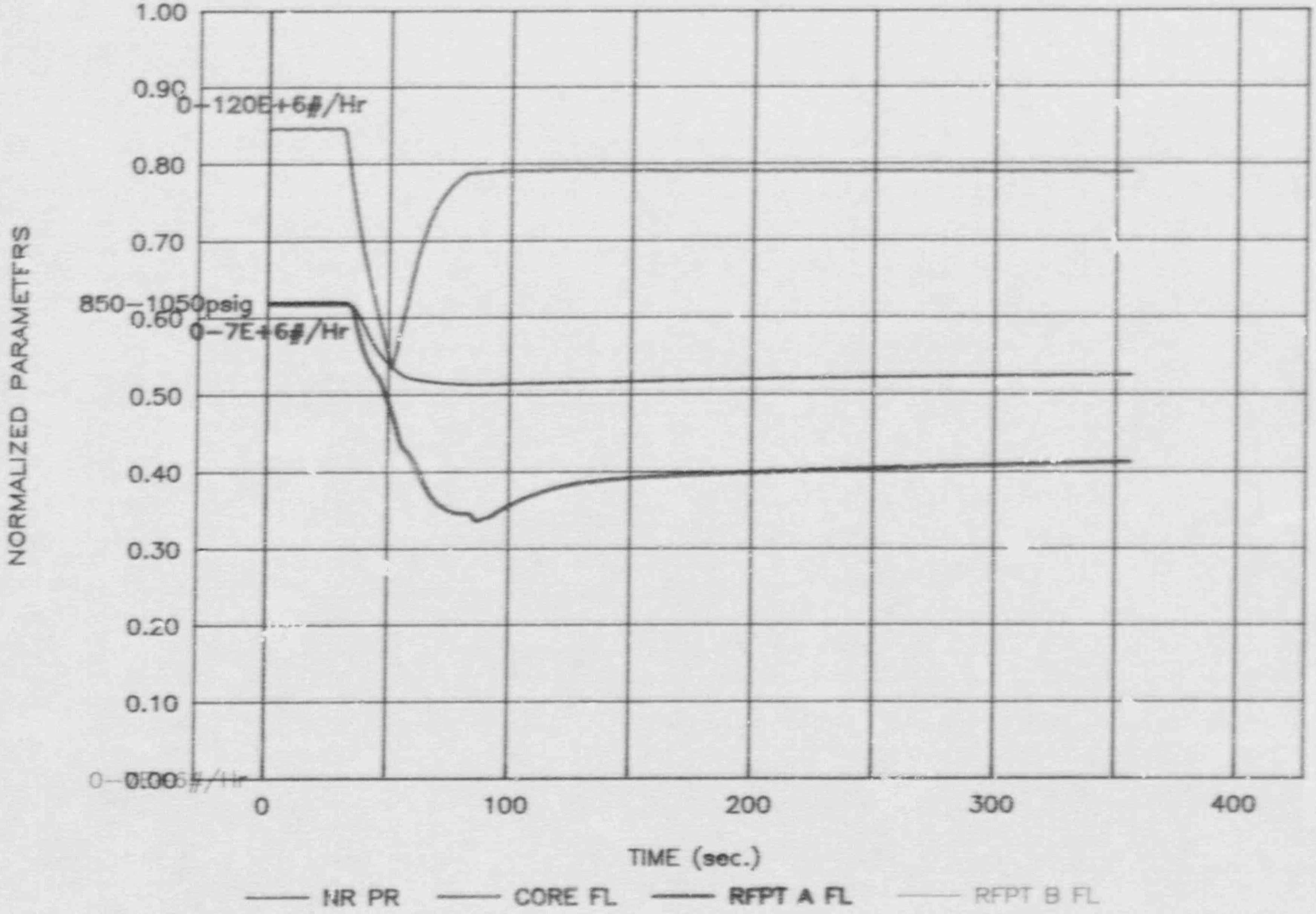
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT SP1231



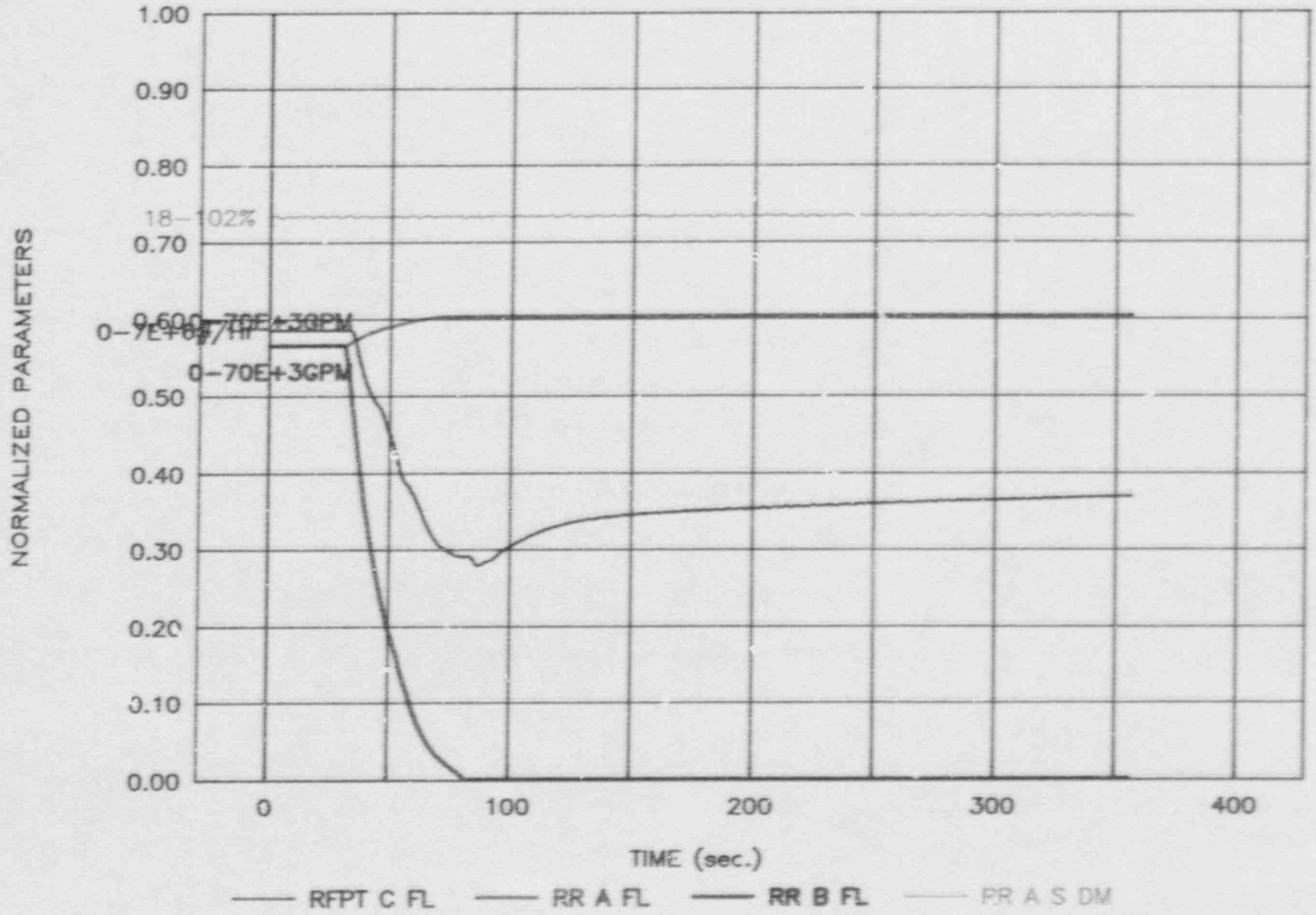
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT SP1231



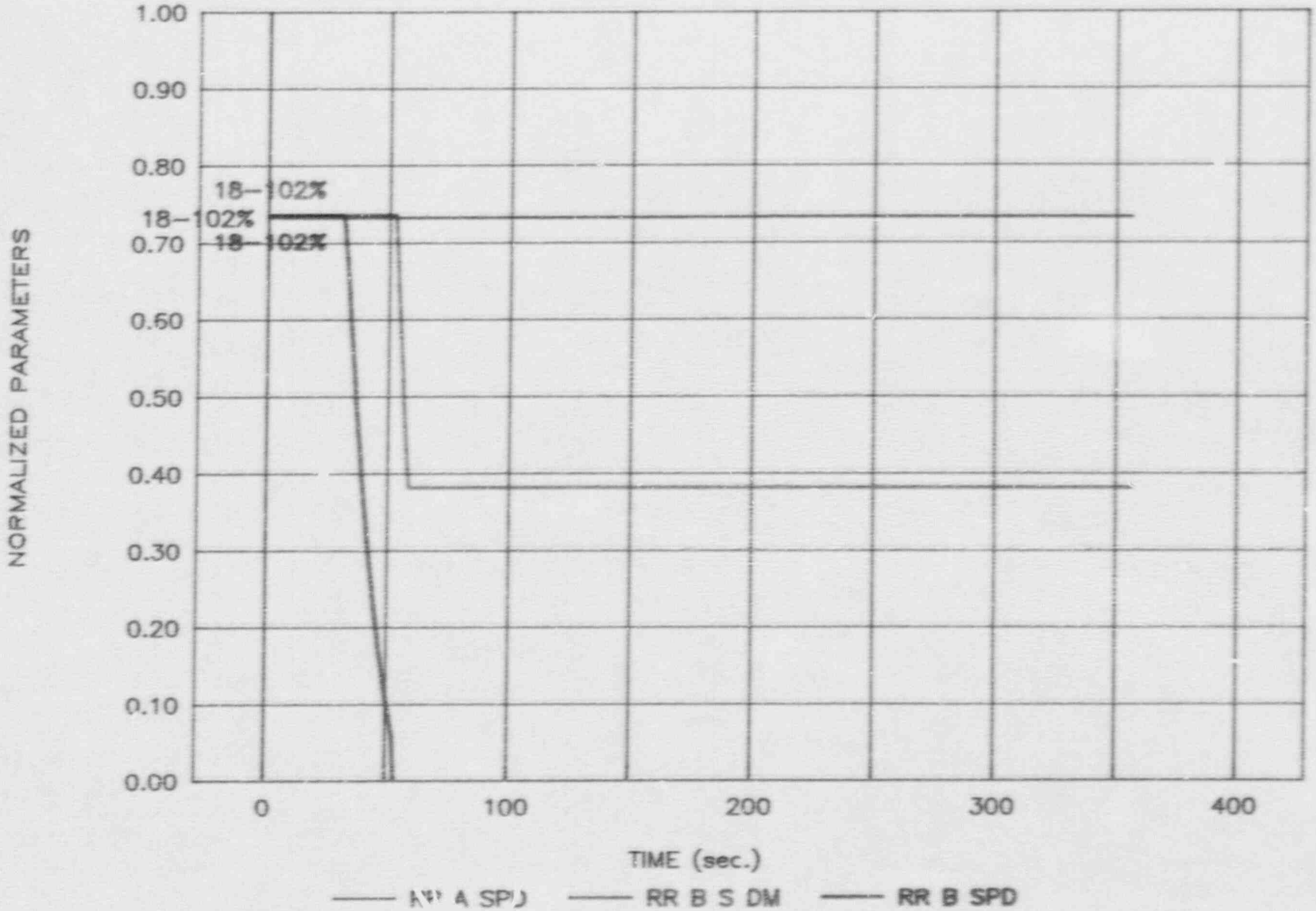
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT SP1231

