FLORIDA POWER & LIGHT COMPANY

TURKEY POINT SIMULATOR

INITIAL CERTIFICATION

VOLUME II

TEST ABSTRACTS

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FLORIDA POWER AND LIGHT COMPANY
TURKEY POINT UNIT 3
INITIAL SIMULATOR CERTIFICATION REPORT
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INTRODUCTION

Volume II contains abstracts from all of the certification tests along with one complete test. The abstract comprises two pages that contain the following information:

Description of the Test,
Options Relevant to the Test,
Initial and Final Conditions,
Basis for Evaluation,
Discussion of the Test Results,
Out of Bounds Conditions Encountered,
Deficiencies Noted During the Test, and
Exceptions to ANS 3.5.

Appendix A contains one complete test. This test procedure is provided as an example of the test format and content. Table 0-1 provides a summary of all deficiencies noted during Certification testing and the current status thereof.

TABLE 0-1
SUMMARY OF CERTIFICATION TESTING DISCREPANCIES

TEST NUMBER	SWRN NUMBER	DESCRIPTION	STATUS
RTT-001	None		
RTT-002	None		
SST-001	9000347	CRDM cooler outlet temperature too low.	Inwork
	9000348	ECC CCW flow too low.	Closed
	9000349	Hotwell level higher than in plant.	Closed
SST-002	9000350	N-35 reading too low.	Closed
SST-003	9000351	Containment pressure doesn't match plant.	Closed
SST-004	None		
NPE-001	9000007	Reactor vessel, pressurizer, and RCS temperatures are incorrect.	Inwork
	9000134	PRT level doesn't increase during primary fill.	Inwork
	9000135	RV/pressurizer levels do not correspond during primary fill.	Inwork
	9000136	LI-6421 continues to indicate when de-energized.	Closed
	8900434	RCP seal leakoff manual isolation valves aren't modelled.	Closed
	9000137	RV/pressurizer vents: Over-sized and allow flow without flowpath.	Inwork
	9000006	Aborts occurred when primary water to containment opened.	Closed

NPE-002	8900219	Alarm G/8/4 does not clear.	Closed
	8900220	Manual isolation valve to blender isn't modelled.	Inwork
	8900221	RHR temperature trends are erroneous.	Closed
	8900223	RCS heatup rate is too high.	Closed
	8900234	Pressurizer boron increases without an increase in RCS boron.	Inwork
	9000086	Improper actuation of alarm X/6/3.	Closed
	9000087	Alarm X/6/3 comes in and cannot be cleared.	Closed
	9000091	RCP temperature recorder alarm.	Closed
	9000092	Loss of 3B 4160 bus when starting C RCP.	Closed
	9000098	High letdown flowrate at low RCS pressures.	Inwork
	9000099	S/G blowdown flow delayed.	Closed
	9000100	IC 4 is unstable.	Closed
	9000105	RCS pressure spikes when solid.	Closed
NPE-003	8900238	Heater drain pump won't go into service and cavitates.	Closed
	8900242	Delta I response is inadequate.	Inwork
	8900258	Steam jet air ejector valves are open and shouldn't be.	Closed
	9000133	Erroneous actuation of motor overload alarms.	Closed
	9000138	Water counter to VCT only reads 10% of total flow.	Closed
	9000223	Cycle 10 curves.	Inwork
NPE-004	None		
NPE-005	9000224	Turbine deceleration doesn't change when vacuum is broken.	Inwork
	9000239	MSR temperature trends.	Inwork

NPE-006	*9000285*	*RHR SOS on low suction pressure.*	*Closed*
	9000366	*Vacuum and hotwell level spikes.*	*Closed*
	9000383	*OMS test switches aren't modelled.*	*Closed*
SUR-001	*9000248*	*Reactivity computer doesn't work.*	*Closed*
SUR-002	*9000260*	*I/F page 552 shows incorrect flowpath.*	*Inwork*
	9000252	*Post refueling startup boron not in spec.*	*Inwork*
SUR-003	*8900208*	*Adjusting EDG voltage affects load.*	*Closed*
	8900209	*EDG load control insensitive with zero droop.*	*Closed*
SUR-004	*None*		
SUR-005	*None*		
SUR-007	*None*		
SUR-008	*9000021*	*Boric acid transfer pump 3B normal/isolate switch logic problem.*	*Closed*
SUR-009	*None*		
SUR-010	*None*		
SUR-011	*None*		

SUR-012	None		
SUR-014	None		
SUR-015	None		
SUR-016	None		
SUR-017	None		
SUR-018	9000217	DDPS console doesn't respond to "CAL" command.	Closed
SUR-019	9000450	R-3-14 goes to 78K when aux bldg. exhaust fans stopped.	Closed
SUR-020	None		
SUR-021	None		
SUR-022	None		
SUR-024	None		
SUR-026	8900266	RCP lower guide bearing heats up on loss of CCW.	Closed
	9000012	SGFP breaker logic is incorrect.	Closed
	9000013	Pressurizer backup heaters breaker logic incorrect.	Closed
	9000014	Inadequate CCW header flow per 3-OSP-203.	Inwork

	9000015	Spent fuel pool pump breaker logic is incorrect.	Closed
	9000016	CCW pumps fail to start.	Closed
	9000018	LC 3D supply breaker fails to trip.	Closed
	9000019	MCC 3A supply breaker fails to trip.	Closed
	9000080	Aux oil pump breaker logic.	Closed
	8900267	Spray pump trips when it shouldn't.	Closed
SUR-029	None		
SUR-030	None		
SUR-031	9000340	Unexplained actuation of alarm E/9/1.	Closed
	9000341	Improper actuation of alarm G/5/1.	Inwork
SUR-032	9000510	Blinking lights on incore detector.	Inwork
MCN-001	None		
MCS-001	None		
MCS-002	None		
MCS-003	8900409	Various components don't alarm on loss of TPCW.	Closed
MCS-004	8900407	PORV's can't cycle fully on loss of instrument air.	Closed

	8900419	TCV-3-143 fails in wrong position on loss of instrument air.	Closed
	8900422	Instantaneous header pressure reduction on loss of instrument air.	Closed
	8900423	CV-3725 fails wrong way on loss of instrument air.	Closed
MCV-001	None		
MCV-002	None		
MCV-003	9000346	No area radiation monitor alarm with charging line break.	Closed
MCV-004	9000154	RV-203 cycles wildly when CV-204 is failed shut.	Closed
	9000339	RHX letdown outlet temperature is too low.	Closed
MCV-005	8900286	CCW surge tank process monitor alarm following NRHX tube leak.	Closed
MFW-001	None		
MFW-002	8900284	Steam dumps to condenser have excessive capacity.	Closed
	8900375	Insufficient total steam generator mass at HFP.	Inwork
MFW-003	9000592	PORV liquid relief conductance is too high.	Inwork
MFW-004	9000594	S/G outlet flow spikes at 500-600 seconds.	Inwork
MFW-005	None		

MFW-006	None		
MFW-007	None		
MFW-008	None		
MGG-001	None		
MGG-002	9000044	Incorrect power supply to MOV's 1433,1434.	Closed
MGG-003	None		
MGG-004	8900228	RCP failure on loss of cooling clears when it shouldn't.	Closed
	8900231	RCP failure: incorrect indication.	Closed
	8900247	Lack of head void in natural circ cooldown.	Closed
MMP-001	8900202	TI-3-140 improper failure.	Closed
	9000062	PR-3-6306B wrong color stripe.	Closed
	9000063	TR-3-607B,610B wrong power supply.	Closed
	9000049	Vital bus 3P06 instruments do not fail.	Closed
MMP-002	9000040	AFW flow controllers wrong power supply.	Closed
	9000060	FR-154A wrong pen fails.	Closed
MMP-003	9000039	LI-6308B wrong color stripe.	Closed
	9000058	RCP seal leakoff recorder wrong power supply.	Closed

	9000059	*CST level wrong power supply.*	*Closed*
MMP-004	*9000056*	*TI-607A, 610A wrong power supply.*	*Closed*
MMP-005	*None*		
MMP-006	*9000055*	*Reactor trip bypass breaker 52/BYA does not lose power.*	*Closed*
	9000057	*CV-3-6320B does not lose power.*	*Closed*
MMP-007	*None*		
MMP-008	*None*		
MRC-001	*None*		
MRC-002	*9000555*	*Low containment pressure after an SI.*	*Inwork*
MRC-003	*9000593*	*Oscillations in break flow as loops begin to refill.*	*Inwork*
MRC-004	*None*		
MRC-005	*None*		
MRC-006	*None*		
MRC-007	*9000009*	*Pressurizer surge line temperature response incorrect.*	*Closed*

MRC-008	9000591	FCV's take too long to shut from less than fully open.	Inwork
	9000436	RCP current differs from plant by 60 amps.	Inwork
MRX-001	None		
MRX-002	None		
MRX-003	None		
MRX-004	8900243	Flux deviation with a stuck control rod is underestimated.	Inwork
MRX-005	None		
MRX-006	None		
MRX-007	None		
MRX-008	None		
MRX-009	None		
MSG-001	None		
MSG-002	None		
MSG-003	None		

MSG-004	None		
MSG-005	None		
MSG-006	9000492	Feedwater temperature drops when feedwater is restored.	Inwork
MSP-001	9000312	B/U heaters breakers do not trip and lockout on loss of bus 3A.	Closed
	9000313	Aux oil pump breaker doesn't trip and lockout on loss of bus 3A.	Closed
	9000448	Spray pump trips and restarts.	Inwork
MSS-001	8900292	No aux bldg. ARM alarms with SI pipe leak outside containment.	Closed
MSS-002	8900410	Incorrect accumulator check valve leakage.	Closed
MSS-003	8900277	Saturation margin calculations.	Closed
MSS-004	None		
MTU-001	None		
MTU-002	None		
MTU-003	9000315	No increase in vibration on loss of lube oil.	Closed
MTU-004	8900211	Turbine doesn't become self-sealing.	Closed
	8900212	Gland exhaust fans don't effect pressure.	Closed

MTU-005	None		
MTU-006	None		
MTU-008	9000311	No alarm on high liquid level in generator.	Closed
MTU-009	None		
MTU-010	None		
MTU-011	None		

1.0 COMPUTER REAL TIME TEST

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: SIMULATOR REAL TIME TEST

NUMBER: RTT-001

ANS 3.5 REFERENCE SECTIONS: 3.1.1 Normal Plant Evolutions
3.1.2 Plant Malfunctions
A.3.1 Computer Real Time Test

DESCRIPTION

This test is designed to verify that the simulator is operating in real time. In the Turkey Point simulator, most of the modules are run on a 200 milli-second time step. There are a few modules which are run each 50 milli-seconds. Each 50 milli-second period is called a 'leg.' If the computer is unable to complete all module calculations within one leg, an overrun will be generated. When an overrun occurs, the computer reschedules the missed tasks, and may be able to make up the time during the next three legs. Four consecutive overruns would mean that all calculations were not completed within the 200 milli-second time band. For this test, the simulator will be set up to receive a module abort if, at any time, four consecutive overruns occur. This function will be run with five different conditions in the simulator, including some significant transients.

OPTIONS

Any malfunctions could be used with the dispatcher to verify simulator real time, this test will select significant malfunctions which will challange the simulator's ability to remain in real time.

INITIAL CONDITIONS
100% power steady state with maximum consecutive overruns set at four.

FINAL CONDITIONS
Each run will proceed for about 60 minutes, or until the significant transient has occurred.

APPROVED FOR USE

R E Dodson III DATE: 8/21/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Turkey DATE: 8/23/90

DATE: ________

DATE: ________

SIMULATOR REAL TIME TEST: RTT-001

BASIS FOR EVALUATION

The simulator must not abort on four consecutive overruns.

DISCUSSION OF TEST RESULTS

The simulator passed this test in all respects. For each of the six conditions run in the simulator, four consecutive overruns never occurred. This indicates that all tasks were run within their design time steps.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
	DATE: 8/27/90		DATE: 9/11/90
	DATE: 8/27/90		DATE: 9/11/90
	DATE:		DATE: 9-11-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: SIMULATOR REAL TIME TEST VALIDATION TEST

NUMBER: RTT-002

ANS 3.5 REFERENCE SECTIONS: 3.1.1 NORMAL PLANT EVOLUTIONS
3.1.2 PLANT MALFUNCTIONS
A.3.1 COMPUTER REAL TIME TEST

DESCRIPTION

This test is designed to show that the methods used in RTT-001, Simulator Real Time Test, will give proper indication if the computer fails to operate in real time. For this test, test modules will be linked into the simulator configuration which can be controlled to cause the simulator to go out of real time.

OPTIONS

This test may be run from any simulator operating condition. Five test modules with user controlled execution times are linked into the simulator to force overruns and verify the simulator's ability to detect them. These tasks may be linked to any processor with at least seven tasks.

INITIAL CONDITIONS

Simulator unloaded and the Work and Father configurations are the same.

FINAL CONDITIONS

When testing is completed, the test modules in the work configuration will be removed by copying the Father configuration to the Work configuration.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 9/10/90

TEST TEAM

DATE: 9/10/90

DATE:

DATE:

SIMULATOR REAL TIME TEST VALIDATION TEST: RTT-002

BASIS FOR EVALUATION

Overrun or processor halt conditions must be detected by the simulator. The simulator must freeze and the appropriate warning message must be displayed on all instructor facility terminals.

DISCUSSION OF TEST RESULTS

The simulator passed this test in all respects. The detection methods were all exercised and in each case provided the appropriate warnings.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert A. Sinbey	DATE: 10/1/90	R. E. Dooson D	DATE: 10-10-90
Kenneth D. White	DATE: 10/1/90	Richard L. Mende	DATE: 10-10-90
	DATE:	Leo Goebel	DATE: 10-10-90

2.0 STEADY STATE TESTS

TITLE: STEADY STATE 45% POWER HEAT BALANCE

NUMBER: SST-001

ANS 3.5 REFERENCE SECTIONS: 4.1 Simulator Capabilities
A3.2 Steady State and Normal Tests
B2. Simulator Operability Test

DESCRIPTION

This test examines the steady state performance of the Simulator at an intermediate power level. The 45% (approximate) power level was chosen for this test because it roughly corresponds to a standard hold point for chemistry testing during plant startup. Data from the plant logs and from the plant heat balance procedure will be compared to the same data in the simulator. Critical parameters will be verified to be within 2% of each other and other logged parameters will be verified to be within 10%. The simulator will be operated per normal operating procedures to reach the same conditions as reflected on the plant logs.

OPTIONS

The simulator steady state heat balance test can be performed at any intermediate power level at which heat balance data is available.

INITIAL CONDITIONS

Steady state at approximately 30% power, BOL

FINAL CONDITIONS

Steady state 45% power.

APPROVED FOR USE

[signature]
SIMULATOR ENGINEERING COORDINATOR DATE: 7/5/90

TEST TEAM

Robert J. Sinclay DATE: 7-6-90

DATE:

DATE:

STEADY STATE 45% POWER HEAT BALANCE: SST-001

BASIS FOR EVALUATION

Plant data as compared to simulator data. Critical parameters must agree within 2% and others must agree within 10%. No parameters may be different enough to detract from training.

DISCUSSION OF TEST RESULTS

Overall the test was successful as almost all simulated parameters agreed with the plant within the required tolerances. In order to match the plant conditions, the 3B1 and 3B2 circulating water pumps were turned off as they were for the plant conditions used. The plant logs used did not have a place for recording the reading of the gammametric neutron detectors so these values were not compared. One intermediate range nuclear instrument was out of tolerance. This problem was noted on a DR for SST-003 so no new DR was written. Loop hot leg and cold leg temperatures are not recorded on the logs so they were calculated based on the recorded average temperatures and the loop delta T's recorded in the heat balance. In addition, the plant had a leaking reactor vessel head vent valve which caused PI-6317 to read RCS pressure instead of ambient. No DR was written as this will not be a permanent plant problem and the simulator correctly reads ambient pressure.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Three deficiency reports were written for this test and three old DRs continued to exist. The new DRs were written on condenser hotwell level being controlled in the simulator too high, the emergency containment cooling CCW flow being too low and the CRDM cooler temperatures being recorded too low. The old DRs were that the one channel of intermediate range was out of tolerance, one channel of axial flux difference was too low in the simulator and the heater drain flow was too low. None of these problems, the old or the new, were deemed as detracting from training to any significant degree.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

Robert J. Sinly DATE: 7-6-90

Kenneth D. White DATE: 7/6/90

DATE:

SIMULATOR CONFIGURATION REVIEW BOARD

L E Dodson DATE: 8/15/90

Richard L. Wende DATE: 8-15-90

Leo Goebel DATE: 8-15-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: STEADY STATE 75% POWER HEAT BALANCE

NUMBER: SST-002

ANS 3.5 REFERENCE SECTIONS: 4.1 Simulator Capabilities
A3.2 Steady State and Normal Tests
B2. Simulator Operability Test

DESCRIPTION

This test examines the steady state performance of the Simulator at an intermediate power level. The 75% (approximate) power level was chosen for this test because it roughly corresponds to a standard hold point for chemistry and heat balance testing during plant startup. Data from the plant logs and from the plant heat balance procedure will be compared to the same data in the simulator. The post-refueling startup of unit 3 cycle twelve logs will be used. Critical parameters will be verified to be within 2% of each other and other logged parameters will be verified to be within 10%. The simulator will be operated per normal operating procedures to reach the same conditions as reflected on the plant logs.

OPTIONS

The simulator steady state heat balance test can be performed at any intermediate power level.

INITIAL CONDITIONS

Hot standby, beginning of core life, equilibrium xenon

FINAL CONDITIONS

Steady state at approximately 75% power.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 7/1/90

TEST TEAM

Robert J. Sinsley DATE: 7-1-90

DATE:

DATE:

STEADY STATE 75% POWER HEAT BALANCE: SST-002

BASIS FOR EVALUATION

Plant data as compared to simulator data. Critical parameters must agree within 2% and others must agree within 10%. No parameters may be different enough to detract from training.

DISCUSSION OF TEST RESULTS

The 75% steady state comparison test showed satisfactory results for almost all parameters. Five critical parameters failed to meet the 2% comparison test and three of those were attributed to abnormal readings in the plant. The intermediate range channel N-35 was reading too low in the simulator and a deficiency (DR) was written for this problem. The flux difference meters were all much lower in the simulator than in the plant. A DR was not written for this deviation as it is a known problem and several DR's are already outstanding for other certification tests. The plant containment was reading about 1.0 psig where the simulator read 0 psig. No DR was generated for this discrepancy as it is a known plant instrumentation problem and will not be permanent. Another plant problem is that the loop A OPDT setpoint is reading higher than it should. Channels B and C are reading 62 degrees while A is 64. Since 62 matches the simulator, no DR was written for this difference. The last problem in the critical parameters section is that the A and B steam generator narrow range levels are controlling about 2% high in the plant. The plant logs make note of this problem. No DR was written for this small discrepancy.

In the non-critical parameter list, no new DR's were generated. A DR was written on the emergency containment cooler CCW flow which is higher in the plant than in the simulator and a DR was written on the control rod drive mechanism cooler outlet temperatures which are reading lower in the simulator than in the plant. Another DR was heater drain flow which was greater in the simulator than the plant. All of these DR's are attached to SST-001 (45% power heat balance), so no new DR's were written. One other non-critical parameter was not in specification. It was the pressure downstream of the reactor vessel head vent valve. This valve is leaking in the plant and a plant work request has been written to correct it, therefore, no DR was written for this discrepancy.

None of the deficiencies were determined to detract from training significantly.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

As discussed above, several parameters were not within the required tolerance; however, only one new Discrepancy Report was written as the other problems had been discovered in the other steady state tests. The one discrepancy was written on the intermediate range instrument reading lower in the simulator. This problem is being investigated but poses no hinderance to training in the power range.

EXCEPTIONS TO ANS 3.5

The recorded parameters will be compared to the reference plant and will be required to agree within +/- 2% (+/-10%) of the instrument loop range rather than within 2% (10%) of the reference plant value.

EVALUATION TEAM		**SIMULATOR CONFIGURATION REVIEW BOARD**	
Robert J. Tinley	**DATE:** 7-23-90	L E Dodson Jr	**DATE:** 8/15/90
Kenneth D. White	**DATE:** 7/23/90	Richard L. Maude	**DATE:** 8-15-90
	DATE:	Leo Goebel	**DATE:** 8-15-90

TITLE: STEADY STATE 100% POWER HEAT BALANCE

NUMBER: SST-003

ANS 3.5 REFERENCE SECTIONS: 4.1 Simulator Capabilities
A3.2 Steady State and Normal Tests
B2. Simulator Operability Test

DESCRIPTION

This test examines the steady state performance of the Simulator at a power level of 100%. Data from the plant logs and from the plant heat balance procedure will be compared to the same data in the simulator. The post-refueling startup of unit 3 cycle twelve logs will be used. Critical parameters will be verified to be within 2% of each other and other logged parameters will be verified to be within 10%. The simulator will be operated per normal operating procedures to reach the same conditions as reflected on the plant logs.

OPTIONS

The simulator steady state heat balance test can be performed at any intermediate power level.

INITIAL CONDITIONS

Hot full power, beginning of core life, equilibrium xenon

FINAL CONDITIONS

Steady state at approximately 100% power.

APPROVED FOR USE

R E Dodson Jr
SIMULATOR ENGINEERING COORDINATOR DATE: 7/5/90

TEST TEAM

Robert Sinley DATE: 7-10-90

DATE: ________

DATE: ________

STEADY STATE 100% POWER HEAT BALANCE: SST-003

BASIS FOR EVALUATION

Plant data as compared to simulator data. Critical parameters must agree within 2% and others must agree within 10%.

DISCUSSION OF TEST RESULTS

The 100% steady state comparison test showed satisfactory results for almost all parameters. Three critical parameters failed to meet the 2% comparison test and one of those was attributed to an abnormal reading in the plant. The intermediate range channel N-35 was reading too low in the simulator and a deficiency (DR) was written for this problem. The 3B 4160 volt bus was reading 4310 volts in the plant for the logs chosen while it read 4160 volts in the simulator. A DR was not written for this deviation as it represents an unusual reading for this bus and was not this high for the other comparison tests. In addition, 'A' loop of narrow range temperature was out of service in the plant and so it could not be compared, but the other two loops were within specification. Since the plant was in steady state, there is no reason to suspect that the 'A' loop would not be within specification. Lastly, the plant containment was slightly pressurized to about 1.8 psig where the simulator read 0 psig. A DR was generated to examine this discrepancy.

In the non-critical parameter list, three new DR's were generated. A new DR was written on condenser hotwell level which is controlling higher in the simulator than in the plant. Another new DR was written on the emergency containment cooler CCW flow which is higher in the plant than in the simulator. Lastly, a DR was written on the control rod drive mechanism cooler outlet temperatures which are reading lower in the simulator than in the plant. One other non-critical parameter was not in specification. This was the pressure downstream of the reactor vessel head vent valve. This valve is leaking in the plant and a plant work request has been written to correct it, therefore, no DR was written for this discrepancy. None of the deficiencies were determined to detract from training significantly.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Deficiencies were written for N-35, containment pressure, condenser hotwell level, emergency containment cooler CCW flow, and CRDM cooler temperature.

EXCEPTIONS TO ANS 3.5

The recorded parameters will be compared to the reference plant and will be required to agree within +/- 2% (+/- 10%) of the instrument loop range rather than within 2% (10%) of the reference plant value.

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Robert J. Rinly	*DATE:* 7-10-90	L E Dodson	*DATE:* 8/15/90
Kenneth D. White	*DATE:* 7/10/90	Richard J. Mlenck	*DATE:* 8-15-90
	DATE:	Leo Goebel	*DATE:* 8-15-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: 100% POWER 60 MINUTE NULL TRANSIENT

NUMBER: SST-004

ANS 3.5 REFERENCE SECTIONS: 4.1.2 Steady State Operation
B.2.1 Steady State Performance

DESCRIPTION

This test will verify the stability of the simulator models during a one hour run at 100% power. In accordance with the ANSI standard 3.5, the computed values of the principle primary and secondary system parameters should not vary more than 2% from their initial values during the run.

OPTIONS

Any time in core life may be chosen for the steady state run. However, the simulator should have reached equilibrium xenon prior to taking data.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

Data should be recorded for at least 60 minutes.

APPROVED FOR USE

[signature] DATE: 4/11/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Sinbeg DATE: 4/11/90

DATE:

DATE:

100% POWER 60 MINUTE NULL TRANSIENT: SST-004

BASIS FOR EVALUATION

All of the examined parameters shall be shown to not vary by more than 2% from their initial values during the test.

DISCUSSION OF TEST RESULTS

The run was performed and data plotted for 100 minutes in order to insure simulator stability. The simulator showed considerable stability during the run. The maximum deviation of any significant parameter was 0.3%. One parameter deviated by 5%. This was volume control tank level. VCT level is mentioned in the plant's heat balance test as an indicator of plant stability. The requirement was that it 'not be changing appreciably.' The 5% change in VCT level was not considered an appreciable change, it had no effect on other system parameters, and it is expected due to normal RCP seal leakoff.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

Steam generator temperature is mentioned in ANS-3.5 as a secondary parameter to monitor. This temperature is not measured in Westinghouse vertical steam generators. Instead, steam generator secondary side pressure and level were monitored. Both these parameters were stable during the run.

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
Robert J. Sinley	DATE: 6/13/90	R. E. Dodson	DATE: 6/13/90
Kenneth D. White	DATE: 6/12/90	D. J. Wande	DATE: 6-13-90
	DATE:	Leo Joerbel	DATE: 6-13-90

3.0 NORMAL PLANT EVOLUTIONS

3.1 NPE-001 PLANT FILL AND VENT FROM A PARTIAL DRAIN DOWN TO A SOLID PRESSURIZER

3.2 NPE-002 PLANT STARTUP FROM COLD SHUTDOWN TO HOT STANDBY

3.3 NPE-003 PLANT STARTUP FROM HOT STANDBY TO RATED POWER

3.4 NPE-004 REACTOR TRIP FOLLOWED BY RECOVERY TO RATED POWER

3.5 NPE-005 PLANT SHUTDOWN FROM RATED POWER TO HOT STANDBY

3.6 NPE-006 COOLDOWN FROM HOT STANDBY TO COLD SHUTDOWN

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: PLANT FILL AND VENT FROM A PARTIAL DRAINDOWN TO A SOLID PRESSURIZER

NUMBER: NPE-001

ANS 3.5 REFERENCE SECTIONS: 3.1.1(1) Plant Startup from Cold Shutdown to Hot Standby

DESCRIPTION

During this test the simulator will be taken from a partially drained reactor coolant system to a water solid pressurizer. The reactor vessel, reactor coolant system, and the pressurizer will be filled and vented. This test will be run using the plant operating procedure Filling and Venting the Reactor Coolant System, 3-OP-041.8, and other plant operating procedures as directed by 3-OP-041.8. This test includes such evolutions as initiating charging to the reactor coolant system and the reactor coolant pump seals, filling the reactor coolant system and the pressurizer, venting the reactor vessel and the pressurizer, starting and stopping the reactor coolant pumps, and other evolutions as necessary to complete the test. There are no equipment malfunctions in place, allowing verification that the simulator can be taken from a partially drained reactor coolant system to a water solid pressurizer by the use of normal plant operating procedures.

Several parameters will be monitored in order to compare simulator results with expected plant results. All aspects of the simulation will be monitored, including control room indications, alarms, and trends. Local actions will be simulated and the impact verified. The plant heatup will not begin with this procedure, but with NPE-002.

OPTIONS

None

INITIAL CONDITIONS

Cold shutdown with a partially drained reactor vessel.

FINAL CONDITIONS

The test is complete when the procedure is complete. The RCS has been filled and vented and the pressurizer is water solid.

APPROVED FOR USE

R E Dodson III

SIMULATOR ENGINEERING COORDINATOR

DATE: 3/10/90

TEST TEAM

Kenneth D. White DATE: 3/10/90

Robert J. Lindsay DATE: 3/10/90

DATE:

PLANT FILL AND VENT FROM A PARTIAL DRAINDOWN TO A SOLID PRESSURIZER: NPE-001

BASIS FOR EVALUATION

Expert Examination. Control room indications should be as expected by the procedure. The evaluation team will include a current or past Turkey Point senior reactor operator license holder and/or a hot license instructor to assist in the evaluation of the discrete control room interactions and indications.
Plant Data. Plots will be compared with a Unit 3 fill and vent completed on April 18, 1990.

DISCUSSION OF TEST RESULTS

The simulator was able to be taken from a partially drained condition to a water solid pressurizer by the use of normal plant procedures. The plant responds properly to the use of charging as a filling agent. The reactor vessel, then the pressurizer, indicated increasing levels with the maintenance of charging. The RHR to letdown was put in and then PCV-145 was used to maintain and adjust RCS pressure, as required. RCS pressure was raised from 125 psig to 375 psig and returned to 125 psig several times. RCP'S were started in each loop, then all three were started. The system pressure responded to adjustments on the charging and/or letdown flowrates. The PRT level and pressure responded properly to a solid pressurizer. The PRT level was adjusted by pumping water out and the pressure was adjusted by venting it off. The boric acid and primary water storage tanks levels decreased with makeup to the VCT and the low level alarms came in properly. The vent solenoids were used to vent the reactor vessel and the pressurizer to the PRT. Control room indications, interactions, and alarms were appropriate except as noted below in the deficiency section.

In a test of this nature it is difficult to make exact correlations between simulator plots and plant plots; nevertheless the comparison is quite good. The pressurizer level increases with charging and there is a good match between the wide range and narrow range pressurizer levels.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Several temperatures did not respond properly. The pressurizer surge line, steam space and liquid space temperatures increased as the RCS was filled. These temperatures actually started out higher than they should have. The temperatures exceeded 200F and as the fill progressed past them, they dropped down to the RCS temperature range. The QSPDS RV head temperatures responded similarly, but exceeded 230F. TI-6397 and TI-6398 also acted this way, but exceeded 500F. When the RV was filled it did not cause an increase in the PRT level. The pressurizer level indications came on scale too soon and the RV completed filling at a higher pressurizer level than expected by plant procedures. When the actual system venting was performed, the RCS pressure decreased whenever a vent solenoid was opened and increased when the solenoid was closed, even though there was no flowpath through the solenoid. The PRT pressure and level increased, even though there was not any flowpath for venting into it. The vents are also over-sized; RCS pressure could not be sustained with any of the vents open. The problems experienced in NPE-002 with loss of off-site power when two RCP's are started on the B 4160 volt bus and with RCS pressure spikes at pressures above 200 psig showed up again. Aborts occurred when the primary water to containment isolation valve was opened with the seal standpipe fills open. The RCP seal leakoff manual stop valves are not modelled and probably should be. Not having them modelled provides indication of seal leakoff flow sooner than it would be in the plant. LI-6421 continues to indicate when power is removed from it, but does drop to zero when it is isolated. DR's have been submitted on all problems encountered.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
[signature]	DATE: 11/26/90	[signature]	DATE: 12/5/90
[signature]	DATE: 12/4/90	[signature]	DATE: 12/5/90
[signature]	DATE: 12-5-90	[signature]	DATE: 12-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: PLANT STARTUP FROM COLD SHUTDOWN TO HOT STANDBY

NUMBER: NPE-002

ANS 3.5 REFERENCE SECTIONS: 3.1.1(1) Plant Startup-Cold Shutdown to Hot Standby
3.1.1(5) Operations at Hot Standby
3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

During this test the simulator will be taken from cold shutdown to hot standby. This test will be run using the normal operating procedure Cold Shutdown to Hot Standby, 3-GOP-503, and other plant operating procedures as directed by 3-GOP-503. This test includes such evolutions as heating up the pressurizer in order to draw a bubble and then heating up the reactor coolant system by the use of pump heat. Reactor coolant pumps will be started, the residual heat removal system will be taken out of service and placed in safety injection standby, blowdown will be used to drain the steam generators to an operating level and to maintain this level during startup, the safety injection accumulators will be placed in standby, charging and letdown will be placed in service, the VCT will be purged with hydrogen to replace the nitrogen atmosphere, a main feedwater pump will be started in order to initiate feedwater to the steam generators, and other evolutions performed as necessary to complete the test. All actions will be conducted in accordance with normal operating procedures. There are no equipment malfunctions in place, allowing verification that the simulator can be taken from cold shutdown to hot standby by the use of normal plant operating procedures.

Several parameters will be monitored in order to compare simulator results with expected plant results. All aspects of the simulation will be monitored, including control room indications, alarms, and trends. Local actions will be simulated and the impact verified. Power escalation will not begin with this procedure, but with NPE-003. The plant fill and vent from a partially drained reactor coolant system is accomplished in NPE-001.

OPTIONS

The simulator can be initialized in cold shutdown with a water-solid pressurizer or a partially drained reactor coolant system.

INITIAL CONDITIONS

The simulator is in cold shutdown with a water-solid pressurizer. The RHR is in service and all RCP's are stopped. Tav is 118F and the pressurizer pressure is 320 psig.

FINAL CONDITIONS

The test is complete when the procedure is complete. The simulator has been brought to hot standby, the RCS pressure control is in automatic at 2235 psig and the RCS temperature is 546-549F. Steam generator pressure is maintained at 1005 psig by the use of the atmospheric dumps and a main feedpump is supplying feedwater with the flow controlled manually.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 2/5/90

TEST TEAM

DATE: 2/5/90
DATE: 2/28/90
DATE:

PLANT STARTUP FROM COLD SHUTDOWN TO HOT STANDBY: NPE-002

BASIS FOR EVALUATION

Expert Examination. Control room indications should be as expected by the procedure. The evaluation team will include a current or past Turkey Point senior reactor operator license holder and/or a hot license instructor to assist in the evaluation of the discrete control room interactions and indications.
Plant Data. Plots will be compared with a Unit 3 plant heatup started on April 22, 1990.

DISCUSSION OF TEST RESULTS

The simulator was able to be taken from cold shutdown to hot standby by the use of plant operating procedures. The pressurizer bubble formation and RCS heatup went very well, the RHR was able to be removed and placed in safety injection standby via the use of normal procedures, the VCT was purged with hydrogen to remove the nitrogen, and charging and letdown functioned properly. The PRT had to be drained due to a high level and all actions were properly modelled. Steam generator blowdown was used initially to drain the generators to their proper level for startup and occasionally during the heatup to return the levels to around 50%. Blowdown functioned as it should except for one minor problem. The atmospheric dumps worked in manual and auto to control steam generator pressures and RCS temperatures after the heatup was completed. A SGFP was started to maintain steam generator levels and the bypass valves were used to control the flowrate. Except for the deficiencies detailed below, the control room indications and alarms were appropriate for this test.