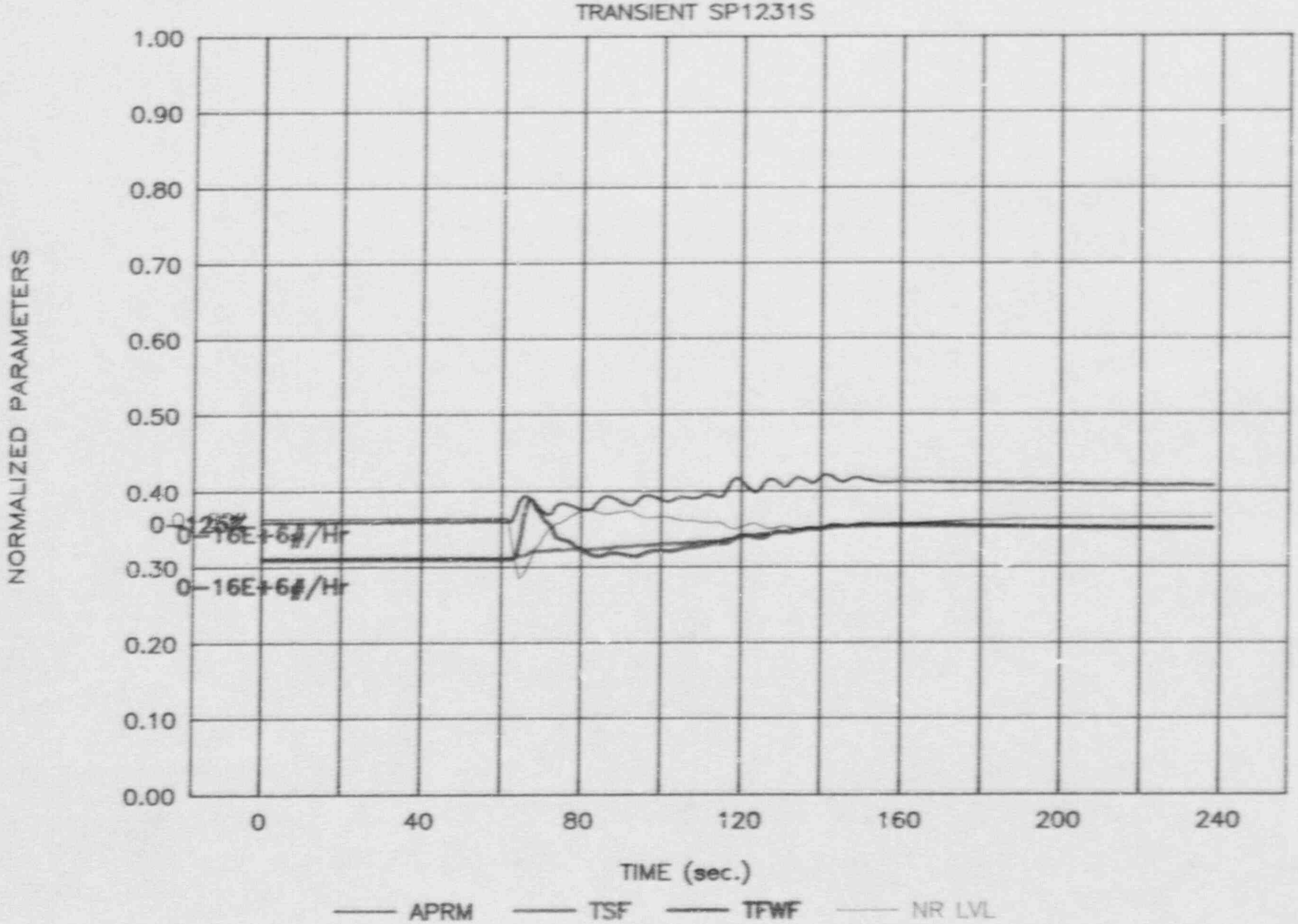


PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

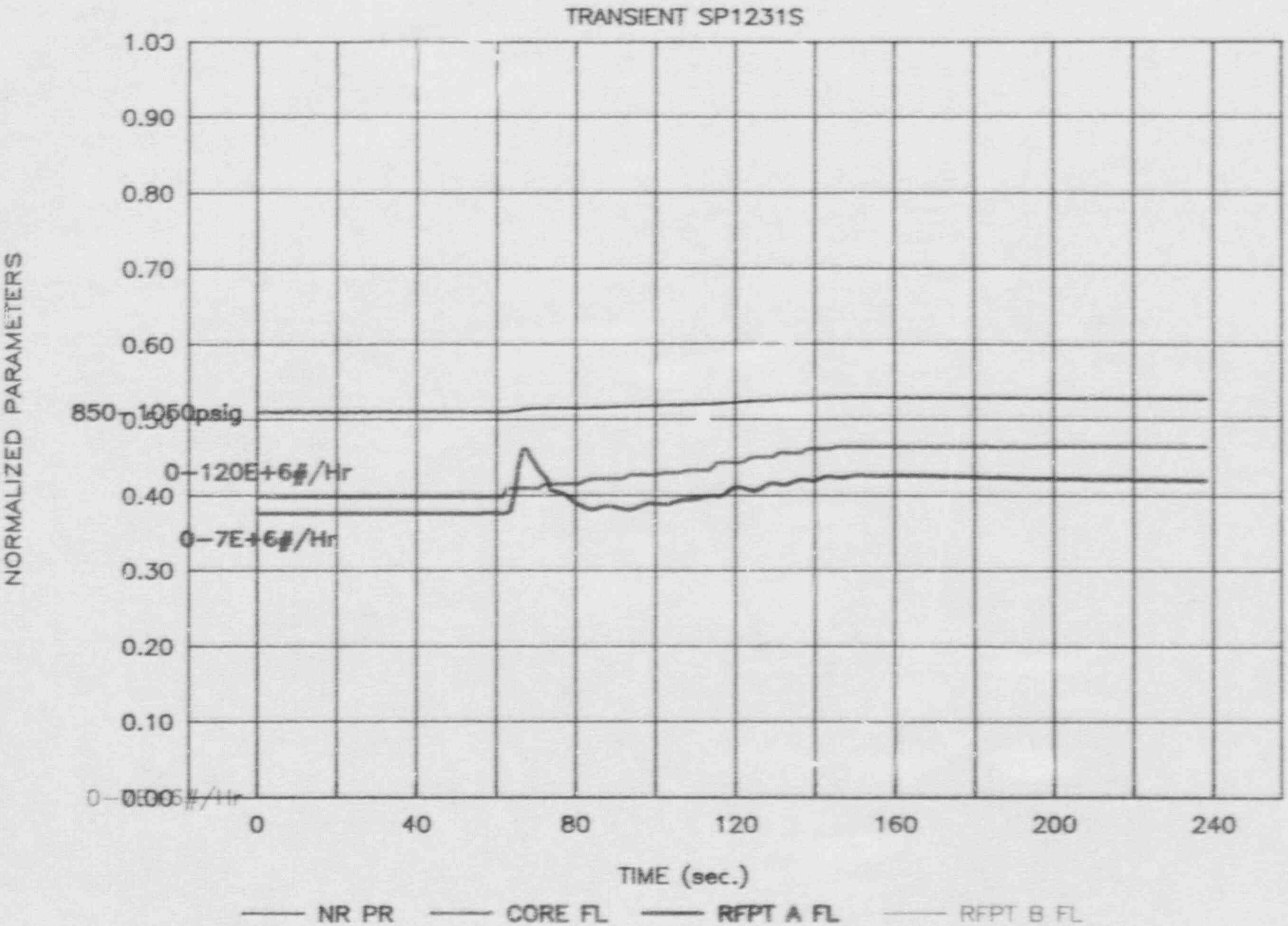
TRANSIENT SP1231



PBAPS UNIT 2 SIMULATOR TRANS'ENT DATA

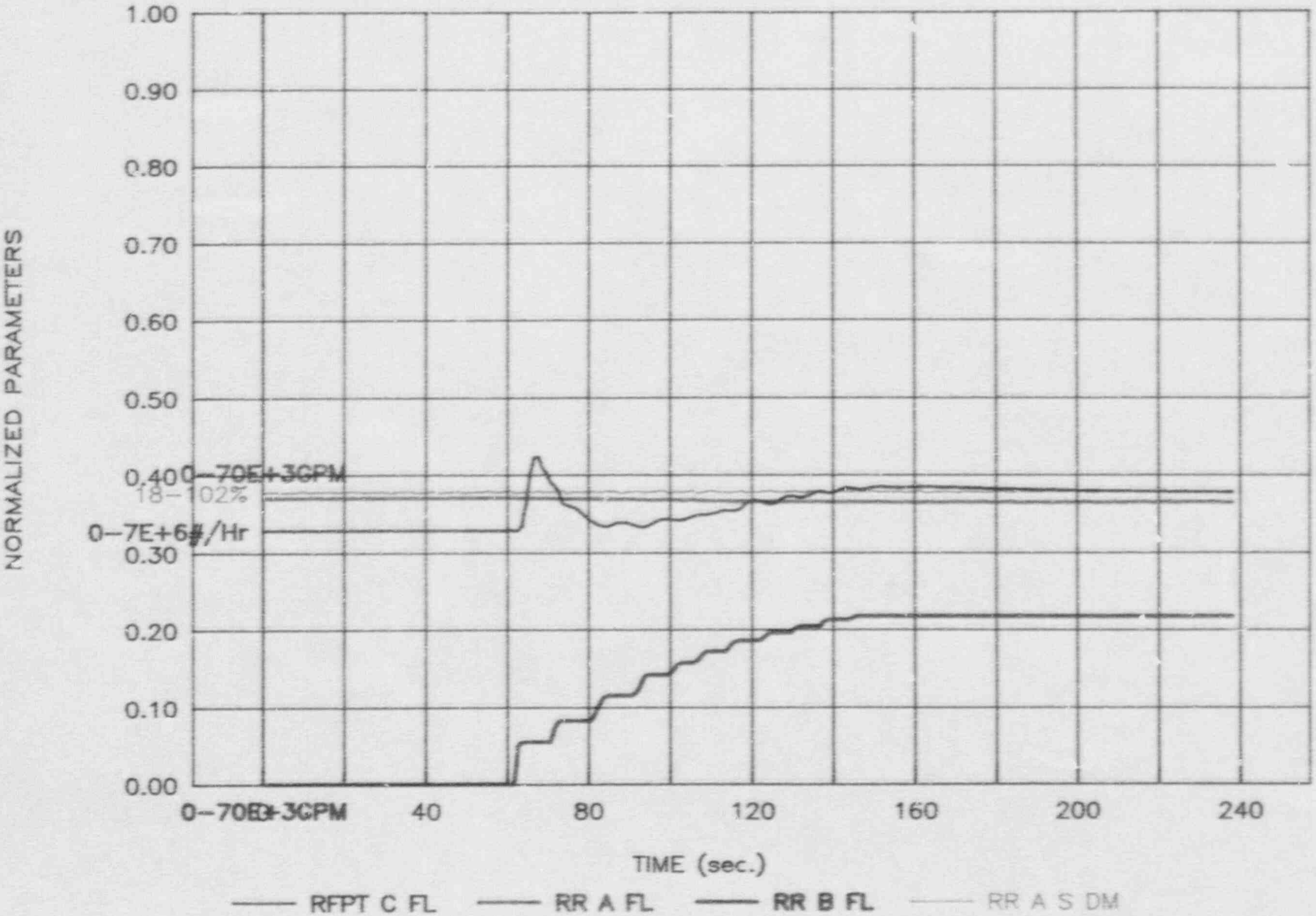


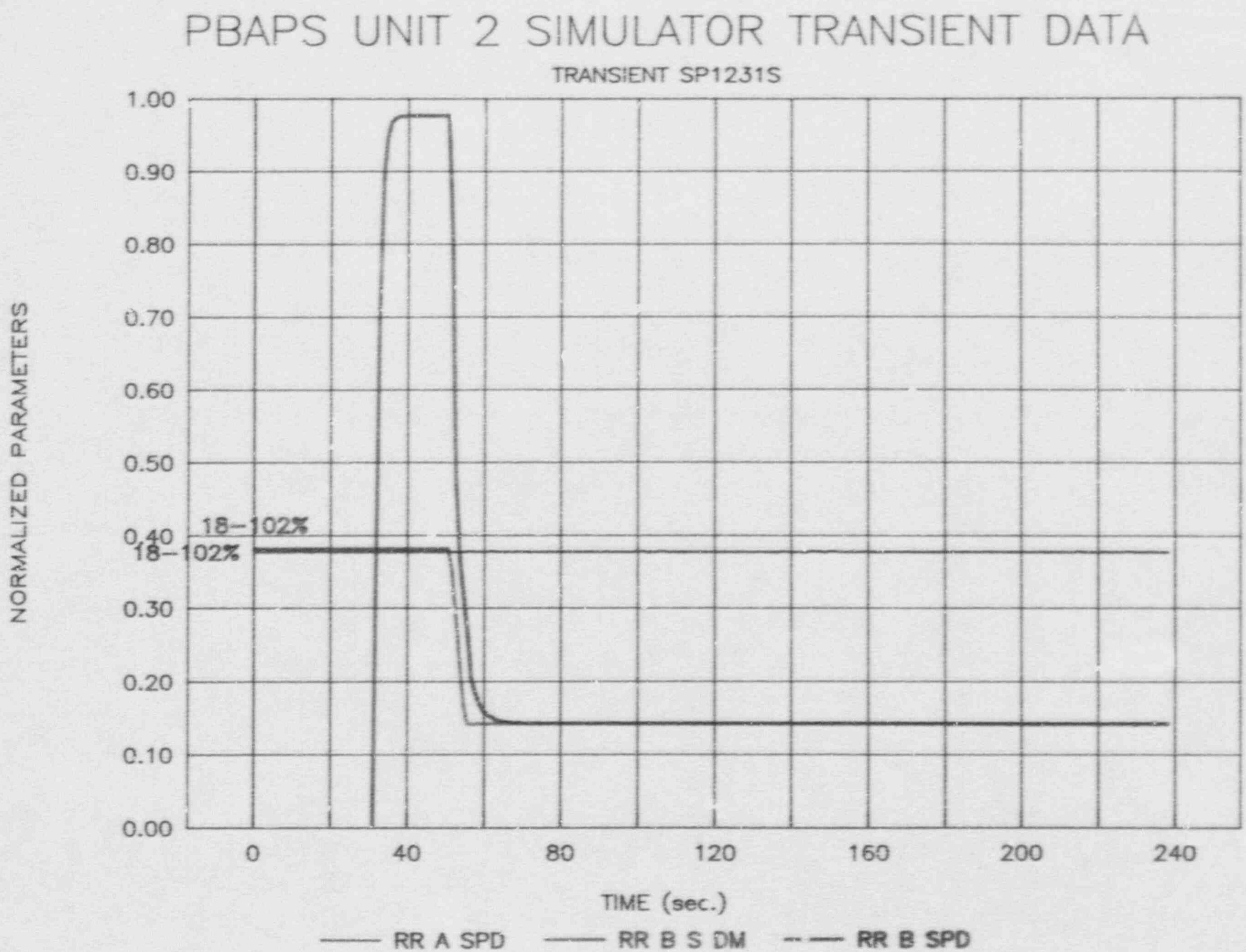
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA



PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT SP1231S




PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT SP1231S
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
18-102%
18-102%
0
40
80
120
160
200
240
TIME (sec.)
RR A SPD
RR B S DM
RR B SPD

PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-SP-1232

SPECIAL PROCEDURE - REACTOR FEEDWATER PUMP TRIP

Prepared by: Bud Havens
Simulator Test Operator
Date: 12/20/90

Approved by: RW Tyler
Lead Test Operator
Date: 1/2/91

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix A, Section A3.3
Perform transient test and compare transient test results to those transients which have occurred in the Reference Plant and for which data is available.

II. TEST ABSTRACT
This performance test will duplicate the test performed during Unit 2 resta ., SP-1232 Feed Pump Trip on the Simulator. Since the Reference Plant test was run as an operating procedure, the Simulator Performance Test will be done as a operating procedure performance test.