The plant plots start with a bubble already drawn, so that part of the heatup cannot be looked at for comparison purposes. The simulated heatup does not have the delays that are encountered in the plant, but the pressure and temperature responses seem appropriate, except as noted below. There is a similar steady decline in RCS flow and RCP amps as RCS temperatures increase. The steam generator pressure increases appropriately with RCS temperature. The S/G levels are appropriate, but because secondary leakage is not modelled, the narrow range levels do not drop as much as the primary heats up.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

IC 4 is unstable, resulting in numerous false alarms and conditions that would not be seen at this plant state. While solid, the plant would not control above 320 psig, but experienced pressure spikes of 100 psi. The steam generators have a 30 to 40 minute delay after blowdown is lined up before flow starts. The letdown flowrate is too high at low RCS pressures, permitting the early removal of RHR. When the second RCP is started on the B 4160 bus, off-site power is loss to that bus, causing a few other problems; the B EDG does not tie on and the 480 volt LC 3D cannot be aligned to supply MCC D. The RHR cools off too quickly and undergoes temperature transients when it should not. There is an excessive RCS heatup rate, up to 60F per hour, and it does not appear to be dependent upon the number of RCP's running. The pressurizer boron trends up without a corresponding change in the RCS boron. Alarms G/8/4, X/3/4, and X/6/3 were in and should not have been. H/9/6 comes in, but does not stay in, when a point on the reactor coolant pump temperature recorder is above the alarm point. The manual isolation valve for primary water to the blender is not modelled. DR's have been written on all problems encountered.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth D. White	DATE: 11/26/90	[illegible]	DATE: 12/5/90
George Everdell	DATE: 12-5-90	[illegible]	DATE: 12/5/90
	DATE:	[illegible]	DATE: 12-5-90

TITLE: PLANT STARTUP FROM HOT STANDBY TO RATED POWER

NUMBER: NPE-003

ANS 3.5 REFERENCE SECTIONS:

- 3.1.1(2) Nuclear Startup from Hot Standby to Rated Power
- 3.1.1(3) Turbine Startup and Generator Synchronization
- 3.1.1(5) Operations at Hot Standby
- 3.1.1(6) Load Changes
- 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

During this test the simulator will be taken from hot standby to full rated power. This test will be run using the normal operating procedure Hot Standby to Power Operation, 3-GOP-301, and other plant operating procedures as directed by 3-GOP-301. This test includes such evolutions as warming up the steam lines and opening the main steam isolation valves, placing gland sealing steam in service and drawing a vacuum on the condenser, withdrawing control rods to take the reactor critical, rolling the turbine generator up to speed and synchronizing it to the grid, either pulling control rods or diluting the RCS whilst escalating power, and starting secondary and auxiliary plant equipment as needed to complete the test. All actions will be conducted in accordance with plant operating procedures. There are no equipment malfunctions in place, allowing verification that the simulator can be taken from hot standby to full rated power by the use of normal plant operating procedures.

Several parameters will be monitored in order to compare simulator results with expected plant results. All aspects of the simulation will be monitored, including control room indications, alarms, and trends. Local actions will be simulated and the impact verified.

OPTIONS

The simulator can be initialized at different times in core life.

INITIAL CONDITIONS

Middle of core life, 0% reactor power, and 0 megawatts generated. The simulator is at hot standby with the atmospheric dumps controlling steam generator pressure and RCS temperatures. The control rods are fully inserted and the reactor is sub-critical. The secondary side of the simulator is essentially shutdown.

FINAL CONDITIONS

The test is complete when the procedure is complete. The plant has been brought to full rated power, approximately 714 megawatts electrical and 100% nuclear power.

APPROVED FOR USE

[signature]

SIMULATOR ENGINEERING COORDINATOR DATE: 3/5/90

TEST TEAM

Kenneth D. White DATE: 3/5/90

[signature] DATE: 3-7-90

[signature] DATE: 3/5/90

PLANT STARTUP FROM HOT STANDBY TO RATED POWER: NPE-003

BASIS FOR EVALUATION

Expert Examination. Control room indications should be as expected by the procedure. The evaluation team will include a current or past Turkey Point senior reactor operator license holder and/or a hot license instructor to assist in the evaluation of the discrete control room interactions and indications.

Plant Data. Plots will be compared with a Unit 3 startup commenced on June 3, 1990.

DISCUSSION OF TEST RESULTS

The simulator was able to be taken from hot standby to full rated power by the use of normal plant operating procedures. Generally the control room indications were appropriate for the actions. Plant procedures were used to warm up the main steam lines and open the main steam isolation valves, place gland sealing steam in service, and draw a vacuum on the condenser. A low rod index was calculated for the estimated critical position, requiring a dilution. A second orifice and charging pump were placed in service to expedite the dilution. After the dilution was completed, rods were pulled to take the reactor critical. Power was then escalated to 2-3% and Tav was maintained by use of the atmospheric dump valves until the turbine was synchronized to the grid. Whilst power was held at 2-3%, the turbine was rolled and synchronized to the grid. Power was escalated and secondary plant equipment was placed in service as required. The MSR's were purged, warmed up, and placed in service. A second condensate pump, second SGFP, and both heater drain pumps were placed in service by following the appropriate procedures. The FCV's were left in automatic to verify their response during the various pump starts. Because of the low rod index, rod motion was mainly used as power was escalated, but dilution also had to be used. Control room indications, interactions, and alarms were appropriate except as noted below in the deficiency section.

The plots for the plant and simulator display similar increases in pressurizer level and Thot as power increases. Tcold also remains fairly steady with power. On the secondary side steam flow, feed flow, and TREF increase with power. S/G narrow range levels oscillate a lot at the lower power levels, but the general trend is also upwards. Steam pressure has a corresponding decrease as power increases.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The delta I responds inadequately to rod position versus power level. Even with the low initial rod index, the maximum absolute value that was obtained for delta I was -1.875 at 156 steps on bank D with 80% power. The IC has too many valves open to the SJAE's, allowing vacuum to be drawn as soon as the gland sealing steam is put into service. The latter is due to the snapshot for the IC and is not a modelling problem. The A counter for primary water to the VCT only counts 1% of the total flow. A heater drain pump cannot be put into service at 225 MWe; it either cavitates excessively or trips on overload. All major pumps bring in the overload alarm about half a minute after being started and then the alarm immediately clears. The condensate recovery tank, pump, pump discharge valve, and alarm are not properly modelled. The condensate recovery tank pump start and hi hi level alarm actuate at the same time, the pump discharge valve does not shut when the pump stops, and when the pump is aligned to the DWST (the normal flowpath) it does not put out any flow; thereby allowing the condensate recovery tank to continue to fill while the pump is running. Following a dilution, the pressurizer boron dropped to about 40 ppm below RCS boron, then recovered to RCS boron after the spray valve was shut. The present core is not modelled, making the reactivity curves in the plant curve book somewhat inaccurate. DR's have been submitted on all problems.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		**SIMULATOR CONFIGURATION REVIEW BOARD**	
Kenneth D. White	DATE: 11/26/90	[signature]	DATE: 12/6/90
[signature]	DATE: 12/4/90	[signature]	DATE: 12-6-90
[signature]	DATE: 12-5-90	[signature]	DATE: 12-6-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: REACTOR TRIP FOLLOWED BY RECOVERY TO RATED POWER

NUMBER: NPE-004

ANS 3.5 REFERENCE SECTIONS:

3.1.1(2)	Nuclear Startup from Hot Standby to Rated Power
3.1.1(3)	Turbine Startup and Generator Synchronization
3.1.1(4)	Reactor Trip Followed by Recovery to Rated Power
3.1.1(5)	Operations at Hot Standby
3.1.1(6)	Load Changes

DESCRIPTION

During this test the simulator will be tripped from 100% power and returned to 100% power. This test will be run using operating procedures 3-EOP-E-0 (Reactor Trip or Safety Injection), 3-EOP-ES-0.1 (Reactor Trip Response), and 3-GOP-301 (Hot Standby to Power Operation). This test includes such evolutions as verification of reactor trip response, changing from auxiliary feedwater back to main feedwater, taking the reactor critical, turbine generator startup and synchronization, and power escalation. The purpose of this test is to verify that the simulator can be taken back to full power following a reactor trip and that this evolution can be performed by the use of normal plant operating procedures. The reactor trip response will be verified per procedures 3-EOP-E-0 and 3-EOP-ES-0.1, but for a detailed analysis of a trip response see MTU-002, Turbine Trip from 100% Power.

OPTIONS

None

INITIAL CONDITIONS

Steady state, 100% power, approximately 714 megawatts generated.

FINAL CONDITIONS

The test is complete when the procedure is complete. The simulator has been returned to 100% power with approximately 714 megawatts generated.

APPROVED FOR USE

[signature] DATE: 5/21/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth W. White DATE: 5/21/90

Robert J. Sinclair DATE: 6/1/90

DATE: ________

REACTOR TRIP FOLLOWED BY RECOVERY TO RATED POWER: NPE-004

BASIS FOR EVALUATION

Expert Examination. Control room indications should be as expected by the procedure. The evaluation team will include someone that currently holds or has held a Turkey Point senior reactor operator license and/or a hot license instructor to assist in the evaluation of the discrete control room interactions and indications.

DISCUSSION OF TEST RESULTS

This test was fairly uneventful. All required actions for the verifications of 3-EOP-E-0 and 3-EOP-ES-0.1 were available in the control room and all required local actions were able to be performed from the I/F. 3-OP-075 worked for shutting down the AFW pumps and transferring to MFW. The 25%/hour power escalation went well. The steam generators had no problems handling this rate. Feedwater was controlled on the bypasses until slightly above 15% then transferred successfully to the FCV's. Due to the buildup of xenon some dilution had to be done, but due to the rate of power ascension, not a lot. It is apparent from the trends at the end of the test that boration would have to be used to maintain rod index as xenon burned out. No new problems were encountered and no DR's were generated from this test.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Kenneth D. White	DATE: 6/1/90	[illegible]	DATE: 6/6/90
Robert J. Simbey	DATE: 6-1-90	[illegible]	DATE: 6/6/90
Kay Lovell	DATE: 6/1/90	[illegible]	DATE: 6-6-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: PLANT SHUTDOWN FROM RATED POWER TO HOT STANDBY

NUMBER: NPE-005

ANS 3.5 REFERENCE SECTIONS: 3.1.1(5) Operations at Hot Standby
3.1.1(6) Load Changes
3.1.1(8) Plant Shutdown from Rated Power to Hot Standby

DESCRIPTION

During this test the simulator will be taken from full rated power to hot standby. This test will be run using the normal operating procedure Power Operation to Hot Standby, 3-GOP-103, and other plant operating procedures as directed by 3-GOP-103. This test includes such evolutions as reducing generated power and taking the turbine generator off-line, breaking condenser vacuum, borating the reactor coolant system to cold shutdown, starting and using the standby feedpump to feed the steam generator, shutting down miscellaneous secondary and auxiliary plant equipment, inserting control rods, and other evolutions performed as necessary to complete the test. All actions will be conducted in accordance with normal operating procedures. There are no equipment malfunctions in place, allowing verification that the simulator can be taken from full rated power to hot standby by the use of normal plant operating procedures.

Several parameters will be monitored in order to compare simulator results with expected plant results. All aspects of the simulation will be monitored, including control room indications, alarms, and trends. Local actions will be simulated and the impact verified. The plant cooldown from hot standby to cold shutdown will be performed in NPE-006.

OPTIONS

None

INITIAL CONDITIONS

Steady state 100% power, approximately 714 megawatts generated, and equilibrium xenon.

FINAL CONDITIONS

The test is complete when the procedure is complete. The plant has been brought to hot standby, Tav is 547F, the generator is off-line, vacuum has been broken, the regulating rods have been inserted, the RCS has been borated to cold shutdown, and the standby feedpump is feeding the steam generators.

APPROVED FOR USE: [signature]
SIMULATOR ENGINEERING COORDINATOR
DATE: 4/10/90

TEST TEAM: Kenneth W. White DATE: 4/10/90
[signature] DATE: 4-10-90
DATE: ______

PLANT SHUTDOWN FROM RATED POWER TO HOT STANDBY: NPE-005

BASIS FOR EVALUATION

Expert Examination. Control room indications should be as expected by the procedure. The evaluation team will include a current or past Turkey Point senior reactor operator license holder and/or a hot license instructor to assist in the evaluation of the discrete control room interactions and indications.
Plant Data. Plots will be compared with a Unit 3 plant shutdown from 30% power completed on June 4, 1990.

DISCUSSION OF TEST RESULTS

Generally this test went quite well. The simulator was able to be taken from full rated power to hot standby by the use of normal plant operating procedures. There were a few discrepancies encountered, but most of them had been seen in other tests. There were a few new deficiencies and DR's have been written to cover them. A boration was started to lower Tav and as it came down, generator load was reduced. A second charging pump and letdown orifice were placed in service to make the RCS more responsive to boron changes. The boration and generator load reduction was able to be controlled and allowed a 25%/hour load reduction be maintained. Rods were used some during the shutdown, but most of the rod insertion was after the plant was fully shutdown. As power was reduced, secondary plant equipment was shutdown. This included a SGFP, both heater drain pumps, a condensate pump, and the MSR's. The in-house loads were transfered to the startup transformer from the auxiliary transformer before the turbine generator was taken off line. Vacuum was broken and the gland sealing steam was taken out of service. After the turbine had coasted down it was placed on the turning gear. The steam dumps to the condenser were used to control Tav until shortly before the MSIV's were closed, then control was passed to the ADV's. The standby steam generator feedwater pump was used to feed the steam generators after the feed control had been transfered from the FCV's to the bypass valves. As power was being decreased, the appropriate NI status lights and alarms changed state. After the reactor was taken subcritical and the intermediate ranges were below 5x10-11 amps, the source range voltages were restored. The RCS was borated to cold shutdown. All control room alarms, indications, and interactions were appropriate except as noted below in the deficiency section.

It is impossible to exactly match the conditions for the Unit 3 shutdown on June 4, 1990, but the plot comparisons were generally quite good. Tav responds to changes in load and this produces similar responses in pressurizer level, RCS flow, and RCP amps. The secondary side parameters, corresponded quite well, also.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Most of the deficiencies have been covered by other tests; e.g., inappropriate alarm for startup transformer trouble, lack of a proper delta I model, and the heater drain pump tripping with turbine load below 300 MWe. There were, however, a few new problems. The turbine deceleration rate did not increase when condenser vacuum was broken. The MSR's did not provide appropriate temperature responses when being taken out of service. The temperatures out of the MSR's did not decrease until the time control valves were almost fully closed and then the temperatures wanted to come back to 500F. After the turbine trip the temperatures went to almost 600F and they dropped to 100F when the MSIV's were shut. DR's have been submitted on all new problems.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth H. White	DATE: 11/26/90	[signature]	DATE: 12/5/90
Kerry A. Powell	DATE: 12/4/1990	[signature]	DATE: 12/5/90
	DATE:	Leo Tóth	DATE: 12-5-90

TITLE: COOLDOWN FROM HOT STANDBY TO COLD SHUTDOWN

NUMBER: NPE-006

ANS 3.5 REFERENCE SECTIONS:
3.1.1(5) Operations at Hot Standby
3.1.1(8) Plant Cooldown from Hot Standby to Cold Shutdown
3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

During this test the simulator will be taken from hot standby to cold shutdown. This test will be run using the normal operating procedure Hot Standby to Cold Shutdown, 3-GOP-305, and other plant operating procedures as directed by 3-GOP-305. This test includes such evolutions as cooling down the reactor coolant system and the pressurizer, stopping the reactor coolant pumps, placing the residual heat removal system in service, taking the pressurizer solid, and other evolutions performed as necessary to complete the test and as directed by 3-GOP-305. All actions will be conducted in accordance with normal operating procedures. There are no equipment malfunctions in place, allowing verification that the simulator can be taken from hot standby to cold shutdown by the use of normal plant operating procedures. Several parameters will be monitored in order to compare simulator results with expected plant results. All aspects of the simulation will be monitored, including control room indications, alarms, and trends. Local actions will be simulated and the impact verified. Power reduction will not be performed in this procedure, but with NPE-005.

OPTIONS

None

INITIAL CONDITIONS

The simulator is at hot standby.

FINAL CONDITIONS

The test is complete when the procedure is complete. The simulator has been brought to cold shutdown, decay heat is being removed by the residual heat removal system, and the pressurizer is water solid.

APPROVED FOR USE

[signature] DATE: 7/1/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth D. White DATE: 7/11/90

DATE:

DATE:

COOLDOWN FROM HOT STANDBY TO COLD SHUTDOWN: NPE-006

BASIS FOR EVALUATION

Expert Examination. Control room indications should be as expected by the procedure. The evaluation team will include a current or past Turkey Point senior reactor operator license holder and/or a hot license instructor to assist in the evaluation of the discrete control room interactions and indications.
Plant Data. Plots will be compared with a Unit 3 cooldown completed on April 25, 1990.

DISCUSSION OF TEST RESULTS

3-GOP-305 was used for the primary plant cooldown, the shutdown of secondary and auxiliary plant equipment, and to take the pressurizer solid. With the exception of the few DR's noted below, the simulator responses were as expected. The cooldown was initiated by opening the ADV's in hand as required and stopping A reactor coolant pump. The depressurization was accomplished by turning off the pressurizer heaters and opening one spray valve as necessary to reduce pressure in accordance with RCS temperature as the cooldown went along. Shortly after the test was started condenser vacuum commenced spiking up to 15 inches, even though vacuum had been broken. 3-OP-050 was used to place RHR in service and all responses were proper. After placing RHR in service CV-2202 had to be adjusted to clear a high CCW cooler outlet temperature alarm. This is a reasonable response. Towards the end of the test an attempt was made to go to one CCW pump, but there was too much decay heat left and RHR temperatures could not be kept from increasing. Again, this seems like a reasonable response for the amount of time since shutdown.

The plots of the Unit 3 cooldown compare quite nicely to this evolution. S/G pressure follows RCS temperature at about the same values. The cooldown on the plant went quite rapidly to around 400F, then slowed down considerably with a constantly decrease rate until RHR was put in service at about 280F. The same events occurred during the simulator cooldown. The running RCP current increased with the cooldown. Pressurizer steam and liquid space temperatures follow pressurie at the same values. Both surge line temperatures showed decreasing temperatures at the same rate on an insurge and slowly increasing temperatures afterwards.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

There is an improper SOS on low RHR suction pressure. Vacuum spikes of up to 15 inches occurred along with high hotwell level spikes and the turbine speed would increase during the spikes. The OMS primary and backup test switches need to be modelled. DR's have been submitted against these problems.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth W. White	DATE: 11/26/90	R E [illegible]	DATE: 12/6/90
[illegible]	DATE: 12/4/90	[illegible]	DATE: 12-6-90
[illegible]	DATE: 12-5-90	Leo [illegible]	DATE: 12-6-90

4.0 SURVEILLANCES

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: INITIAL CRITICALITY AFTER REFUELING, OP-0204.3

NUMBER: SUR-001

ANS 3.5 REFERENCE SECTIONS: 3.1.1 (9) Core Performance Testing

DESCRIPTION

This test will be a performance of the initial criticality after refueling procedure. The procedure will be followed as closely as possible to insure that the simulator can support training on initial criticality procedures. Because of the specific nature of the test, the plant reactor engineering staff will actually perform the physics tests with the simulator test team acting as the plant operators.

OPTIONS

Parts of the test require chemistry testing for boron concentration. The simulator computed values for boron concentration may be used for these steps.

INITIAL CONDITIONS

BOL, hot standby. All rods in.

FINAL CONDITIONS

Procedure OP-0204.3 complete.

APPROVED FOR USE

R E Dodson III DATE: 5/7/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Sinely DATE: 6-3-90

DATE: ______

DATE: ______

INITIAL CRITICALITY AFTER REFUELING, OP-0204.3: SUR-001

BASIS FOR EVALUATION

Expert evaluation of the ability to perform the procedure on the simulator.

DISCUSSION OF TEST RESULTS

For this test the simulator test team was assisted by a group of reactor engineers who normally perform the procedure in the plant. The procedure was used successfully to perform a reactor startup in the simulator. The main problem encountered was that the reactivity computer did not respond properly. To circumvent this problem, the simulator test team set up a graphic screen in the instructor facility to take the place of the reactivity computer. The reactor engineers directed the test using this screen. From a training standpoint, the test was a success. The experienced reactor engineers used the test as a review of the procedure and as a chance to train new reactor engineers.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The reactivity computer failed to work properly for this test. A deficiency report was submitted and the computer was subsequently calibrated. A reactor engineer participated in the retest of the reactivity computer.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert A. Sinly	DATE: 6-3-90	[signature]	DATE: 6/4/90
Gary J. Maul	DATE: 10-25-90	[signature]	DATE: 6/4/90
	DATE:	[signature]	DATE: 6-4-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: NUCLEAR DESIGN CHECK TESTS DURING STARTUP SEQUENCE AFTER REFUELING, OP-0204.5

NUMBER: SUR-002

ANS 3.5 REFERENCE SECTIONS: 3.1.1 (9) Core Performance Testing

DESCRIPTION

This test will be a performance of the post refueling core physics test procedure in the simulator. The procedure will be followed as closely as possible to insure that the simulator can support training on core performance testing procedures.

OPTIONS

Parts of the test require chemistry testing for boron concentration. The simulator computed values for boron concentration may be used for these steps.

INITIAL CONDITIONS

BOL, hot zero power after Initial criticality Procedure is complete.

FINAL CONDITIONS

Procedure OP-0204.5 complete.

APPROVED FOR USE

R E Dodson

SIMULATOR ENGINEERING COORDINATOR DATE: 5/1/90

TEST TEAM

Robert J. Sing DATE: 8/5/90

DATE:

DATE:

NUCLEAR DESIGN CHECK TESTS DURING STARTUP SEQUENCE AFTER REFUELING, OP-0204.5: SUR-002

BASIS FOR EVALUATION

Expert evaluation of the ability to perform the core physics tests in the simulator and the ability of the simulator to meet the acceptance criteria of the procedure.

DISCUSSION OF TEST RESULTS

The test was run with very little problems. The reactor engineering group assisted the certification test team by performing the core physics testing associated with this test. The only hold up on finishing the test was some problems with the flux mapping system in the simulator. These problems were fixed and the flux mapping test (SUR-032) was run.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Two discrepancies were written on this test. First, the critical boron concentration was outside the limits allowed by the physics testing procedure. Second, one of the instructor facility pages was found to have incorrect page connectors. Neither of these discrepancies has a significant effect on operator training.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Pimber	DATE: 10/8/90	[signature]	DATE: 10-10-90
Kenneth W. White	DATE: 10/8/90	Richard L. Wende	DATE: 10-10-90
	DATE:	[signature]	DATE: 10-10-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: EDG 8 HOUR LOAD TEST AND LOAD REJECTION TEST, OP-4304.3

NUMBER: SUR-003

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

The purpose of this test is to verify that the emergency diesel generators (EDG's) can be operated from the simulator control room and that they operate as do the actual EDG's in the plant. The eight hour full load test and load rejection test operator surveillance will be used to perform this test.

OPTIONS

None

INITIAL CONDITIONS

Any power level, normal electric plant lineup.

FINAL CONDITIONS

EDG surveillance complete.

APPROVED FOR USE

DATE: 3/13/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

DATE: 3-13-90

Kenneth D. White DATE: 3/13/90

DATE: ______

EDG 8 HOUR LOAD TEST AND LOAD REJECTION TEST, 3-OSP-4304.3: SUR-003

BASIS FOR EVALUATION

Expert evaluation of the ability to perform the surveillance in the simulator and the simulator's ability to meet the acceptance criteria of the surveillance.

For the load rejection portion of the test, the simulator response was compared to actual plant data obtained from the applicable test results.

DISCUSSION OF TEST RESULTS

The team was able to run the surveillance without any problems. All functions which needed to be controlled from the control room were performed. In addition, any local control functions which needed to be manipulated, such as speed droop, were controllable from the instructor facility.

For the load rejection portion of the surveillance, the simulator data was graphed and compared to actual plant data. Both the simulator and the actual plant EDG's returned to steady state values within two seconds of opening the output breaker. The actual plant EDG's had higher transient frequency and voltage, but the direction of the response was correct and the transient is over so quickly that no adverse effect on training would occur due to the differences in the response.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Two problems were noted and both had discrepancies previously written on them. First, a voltage adjustment on the EDG while it is in parallel with the grid causes a change in EDG real loading (megawatts). Second, with the EDG in parallel with the grid, its loading could be easily controlled even with zero speed droop set in.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. [illegible]	DATE: 3-13-90	R. E. [illegible]	DATE: 4/27/90
Kenneth A. White	DATE: 3/30/90	C.H. Cohen for L.G.	DATE: 4-27-90
	DATE:	Richard J. Mende	DATE: 4-27-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: COMPONENT COOLING WATER PUMPS LOW HEADER PRESSURE START TEST, 3-OSP-030.5

NUMBER: SUR-004

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will consist of performing the normal operator surveillance procedure, 3-OSP-030.5, for checking the low pressure auto starts on the component cooling water pumps. With no malfunctions present, the test should pass the applicable acceptance contained in 3-OSP-030.5.

OPTIONS

This test can be performed in any plant condition.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

The test is complete when the surveillance has been completed.

APPROVED FOR USE

R E Dodson III DATE: 1/4/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth D. White DATE: 1/4/90

DATE:

DATE:

COMPONENT COOLING WATER PUMPS LOW HEADER PRESSURE START TEST, 3-OSP-030.5: SUR-004

BASIS FOR EVALUATION

Expert examination. 3-OSP-030.5 can be performed and the applicable acceptance criteria of the procedure met.

DISCUSSION OF TEST RESULTS

The test went well. The surveillance was able to be performed on the simulator, the low pressure start of the CCW pumps worked, and the acceptance criteria of 3-OSP-030.5 were met. The CCW pump auto start works properly. There is a 30 second delay on the auto start of a CCW on low pressure. The surveillance does not require monitoring this delay, but it was checked and works properly.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

Kenneth D. White DATE: 1/5/90

RJ Simdy DATE: 1/5/90

DATE:

SIMULATOR CONFIGURATION REVIEW BOARD

L E Dodson DATE: 2/5/90

Richard J McLeod DATE: 2-5-90

Leo Goebel DATE: 2-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: REACTOR COOLANT SYSTEM LEAK RATE CALCULATIONS,.3-OSP-041.1

NUMBER: SUR-005

ANS 3.5 REFERENCE SECTIONS: 3.1.2 Plant Malfunctions
3.1.1 (10) Plant Surveillances

DESCRIPTION

This test will verify the ability of the simulator to support operator conducted RCS leak rate calculation in accordance with normal operations procedures. A small leak will be inserted, and the operating procedures will be performed to verify that they calculate the correct leak rate within a reasonable tolerance.

OPTIONS

Leak size is optional but should be less than about 5 gallons per minute to prevent the need for makeup to the Volume Control Tank.

INITIAL CONDITIONS

100% power or HSD, must be steady state.

FINAL CONDITIONS

100% power, steady state.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 2/2/90

TEST TEAM

DATE: 2-2-90

DATE: ________

DATE: ________

REACTOR COOLANT SYSTEM LEAK RATE CALCULATIONS, 3-OSP-041.1: SUR-005

BASIS FOR EVALUATION

Expert evaluation of the results of the surveillance as compared to the known leak rate.

DISCUSSION OF TEST RESULTS

The calculate leak rate on the surveillance was 3.16 gallons per minute. The leak rate initiated by the malfunction was a port area of 0.0001. This resulted in a leak rate which the simulator reported as 0.2 to 0.3 pounds mass per second. Converting this to gallons per minute yields a leak rate in gallons per minute which cooresponds very closely to the 3.16 gpm.

The team was able to perform the surveillance with no difficulty.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Robert J. Simbey	DATE: 3-20-90	[illegible]	DATE: 3/20/90
Kenneth W. White	DATE: 3/20/90	Richard J. Mende	DATE: 3-20-90
	DATE:	[illegible]	DATE: 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: CVCS BORIC ACID TRANSFER FLOW TEST, 3-OSP-046.2

NUMBER: SUR-007

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will consist of performing the normal operator surveillance procedure, 3-OSP-046.2, for verifying adequate boric acid flow capability. With no malfunctions present, the test should pass the applicable acceptance criteria contained in 3-OSP-046.2.

OPTIONS

This test can be performed in any stable shutdown condition.

INITIAL CONDITIONS

Cold shutdown with a water-solid pressurizer.

FINAL CONDITIONS

The test is complete when the surveillance has been completed.

APPROVED FOR USE

R E Dodson III DATE: 7/16/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth W. White DATE: 1/16/90

Robert J. Zimberg DATE: 1/16/90

__________ DATE: ______

CVCS BORIC ACID TRANSFER FLOW TEST, 3-OSP-046.2: SUR-007

BASIS FOR EVALUATION

Expert examination. 3-OSP-046.2 can be performed and the applicable acceptance criteria of the procedure met.

DISCUSSION OF TEST RESULTS

- *The surveillance was performed on the simulator, but due to a calibration inaccuracy on the control room flow recorder FR-3-113, the acceptance criteria were not met. This is the sort of problem that could occur in plant testing and is not considered to be a deficiency. The Stylized Instrument for FR-3-113 indicated 10 gpm, which would have met the acceptance criteria. This is a hardware problem and not a software one.*

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
[illegible]	DATE: 1/17/90	[illegible]	DATE: 2/5/90
[illegible]	DATE: 1/17/90	Richard L. [illegible]	DATE: 2-5-90
	DATE:	[illegible]	DATE: 2-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: BORIC ACID TRANSFER PUMP 3B TRANSFER AND CONTROL SWITCH TEST, 3-OSP-046.5

NUMBER: SUR-008

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will consist of performing the normal operator surveillance procedure, 3-OSP-046.5, for checking the 3B boric acid transfer pump transfer and control switch. With no malfunctions present, the test should pass the acceptance criteria contained in 3-OSP-046.5.

OPTIONS

This test can be performed in any stable plant condition.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

The test is complete when the surveillance has been completed.

APPROVED FOR USE

R E Dodson II DATE: 1/14/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth D. White DATE: 1/14/90

DATE:

DATE:

BORIC ACID TRANSFER PUMP 3B TRANSFER AND CONTROL SWITCH TEST, 3-OSP-046.5: SUR-008

BASIS FOR EVALUATION

Expert examination. 3-OSP-046.5 can be performed and the applicable acceptance criteria of the procedure met.

DISCUSSION OF TEST RESULTS

The surveillance was performed on the simulator, but the acceptance criteria were not met. The normal/isolate switch does not inhibit operating the 3B boric acid pump from the control room when the switch is placed in isolate. A DR has been submitted to correct this. Otherwise, alarms and indications were as expected.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

With the normal/isolate switch in isolate, the 3B boric acid transfer pump can still be operated from the control room.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth D. White	DATE: 1/15/90	R. E. Dodson III	DATE: 2/5/90
Robert J. Sinclair	DATE: 1/15/90	Richard J. Wende	DATE: 2-5-90
	DATE:	Leo Goebel	DATE: 2-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: REACTOR PROTECTION SYSTEM LOGIC TEST, 3-OSP-049.1

NUMBER: SUR-009

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will consist of performing the normal operator surveillance procedure, 3-OSP-049.1, for checking the proper operation of the reactor protection system logic. Train A and train B will both be checked. With no malfunctions present, the test should pass the applicable acceptance criteria contained in 3-OSP-049.1. The RPS logic test circuitry will also be verified to work correctly.

OPTIONS

The power level determines which portions of the surveillance are to be performed, but the reactor protection system logic test circuitry is full modelled and this surveillance can be performed at any stable plant condition on the simulator.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

The test is complete when the surveillance has been completed.

APPROVED FOR USE

L E Dedeaux DATE: 1/10/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth D. White DATE: 1/10/90

Robert J. Siniley DATE: 1/10/90

DATE: ________

REACTOR PROTECTION SYSTEM LOGIC TEST, 3-OSP-049.1: SUR-009

BASIS FOR EVALUATION

Expert examination. 3-OSP-049.1 can be performed and the applicable acceptance criteria of the procedure met.

DISCUSSION OF TEST RESULTS

The test went well. The surveillance was performed on the simulator, the reactor protection system logic test circuitry worked properly, and the applicable acceptance criteria were met. The control room indications and alarms were appropriate for the exercise. The RPS logic test panels (racks 36 and 41) are modelled correctly and operations in them produce the correct responses inside control room. The RPS logic matrix inside the control room changed in accordance with the OSP and operator actions inside the logic cabinets. Also, the changes inside the logic cabinets corresponded to operator actions.

The reactor trip and reactor trip bypass breakers worked properly. The trip bypass breaker test position not being modelled had no apparent effect inside the control room. The shunt block and shunt trip pushbuttons not being modelled also had no apparent effect inside the control room.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth D. White	DATE: 1/17/90	L E Dodson IV	DATE: 2/5/90
RJ Scully	DATE: 1/17/90	Richard L Woods	DATE: 2-5-90
	DATE:	Leo Goebel	DATE: 2-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: RHR MOV'S/SYSTEM PRESSURE INTERLOCK TEST, 3-OSP-050.7

NUMBER: SUR-010

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will be conducted by performing the operator surveillance procedure 3-OSP-050.7, RHR MOV's/System Pressure Interlock Test with no malfunctions inserted. The ability to successfully perform the operator surveillance will be verified.

OPTIONS

None

INITIAL CONDITIONS

Mode 4 with RHR isolated.

FINAL CONDITIONS

Mode 4 with RHR isolated, surveillance complete.

APPROVED FOR USE

[signature]
SIMULATOR ENGINEERING COORDINATOR DATE: 2/10/90

TEST TEAM

[signature] DATE: 2-2-90

_______________ DATE: ________

_______________ DATE: ________

RHR MOV'S/SYSTEM PRESSURE INTERLOCK TEST, 3-OSP-050.7: SUR-010

BASIS FOR EVALUATION

Expert evaluation of the ability to successfully perform the control room functions of the surveillance with the test passing the acceptance criteria.

DISCUSSION OF TEST RESULTS

The test was run in the simulator with no problems. The instrument tasks to simulate pressure at the pressure switches was accomplished by failing the associated bistables on or off. There were no discrepancies.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Sinaley	DATE: 3-20-90	R E Dodson	DATE: 3/20/90
Kenneth W. White	DATE: 3/20/90	Richard L Mende	DATE: 3-20-90
	DATE:	Leo Gödel	DATE: 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: RHR MOV'S 750, 751, 862, 863, INTERLOCK TEST, 3-OSP-050.8

NUMBER: SUR-011

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will be conducted by performing the operator surveillance procedure 3-OSP-050.8, RHR MOV's Interlock Test with no malfunctions inserted. The ability to successfully perform the operator surveillance will be verified.

OPTIONS

None

INITIAL CONDITIONS

Plant pressure less than 500 psig and cooldown in progress.
RHR system isolated.

FINAL CONDITIONS

Surveillance complete.

APPROVED FOR USE

R E [signature]
SIMULATOR ENGINEERING COORDINATOR DATE: 2/2/90

TEST TEAM

Robert J Ginsberg DATE: 2-2-90

Kenneth A. White DATE: 2/2/90

DATE: ______

RHR MOV'S 750, 751, 862, 863, INTERLOCK TEST, 3-OSP-050.8: SUR-011

BASIS FOR EVALUATION

Expert evaluation of the ability to successfully perform the control room functions of the surveillance with the test passing the acceptance criteria.