II . Test References

A. Other Performance Tests

B. Reference Data

1. SP-1232, Feed Pump Trip

IV. TEST DESCRIPTION

A. Initial Conditions - IC 14 modified to meet the prerequisites and initial conditions of SP-1232

B. Malfunctions used: none

C. Effects

The Simulator will be capable of simulating the response of the Reference Plant to an extent that step-by-step performance of operating procedures will be possible without deleting, skipping, or omitting steps unless they would have been under similar circumstances in the plant. The expected response of the parameters required by the procedure to be observed during the performance of the procedure are considered to be a part of the Reference Plant Performance Data.

D. Documentation

1. Significant Parameters to be Collected

The Significant Parameters for this test are those parameters, indications, and interlocks required by the procedure to be observed during the performance of the procedure; and the following for which transient data was taken during the Reference Plant performance:

a. Narrow Range Level
b. Total Core Flow
c. RFPT A Flow
d. RFPT B Flow
e. RFPT C Flow
f. RFPT B Turbine Speed

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 4 and the DATA1232 dataset.

b. Significant annunciators, indications, and interlocks requiring observation by SP-1232 are to be logged and initialled on the certification copy of the procedure.

E. Terminating Condition:

This test may be terminated when all steps in the procedure which can be performed in the control room have been tested and documented.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test:

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

C. Significant Parameters Acceptance Criteria

1. For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the Reference Plant data collected for that parameter within ±10%, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

2. The Simulator displayed values of all other parameters noted in the procedure having an expected response will meet the expectations of the procedure.

3. The requirements in Section IV.C., EFFECTS, will be met.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 14

2. Maneuver the Simulator IAW GP-5, Power Operation to meet the applicable prerequisite conditions of SP-1232, as modified below:

NOTE: Do NOT secure the 'B' RFPT.

a. APRM power 69±2%

b. Total Core Flow 100±2 MLbm/Hr

3. Obtain a copy of the controlled procedure from the Simulator Controlled Procedures and mark it "Simulator Certification Copy".

B. Performance

1. Perform the operating procedure

a. Prior to the actual trip of the feedwater pump:

(1) place the Simulator in freeze,

SP1232.047

(2) Prepare to collect data IAW Appendix I and Section IV.D.2,

(3) While collecting data IAW Appendix I, take the Simulator out of freeze - then trip the feedwater pump per SP-1232 at approximately 30 sec. after coming out of freeze.

b. SP-1232 steps which are not applicable to the scope of simulation should be marked "N/A".

c. Document the satisfactory performance of SP-1232 steps by initialling the step on the Simulator Certification Copy of the procedure.

d. Steps which result in unsatisfactory performance should be marked in a conspicuous manner indicating the reason, without initials.

e. On any steps requiring the observation of specific parameter or instrument response, log the observed simulator value next to the requirement.

2. The test may be terminated when all procedural steps which can be performed in the control room at this plant condition have been completed.

3. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 1/5/91 Test Performer J. Haven

Date Analyzed 1/14/91 Analysis by B. Haven

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation...	Sat
C. Significant Parameters Acceptance Criteria	
1. Parameters	
a. Narrow Range Level	Sat
b. Total Core Flow	Sat
c. RFPT A Flow	Sat
d. RFPT B Flow	Sat
e. RFPT C Flow	Sat
f. RFPT B Turbine Speed	Sat
2. The Simulator will be capable of simulating the response of the Reference Plant to an extent that step-by step performance ...	Sat

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1.

2.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ✓ Unsat ____

Database updated RH
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ____ NO ____

2. All SDR's resolved, Test Sat:

______________________ ______________________
Test Operator Date

Database updated ______________________
Data Entry

C. Test Reviewed:

RW Tyler 1/14/91
Lead Test Operator Date

D. Test Completed:

M. A. Rosenberg 30 Jan 91
Sim. Support Supv. Date

PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM UNIT 2

Gray
3-1-89

SPECIAL 1232 FEEDPUMP TRIP

SOURCE OF TESTING REQUIREMENT: Restart Power Ascension

Simulator Certification Copy

TEST RESULTS:

A. All of the steps were completed SATISFACTORILY.

PERFORMED BY: ______________________ SIGNATURE ______________ TIME/DATE

PERFORMED BY: ______________________ SIGNATURE ______________ TIME/DATE

INFORMED OF COMPLETION: ______________________ SIGNATURE (A.C.O. or C.O.) ______________ TIME/DATE

REVIEWED BY: ______________________ SIGNATURE (SHIFT MANAGEMENT) ______________ TIME/DATE

B. One or more of the steps were completed UNSATISFACTORILY.

MRF No.______________

______________________ SIGNATURE ______________ TIME/DATE

______________________ SIGNATURE (A.C.O. or C.O.) ______________ TIME/DATE

______________________ SIGNATURE (SHIFT MANAGEMENT) ______________ TIME/DATE

OPTIONAL AT DISCRETION OF SSV: NOTIFY STATION MANAGER OR ALTERNATE OR OTHERS

______________________ NAME OF PERSON NOTIFIED ______________ TIME/DATE

______________________ SIGNATURE (SHIFT MANAGEMENT) ______________ TIME/DATE

Additional action required if other portions of test did not function properly or other discrepancies were noted during test.

1. MRF submitted: MRF No.______________
2. Other:

______________________ SIGNATURE ______________ DATE

REVIEWED BY:

______________________ PLANT STAFF MANAGEMENT ______________ DATE

PURPOSE:

The purposes of this special procedure are to verify that the feedwater control system can satisfactorily control reactor water level when one of the three operating reactor feedpumps is tripped and to provide an opportunity to augment operator training on plant response and procedures during this transient.

With three reactor feedpumps operating in automatic and the reactor at approximatley 70% power, one feedpump will be tripped from the Control Room to demonstrate the feedwater control system can control water level without causing a reactor scram.

REFERENCES:

1. PBAPS BWR Discussion 7.6 Reactor Feed Pumps and Turbine Drives
2. Bechtel P&ID M-308, M-308 F.D. (3 sheets)
3. Control Diagram M-1-S-25
4. Level Diagram G.E. 509E 252 CX
5. E-129 RFPT Control Scheme
6. OT-100 Reactor Low Level

PREREQUISITES: INITIAL/DATE

1. The following tests shall be conducted at the 70% Test Plateau prior to conducting this test:

   A. ST-26.1-2 - Feedwater Control Loop Stability Test — N/A / ______ TEST ENG

   B. ST 26.6-2 - Recirc Flow Controller Stability Test — N/A / ______ TEST ENG

   C. ST 26.7-2 - Pressure Regulator Stability Test — N/A / ______ TEST ENG

2. Three reactor feedpumps operating in automatic with a minimum of two condensate pumps in service. 3 — BR / 1/5/91 TEST ENG

3. Ensure that, as a minimum, PECo Data Acquisition System (DAS) is loaded with signal ID's listed in Appendix A, calibrated, and is ready to record data. GIDDRC DATA 1232 — BR / 1/5/91 TEST ENG

4. Obtain permission from the Shift Management to perform this test. — N/A / ______ Shift Mgmt

5. Obtain permission from the Unit #2 Reactor Operator to perform this test. — N/A / ______ RO

6. Verify a Reactor Engineer is available for the performance of this test. — N/A / ______ RE

7. The load dispatcher has been notified of this test. N/A / ____ CO

8. A shift briefing has been performed for the shift that is doing the test. N/A / ____ SSV

9. The Test Sponsor Engineer (Feedwater System Engineer) and the Unit 2 RO will select which feedpump is to be tripped. Feedpump B BA / 1/5/91 TEST ENG

RESPONSIBILITIES:

1. Test Sponsor Engineer will provide in-plant direction of this test and is responsible to review the results of this test.

TEST EQUIPMENT:

1. PECo Data Acquisition System (DAS)

PRECAUTIONS:

1. If Reactor water level decreases to +10 inches during this test, terminate this test and enter OT-100 - Reactor Low Level.

2. A reactor recirc pump runback may occur during this transient if recirc pump speed is greater than 60% and a low reactor vessel water level alarm occurs (+17 inches). If a runback occurs during this test it will be considered as a normal response to the pump trip.

PROCEDURE:

1. Initial Conditions - 70% (±5%) CTP
CTP 67.7 % BA / 1/5/91 TEST ENG.

2. Obtain an Initial Conditions Histogram output from the transient recorder (DAS) and attach the output to this procedure as Data Sheet 1. GINARC Pre Trip DATA BA / 1/5/91 TEST ENG

3. Verify no base crits exist at the limiting MCPR core location - resolve with Reactor Engineer if necessary. NA / ____ TEST ENG

4. Obtain a process computer edit OD-3, Opt. 2. Attach it to this procedure as Data Sheet 2. BA / 1/5/91 TEST ENG

5. Raise reactor water level to +27 inches by adjusting the level set on the feedwater master level controller. BA / 1/5/91 TEST ENG

6. Notify plant personnel over the PA system that a feedpump will be tripped.

N/A / ______
TEST ENG

```
**************************************************
*                  CAUTION:                      *
*If reactor water level decreases to +10 INCHES *
*during this test, terminate this test and enter*
*OT-100 Reactor Low Level.                       *
**************************************************
```

7. Initiate a countdown to the pump trip such that the transient recorder (DAS) will be started and record 10 seconds of data before the trip is initiated. Trip the selected feedpump from the Control Room.

GINDAC 30 sec 5 data
SP1232.DAT

BR / 1/5/91
TEST ENG

8. Water level decreased to +10 yes ____ no __✓__

BR / 1/5/91
TEST ENG

9. Reactor recirc pump runback may occur during this transient if recirc pump speed is greater than 60% and a reactor low level alarm (+17 inches) occurs.

Recirc runback did occur yes____ no__✓__

BR / 1/5/91
TEST ENG

10. When reactor water level recovers to +27" and stabilizes, stop the transient recorder. Attach this data as Data Sheet 3.

GINDAC secured

BR / 1/5/91
TEST ENG

11. Obtain a process computer edit OD-3, Opt. 2. Attach it to this procedure as Data Sheet 4.

BR / 1/5/91
TEST ENG

12. Restore reactor water level to +23".

BR / 1/5/91
TEST ENG

13. Inform Shift Management that the feedpump trip testing is complete and the plant may be restored to previous operating status or as schedule requires.

NA / ______
TEST ENG

14. If a reactor scram did not occur or manual control was not required to prevent a scram during the transient, this test is satisfactory.
__✓__SAT ______ UNSAT

BR / 1/5/91
TEST ENG

15. Reactor water level stabilizes at +27" within 5 minutes.
    ✓ Sat ____ Unsat

BM / 1/14/91
TEST ENG

```
************************************************
*                   NOTE                       *
*                                              *
*The Test Sponsor Engineer will review         *
*the transient data from the test to determine*
*if recommendations need to be made to improve*
*the response of feedwater control for future *
*transients.                                   *
************************************************
```

FEEDPUMP TRIP

DATA SHEET 1

HISTOGRAM

STEP 2

FEEDPUMP TRIP

DATA SHEET 2

OD-3, OPTION 2

CORE THERMAL POWER AND APRM CALIBRATION

STEP 4

FEEDPUMP TRIP

DATA SHEET 3

TRANSIENT RECORDER (DAS)

STEP 10

FEEDPUMP TRIP

DATA SHEET 4

OD-3, OPTION-2

CORE THERMAL POWER AND APRM CALIBRATION

STEP 11

APPENDIX A
DAS SAMPLE PLAN

Point ID.	Description
NR LVL	Narrow Range Level
NR PR	Narrow Range Pressure
APRM A	APRM A
TOT WT	Total Core Flow
TOT FW	Total Feedwater Flow
TOT WS	Total Steam Flow
FW AFLO	Feedwater Flow A
FW BFLO	Feedwater Flow B
FW CFLO	Feedwater Flow C
RFPT RPM A	Feedpump A Speed
RFPT RPM B	Feedpump B Speed
RFPT RPM C	Feedpump C Speed
LVL CONT	Master Level Controller Output
FWFG OA	Function Generator A Output
FWFG OB	Function Generator B Output
FWFG OC	Function Generator C Output

H

D APRM CALIBRATION. 04/05/91 0024 PEACH BOTTOM UNIT 2

WT	WTHB	WTSUB	WD	WTFLAG	IREC	IEQL
102.26	102.92	107.00	31.33	1.00	0	0

DPC-M	WFW	HFW	HD	DHS	CAEQ	CAQA
16.56	8.58	311.97	523.84	17.01	0.0777	0.0977

E	B	D	F
73.50	71.67	69.95	71.58
0.916	0.940	0.963	0.941

20.72	34.24	51.40	65.07
103.50	107.62	128.50	190.56

QCU	QRAD	QPUMP	TFW
6.09	0.60	7.10	339.91

HG	HS	WCR	WCR
1193.30	1193.30	0.0300	84.40

HCU2	TD	REFCTP	RATCTP
391.76	530.34	3293.00	3293.00

0.00909	0.00963	0.00916	0.00941
100.00	100.00	100.00	100.00

30.50	35.50	39.00	42.50
76.00	86.50	95.00	102.5

SD
RE3C
Rimd
BM

Data Sheet 4

OD-3. CORE THERMAL POWER AND APRM CALIBRATION. 01/05/94 0024 PEACH BOTTOM UNIT 2

GMWE	CMWT	WT	WTHN	WTSUB	WD	WTFLAG	IREC	IEOL
696.22	2217.95	102.26	102.92	107.00	31.33	1.00	0	0

PR	RHI	DFC-H	MFW	HFW	HD	DHS	CAEQ	CAQA
974.12	26.45	18.54	8.58	311.97	523.84	17.01	0.0777	0.0977

	A	C	E	B	D	F
RAP	68.13	74.06	73.50	71.67	69.95	71.58
AGAF	0.989	0.909	0.916	0.930	0.963	0.941

IB 1

RAPL	-190.56	5.01	20.72	34.24	51.40	65.07
	76.22	90.21	102.58	107.42	128.50	190.56

FAILED SENSOP LIST.
0

QFW	QCR	QCU	QRAD	QPUMP	TFW
2208.64	9.71	6.09	0.60	7.10	339.91

HF	HFG	HG	HS	WCR	HCR
540.05	652.45	1193.30	1193.30	0.0300	84.40

WCU	HCU1	HCU2	ID	REFCTP	EATCTP
0.4500	530.39	391.76	530.34	3293.00	3293.00

PPW 3.55 3.55

CAP	0.00989	0.00940	0.00909	0.00963	0.00916	0.00941
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00
WDC	14.50	25.00	30.50	35.50	39.00	42.50
WTC	46.50	64.00	76.00	86.50	95.00	102.5

RN CALIBRATION.   01/05/91   0014   PEACH BOTTOM UNIT 2

M	WTHR	WTSUB	WD	WTFLAG	TREC	IEAL
.20	100.86	106.76	31.33	1.00	0	0
-M	WFW	HFW	HD	DHS	CAFA	CAQA
.54	8.60	310.25	523.66	17.22	0.0779	0.0984
E	B	D	F			
.84	72.00	76.30	71.93			
.916	0.940	0.962	0.941			
.72	34.26	51.40	65.40			
.50	107.66	120.51	190.08			
CU	QRAD	QPUMP	TFW			
.09	0.60	7.10	338.46			
HG	HS	WCR	HCR			
.29	1193.29	0.0300	84.40			
CU2	TD	REFCTP	RATCTP			
.62	530.15	3293.00	3293.00			
.00909	0.00762	0.00916	0.00947			
.00	100.00	100.00	100.00			
.50	35.50	39.00	42.50			
.00	86.50	95.00	102.5			

Data Sheet 2

01/05/91

OD-3. CORE THERMAL POWER AND APRM CALIBRATION. 01/05/91 0014 PEACH BOTTOM UNIT 2

GMWE	CMWT	WT	WTHP	WTSUB	WD	WTFLAG	IREC	IEAL
697.90	2228.02	102.20	100.86	106.76	31.33	1.00	0	0

PR	RWL	DPC-M	WFW	HFW	HD	DHS	CAEQ	CAQA
974.30	21.94	18.54	8.60	310.25	523.66	17.22	0.0779	0.0981

	A	C	E	B	D	F
RAP	68.55	74.40	73.84	72.00	70.30	71.93
AGAF	0.987	0.909	0.916	0.940	0.962	0.941

IB 1

RAPL	190.88	5.01	20.72	34.26	51.40	65.10
	76.35	90.22	103.58	107.66	120.51	190.88

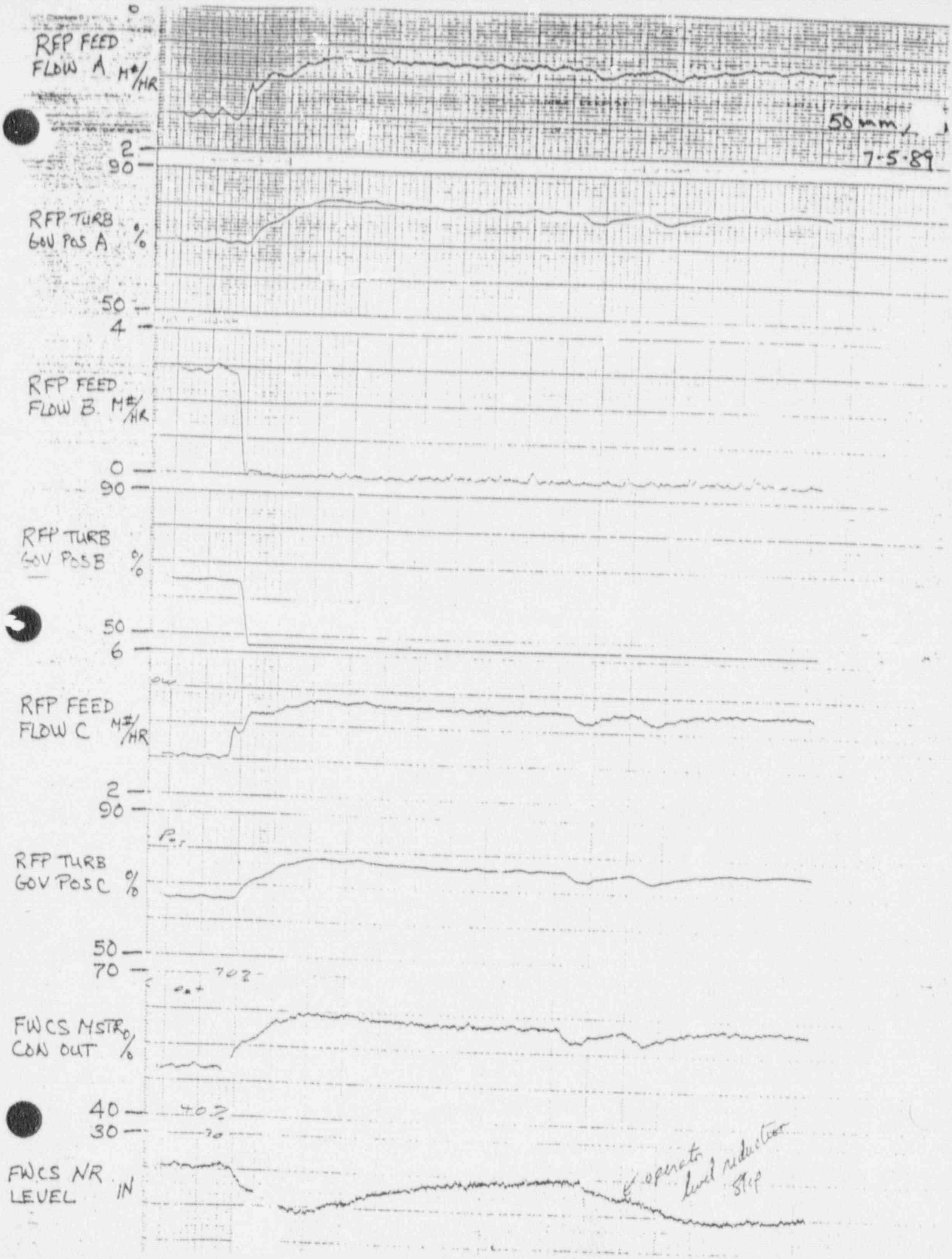
FAILED SENSOR LIST.
0

QFW	QCR	QCU	QRAD	QPUMP	TFW
2218.71	9.71	6.09	0.40	7.10	339.46

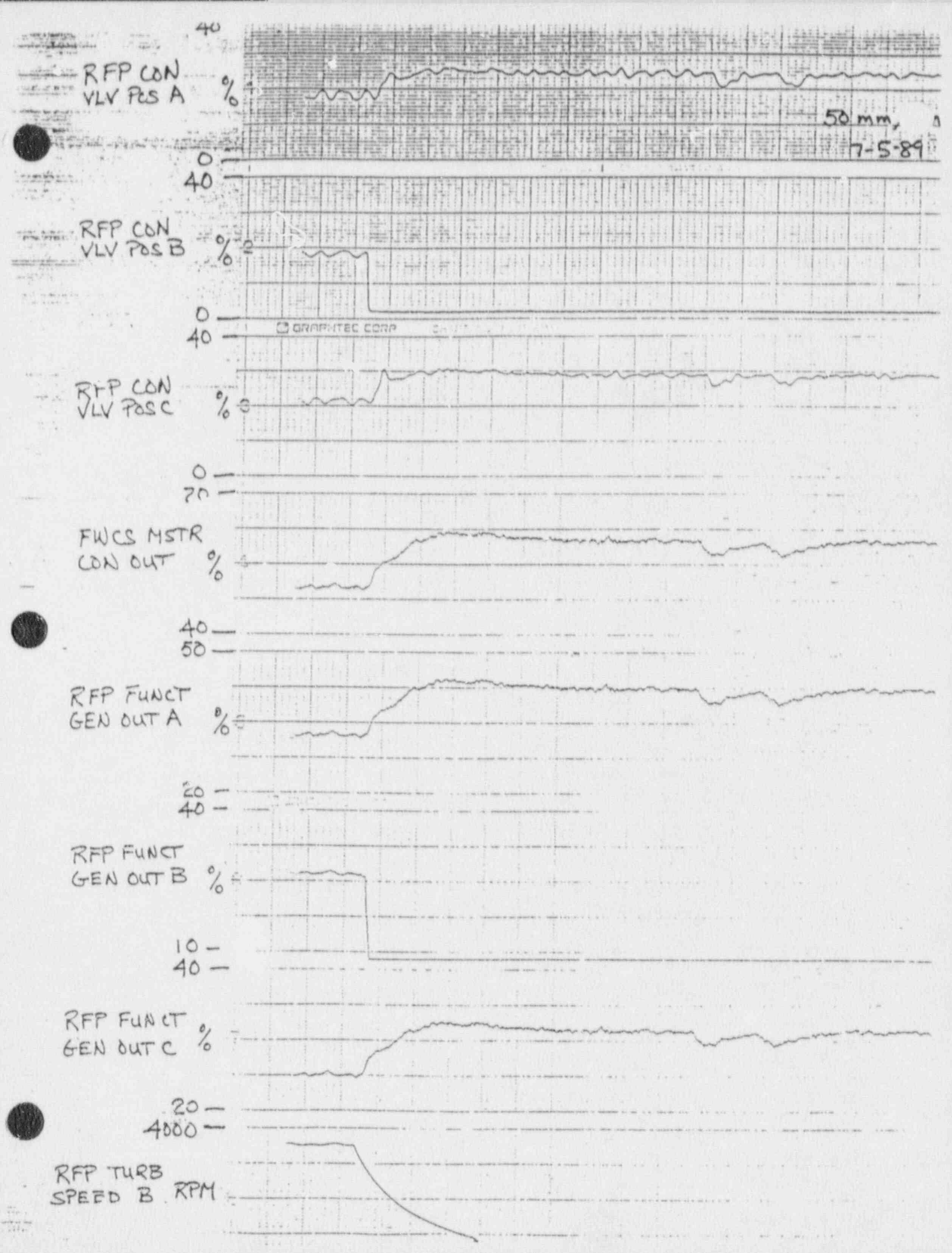
HF	HFG	HG	HS	WCP	HCR
540.88	652.41	1193.29	1193.29	0.0300	84.40

WCU	HCU1	HCU2	TP	RECTP	RATCTP
0.1500	530.20	391.62	530.15	3293.00	3293.00

PPW	3.55	3.54				
CAP	0.00987	0.00940	0.00909	0.00962	0.00916	0.009 1
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00
WDC	14.50	25.00	30.50	35.50	39.00	42.50
WTC	46.50	64.00	76.00	86.50	95.00	102.5