DISCUSSION OF TEST RESULTS

The surveillance was performed almost exactly as written and without any problems. To simulate the Instrument Technicians' task of simulating pressure at the RCS low range pressure detectors, the test team failed the detectors high from the instructor facility.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Simbery	DATE: 3-20-90	R C Dodson	DATE: 3/20/90
Kenneth W. White	DATE: 3/20/90	Richard L Ward	DATE: 3-20-90
	DATE:		DATE:

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: EMERGENCY CONTAINMENT FILTER FANS OPERATING TEST, 3-OSP-056.1

NUMBER: SUR-012

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will consist of performing the normal operator surveillance procedure, 3-OSP-056.1, for verifying the proper operation of the emergency containment filter fans. With no malfunctions present, the test should pass the applicable acceptance criteria contained in 3-OSP-056.1.

OPTIONS

This surveillance can be performed in any plant condition.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

The test is complete when the procedure has been completed.

APPROVED FOR USE

R E Dodson Jr

SIMULATOR ENGINEERING COORDINATOR DATE: 1/4/90

TEST TEAM

Kenneth D. White DATE: 1/4/90

DATE: ________

DATE: ________

EMERGENCY CONTAINMENT FILTER FANS OPERATING TEST, 3-OSP-056.1: SUR-012

BASIS FOR EVALUATION

Expert examination. 3-OSP-056.1 can be performed and the applicable acceptance criteria of the procedure met.

DISCUSSION OF TEST RESULTS

The test went well. The surveillance was performed on the simulator, the fans operated properly, and the acceptance criteria were all met.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

Kenneth D. White DATE: 1/5/90

RG Simberg DATE: 1/5/90

DATE:

SIMULATOR CONFIGURATION REVIEW BOARD

R E Dodson DATE: 2/5/90

Richard L Wende DATE: 2-5-90

Leo Goebel DATE: 2-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: SOURCE RANGE NUCLEAR INSTRUMENTATION ANALOG CHANNEL OPERATIONAL TEST, 3-OSP-059.1

NUMBER: SUR-014

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety-Related Equipment or Systems

DESCRIPTION

This test will be conducted by performing the operator surveillance procedure 3-OSP-059.1, Source Range Nuclear Instrument Analog Channel Operational Test.

OPTIONS

May be done shutdown by performing alternate sections of OSP-059.1.

INITIAL CONDITIONS

Done at power.

FINAL CONDITIONS

Surveillance complete.

APPROVED FOR USE

R E Dodson III DATE: 4/7/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J Sinly DATE: 4-8-90

DATE:

DATE:

SOURCE RANGE NUCLEAR INSTRUMENTATION ANALOG CHANNEL OPERATIONAL TEST, 3-OSP-059.1: SUR-014

BASIS FOR EVALUATION

Expert evaluation of the test team's ability to use the surveillance as written and the ability of the simulator to meet the acceptance criteria of the test.

DISCUSSION OF TEST RESULTS

The test was run using the operator surveillance procedure as written with power at 100%. The test went completely as planned and all parameters, alarms, and indications met the acceptance criteria. No discrepancies were noted.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

Robert J. Lind DATE: 4-10-90

Kenneth D. White DATE: 4/10/90

DATE:

SIMULATOR CONFIGURATION REVIEW BOARD

John Crockford DATE: 6/4/90

Kay Howell DATE: 6/4/90

Leo Gieler DATE: 6-4-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: INTERMEDIATE RANGE NUCLEAR INSTRUMENTATION ANALOG CHANNEL OPERATIONAL TEST, 3-OSP-059.2

NUMBER: SUR-015

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will consist of performing the normal operator surveillance procedure, 3-OSP-059.2, for verifying the proper analog output of the intermediate range nuclear instrumentation. With no malfunctions present, the test should pass the applicable acceptance criteria contained in 3-OSP-059.2. The proper modelling of the intermediate range nuclear instrumentation analog test circuitry will also be verified.

OPTIONS

This test can be performed in any stable plant condition.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

The test is complete when the surveillance has been completed.

APPROVED FOR USE

L E Dodson III DATE: 1/7/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth D. White DATE: 1/7/90

Robert J. Sinberg DATE: 1/7/90

DATE: ________

INTERMEDIATE RANGE NUCLEAR INSTRUMENTATION ANALOG CHANNEL OPERATIONAL TEST, 3-OSP-059.2: SUR-015

BASIS FOR EVALUATION

Expert examination. 3-OSP-059.2 can be performed and the applicable acceptance criteria of the procedure met.

DISCUSSION OF TEST RESULTS

The test went well. The surveillance was performed on the simulator without any local operator actions. The intermediate range nuclear instrumentation analog test circuitry checked out properly and the acceptance criteria in 3-OSP-059.2 were met.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth D. White	DATE: 1/10/90	[illegible]	DATE: 2/5/90
[illegible]	DATE: 1/10/90	[illegible]	DATE: 2-5-90
	DATE:	[illegible]	DATE: 2-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: INTERMEDIATE RANGE NIS SETPOINT VERIFICATION, 3-OSP-059.3

NUMBER: SUR-016

ANS 3.5 REFERENCE SECTIONS: 3.1.1 (10) Operator Conducted Surveillance Testing of Safety-Related Equipment or Systems

DESCRIPTION

This test will be conducted by performing the operator surveillance which checks the intermediate range setpoints during a power escalation. The test will be performed concurrently with SUR-002, the post-refueling power escalation.

OPTIONS

None

INITIAL CONDITIONS

Hot standby.

FINAL CONDITIONS

Surveillance complete.

APPROVED FOR USE

[signature] DATE: 5/14/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 6-3-90

DATE: ________

DATE: ________

INTERMEDIATE RANGE NIS SETPOINT VERIFICATION, 3-OSP-059.3: SUR-016

BASIS FOR EVALUATION

Expert evaluation of simulator's ability to support the surveillance and pass the acceptance criteria of the test.

DISCUSSION OF TEST RESULTS

The test was conducted in conjunction with the post refueling startup and power escalation of SUR-002. The intermediate range nuclear instruments passed the acceptance criteria of the test and the test was performed with no problems.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
Robert J. Sinsby	DATE: 6-3-90	John E. Crockford	DATE: 6/4/90
Kenneth D. White	DATE: 6/3/90	Kay A. Lovell	DATE: 6/4/90
	DATE:	Leo Goibel	DATE: 6-4-90

TITLE: POWER RANGE NUCLEAR INSTRUMENTATION ANALOG CHANNEL OPERATIONAL TEST, 3-OSP-059.4

NUMBER: SUR-017

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will consist of performing the normal operator surveillance procedure, 3-OSP-059.4, for verifying the proper analog output of the power range nuclear instrumentation. With no malfunctions present, the test should pass the applicable acceptance criteria contained in 3-OSP-059.4. The proper modelling of the power range nuclear instrumentation analog test circuitry will also be verified.

OPTIONS

The power level determines which portions of the surveillance are to be performed, but the power range analog test circuitry is full modelled and this surveillance can be performed at any stable plant condition on the simulator.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

The test is complete when the surveillance has been completed.

APPROVED FOR USE

[signature] DATE: 1/15/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth D. White DATE: 1/15/90

DATE:

DATE:

POWER RANGE NUCLEAR INSTRUMENTATION ANALOG CHANNEL OPERATIONAL TEST, 3-OSP-059.4: SUR-017

BASIS FOR EVALUATION

Expert examination. 3-OSP-059.4 can be performed and the applicable acceptance criteria of the procedure met.

DISCUSSION OF TEST RESULTS

The test went well. The surveillance was performed on the simulator, the analog output from the power range nuclear instrumentation was correct per the surveillance procedure, and the applicable acceptance criteria of 3-OSP-059.4 were met. The nuclear instrumentation analog test circuitry works properly. The OSP requires tripping certain protection channel bistables and that also worked properly; the correct lights came on in the protection channel cabinets and proper reactor protection matrix lights lit in the control room and the associated alarms were annunciated.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth D. White	DATE: 1/22/90	[illegible]	DATE: 2/5/90
[illegible]	DATE: 1/22/90	[illegible]	DATE: 2-5-90
	DATE:	[illegible]	DATE: 2-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: POWER RANGE NUCLEAR INSTRUMENTATION SHIFT CHECKS AND DAILY CALIBRATION, 3-OSP-059.5

NUMBER: SUR-018

ANS 3.5 REFERENCE SECTIONS: 3.1.1 (10) Operator Conducted Surveillance Testing on Safety-Related Equipment or Systems

DESCRIPTION

In this test, the normal plant surveillance to calibrate the power range nuclear instruments will be performed. This will insure that the simulator provides correct heat balance data for the indicated power level and that it is possible to do the surveillance. This test will be performed during the steady state stability run.

OPTIONS

The test may be run at any time in core life.

INITIAL CONDITIONS

100% Power, steady state.

FINAL CONDITIONS

Surveillance complete.

APPROVED FOR USE

[signature] DATE: 4/8/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert A. J. Sinsley DATE: 4-8-90

DATE: ______

DATE: ______

POWER RANGE NUCLEAR INSTRUMENTATION SHIFT CHECKS AND DAILY CALIBRATION, 3-OSP-059.5: SUR-018

BASIS FOR EVALUATION

Expert evaluation of the ability to perform the operator surveillance in the simulator and the simulator's ability to meet the performance criteria of the surveillance.

DISCUSSION OF TEST RESULTS

The surveillance was run with satisfactory heat balance results. The only problem was that the Digital Data Processing System model in the simulator did not support the use of the computer calculated heat balance (the 'cal' program). The team used meter indications and instructor facility variable monitoring to the perform the functions normally provided by the 'cal' program.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The DDPS 'cal' program will not run in the simulator. A deficiency report was submitted to get this problem fixed.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Sinsby	DATE: 4-18-90	John Crockford	DATE: 6/4/90
Kenneth D. White	DATE: 4/18/90	Kay Howell	DATE: 6/4/90
	DATE:	Leo Goebel	DATE: 6-4-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: PROCESS RADIATION MONITORING OPERABILITY TEST, 3-OSP-067.1

NUMBER: SUR-019

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will consist of performing the normal operator surveillance procedure, 3-OSP-067.1, for monitoring the operability of the process radiation monitors. This test will actuate all alarms and interlocks associated with each tested process radiation monitor channel. These process monitors include R-3-11 (Containment air particulate), R-3-12 (Containment air gaseous), R-3-14 (Plant vent gas monitor), R-3-15 (Condenser air ejector monitor), R-3-17A and R-3-17B (Component cooling water monitors), R-3-18 (Waste disposal system liquid effluent monitor), R-3-19 (Steam generator liquid monitor), and R-3-20 (Reactor coolant letdown monitor). Each channel should pass the applicable acceptance criteria contained in 3-OSP-067.1, which includes proper actuation of all alarms and interlocks.

OPTIONS

This test can be performed in any plant condition. If containment purge is not in service, the associated channels need not be tested.

INITIAL CONDITIONS

100% power with containment purge in service.

FINAL CONDITIONS

The test is complete when the procedure is complete.

APPROVED FOR USE

[signature] DATE: 8/29/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth W. White DATE: 8/29/90

__________ DATE: ______

__________ DATE: ______

PROCESS RADIATION MONITORING OPERABILITY TEST, 3-OSP-067.1: SUR-019

BASIS FOR EVALUATION

Expert Evaluation. 3-OSP-067.1 can be performed and the applicable acceptance criteria can be met.

DISCUSSION OF TEST RESULTS

Basically, the test went well. The team was able to perform the surveillance and the applicable acceptance criteria were met. There were a few problems and they will be detailed below in the deficiency section. The process monitors' indications were appropriate throughout this test. The control room alarms and equipment interlocks functioned as expected. The tested interlocks included such actuations as isolating and stopping the containment purge and shutting the instrument air bleed valves when R-3-11 or R-3-12 were tested; isolating a waste gas release when R-3-14 is actuated; shutting the CCW surge tank vent when R-3-17A or R-3-17B are tested; and isolating a liquid release when R-3-18 is tested.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

When the auxiliary building exhaust fans were stopped as part of the test of R-3-14, the reading for R-3-14 quickly increased from 3K to approximately 78K. When a fan was restarted the reading quickly returned to 3K. A DR will be submitted against this problem. The OSP requires checking the high alarm setpoint against the I&C posted value. These values are not posted. This will be covered by the plant/simulator hardware comparison, therefor a new DR will not be written against it.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Kenneth W. White	*DATE:* 8/30/90	R E Dodson	*DATE:* 10/11/90
P Q Sumby	*DATE:* 8/31/90	Richard L Mende	*DATE:* 10-11-90
	DATE:	Lee Joibef	*DATE:* 10-11-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: MAIN STEAM ISOLATION VALVE CLOSURE TEST

NUMBER: SUR-020

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems

DESCRIPTION

This surveillance test involves closing each of the main steam line isolation valves at a hot zero steam flow condition to verify that the valves will close in less time than required by the Technical Specifications. The procedure covers all three of the steam lines. Aspects of the test that involve local actions will be simulated through the scenario.

The majority of the activities in this Surviellance are either not simulated or are performed remotely. However, the test was performed to verify the closure timing of the MSIV for a pressurized hot zero steam flow condition.

OPTIONS

The simulator is capable of simulating this test for each of the MSIVs.

INITIAL CONDITIONS

0% power steady state, hot, zero steam flow, steam generator pressure greater than 1000 psig.

FINAL CONDITIONS

The test is complete when the procedure is complete. The system thermal hydraulic conditions are the same as at the start of the test.

APPROVED FOR USE

R E Dandon III
SIMULATOR ENGINEERING COORDINATOR DATE: 2/20/90

TEST TEAM

James D. Harrison DATE: 2/20/90

Kenneth W. White DATE: 2/20/90

DATE:

MAIN STEAM ISOLATION VALVE CLOSURE TEST: SUR-020

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.
Plant Data - Results from completed plant procedures will be used to compare the closure timing.

DISCUSSION OF TEST RESULTS

The surveillance was conducted as planned. The acceptance criteria for main steam isolation valve closure time was met by the simulator and the closure time provided reasonable agreement with plant data.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
James D. Harrison	DATE: 3/20/90	L C Dodson IV	DATE: 4/12/90
Kenneth D. White	DATE: 3/20/90	Richard L. Mende	DATE: 4-12-90
	DATE:	Leo Doilop	DATE: 4-12-90

TITLE: STANDBY STEAM GENERATOR FEEDWATER PUMPS/CRANKING DIESELS TEST, 0-OSP-074.4

NUMBER: SUR-021

ANS 3.5 REFERENCE SECTIONS: 3.1.1 (10) OPERATOR CONDUCTED SURVEILLANCES ON SAFETY-RELATED EQUIPMENT OF SYSTEMS

DESCRIPTION

This test will show the ability of the simulator to support the testing of the standby steam generator feed pumps. For this test, the applicable plant surveillance procedure has the operators supply the standby feed pump from the unit 1 and 2 cranking diesels which are a backup power supply to the nuclear units. The certification test will be performed by performing the applicable operator surveillance procedure to the fullest extent possible in the simulator.

OPTIONS

None

INITIAL CONDITIONS

The surveillance requires that it be possible to deenergized the unit 3 4C 4Kv bus. This is most easily done at hot standby.

FINAL CONDITIONS

Surveillance complete.

APPROVED FOR USE

R E Dodson Jr

SIMULATOR ENGINEERING COORDINATOR

DATE: 6/3/90

TEST TEAM

Robert J Simberg DATE: 6-3-90

DATE:

DATE:

STANDBY STEAM GENERATOR FEEDWATER PUMPS/CRANKING DIESELS TEST, 0-OSP-074.4: SUR-021

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevent parameters will be evaluated. In addition, the ability of the simulator to support the surveillance as written will be evaluated.

DISCUSSION OF TEST RESULTS

The surveillance was performed almost exactly as written without any problems. Some local actions were performed from the instructor facility, but this is normal for simulator operation. In addition to testing the 'A' standby feed pump, the test team started the 'B' standby feed pump and fed the steam generators with it to show that it could be used. The 'B' pump is powered from unit 4C bus and is not fully modeled electrically so the surveillance was not performed for it. No deficiencies were noted.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATION CONFIGURATION REVIEW BOARD***	
[signature]	***DATE:*** 6-3-90	[signature]	***DATE:*** 6/4/90
[signature]	***DATE:*** 6/3/90	[signature]	***DATE:*** 6/4/90
	DATE:	[signature]	***DATE:*** 6-4-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: AUXILIARY FEEDWATER TRAIN 1 OPERABILITY VERIFICATION, 3-OSP-075.1

NUMBER: SUR-022

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will be conducted by performing the operator surveillance procedure 3-OSP-075.1, Auxiliary Feedwater Train 1 Operability Verification with no malfunctions inserted.

OPTIONS

Either train of Auxiliary Feedwater could be tested.

INITIAL CONDITIONS

Can be performed at any power level above the point of adding heat.

FINAL CONDITIONS

Surveillance complete.

APPROVED FOR USE

[signature] DATE: 2/2/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 2-2-90

DATE:

DATE:

AUXILIARY FEEDWATER TRAIN 1 OPERABILITY VERIFICATION, 3-OSP-075.1: SUR-022

BASIS FOR EVALUATION

Expert evaluation of the ability to successfully perform the control room functions of the surveillance with the test passing the acceptance criteria.