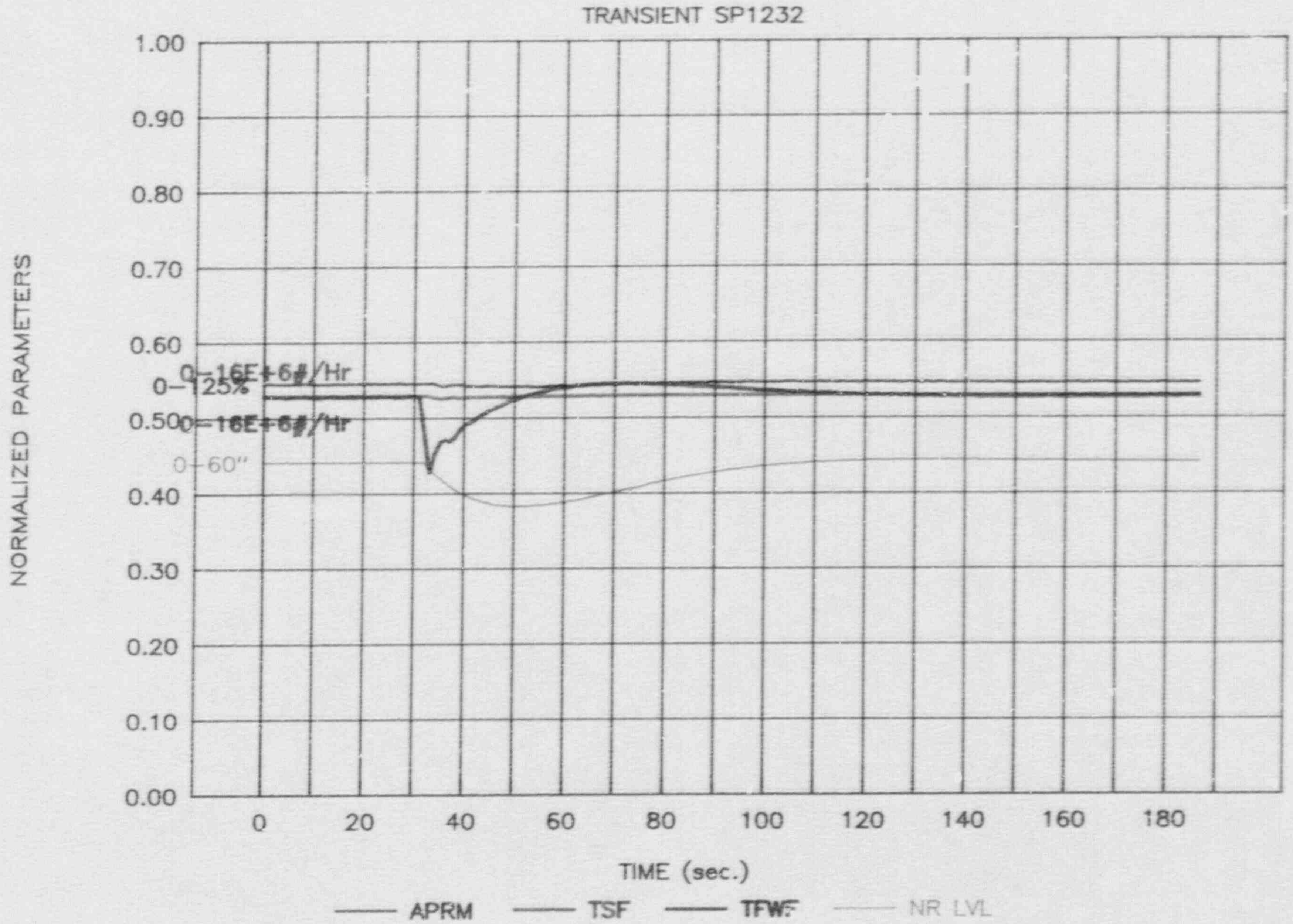


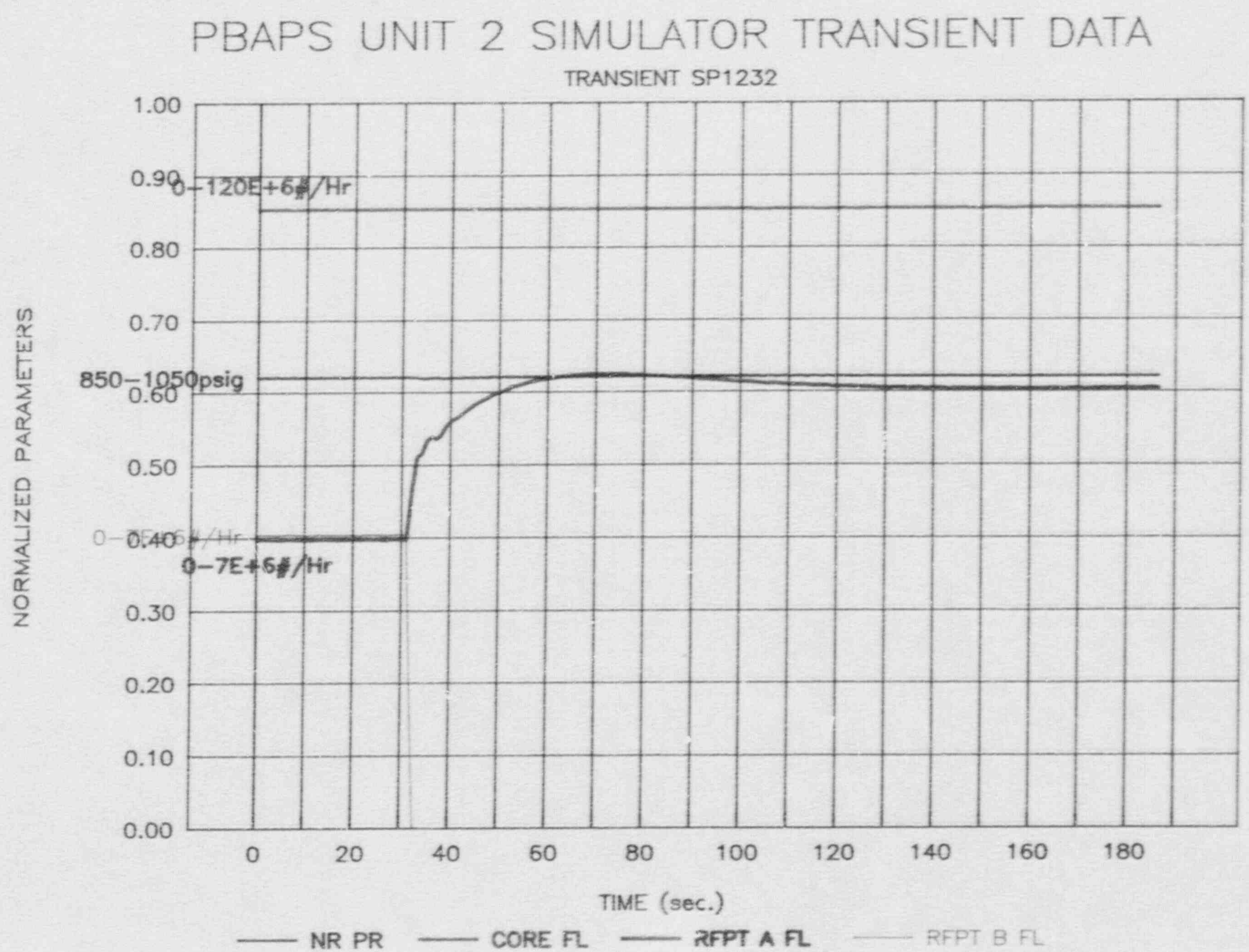
0
RFP FEED FLOW A M#/HR
2
90
50 mm/
7-5-89
RFP TURB GOV POS A %
50
4
RFP FEED FLOW B. M#/HR
0
90
RFP TURB GOV POS B %
50
6
RFP FEED FLOW C M#/HR
2
90
RFP TURB GOV POS C %
50
70
70%
FWCS MSTR CON OUT %
40
40%
30
FWCS NR LEVEL IN
operator level reduction step



RFP CON VLV POS A %
40
0
50 mm,
7-5-89
RFP CON VLV POS B %
40
0
GRAPHTEC CORP
RFP CON VLV POS C %
40
0
FWCS MSTR CON OUT %
70
40
RFP FUNCT GEN OUT A %
50
20
RFP FUNCT GEN OUT B %
40
10
RFP FUNCT GEN OUT C %
40
20
RFP TURB SPEED B RPM
4000

PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

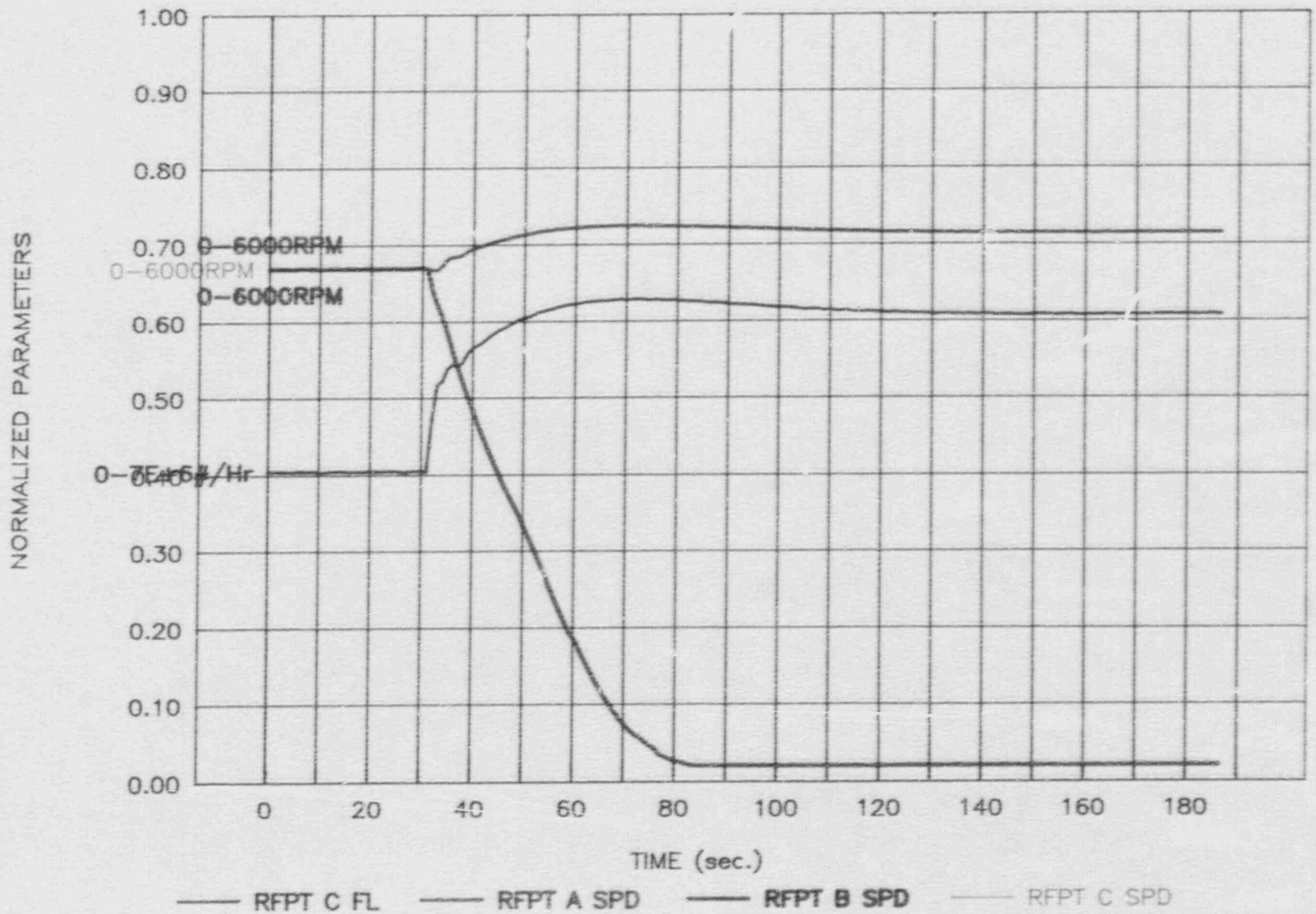




PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT SP1232
0-120E+6#/Hr
850-1050psig
0-7E+6#/Hr
0-7E+6#/Hr
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
20
40
60
80
100
120
140
160
180
TIME (sec.)
NR PR
CORE FL
RFPT A FL
RFPT B FL

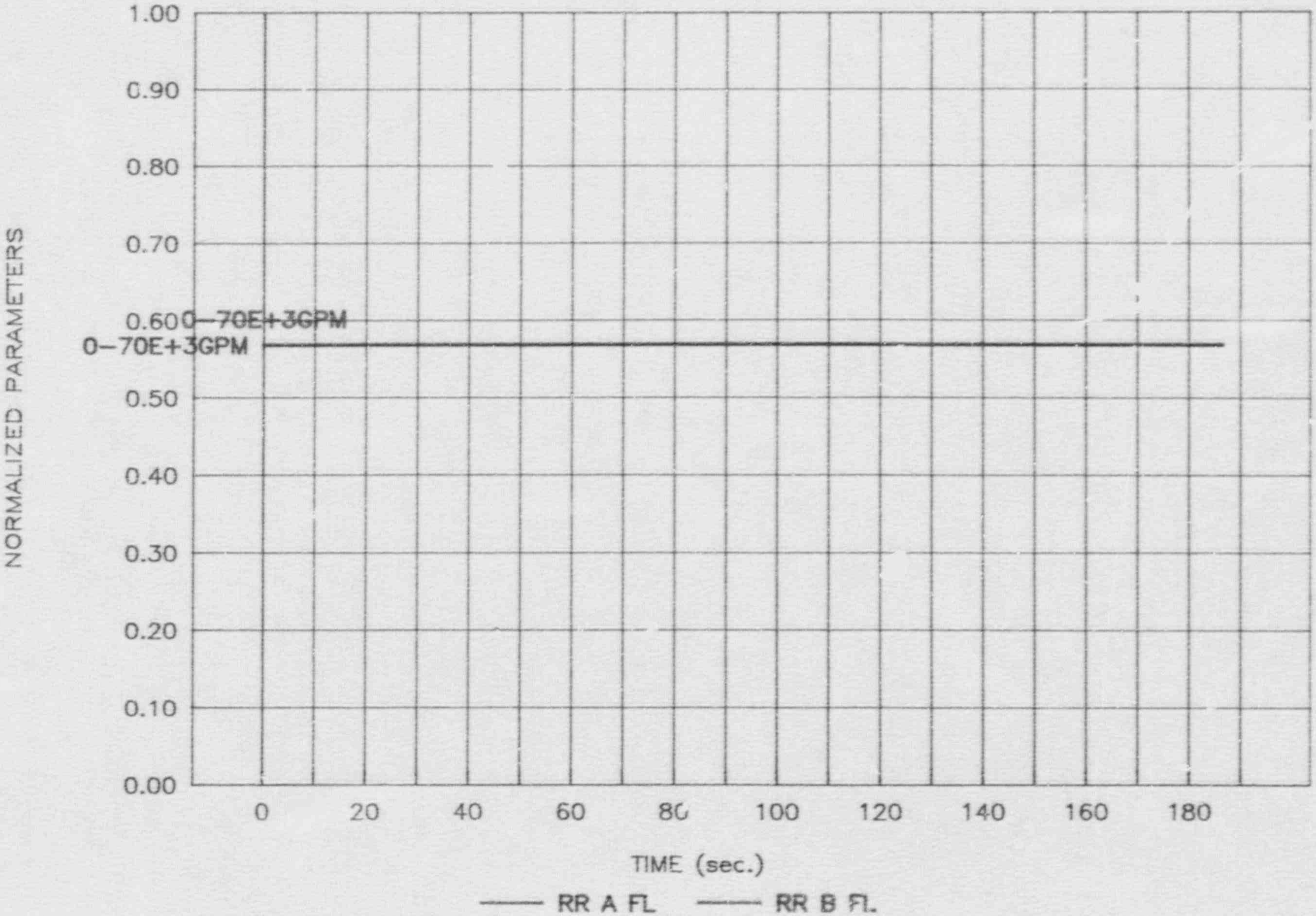
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT SP1232



PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT SP1232



PBAPS SIMULATOR TRANSIENT PERFORMANCE TEST

STPT-SP-1233

SPECIAL PROCEDURE -
TURBINE TRIP WITHIN BYPASS VALVE CAPACITY

Prepared by: Bud Havens — Simulator Test Operator — Date: 12/26/90

Approved by: R. W. Tyler — Lead Test Operator — Date: 1/2/91

I. TEST REQUIREMENT
SIMULATOR OPERABILITY TRANSIENT PERFORMANCE TEST
ANS-3.5 Appendix A, Section A3.3
Perform transient test and compare transient test results to those transients which have occurred in the Reference Plant and for which data is available.