DISCUSSION OF TEST RESULTS

The team was able to perform the surveillance with no problems. All the control room functions could be performed. The portions of the test done locally were not done, but this did not adversely affect the test.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
[illegible]	***DATE:*** 3-20-90	[illegible]	***DATE:*** 3/20/90
Kenneth D. White	***DATE:*** 3/20/90	Richard L. [illegible]	***DATE:*** 3-20-90
	DATE:	[illegible]	***DATE:*** 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: MAIN TURBINE VALVES OPERABILITY TEST, 3-OSP-089

NUMBER: SUR-024

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test is a performance of the operator surveillance which checks the freedom of motion of the main turbine valves. In order to provide as much data as possible, the test will be run at power even though the operator surveillance has the option of being run at hot standby.

OPTIONS

The test may be run at power or shutdown.

INITIAL CONDITIONS

Power less than 40%.

FINAL CONDITIONS

Surveillance completed.

APPROVED FOR USE

[signature]

SIMULATOR ENGINEERING COORDINATOR

DATE: 9/24/90

TEST TEAM

[signature] DATE: 9-24-90

DATE:

DATE:

MAIN TURBINE VALVES OPERABILITY TEST, 3-OSP-089: SUR-024

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevent parameters will be evaluated. In addition, the ability to successfully perform the surveillance and the ability of the simulator to pass the acceptance criteria will be evaluated.

DISCUSSION OF TEST RESULTS

The final run of this surveillance was performed with very little problem. As in the plant, the initial stages of shutting the left turbine control valves with the test switch is very difficult due to the large change in power with a small valve movement. The team was, however, able to perform the test without undue transients ensuing in the simulator. No deficiencies were noted.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Lindsey	DATE: 9-25-90		DATE: 10-10-90
Kenneth D. White	DATE: 9/25/90		DATE: 10-10-90
	DATE:		DATE: 10-10-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: ENGINEERED SAFEGUARDS INTEGRATED TEST, 3-OSP-203

NUMBER: SUR-026

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will consist of performing the normal operator surveillance procedure, 3-OSP-203, for verifying proper engineered safety features actuation. With no malfunctions present, the test should pass the applicable acceptance criteria contained in 3-OSP-203. As stated in the title, this is an integrated test and it verifies the proper plant response to a loss of off-site power. It also verifies proper plant response to a high containment pressure followed by a loss of off-site power. All modelled equipment that would receive a signal during a safety injection or loss of off-site power will receive that signal during the performance of this OSP. In order to verify proper equipment actuation without actually starting components in conditions that could damage them or the plant, this surveillance requires starting or auto starting these components with their breakers in the test position.

OPTIONS

This test can be performed in cold shutdown, solid or partially drained.

INITIAL CONDITIONS

Cold shutdown, partially drained.

FINAL CONDITIONS

The test is complete when the procedure is complete.

APPROVED FOR USE

R E Dawson II DATE: 1/12/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth D. White DATE: 1/12/90

Robert J. Weinberg DATE: 1/12/90

__________ DATE: ______

ENGINEERED SAFEGUARDS INTEGRATED TEST, 3-OSP-203: SUR-026

BASIS FOR EVALUATION

Expert examination. 3-OSP-203 can be performed and the applicable acceptance criteria met.

DISCUSSION OF TEST RESULTS

The surveillance was performed on the simulator and, generally, control room alarms and indications were appropriate, but a number of small problems were encountered. These problems resulted in 10 DR's being written against this test. Some of the deficiencies, such as the spent fuel pit pump not stopping, do not have an immediate effect inside the control room, but after a period of time could cause an alarm. Other equipment not tripping or auto starting, however, would have an immediate indication or alarm inside the control room. This includes such equipment as the 3C CCW pump, the turbine auxiliary oil pump, and the pressurizer heaters. The operator actions for setting up this surveillance worked well and, although this is an extensive test, most of the operations functioned properly.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

With the SGFP breakers in test, starting the first SGFP produced an AFW auto start signal.
On loss of off-site power the spent fuel pit pump continued to run, the turbine auxiliary oil pump continued to run, pressurizer backup group B heaters did not de-energize, and the 3A supply to MCC 3A remained closed as did the LC 3D supply to MCC C.
For the SI followed by a loss of off-site power, the total CCW was less than the procedural minimum, pressurizer backup group A heaters did not de-energize, the turbine auxiliary oil pump did not trip, the same LC supplies to the MCC's failed to open, and the 3C CCW pump did not start when it was the standby pump.
The RCP guide bearing temperatures increased when CCW was isolated, even though the RCS was cold and the RCP's were not running.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Kenneth R. White	DATE: 2/1/90	L E Dodson IV	DATE: 2/5/90
PG Rumbly	DATE: 2/1/90	Richard L Woods	DATE: 2-5-90
	DATE:	Leo Joebel	DATE: 2-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: OPERATIONAL TEST OF MOV-535, 536 AND PORV 455C,456, OP-1300.2

NUMBER: SUR-029

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will be conducted by performing the operating procedure 3-OP-1300.2, Operational Test of MOV-535, 536 and PORV-455C, 456. This test performs a leak check of the associated valves.

OPTIONS

None

INITIAL CONDITIONS

Unit at Hot Standby.

FINAL CONDITIONS

Surveillance complete.

APPROVED FOR USE

L E Dearmont DATE: 3/13/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Sinberg DATE: 3-13-90

Kenneth D. White DATE: 3/13/90

DATE:

OPERATIONAL TEST OF MOV-535, 536 AND PORV-455C, 456, OP-1300.2: SUR-029

BASIS FOR EVALUATION

Expert evaluation of the ability to perform the surveillance in the simulator and the simulator's ability to meet the acceptance criteria of the surveillance.

DISCUSSION OF TEST RESULTS

The test team was able to perform the surveillance with no difficulties. All actions that needed to be taken from the control room were performed as written and all parameters which needed to be monitored were available for recording. No deficiencies were noted.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

Robert J. Sinsky DATE: 3-14-90

Kenneth D. White DATE: 3/14/90

DATE:

SIMULATOR CONFIGURATION REVIEW BOARD

DATE: 6/13/90

DATE: 6-13-90

DATE: 6-13-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: FULL LENGTH RCC - PERIODIC EXERCISE, OP-1604.1

NUMBER: SUR-030

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will consist of performing the operator surveillance procedure OP-1604.1, which exercises the control and shutdown rods. In this surveillance each bank of rods is individually moved and verification will be made via the step counters and rod position indicators (RPI's), less than 12 steps deviation between the step counters and RPI's will be checked, proper operation of the rod off top lights will be monitored, and when the safety rods are moved the actuation of the shutdown bank off top alarm will be verified. With no malfunctions present this test should pass the applicable acceptance criteria contained in OP-1604.1. The data sheets of this test will be compared with the data sheets from an actual performance of this test at Turkey Point.

OPTIONS

This test can be conducted from any steady state power level.

INITIAL CONDITIONS

100% power.

FINAL CONDITIONS

The test is complete when the procedure is complete.

APPROVED FOR USE

R E Dodge II DATE: 6/10/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth D. White DATE: 6/10/90

________________ DATE: ________

________________ DATE: ________

FULL LENGTH RCC - PERIODIC EXERCISE, OP-1604.1: SUR-030

BASIS FOR EVALUATION

Expert examination. OP-1604.1 can be performed on the simulator and the applicable acceptance criteria of the procedure can be met.
Plant data. The data sheets of this test will be compared with the data sheets from the performance of this test on Unit 4 on 6/11/90.

DISCUSSION OF TEST RESULTS

This test went well; all control room indications, interactions, and alarms were as expected. The review of the ACCEPTANCE CRITERIA was satisfactory. The maximum deviation between group step counters and RPI's was 6 steps. Tavg dropped with rod motion and returned to its original value upon the return of the rods to full out. All of the shutdown rods off top lights came on by 216 steps, which is within the acceptance criteria. The bank low limit alarm annunciated for A, B, and C rod banks. All control rods were driven to 215 steps. D bank was driven to the same position, although the required Tavg change occurred at a slightly higher rod position. The return to 228 steps was accomplished in one continuous rod pull. During the pull for A and C banks the alarm NIS power range overpower rod withdrawal stop annunciated and rod withdrawal was blocked. It cleared in a few seconds and the pull was resumed successfully. This actuation seems reasonable and is to be expected for a continuous rod pull of this size at 100% power. The comparison with the plant performance of this test was also satisfactory. Tavg dropped more on the simulator, but it was not a major difference and it is due to a couple of causes. In the simulator performance of this test rods were driven 3 steps further in and were allowed to stay in slightly longer than in the plant performance. The shutdown rods had to be driven in further on the plant to illuminate all of the rod off top lights, but for the purpose of training this is insignificant.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth D. White	DATE: 6/11/90	[signature]	DATE: 8/24/90
Robert J. Sinkey	DATE: 6/11/90	Richard L. Mende	DATE: 8-24-90
	DATE:	Leo Goeb	DATE: 8-24-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: INDUCING XENON OSCILLATIONS TO PRODUCE VARIOUS.INCORE AXIAL OFFSETS, OP-12304.8

NUMBER: SUR-031

ANS 3.5 REFERENCE SECTIONS: 3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment

DESCRIPTION

This test will consist of performing the operating procedure for inducing a xenon oscillation in order to produce various axial offsets, OP-12304.8. From a steady state condition rods will be inserted in order to drive delta I in the negative direction and start a xenon oscillation. A dilution will also be performed to counteract the negative reactivity of the rod insertion. This test will also be used to actually look at the effects of the xenon oscillation on a number of core nodes. The xenon oscillation will be started and power stabilized. Then to expedite matters, xenon will be run at a fast time factor of ten for at least 1.75 hours. This will be long enough to see xenon and power peak or bottom out at all core nodes and start back in the other direction. The xenon oscillation will be recorded and analyzed. A flux map will not be performed on the simulator at this time, but for a test including the performance of a flux map see SUR-002. Several incore parameters will be monitored and recorded in order to compare simulator results during this test with expected plant results.

OPTIONS

This test may be performed at any steady state power level.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

The test is complete when the procedure is complete. After inducing the xenon oscillation and stabilizing power and temperature, xenon will be run at fast time for at least 1.75 hours.

APPROVED FOR USE

[signature] DATE: 6/15/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth D. White DATE: 6/15/90

________________________ DATE: ________

________________________ DATE: ________

INDUCING XENON OSCILLATIONS TO PRODUCE VARIOUS INCORE AXIAL OFFSETS, OP-12304.8: SUR-031

BASIS FOR EVALUATION

Expert examination. OP-12304.8 must be able to be performed. The nodal xenon and power plots will be analyzed and evaluated for any impact on training.

DISCUSSION OF TEST RESULTS

OP-12304.8 was used to induce the xenon oscillation. A 700 gallon dilution was used, requiring that control rods be inserted to 171 steps to maintain TAV and power level steady. This magnitude of dilution and rod motion was used because of the problem with the delta I model. This caused an immediate change in delta I. Boron was equalized, power and TAV were stabilized, then a snapshot was taken. Xenon was placed at fast time and the simulator was taken out of freeze. TAV and power started dropping and continued to drop for .75 hours real time before starting an upwards trend. Both were still increasing at the end of the run by which time TAV had increased .8F and power .8%. Changes in delta I indication, xenon by node, and power by node seemed not to be overly influenced by this. The delta I trend in the negative direction continued as xenon built up in the top of the core and was burned out in the bottom. This continued for about 5 hours before the processes reversed. Delta I started trending in the positive direction, xenon started burning out in the top and building up in the bottom. These trends were still going on at the end of the test, but started to change at lower rates. The magnitude of xenon and power change varied by node, but total xenon reactivity remained virtually constant. The time required to peak also varied by node.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The alarm for hydrogen system alarm panel hydrogen trouble actuated about an hour after the simulator was taken out of freeze and the alarm for delta flux >5% max power 90% actuated less than five minutes after coming out of freeze. The delta I model is not fully responsive.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
Kenneth D. White	DATE: 6/29/90	[signature]	DATE: 8/24/90
Robert J. Sinberg	DATE: 8/6/90	Richard L. Wendt	DATE: 8-24-90
	DATE:	Leo Goebel	DATE: 8-24-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: NORMAL OPERATION OF INCORE MOVEABLE DETECTOR SYSTEM AND POWER DISTRIBUTION SURVEILLANCE, OP-12404.1

NUMBER: SUR-032

ANS 3.5 REFERENCE SECTIONS: 3.1.1 (9) CORE PERFORMANCE TESTING
3.1.1 (10) OPERATOR CONDUCTED SURVEILLANCES

DESCRIPTION

This test will verify the operability of the incore moveable detector system in the simulator. The operating procedure will be used to operate the system and the plant reactor engineers will be used to perform the actual operation. A full flux map will not be taken, but at least one pass will be done with each detector in order to insure that all detectors work in the simulator.

OPTIONS

Each detector can be inserted into several locations in the core. Each detector should be inserted into a different location in order to test as much of the system as possible with the runs performed.

INITIAL CONDITIONS

Any power level in mode 1, steady state.

FINAL CONDITIONS

Required operations complete.

APPROVED FOR USE

L C Dodson [signature] DATE: 10/4/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Sirely [signature] DATE: 10/4/90

DATE:

DATE:

NORMAL OPERATION OF INCORE MOVEABLE DETECTOR SYSTEM AND POWER DISTRIBUTION SURVEILLANCE, OP-12404.1: SUR-032

BASIS FOR EVALUATION

Expert evaluation of simulator's ability to support the surveillance and pass the acceptance criteria of the test.

DISCUSSION OF TEST RESULTS

The test was run successfully. In addition to running the detectors through the calibrate and normal positions, the test team ran all detectors through both their emergency positions to verify emergency operations. In addition, the team checked that the detectors would stick if misoperation of the drive system occured.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The only problem noted was that several light on the right hand side of the panel were periodically blinking off and on for no apparent reason. This problem did not affect the operation of the system.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

Robert A. Sinely DATE: 10/8/90

Kenneth D. White DATE: 10/8/90

DATE:

SIMULATOR CONFIGURATION REVIEW BOARD

L. E. Dawson DATE: 10-10-90

Richard L. Meade DATE: 10-10-90

Leo Doiche DATE: 10-10-90

5.0 MALFUNCTION TESTS

5.1 CONTAINMENT (MCN)

5.1.1	MCN-001	CONTAINMENT SPRAY SYSTEM OPERATIONS AND MALFUNCTIONS

5.2 COMMON SERVICES (MCS)

5.2.1	MCS-001	COMPONENT COOLING WATER OPERATIONS AND MALFUNCTIONS UP TO AND INCLUDING TOTAL LOSS OF CCW
5.2.2	MCS-002	INTAKE COOLING WATER SYSTEM OPERATIONS AND MALFUNCTIONS
5.2.3	MCS-003	TURBINE PLANT COOLING WATER OPERATION AND MALFUNCTIONS
5.2.4	MCS-004	INSTRUMENT AIR SYSTEM OPERATION AND MALFUNCTIONS

5.3 CHEMICAL AND VOLUME CONTROL SYSTEM (MCV)

5.3.1	MCV-001	UNCONTROLLED MAXIMUM RATE BORON DILUTION
5.3.2	MCV-002	CHARGING SYSTEM FAILURES
5.3.3	MCV-003	CHARGING LINE BREAK OUTSIDE CONTAINMENT
5.3.4	MCV-004	LETDOWN AND VOLUME CONTROL TANK SYSTEM OPERATIONS AND MALFUNCTIONS
5.3.5	MCV-005	NON-REGENERATIVE HEAT EXCHANGER TUBE LEAK

5.4 FEEDWATER (MFW)

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5.4.2	MFW-002	LOSS OF NORMAL FEEDWATER
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5.5 GENERATOR AND GRID (MGG)

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5.6.5	MMP-005	LOSS OF DC BUS 3A (3D01)
5.6.6	MMP-006	LOSS OF DC BUS 3B (3D23)
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	5.7.4	*MRC-004*	*PORV FAILURE (OPEN) WITHOUT HIGH PRESSURE INJECTION*
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	5.7.6	*MRC-006*	*LOSS OF A SINGLE REACTOR COOLANT PUMP WITH POWER BELOW P-8*
	5.7.7	*MRC-007*	*STUCK OPEN SPRAY VALVE*
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	5.8.2	*MRX-002*	*LOSS OF PROTECTION SYSTEM CHANNEL*
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	5.9.1	*MSG-001*	*MAIN STEAM LINE BREAK INSIDE CONTAINMENT*
	5.9.2	*MSG-002*	*MAIN STEAM LINE BREAK OUTSIDE CONTAINMENT*
	5.9.3	*MSG-003*	*SIMULTANEOUS CLOSURE OF ALL MSIV's*
	5.9.4	*MSG-004*	*TRANSMITTER FAILURE RESULTING IN MAXIMUM ATMOSPHERIC DUMP DEMAND*
	5.9.5	*MSG-005*	*FAILURE OF REFERENCE TEMPERATURE TO STEAM DUMPS*
	5.9.6	*MSG-006*	*CLOSURE OF A SINGLE MSIV AT SEVERAL DIFFERENT POWER LEVELS*
5.10	*STANDBY POWER & SYNCHRONIZATION (MSP)*		
	5.10.1	*MSP-001*	*BUS STRIPPING AND LOAD SEQUENCING TESTS*
5.11	*SAFETY SYSTEMS (MSS)*		
	5.11.1	*MSS-001*	*SMALL LEAK IN SAFETY INJECTION PIPING OUTSIDE CONTAINMENT*
	5.11.2	*MSS-002*	*ACCUMULATOR OPERATIONS AND MALFUNCTIONS*
	5.11.3	*MSS-003*	*LOSS OF RHR WHILE IN COLD SHUTDOWN*
	5.11.4	*MSS-004*	*LOSS OF INVENTORY DURING A SHUTDOWN AND PARTIAL DRAINDOWN CONDITION*

TITLE: CONTAINMENT SPRAY SYSTEM OPERATIONS AND MALFUNCTIONS

NUMBER: MCN-001

ANS 3.5 REFERENCE SECTIONS: 3.1.2(23) Passive Malfunctions in Engineered Safety Features Systems

DESCRIPTION

Two failures will be placed on the spray system in order to verify proper modelling of the spray system. One failure consists of a stuck shut valve on the B spray pump discharge with a LOCA instated. Ten minutes after the LOCA has been initiated the RWST outlet valve will be shut. No manual actions will be taken. Several parameters will be monitored and recorded in order to compare simulator results with expected results.

OPTIONS

Either spray pump discharge valve can be failed shut.

INITIAL CONDITIONS

Steady state 100% power.

FINAL CONDITIONS

The test will run for five minutes after the RWST outlet valve has been shut.

APPROVED FOR USE

R E Dodson III DATE: 4/9/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth N. White DATE: 4/9/90

DATE: ______

DATE: ______

MCN-001: CONTAINMENT SPRAY SYSTEM OPERATIONS AND MALFUNCTIONS

BASIS FOR EVALUATION

Expert examination.

DISCUSSION OF TEST RESULTS

This test went well. The B spray pump had no flow, but containment pressure continued to decrease due to the A spray pump flow and the containment coolers. When the RWST outlet was shut, the spray flow, RHR flow, and Unit 3 SI flow went to zero. With the new pump cavitation model, the flow actually was zero. Because this was well into the scenario and there was still SI flow from Unit 4 along with the containment coolers, the containment pressure held steady.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth W. White	DATE: 4/16/90	[illegible]	DATE: 5/15/90
[illegible]	DATE: 5/2/90	[illegible]	DATE: 5/17/90
	DATE:	[illegible]	DATE: 5-17-90

TITLE: COMPONENT COOLING WATER OPERATIONS AND MALFUNCTIONS UP TO AND INCLUDING TOTAL LOSS OF CCW

NUMBER: MCS-001

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (8) Loss of Component Cooling

DESCRIPTION

This test will exercise the Component Cooling Water system with different malfunctions in order to insure proper simulator response. In one case, the Intake Cooling Water to the CCW heat exchangers will be lost. In the second case, all CCW pumps will be tripped, resulting in a total loss of CCW cooling.

OPTIONS

There is a large number of malfunctions which can be run on the Component Cooling System. Only representative ones need be chosen for this test, but they should put the system near its limits. In addition, numerous component could be monitored for their response to a loss of cooling. Representative important components will be chosen.

INITIAL CONDITIONS

100% power, normal system line ups.

FINAL CONDITIONS

Run 1, no Intake Cooling of CCW for 20 minutes.
Run 2, no CCW flow for 20 minutes.

APPROVED FOR USE

R E Dodson III

SIMULATOR ENGINEERING COORDINATOR DATE: 3/10/90

TEST TEAM

Robert J. Sind DATE: 3-10-90

Kenneth W. White DATE: 3/~~30~~10/90 KWW

DATE: ______

COMPONENT COOLING WATER OPERATION AND MALFUNCTIONS UP TO AND INCLUDING TOTAL LOSS OF CCW: MCS-001

BASIS FOR EVALUATION

Expert evaluation of overall system and selected component response.

DISCUSSION OF TEST RESULTS

RUN 1: LOSS OF INTAKE COOLING TO THE COMPONENT COOLING WATER HEAT EXCHANGERS

In this run, component cooling flow was maintained so that the temperatures of cooled components rose, but not at an extreme rate. Letdown temperature out of the non-regenerative heat exchanger rose 20 degrees in twenty minutes, and RCP upper bearing temperatures rose about 15 degrees in the same time period. Other temperatures began rising at lesser rates as expected. All components showed an increasing rate of temperature rise as the event continued.

RUN 2: TOTAL LOSS OF COMPONENT COOLING WATER FLOW

In this run, all of the component cooling pumps were tripped to create a total loss of component cooling. As expected, all temperature rose rapidly to trip or failure conditions. Expected alarms were received, and appropriate automatic actions took place. For example, the letdown divert around the demineralizers occurred in about 20 seconds. No unanticipated responses occurred.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Sing	DATE: 3-10-90	[illegible]	DATE: 4/19/90
Kenneth W. White	DATE: 3/10/90	[illegible]	DATE: 4-19-90
	DATE:	[illegible]	DATE: 4-19-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: INTAKE COOLING WATER SYSTEM OPERATIONS AND MALFUNCTIONS

NUMBER: MCS-002

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (6) Loss of Service Water or Cooling to Individual Components

DESCRIPTION

This test will check proper Component Cooling Water and Turbine Plant Cooling Water system response to a loss of Intake Cooling Water. Since other tests verify simulator response to loss of CCW and TPCW, only the ICW loss's effect on these two systems will be checked.

OPTIONS

There are several different means to cause a loss of Intake Cooling Water including tripping of the pumps, clogging of suction screens and large leaks. Any method may be used.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

The run will be stopped 30 minutes after the Intake Cooling Water pumps are tripped.

APPROVED FOR USE

[signature] DATE: 3/10/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 3/10/90

[signature] DATE: 3/10/90

DATE: ______

INTAKE COOLING WATER SYSTEM OPERATIONS AND MALFUNCTIONS: MCS-002

BASIS FOR EVALUATION

Expert evaluation of system response.

DISCUSSION OF TEST RESULTS

The loss of ICW test went as expected. The CCW and TPCW system temperatures rose as expected. TPCW system temperature rose 60 degrees in 30 minutes. In addition, a number of expected alarms were received including: RCP motor brg high temperature, TPCW high temperature, instrument air system high temperature, turbine lube oil high temperature, turbine bearing high temperature, exciter air cooler high temperature, hydrogen system alarm panel trouble, generator RTD high temperature, Generator core trouble, and CC surge tank high level (due to system heat up).

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Siruby	DATE: 3-10-90	L E Dodson Jr	DATE: 4/19/90
Kenneth W. White	DATE: 3/30/90	R J Woude	DATE: 4-19-90
	DATE:	Leo Göbel	DATE: 4-19-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: TURBINE PLANT COOLING WATER OPERATION AND MALFUNCTIONS

NUMBER: MCS-003

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (6) Loss of Service Water or Cooling to Individual Components

DESCRIPTION

This test will exercise the Turbine Plant Cooling Water system with two different malfunctions in order to insure proper simulator response. In one case, the Intake Cooling Water to the TPCW heat exchangers will be lost. In the second case, all TPCW pumps will be tripped. In both cases, no operator action will be taken.

OPTIONS

Several different means are available to cause a loss of Turbine Plant Cooling Water.

INITIAL CONDITIONS

100% power, normal line up.

FINAL CONDITIONS

For each run, the test will be stopped 30 minutes after the initiation of the event.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 3/10/90

TEST TEAM

DATE: 3-10-90

Kenneth L. White DATE: 3/10/90

DATE: ______

TURBINE PLANT COOLING WATER OPERATION AND MALFUNCTIONS: MCS-003

BASIS FOR EVALUATION

Expert evaluation of overall plant and selected parameter response.

DISCUSSION OF TEST RESULTS

RUN 1: LOSS OF INTAKE COOLING WATER TO TPCW HEAT EXCHANGERS
In run one, the cooling medium for the TPCW coolers was isolated via valve CV-2201 which was failed shut. As expected, the TPCW out of the heat exchangers heated up rapidly. TPCW temperature went from 111 degrees to 157 degrees in 30 minutes. This is turn caused components cooled by TPCW to heat up rapidly. The turbine and generator loads were monitored and graphed. An example is that #1 turbine bearing temperature went up from 133 degrees to almost 180 degrees in the 30 minutes. Several alarms were received: Generator RTD high temp., Turbine lube oil high temp., turbine bearing high temperature, hydrogen system trouble, exciter air cooler hi temp., instrument air high temp., TPCW high temp., and generator core trouble.

RUN 2: TOTAL LOSS OF TPCW
In this run, all the TPCW pumps were tripped to simulate a total loss of TPCW. As expected, all TPCW cooled components heated up extremely rapidly. For example, the generator stator gas outlet temperature reached 250 degrees in just over three minutes. The alarms received in run one again annunciated with the addition of the TPCW low pressure alarm.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Several expected alarms were not received. They were: steam generator feed pumps, condensate pumps, heater drain pumps, and the iso-phase bus duct coolers. These discrepancies were documented in October 1989 on SWRN-8900409. Due to the nature of the loss of TPCW event, the lack of these alarms does not constitute a serious training deficiency. All discrepancies will be fixed however.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert A. Sing	DATE: 3-10-90	C. A. Coker for L. G.	DATE: 4-27-90
Kenneth W. White	DATE: 3/10/90	R E Dodson	DATE: 4/27/90
	DATE:	[illegible] Wendt	DATE: 4-27-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: INSTRUMENT AIR SYSTEM OPERATION AND MALFUNCTIONS

NUMBER: MCS-004

ANS 3.5 REFERENCE SECTIONS: 3.1.2(2) Loss of Instrument Air

DESCRIPTION

The purpose of this test is to verify the proper performance of the simulator during operations involving the instrument air system and with various instrument air malfunctions. There will be six separate runs involved in the completion of this test and a different malfunction will be inserted in each run. In the first test the diesel air compressor discharge pressure will be reduced to 14.6 psia and system pressure will be allowed to decay for 6 minutes, at which time the service air supply will be opened to raise system pressure back to 75 psig. In the second test the dryer will be completely fouled, allowing no air passage after a 3 minute ramp in of the fouling. System pressure will decay more rapidly in this case. The service air supply will be opened to verify that it has no effect, then the dryer bypass from Unit 4 will be opened to restore system pressure. In the third test a leak will be placed on the instrument air reservoir. The service air supply will be opened to reduce the rate of pressure decay and the Unit 4 supply will be opened to recover pressure. In the fourth test leaks will be placed on several headers. System pressure will be allowed to fully decay to verify simulator response to a complete loss of instrument air. In the fifth test a leak will be placed on the containment air header. After a 5 minute time delay the containment header will be isolated. In the sixth test a leak will be placed on the turbine building air header. The same procedure will be followed as for the containment header leak. In the fifth and sixth tests the isolated headers should decay to atmospheric pressure whilst the rest of the system is fully restored.

Several parameters will be monitored in order to compare simulator results with expected plant results. A member of the test team will be on the control room for at least part of each run to verify that alarms, indication, and actuations are appropriate.

OPTIONS

Leaks of variable size are available on the simulator in numerous locations, including each major air header and the instrument air reservoir. Multiple leaks or individual leaks can be instated. The diesel air compressor discharge pressure and the amount and rate of dryer fouling can also be varied. The instrument air filters can be used instead of the dryers.

INITIAL CONDITIONS

Steady state, 100% power.

FINAL CONDITIONS

N/A

APPROVED FOR USE

L E Dodson IV

SIMULATOR ENGINEERING COORDINATOR

DATE: 3/12/90

TEST TEAM

Kenneth D. White DATE: 3/12/90

DATE: ________

DATE: ________

INSTRUMENT AIR SYSTEM OPERATION AND MALFUNCTIONS: MCS-004

BASIS FOR EVALUATION

Expert examination

DISCUSSION OF TEST RESULTS

Generally, this test went extremely well. There were a few discrepancies, but they were all of a minor nature and they are detailed below in the deficiency section. Reducing the diesel air compressor output causes system header pressure to gradually decrease accordingly. Opening the service air supply restores system pressure to 75 psig, but due to the inability to control the FCV's this is not enough to prevent a plant trip. Clogging the instrument air dryer causes a much more rapid system pressure decay. In this instance opening the service air supply has no effect, but opening the Unit 4 supply is enough to fully restore system pressure. The leak on the instrument air reservoir is not meaningful because the diesel air compressor can keep up with it. Since there are a number of other means for causing a loss of instrument air, this is not significant and has no impact on training. During the complete loss of instrument air, valves drifted shut and with two exceptions, one inside the control room and one outside, all valves failed to the proper position. The valves did not all fail simultaneously, but as system pressure dropped, different valves started to drift. The valves would give intermediate indication while drifting. Valves that had a backup source of either nitrogen or some other air supply were able to be controlled. On the single header failures, system and different header pressures dropped to various steady values. Headers not impacted by the rupture, restored when the ruptured header was isolated. The ruptured header dropped to atmospheric pressure after it was isolated. Control room indication, alarms, and interactions were appropriate for all runs except as noted below.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

TCV-3-143 failed to the demineralizers and not the VCT. The pressurizer PORV's could not be cycled full open when on their nitrogen backup. The gland steam spillover valve, CV-3-3725, failed open instead of shut. When a header is isolated, it decays to atmospheric pressure in less than 10 seconds. DR's have been submitted on all problems encountered.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth W. White	DATE: 3/20/90	[signature]	DATE: 4/27/90
[signature]	DATE: 3/21/90	Richard J. Woods	DATE: 4-27-90
	DATE:	C.A. Coker for L.G.	DATE: 4-27-90

TITLE: UNCONTROLLED MAXIMUM RATE BORON DILUTION

NUMBER: MCV-001

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (17) Failure of Automatic Control Systems which Affect Reactivity and Core Heat Removal

DESCRIPTION

This test is designed to evaluate the simulator behavior following a malfunction of a control system which affects core reactivity. Primary water will be charged through the charging header at the maximum rate which can be balanced by letdown. For the 100% power test, this will be approximately 105 gpm with rods in manual to prevent automatic rod insertion. For the Cold Shutdown test, this will be approximately 150 gpm. In the cold shutdown test, the dilution will be done in real time for 30 minutes to verify that parameters are tracking as expected. After 30 minutes, the fast time mode of the simulator will be used to more quickly lower the boron concentration in order to allow checking the "High Flux at Shutdown" alarm. The simulator response will be verified to reflect the anticipated response of the plant.

OPTIONS

Various combinations of letdown and charging system controls may be used to insure that the proper dilution rate is achieved.

INITIAL CONDITIONS

Test 1, 100% steady state, equilibrium.
Test 2, Cold shutdown, solid, borated to cold shutdown boron concentration.

FINAL CONDITIONS

Test 1, Simulator stable after a series of overtemperature delta T runbacks.
Test 2, High flux at shutdown alarm received.

APPROVED FOR USE

R C Dodson Jr. DATE: 2/22/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Sing DATE: 2/22/90

DATE:

DATE:

UNCONTROLLED MAXIMUM RATE BORON DILUTION: MCV-001

BASIS FOR EVALUATION

Expert evaluation of overall plant response and of selected plant variables.

DISCUSSION OF TEST RESULTS

In both cases, the simulator responded as expected. At power, overtemperature delta T runbacks responded to the increasing temperature which occurred as a result of the dilution. In addition, overpower rod stops occurred as expected. The overtemperature delta T runbacks continued until the turbine was taken to zero megawatts. Since the next runback failed to reduce delta T any further, the unit tripped on overtemperature delta T. Because temperature was elevated prior to the trip, a large outsurge from the pressurizer occurred and the resulting pressure decrease caused a safety injection. The safety injection ended the dilution and started adding boron to the RCS from the Refueling Water Storage Tank.

In the cold shutdown case, source range counts increased as expected. The source range high flux at shutdown alarm occurred at the proper setpoint.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATION CONFIGURATION REVIEW BOARD*	
D Q Tinley	DATE: 3/20/90	L E Dodson III	DATE: 3/20/90
Kenneth L. W. Lute	DATE: 3/20/90	[illegible]	DATE: 3-20-90
	DATE:	Leo Görl[illegible]	DATE: 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: CHARGING SYSTEM FAILURES

NUMBER: MCV-002

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (18) Failure of Reactor Coolant System Pressure and Volume Control Systems

DESCRIPTION

The purpose of this test is to simulate various malfunctions in the charging and seal injection systems in order to verify proper simulator modeling of these systems. Four cases will be run. The first run will consist of clogging the seal injection filter. The second run will fail closed the charging flow control valve, CV-121. In the third run, a leak downstream of CV-121 will be simulated. The last run will be a failure of all three charging pumps resulting in a loss of seal injection and charging. In each case, the simulator will be left in run until proper system responses can be verified.

OPTIONS

The Turkey Point simulator has the capability of failing almost any component in the charging system. Therefore there are wide variety of failures are possible.

INITIAL CONDITIONS

100% power, steady state, with normal charging system lineup.

FINAL CONDITIONS

Final conditions will vary from run to run.

APPROVED FOR USE

[signature] DATE: 1/16/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Sinly DATE: 1-16-90

DATE: ____

DATE: ____

CHARGING SYSTEM FAILURES: MCV-002

BASIS FOR EVALUATION

Expert evaluation of system response and parameter trends.

DISCUSSION OF TEST RESULTS

The simulator correctly responded to all the charging system malfunctions imposed upon it. All system parameters trended in the correct directions and in the approximate amount expected.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Simberg	DATE: 4-16-90	[signature]	DATE: 4/19/90
Kenneth D. White	DATE: 4/16/90	[signature]	DATE: 4-19-90
	DATE:	[signature]	DATE: 4-19-90

TITLE: CHARGING LINE BREAK OUTSIDE CONTAINMENT

NUMBER: MCV-003

ANS 3.5 REFERENCE SECTIONS: 3.1.2(1)(b) Loss of Coolant Outside Primary Containment
3.1.2(18) Failure of Volume Control System

DESCRIPTION

The purpose of this test to verify proper simulator modelling with a charging line leak outside of the containment building. This test will consist of two runs. In the first run a leak will be placed upstream of HCV-121, charging flow control valve, and 3-ONOP- 041.3, Excessive Reactor Coolant System Leakage, will be used to recover from the incident. Isolating the leak would require stopping charging and seal injection, necessitating a plant shutdown and isolating letdown. This test will be allowed to run for 15 minutes. The leak will not be isolated and charging, seal injection, and letdown will be left in service. In the second run the leak will be placed downstream of HCV-121. This will allow the maintenance of seal injection and plant operation can be continued. Letdown will have to isolated and the excess letdown heat exchanger will be placed in service. This test will be taken to the point of isolating the leak and stabilizing the plant. Several parameters will be monitored and recorded in order to compare the simulator results with expected plant results.