II. TEST ABSTRACT
This performance test will duplicate the test performed during Unit 2 restart, SP-1233 Turbine Trip within Bypass Valve Capacity on the Simulator. Since the Reference Plant test was run as an operating procedure, the Simulator Performance Test will be done as a operating procedure performance test.

III. Test References

A. Other Performance Tests

B. Reference Data

1. SP-1233, Turbine Trip within Bypass Valve Capacity

IV. TEST DESCRIPTION

A. Initial Conditions - IC 14 modified to meet the prerequisites and initial conditions of SP-1233

B. Malfunctions used: none

C. Effects

The Simulator will be capable of simulating the response of the Reference Plant to an extent that step-by-step performance of operating procedures will be possible without deleting, skipping, or omitting steps unless they would have been under similar circumstances in the plant. The expected response of the parameters required by the procedure to be observed during the performance of the procedure are considered to be a part of the Reference Plant Performance Data.

D. Documentation

1. Significant Parameters to be Collected

The Significant Parameters for this test are those parameters, indications, and interlocks required by the procedure to be observed during the performance of the procedure; and the following for which transient data was taken during the Reference Plant performance:

a. APRM
b. Total Steam Flow
c. Total Feedwater Flow
d. Narrow Range Level
e. Narrow Range Pressure
f. Total Core Flow
g. Turbine Trip
h. Total Turbine Bypass Valve Position
i. Total Turbine Control Valve Position

2. Data Collection Methods:

a. Significant Analog parameters are to be collected using the GINDAC method described in Appendix I; use suspend level 4 and the DATA1233 dataset.

b. Significant annunciators, indications, and interlocks requiring observation by SP-1233 are to be logged and initialled on the certification copy of the procedure.

E. Terminating Condition:

This test may be terminated when all steps in the procedure which can be performed in the control room have been tested and documented.

V. ACCEPTANCE CRITERIA

The following Criteria are to be used to judge the acceptability of the results of this test:

A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that, within the accuracies listed under Steady-State and Normal Operations Test Criteria (Appendix D), the operator will not observe a difference between the response of the simulator and reference plant control room instrumentation, and shall not violate the physical laws of nature.

B. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation. If simulation is interrupted because of non-real time operation, the status message on a Simulator computer ISD/IST monitor will read FAIL.

C. Significant Parameters Acceptance Criteria

1. For each of the Significant parameters listed in Section IV.D.1 above; the response of the parameter match the Reference Plant data collected for that parameter within ±10%, as long as the response does not cause or fail to cause an automatic action or alarm if the Reference Plant would have or not have caused the automatic action or alarm.

2. The Simulator displayed values of all other parameters noted in the procedure having an expected response will meet the expectations of the procedure.

3. The requirements in Section IV.C., EFFECTS, will be met.

VI. PROCEDURE

A. Preparation

1. Reset the Simulator to IC 12

2. Maneuver the Simulator IAW GP-2, Normal Plant Startup or GP-3, Normal Plant Shutdown to meet the applicable prerequisite conditions of SP-1233, as modified below:

   a. APRM power 18±2%

3. Obtain a copy of the controlled procedure from the Simulator Controlled Procedures and mark it "Simulator Certification Copy".

B. Performance

1. Perform the operating procedure

   a. Instead of step 13:

      (1) place the Simulator in freeze,

      ~~Data~~ SP1233.DAT

      (2) Prepare to collect data IAW Appendix I and Section IV.D.2,

      (3) While collecting data IAW Appendix I, take the Simulator out of freeze, allowing it to run for approximately 30 sec., then trip the Main Turbine per SP-1233.

   b. SP-1233 steps which are not applicable to the scope of simulation should be marked "N/A".

   c. Document the satisfactory performance of SP-1233 steps by initialling the step on the Simulator Certification Copy of the procedure.

   d. Steps which result in unsatisfactory performance should be marked in a conspicuous manner indicating the reason, without initials.

e. On any steps requiring the observation of specific parameter or instrument response, log the observed simulator value next to the requirement.

2. The test may be terminated when all procedural steps which can be performed in the control room at this plant condition have been completed.

3. Assemble Test Data for Analysis.

VII. RESULTS ANALYSIS

Date of Test 01/05/90 Test Performer B Hansen

Date Analyzed 1/14/91 Analysis by B Hansen

Prepare a plot of the collected data in accordance with Appendix I. Using the plotted parameter data and observation notes taken, mark Sat or Unsat to indicate that each Acceptance Criteria listed below criteria is or is not met.

Criteria	Sat/Unsat
A. The response of the Simulator resulting from operator action, automatic plant controls and inherent operating characteristics will be such that...	Sat
B. The Simulator will operate in real time as indicated by the test being completed without interruption of simulation...	[illegible] Sat
C. Significant Parameters Acceptance Criteria	
1. Parameters	
a. APRM	Sat
b. Total Steam Flow	Sat
c. Total Feedwater Flow	Sat
d. Narrow Range Level	Sat
e. Narrow Range Pressure	Sat
f. Total Core Flow	Sat
g. Turbine Trip	Sat
h. Total Turbine Bypass Valve Position	Sat
* i. Total Turbine Control Valve Position	Sat
2. The Simulator will be capable of simulating the response of the Reference Plant to an extent that step-by step performance ...	Sat

* Note: on traces, simulator data collection for Total control valve position switches to Turbine Speed if a turb. trip is present.

VIII. CORRECTIVE ACTION

A. For any of the Criteria analyzed in VI. or VII. as Unsat, submit a Simulator Discrepancy Report (SDR) in accordance with TP-162. If any Unsat is recorded, designate the Performance Test Certification Status in the (appropriate) Performance Test Database as Unsat.

B. List all Unsat's and the assigned Work Order Number:

1.

2.

C. If complete retest is required following SDR resolution, indicate by marking the appropriate blank in the Completion section.

IX. TEST COMPLETION

A. Performance Test completed: SAT ✓ Unsat ____

Database updated ____ 6A ____
Data Entry

B. Followup required for Unsat Results

1. Complete Retest required: YES ____ NO ____

2. All SDR's resolved, Test Sat:

____________________ ____________________
Test Operator Date

Database updated ____________________
Data Entry

C. Test Reviewed:

R.W. Tyler 1/28/91
Lead Test Operator Date

D. Test Completed:

M.A. Rosaley 30 JAN 91
Sim. Support Supv. Date

PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM UNIT 2
SP 1233 TURBINE TRIP WITHIN BYPASS VALVE CAPACITY

2-15-89
Simulator Certificate Copy

SOURCE OF TESTING REQUIREMENT: Restart Power Ascension

TEST RESULTS:

A. All of the steps were completed SATISFACTORILY.

PERFORMED BY: ______________________ ______________
SIGNATURE TIME/DATE

PERFORMED BY: ______________________ ______________
SIGNATURE TIME/DATE

INFORMED OF COMPLETION: ______________________ ______________
SIGNATURE (A.C.O. or C.O.) TIME/DATE

REVIEWED BY: ______________________ ______________
SIGNATURE (SHIFT MANAGEMENT) TIME/DATE

B. One or more of the steps were completed UNSATISFACTORILY.

MRF No. ______________

______________________ ______________
SIGNATURE TIME/DATE

______________________ ______________
SIGNATURE (A.C.O. or C.O.) TIME/DATE

______________________ ______________
SIGNATURE (SHIFT MANAGEMENT) TIME/DATE

OPTIONAL AT DISCRETION OF SSV: NOTIFY STATION MANAGER OR ALTERNATE OR OTHERS

______________________ ______________
NAME OF PERSON NOTIFIED TIME/DATE

______________________ ______________
SIGNATURE (SHIFT MANAGEMENT) TIME/DATE

Additional action required if other portions of test did not function properly or other discrepancies were noted during test.

1. MRF submitted: MRF No. ______________
2. Other:

______________________ ______________
SIGNATURE DATE

REVIEWED BY:

______________________ ______________
PLANT STAFF MANAGEMENT DATE

PURPOSE:

The purpose of this procedure is to test the operability and performance of the plant to a Main Turbine trip within Bypass Valve (BPV) capacity.

Acceptance Criteria: For a Turbine Trip within BPV capacity, the Rx shall not scram.

REFERENCES:

1. S.6.3.1.B Main Turbine Generator Shutdown
2. M-1-S-54 GE Elementary Diagram Sheets 2, 4, 6, 9 & 11

PREREQUISITES:

INITIAL/DATE

1. Any individual who initials or signs this procedure shall fill out Appendix B.
2. The following tests shall have been performed prior to conducting this test.
   - A. ST-25.7-2 - Pressure Regulator Stability Test at 35% Rx Pwr. N/A ____/____
   - B. RT 5.8 - Closure of Combined Intermediate Valves N/A ____/____
   - C. RT 5.9 - Exercising of Turbine Bypass Valves N/A ____/____
   - D. RT 5.0 - Individual Full Closure of Main Turbine Stop Valves N/A ____/____
   - E. RT 5.37 - Pressure Check of EHC Accumulators N/A ____/____
   - F. RT 5.14 - Closure of Control Valves N/A ____/____
3. Ensure that as a minimum, PECo Data Acquisition System (DAS) has been loaded with signal ID's listed in Appendix A, calibrated and is ready to record data. GINDAC DATA1233 ____/____
4. A Shift Briefing has been completed, including a discussion of actions to be followed if BPV capacity is exceeded with and without a Scram occurring. N/A ____/____
5. Request permission of Shift Management to begin test. N/A ____/____ Shift Management
6. Request permission of RO to begin test. N/A ____/____ RO
7. Notify the Load Dispatcher of the impending Turbine Trip. N/A ____/____ CO
8. Reactor operating at steady state power between 20% and 25% Rated Thermal Power (658 MWth to 813 MWth via OD-3 opt 2).
   Plant DATA TAKEN at 18% BD ____/ 01/15/91 RO

SPECIAL EQUIPMENT REQUIRED:

1. PECo Data Acquisition System (DAS)

RESPONSIBILITIES:

1. The Test Director for this procedure is the Main Turbine System Engineer. He will conduct the shift briefing, provide the in-plant direction for the test performance and prepare the test results.

2. Throughout this entire procedure the Shift Manager retains overall authority to abort this test if he feels the plant, personnel or equipment are in jeopardy.

PRECAUTIONS:

1. If an abnormal condition is encountered during the performance of this test, place the system in a safe condition, terminate the test and investigate the cause.

2. If BPV capacity is exceeded, then RPV pressure will increase. If a Scram has not occurred exit this procedure and enter the appropriate Operational Transient (OT) procedure: Rx High Pressure (OT-102), Positive Reactivity Insertion (OT-104), or Inadvertent Opening of a Relief Valve (OT-114) and execute.

3. If a Scram s ·ld occur, enter the Rx Scram procedure (T-100).

PROCEDURE:

NOTE
During the performance of this test, the Test Director may stop and restart the PECo DAS at his discretion.

1. Record the following:

					Instrument No. or Source
CORE FLOW	44.93	M lb/hr	43.83	% Rated	DDS
Rx THERMAL POWER	652.27	MWt	19.82	% Rated	DDS
GENERATOR POWER	143.71	MWe	13.12	% Rated	DDS
Rx PRESSURE	914.72	PSIG			DDS
					____ / ____

2. Perform partial procedure S.6.3.1.B, Main Turbine Generator Shutdown, as applicable, steps 1 thru 9. NA / ____

3. Verify House Loads are transferred to Offsite Power per S.8.3.C. BN / 01/05/91
CO

4. Verify on panels 20C015 and 20C017 RPS relays 5A-K9A thru D (CV Fast Closure Turbine Stop Valve Scram Bypass) are energized. BA / 01/5/91
CO

5. Verify "TURB STOP VLV & CONTROL VLV FAST CLOSURE SCRAM BYPASS" alarm (A-2 on 20C205L) is illuminated. BA / 01/5/91
RO

6. Verify all Turbine Bypass Valves are CLOSED. BA / 01/5/91

7. Obtain a Histogram from DAS transient recorder and attach the output to this procedure as Data Sheet 1. GINDAC Plot, Initial Data BA / 01/5/91

8. Utilizing the Process Computer, run OD-3, Option 2 Attach it to this procedure as Data Sheet 2. BA / 01/5/91

9. Record CMWT (Core Megawatts Thermal) from OD-3.

   CMWT = 652.07 MWt BA / 01/5/91

10. Calculate % Rated Thermal Power.

$$\% \text{ Rated Thermal Power} = \frac{\text{CMWT}}{3293} \times 100 = \underline{19.80}\ \%$$

BA / 1/5/91

11. Notify plant personnel over the PA system that the Main Turbine will be tripped for testing. NA / ____

12. Start the transient recorder and obtain at least 10 seconds of steady state data prior to tripping the Main Turbine. 30 sec
SS - GINDAC BA / 1/5/91
SP 1233.DAT

CAUTION:
THE FOLLOWING STEP WILL CAUSE A MAIN TURBINE TRIP. IF A RX SCRAM SHOULD OCCUR, THEN RECOVER IN ACCORDANCE WITH THE REACTOR SCRAM PROCEDURE (T-100).

13. At panel 20C008A, depress the Main Turbine Trip pushbutton. BA / 1/5/91

14. If "Reactor High Press" alarm is received (20C205L G-2), then enter OT-102 and exit this procedure. (Mark N/A if alarm is not received.) NA / ____
RO

15. If "APRM High" alarm is received (20C205R B-2), then enter OT-104 and exit this procedure. (Mark N/A if alarm is not received.) NA / ____
RO

16. When Rx parameters (pressure, water level and power) have stabilized, terminate data recording and mark the PECo DAS recorder charts with time, date, step # and initials. GINDAC DC. secured BA / 1/5/91

17. Utilizing the Process Computer, run OD-3, Option 2. Attach it to this procedure as Data Sheet 3. BA / 1/5/91

18. Record CMWT.

CMWT = 654.92 MWt BA / 1/5/91

19. Calculate % Rated Thermal Power.

$$\% \text{ Rated Thermal Power} = \frac{\text{CMWT}}{3293} \times 100 = 19.89 \%$$

BA / 1/5/91

20. Record from panel 20C008B the position of each BPV:

BPV-1	100 %	BPV-6	0 %
BPV-2	100 %	BPV-7	0 %
BPV-3	100 %	BPV-8	0 %
BPV-4	100 %	BPV-9	0 %
BPV-5	92 %		

BA / 1/5/91

21. Total BPV position from POR-2660 (Black pen) on 20C008A.

Record Total BPV position 54 % BA / 1/5/91

22. Restore the plant in accordance with Shift Manager directions referring to:

a. S.6.3.1.B Main Turbine Generator Shutdown

b. GP-3 Normal Plant Shutdown. NA /

ACCEPTANCE CRITERIA:

1. Verify that for a Turbine Trip within the Bypass Valves capacity (25% of Rated Thermal Power), the reactor did not scram. BA / 1/5/91

APPENDIX A

DAS SAMPLE PLAN

Point ID.	Description
NR LVL	Narrow Range Level
NR PR	Narrow Range Pressure
TOT WT	Total Core Flow
STF	Total Steam Flow
TOT FW	Total Feedwater Flow
APRM A	APRM A
APRM C	APRM C

Turbine Valve Position Indication

Turbine Bypass Valve 1
Turbine Bypass Valve 2
Turbine Bypass Valve 3
Turbine Bypass Valve 4
Turbine Bypass Valve 5
Turbine Bypass Valve 6
Turbine Bypass Valve 7
Turbine Bypass Valve 8
Turbine Bypass Valve 9
Total Turbine Bypass Valve Position
Turbine Control Valve 1
Turbine Control Valve 2
Turbine Control Valve 3
Turbine Control Valve 4
Total Turbine Control Valve Position
Turbine Stop Valve 1
Turbine Stop Valve 2
Turbine Stop Valve 3
Turbine Stop Valve 4
Total Stop Valve Position

Turbine Trip

EHC Pressure

APPENDIX B

SIGNATURE VERIFICATION SHEET

A. List of individuals making Test entries:

PRINTED NAME	SIGNATURE	INITIALS	TITLE

WTC	46.50	64.00	76.00	86.50	95.00	102.50

01/05/91

OD-3. CORE THERMAL POWER AND APRM CALIBRATION. 01/05/91 0029 PEACH BOTTOM UNIT 2

GWUE	CMWT	WT	WTHB	WTSUB	WD	WTFLAG	IREC	IEQL
143.71	652.27	44.93	45.09	46.28	12.22	1.00	0	0

PR	PWL	DPC H	WFW	HFW	HD	DHS	CAEQ	CAQA
914.72	23.24	3.58	1.98	94.31	513.84	17.58	0.0350	0.0287

	A	C	E	B	D	F
RAP	19.34	18.24	18.18	18.18	18.36	19.08
AGAF	1.024	1.085	1.090	1.090	1.079	1.038

IB 1

RAPL	-183.93	4.32	17.36	30.54	43.23	58.97
	73.57	77.81	84.82	96.05	108.08	183.93

FAILED SENSOR LIST.
0

QFW	QCR	QCU	QRAD	QPUMP	TFW
637.42	9.73	5.96	0.59	1.43	105.18

HF	HFG	HG	HS	WCR	HCR
531.42	663.95	1195.37	1195.37	0.0300	84.40

WCU	HCU1	HCU2	TD	REFCTP	RATCTP
0.1500	520.80	385.15	520.67	3293.00	3293.00

PPW	0.72	0.72				
CAP	0.01024	0.01090	0.01035	0.01079	0.01090	0.01038
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00
WBC	16.50	25.00	30.50	35.50	37.00	42.50
WTC	46.50	64.00	76.00	84.50	95.00	102.50

.00	8[illegible]	95.00	102.50

PRM CALIBRATION. 01/05/91 0029 PEACH BOTTOM UNIT 2

WD	WTHP	WTSUB	HD	WTFLOG	IREC	ICAL
.93	5.89	66.28	12.22	1.00	0	0

C-H	WFW	HFW	HD	DHS	CAE0	CA0A
3.58	1.99	94.31	513.84	17.58	0.0350	0.0287

E	B	D	F
18.18	18.18	18.36	19.08
1.090	1.090	1.079	1.038

17.34	30.56	43.23	58.97
36.82	76.05	108.08	133.93

QCU	QRAD	QPUMP	TFW
5.96	0.59	1.43	105.19

HG	HS	WCR	HCR
75.37	1195.37	0.0300	84.40

HCUC	TP	REFCTP	RATCTP
35.15	520.67	3293.00	3293.00

0.01085	0.01077	0.01090	0.01038
00.00	100.00	100.00	100.00

30.50	35.50	39.00	42.50
76.00	84.50	95.00	102.50

SP ... 3A

DATA SHEET
2

01/05/91

OD 3 CORE THERMAL POWER AND APRM CALIBRATION 01/05/91 0032 PEACH BOTTOM UNIT 2

GMWE	CMWT	WT	WIMB	WTSUB	WD	WTFLAG	IREC	IEQL
0.00	654.92	64.92	64.29	64.33	12.22	1.00	0	0

PR	RWI	DPC B	WFW	HFW	HD	DHS	CAEQ	CAQA
916.43	22.39	3.58	1.99	94.12	513.99	17.69	0.0348	0.0288

	A	C	E	B	D	F
RAP	19.24	19.14	18.08	19.08	18.27	18.78
ABAI	1.034	1.055	1.100	1.100	1.089	1.048

IB 1

RAPI	182.27	4.28	17.20	30.28	42.82	58.45
	72.94	77.07	85.94	95.17	107.04	182.27

FAILED SENSOR LIST.
0

QFW	QCR	QCU	QRAD	QPUMP	TFW
640.07	9.73	5.97	0.59	1.43	104.74

HF	HFG	HG	HS	WCR	HCR
531.68	663.64	1195.31	1195.31	0.0300	84.40

WCU	HCU1	HCU2	TD	REFCTP	RATCTP
0.1500	521.03	385.26	520.90	3293.00	3293.00

PPW	0.72	0.72

CAP	0.01034	0.01100	0.01095	0.01089	0.01100	0.01048
REFRAP	100.00	100.00	100.00	100.00	100.00	100.00

WDC	14.50	25.00	30.50	35.50	39.00	42.50
WTC	46.50	64.00	76.00	86.50	95.00	102.50

003052 ALR N512 W BOX LO VAC 1 LOW **********

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RM CALIBRATION.  01/05/91  0038  PEACH BOTTOM UNIT 2

U         DTNS      WTSUB      HD       WTFLAG     JCEC     TEOL
.93       45.27     46.33     12.22      1.00        0         0

 H        WCR       HFW        HD        DHS       CALQ      CAQA
.58       1.99      94.12    513.99     17.69     0.0316    0.0288

 C         B          D        F
.09       19.09     18.22     19.98
.100      1.100     1.037     1.048

.20       30.29     42.82     50.45
.01       95.17    107.04    102.27

CU        QRAD      QPUMP      TFW
.97       0.59      1.43     104.74

HG         HS        WCR       HCR
.31     1195.31    0.0300     84.40

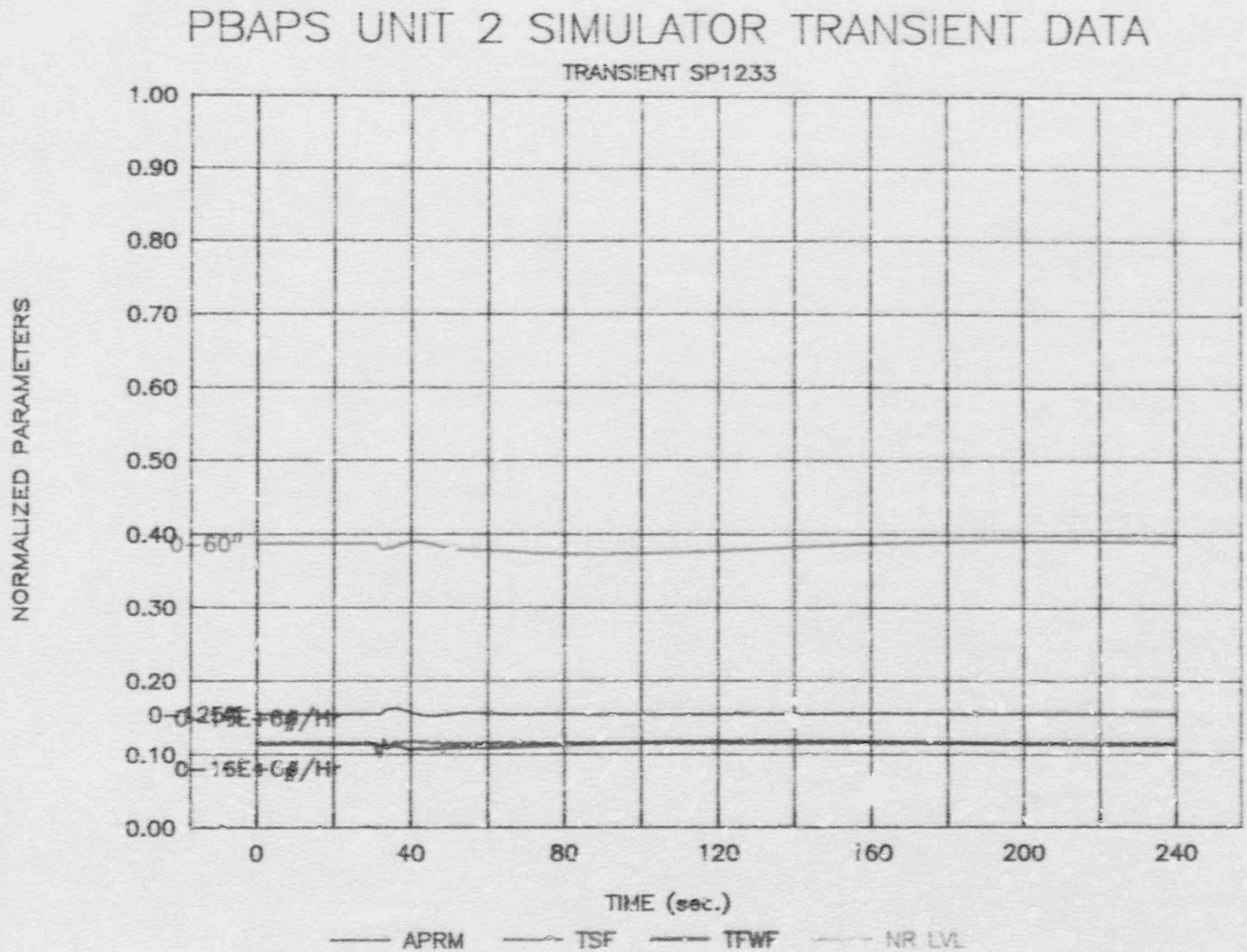
CU2        TD       REFCTP    RATCTP
.26      520.90    3293.00   3293.00

.01095   0.01089   0.01100   0.01048
.00      100.00    100.00    109.00

.50       35.50     39.00     42.50
.00       86.50     95.00    102.50
AC  1               LOW                ***********
```

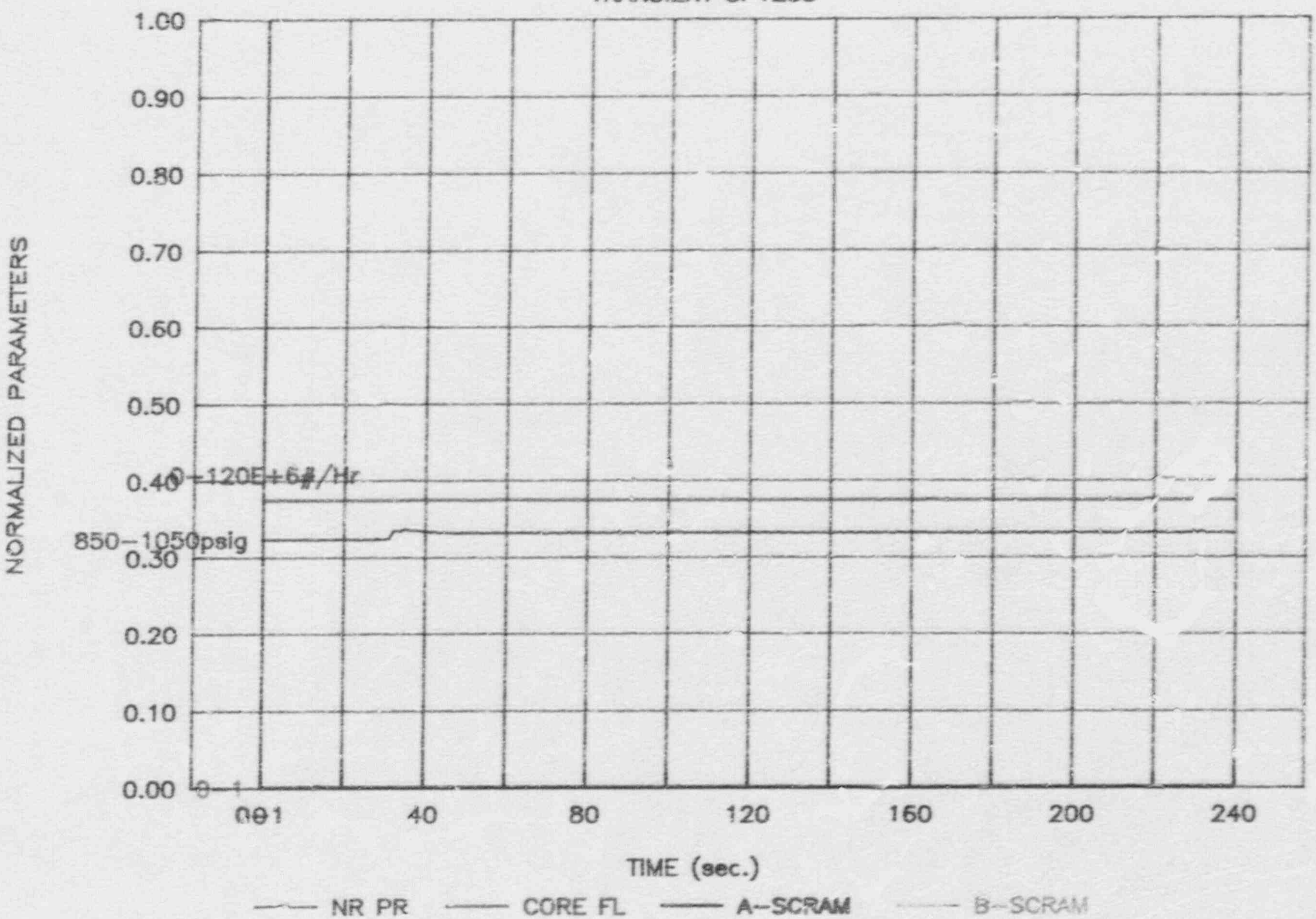
SP 1235
[illegible]
3A

DATA SHEET 3


PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT SP1233
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
NORMALIZED PARAMETERS
0-60"
0-15E+6#/Hr
0
40
80
120
160
200
240
TIME (sec.)
APRM
TSF
TFWF
NR LVL

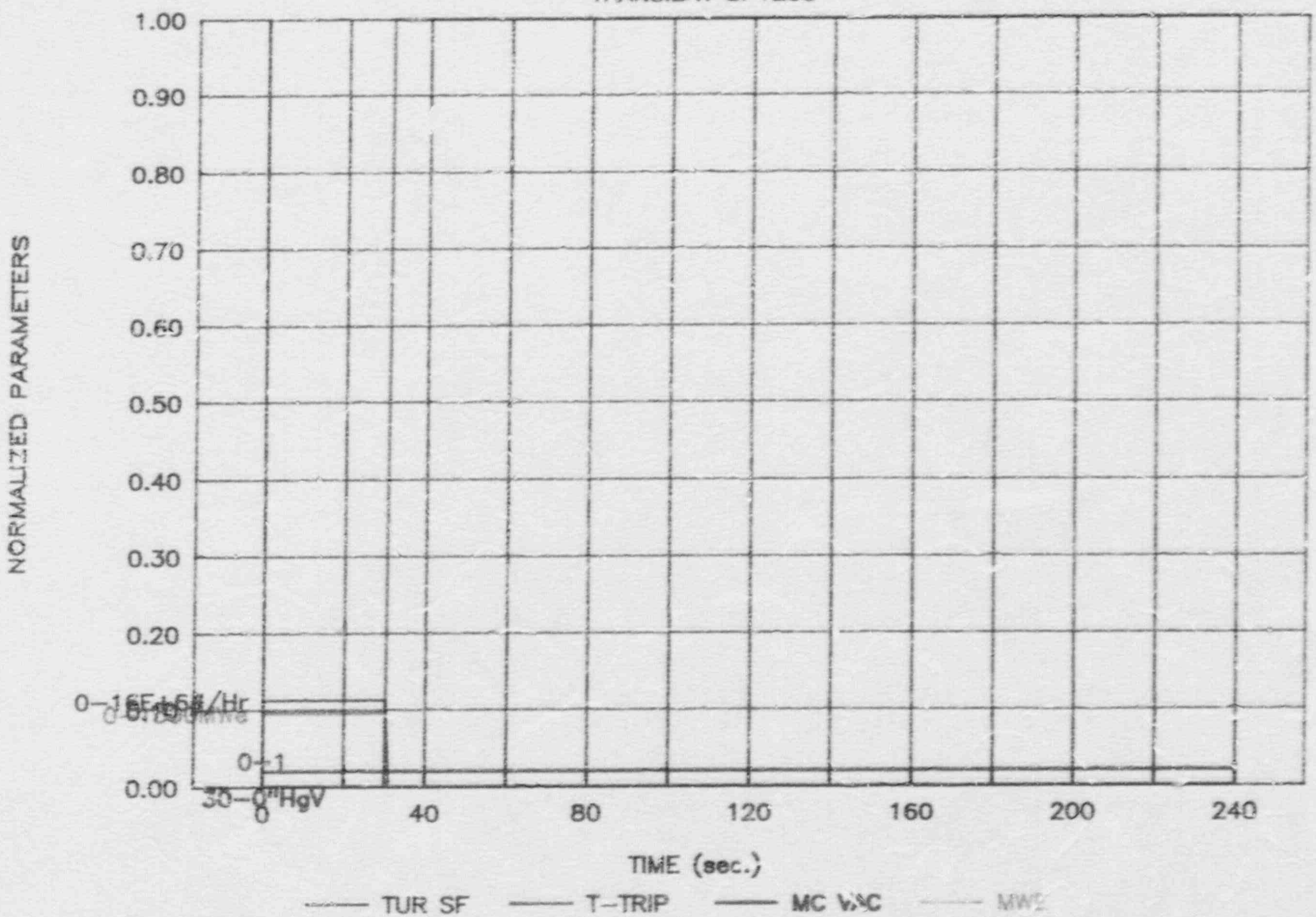
PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

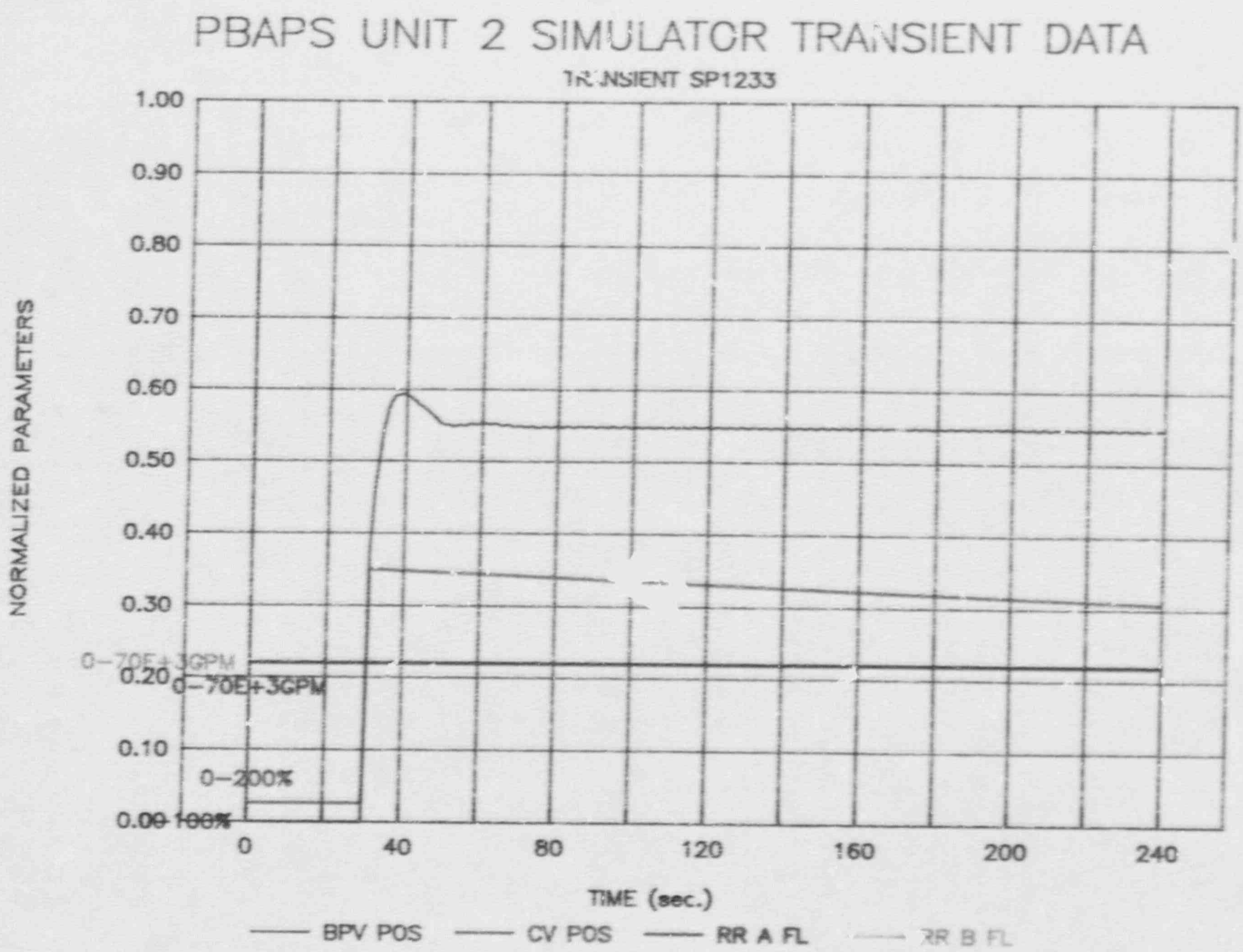
TRANSIENT SP1233

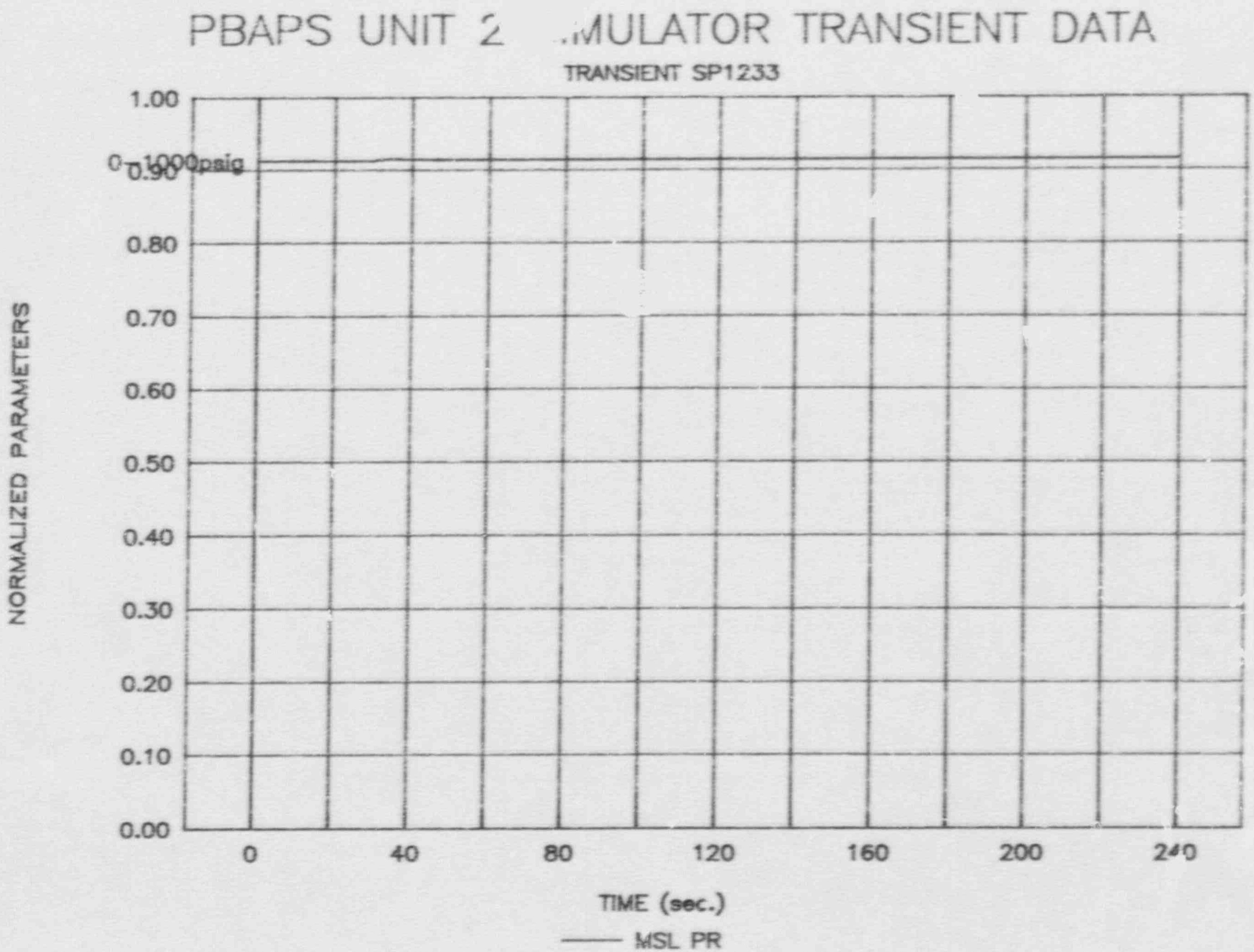


PBAPS UNIT 2 SIMULATOR TRANSIENT DATA

TRANSIENT SP1233




PBAPS UNIT 2 SIMULATOR TRANSIENT DATA
TRANSIENT SP1233
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0-70E+3GPM
0-70E+3GPM
0-200%
100%
0
40
80
120
160
200
240
TIME (sec.)
BPV POS
CV POS
RR A FL
RR B FL


PBAPS UNIT 2 .MULATOR TRANSIENT DATA
TRANSIENT SP1233
NORMALIZED PARAMETERS
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0-1000psig
0
40
80
120
160
200
240
TIME (sec.)
MSL PR