OPTIONS

The leak sizes are fully variable.

INITIAL CONDITIONS

100% power with charging and letdown stable and in automatic.

FINAL CONDITIONS

RUN 1: This test will run for 15 minutes. A second charging pump will be started and the pressurizer level will be recovered.

RUN 2: The leak has been isolated, the excess letdown heat exchanger has been placed in service, and charging is in balance with letdown.

APPROVED FOR USE

R E Dobson TD DATE: 6/15/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth D. White DATE: 6/15/90

DATE: ________

DATE: ________

CHARGING LINE BREAK OUTSIDE CONTAINMENT: MCV-003

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

GENERAL COMMENTS ON BOTH RUNS: The first indication of a problem is the alarm labyrinth seals low delta P, followed shortly by alarms for charging pumps high speed and letdown line high temperature. There is no charging flow indicated and the pressurizer level starts to drop. A second charging pump was able to provide enough charging flow to maintain pressurizer level. Letdown had flashed, but it recovers with the start of the second pump. The VCT level decrease is rapid enough to be noticeable. When makeup to the VCT starts it is not enough to maintain level at the initial setpoints and the flowrates were doubled. They are then adequate to maintain VCT level. Indications were as expected inside the control room. RUN 1: No other actions were required. The makeup flow was enough to maintain pressurizer level. A plant shutdown would be required, but conditions were stable. RUN 2: Swapped to the 45 gpm orifice and the charging pumps were able to reduce speed from 100% and still maintain pressurizer level. HCV-121 was shut and relief valves started lifting on the charging pump discharge. Stopped one charging pump and isolated letdown. This took care of the relief valve problem. Seal injection flowrate increased and the flow control valves were throttled from the I/F to reduce flow along with reducing the charging pump to minimum speed. This enabled controlling the pressurizer fill while excess letdown was being put into service. The use of excess letdown enabled the pressurizer level to start trending towards setpoint. Operation could continue in this mode while the leak was being repaired or until it was convenient to shutdown the plant.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

There were no area radiation monitor or process monitor alarms during either run. A DR has been written against this.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Kenneth D. White	DATE: 6/15/90	R E Dodson	DATE: 8/24/90
Robert J. Sinsley	DATE: 7/6/90	Richard L. Meade	DATE: 8-24-90
	DATE:	Leo Soëlo	DATE: 8-24-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LETDOWN AND VOLUME CONTROL TANK SYSTEM OPERATIONS AND MALFUNCTIONS

NUMBER: MCV-004

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (18) Failure of Reactor Coolant Pressure and Volume Control Systems

DESCRIPTION

The test checks the response of the Letdown and Volume Control Tank portions of the CVCS system. Various malfunctions which affect these systems will be initiated to verify proper system response. A total of five different malfunction tests will be run.

OPTIONS

There are numerous malfunctions which can be run on the Letdown and Volume Control Tank systems. Representative malfunctions should be chosen to exercise as many parts of the systems as possible.

INITIAL CONDITIONS

100% power, normal letdown lineup.

FINAL CONDITIONS

Terminate each run after system parameters have stabilized or trends are clearly evident.

APPROVED FOR USE

[signature] DATE: 4/6/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 4-6-90

Kenneth D. White DATE: 4/6/90

DATE:

LETDOWN AND VOLUME CONTROL TANK SYSTEM OPERATIONS AND MALFUNCTIONS: MCV-004

BASIS FOR EVALUATION

Expert evaluation of system response and the response of specific parameters depending on the particular.

DISCUSSION OF TEST RESULTS

A total of five different runs were made with different malfunctions. With one exception, in each case letdown and VCT parameters responded as expected to the system perturbations. All temperatures, pressures and flows changed as predicted. The malfunctions run were: Loss of CCW to the NRHX, Failure of PCV-145 open, Failure of PCV-145 shut, Failure of LCV-115A to the divert position, and Failure of CV-204 shut.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

On the failure of CV-204 shut, the delay pipe pressure cycles wildly rather than stabilizing at relief valve RV-203 set pressure and a discrepancy report was written. One discrepancy between the simulator and the plant was noted. During normal operation, the letdown temperature out of the Regenerative Heat Exchanger in the plant is reading approximately 320 degrees F, while the simulator is reading 215 degrees. A discrepancy report was written, but preliminary heat balance calculations point to the plant as being incorrect. The problem is being investigated.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
[signature]	DATE: 11-26-90	[signature]	DATE: 11/28/90
Kenneth D. White	DATE: 11/26/90	[signature]	DATE: 11-28-90
	DATE:	[signature]	DATE: 11-28-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: NON-REGENERATIVE HEAT EXCHANGER TUBE LEAK

NUMBER: MCV-005

ANS 3.5 REFERENCE SECTIONS: 3.1.2(1)(b) Loss of Coolant Outside Primary Containment
3.1.2(18) Failure of Volume Control System

DESCRIPTION

The purpose of this test to verify proper simulator modelling with a tube leak on the non-regenerative heat exchanger. This test will consist of two runs. In the first run no operator actions will be taken and it will be allowed to run for 15 minutes. In the second run ONOP-3108.2, High Activity in Component Cooling Water, and 3-ONOP-041.3, Excessive Reactor Coolant System Leakage, will be used to recover from the incident. This will require isolating CCW to the non-regenerative heat exchanger, isolating letdown, and placing the excess letdown heat exchanger in service. Several parameters will be monitored and recorded in order to compare the simulator results with expected plant results.

OPTIONS

The leak size is fully variable.

INITIAL CONDITIONS

100% power with charging and letdown stable and in automatic.

FINAL CONDITIONS

RUN 1: This test will run for 15 minutes.
RUN 2: The simulator has been brought to a stable condition, letdown has been isolated, and the excess letdown heat exchanger has been placed in service.

APPROVED FOR USE

[signature] DATE: 6/19/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth D. White DATE: 6/19/90

DATE: ________

DATE: ________

NON-REGENERATIVE HEAT EXCHANGER TUBE LEAK: MCV-005

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

RUN 1. Immediately after the leak is placed the process monitor for CCW alarms, followed by high CCW surge tank level. The low pressure letdown flow drops to zero and pressure to 100 psig. The leak is over 65 gpm, which means all of the letdown is going to the leak. The NRHX pressure drops to 100 psig then increases to 135 psig. Relief valves limit pressure to this. The NRHX outlet temperatures drops throughout the test, which seems reasonable with no letdown flow. The CCW surge tank goes solid and it is at this point that CCW and letdown pressures stabilize at 135 psig. This seems reasonable for training purposes. RUN 2. The initial indications were the same for this test as for the first run, but all in all this is a much more interesting test. Approximately 3.5 minutes after getting the leak the CCW valves in and out of the NRHX were shut. This stopped all leak flow from letdown to CCW, causing letdown to re-pressurize to over 400 psig. Long before then RV-791C on the CCW side of the NRHX should have lifted, holding pressure to something slightly over 150 psig. When the NRHX is isolated letdown pressure spikes to over 400 psig, then recovers to 250 psig as PCV-145 takes control. NRHX outlet temperature is increasing rapidly. Letdown is manually isolated, which causes an immediate increase in pressurizer level. Charging pump speed is reduced to minimum to keep level under control while excess letdown is being placed in service. The excess letdown temperature and flow indications were appropriate for this evolution.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The process monitor for CCW alarms as soon as the leak is instated. A DR has been submitted against this. Leakage flow stops when CCW is isolated to the NRHX, but since the proper results can be achieved by instructor inputs and this would be a significant scope change it will be left as is.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

Kenneth W. White DATE: 7/23/90

DJ Sinclair DATE: 7/25/90

DATE:

SIMULATOR CONFIGURATION REVIEW BOARD

[signature] DATE: 8/24/90

Richard J. Mende DATE: 8-24-90

Leo Göckel DATE: 8-24-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF VACUUM TESTS, INCLUDING LOSS OF CONDENSER LEVEL CONTROL

NUMBER: MFW-001

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (5) Loss of Condenser Vacuum Including Loss of Condenser Level Control

DESCRIPTION

This series of tests will simulate various conditions which cause of loss of condenser vacuum. One of the tests will cause the loss of vacuum by inducing an overfill condition (high level) in the condenser.

OPTIONS

Several different ways of creating a loss of vacuum condition are available. These include air inleakage, high level, fouling of heat transfer surfaces, loss of cooling water flow and air ejector malfunctions. The test will include several representative means of causing a loss of vacuum.

INITIAL CONDITIONS

100%, any time in life.

FINAL CONDITIONS

For each run, the test will terminate after a turbine/reactor trip due to low vacuum.

APPROVED FOR USE

R E Dagost

SIMULATOR ENGINEERING COORDINATOR

DATE: 3/11/90

TEST TEAM

Robert J. Sindy DATE: 3-11-90

Kenneth D. White DATE: 3/11/90

DATE: ______

LOSS OF VACUUM TESTS, INCLUDING LOSS OF CONDENSER LEVEL CONTROL: MFW-001

BASIS FOR EVALUATION

Expert evaluation of plant and condenser response to the various conditions.

DISCUSSION OF TEST RESULTS

RUN 1: AIR INLEAKAGE WITH AIR EJECTORS ISOLATED

As expected, condenser pressure began to rise at a fairly steady rate until the turbine tripped on low vacuum at 400 seconds into the test. Prior to the trip, several parameters changed as expected. Generator megawatts steadily decreased from 720 to about 640 due to the increase in backpressure. Condenser hotwell temperatures increased as the saturation temperature increased with the increasing pressure in the hotwells. The combined condensate outlet temperature rose as the hotwell temperatures rose. (This graph is labelled 'Cooling water inlet temperature' because it is the inlet to the air ejector condensers.) After the trip, the plant returned to hot standby on the atmospheric dump valves as designed.

RUN 2: BLOCKAGE OF CONDENSER CIRCULATING WATER INTAKE SCREENS

One problem which became readily apparent in this test is that the flow through the water boxes oscillates widely rather than just being cut down to a low value. This problem has been identified previously in other tests and is associated with the pump handler for the circulating water pumps, specifically the handling of cavitation conditions. The response of the plant is correct, however, since the loss of cooling flow almost immediately caused a rapid rise in condenser shell pressures with the resulting turbine trip and plant trip. No other discrepancies were noted.

RUN 3: LOSS OF LEVEL CONTROL LEADING TO HIGH CONDENSER LEVEL

This test leads to a slow rise in condenser level. Condenser pressure slowly increases until the tubes begin to be covered with water at which point the pressure rises rapidly. Hotwell temperature also decreases due to the introduction of the colder makeup water mixing with the condensing steam. Although the process is slow due to the size of the condenser, the plant trips on low vacuum at about 3900 seconds.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The circulating water pumps do not cavitate in run two as they should. This discrepancy has been previously identified.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATION CONFIGURATION REVIEW BOARD	
[illegible]	DATE: 3/13/90	[illegible]	DATE: 6/13/90
[illegible]	DATE: 3/30/90	[illegible]	DATE: 6-13-90
	DATE:	[illegible]	DATE: 6-13-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF NORMAL FEEDWATER

NUMBER: MFW-002

ANS 3.5 REFERENCE SECTIONS: 3.1.2(9) LOSS OF NORMAL FEEDWATER OR FEEDWATER SYSTEM FAILURE

DESCRIPTION

This loss of normal feedwater transient will be compared to a best estimate analysis using the Turkey Point RETRAN model. As such, no operator actions were taken during the course of the event, and several assumptions were made to make the simulator and the RETRAN model consistent. Since the RETRAN model does not include charging and letdown models, these paths were isolated in the simulator. The transient was initiated by tripping open the feedwater pump motor breakers. The turbine runback that would normally result from the tripping of these breakers was blocked. All control systems were in automatic except the control rods. Two tests were performed, the first with a setting of 135 GPM on the demand thumbwheel, and the second with a 300 GPM demand setting.

OPTIONS

The main feedwater can be lost via a variety of mechanisms including the failing closed of the isolation or regulation valves, pump bearing failures, and motor breaker failures.

INITIAL CONDITIONS

100% Power Steady State, BOL, Equilibrium Xenon

FINAL CONDITIONS

The test will be run for 1200 sec at which time the steam generator level is recovering steadily and the system is approaching a stable hot shutdown condition.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 1/15/90

TEST TEAM

Kenneth D. White DATE: 1/15/90

James D. Harrison DATE: 1/15/90

DATE: ________

LOSS OF NORMAL FEEDWATER: MFW-002

BASIS FOR EVALUATION

Best Estimate Analysis - The Simulator results will be compared to a Turkey Point RETRAN model.
Expert Evaluation - The control room indications, overall response, and specific relevent parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The overall trends and magnitudes of the results are comparable between the Simulator and the RETRAN model. Both of the cases behave consistently with the physical processes and assumptions involved in the scenario. The Simulator reaches a low steam generator level trip approximately 20 seconds earlier than the RETRAN model. This difference is probably due to the non-inertial models used to calculate the circulating flows in the Simulator. This isn't classified as a deficiency, but it is a characteristic that should be investigated. To allow a proper overall comparison, the Simulator was set to trip at the same time as the RETRAN model. Differences in the circulating flow calculated in the RETRAN model relative to the Simulator model were the source of most of the observed differences. The RETRAN model calculates circulating flows that are unreasonably large for the heat load and downcomer level following the loss of feedwater and the reactor trip. This large flow causes the entire steam generator to be completely mixed.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Two deficiencies were noted, neither of which has a direct affect on training. The steam dump capacity in the Simulator is approximately 15% greater than design. This has the effect of causing the bypass to control the pressure to a greater degree and close earlier. The initial HFP steam generator fluid mass is approximately 11% less than Westinghouse reference material indicates it should be. This should be investigated.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
James S. Harrison	DATE: 2/1/90	[signature]	DATE: 3/20/90
Kenneth D. White	DATE: 2/1/90	[signature]	DATE: 3-20-90
	DATE:	[signature]	DATE: 3-20-90

TITLE: LOSS OF NORMAL AND EMERGENCY FEEDWATER

NUMBER: MFW-003

ANS 3.5 REFERENCE SECTIONS: 3.1.2(10) LOSS OF NORMAL AND EMERGENCY FEEDWATER
B2.2(2) SIMULTANEOUS TRIP OF ALL FEEDWATER PUMPS

DESCRIPTION

This loss of normal and emergency feedwater transient will be compared to a best estimate analysis (BEA) using the Turkey Point RETRAN model. The primary objective is to test the Simulator models in the feed and bleed mode. In order to limit the total transient time, the scram was delayed to quickly deplete the steam generator inventory. The scenario was designed to go directly into the feed and bleed mode. Key operator actions were initiated via the scenario based on EOP-FR-H.1, Response to Loss of Heat Sink. Several assumptions were made to make the simulator and the RETRAN model consistent. Since the RETRAN model does not include charging and letdown models, these paths were isolated in the simulator. The transient was initiated by tripping open the feedwater and condensate pump motor breakers. The turbine runback that would normally result from the tripping of these breakers was blocked. The steam admission valves for the auxiliary feedwater pump turbines were failed shut to prevent their function. All control systems were in automatic except the control rods.

OPTIONS

The main feedwater can be lost via a variety of mechanisms including the failing closed of the isolation or regulation valves, pump bearing failures, shaft shear, local pushbutton, and motor breaker failures. The auxiliary feedwater can be lost via a wide variety of mechanisms including failures of the steam turbines, controllers, pumps, and valves in the flow paths.

INITIAL CONDITIONS

100% Power Steady State, EOL, Equilibrium Xenon

FINAL CONDITIONS

The transient is analyzed for approximately 15 minutes. At this time, the RCS has been in feed and bleed for approximately 10 minutes, is two phase, and is slowly depressurizing at approximately 1000 psi.

APPROVED FOR USE

R E Dodson IV (signature) DATE: 12/6/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

James D Harrison (signature) DATE: 12/6/90

______________________ DATE: ________

______________________ DATE: ________

LOSS OF NORMAL AND EMERGENCY FEEDWATER: MFW-003

BASIS FOR EVALUATION

Best Estimate Analysis - The Simulator results will be compared to a Turkey Point RETRAN model.
Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The overall behavior is consistent with the processes occurring and the trends and magnitudes meet the requirements of ANS 3.5. The Simulator results are comparable with the RETRAN model.

Since the scram was delayed to reduce the time to steam generator dryout, and feed and bleed procedures were initiated immediately, the primary pressure response doesn't look too much like a loss of heat sink. The depressurization during the vapor relief portion is generally very good. The Simulator depressurizes to just under 1200 psia before showing any signs of upper head flashing whereas the RETRAN model changes slope in the range of 1280 psia. In the Simulator the pressurizer fills up approximately 40 seconds later than the RETRAN model and during this period continues to depressurize. When the Simulator pressurizer fills up, the pressure ticks up about 80 psia. The RETRAN model does the same thing but not to as great an extent. This problem is under study via a separate DR. The most notable character of this transient is the periodic oscillation in pressure, flow and temperature. The Simulator starts such an oscillation between 200 and 300 seconds but then it damps out quickly. We have seen oscillations in other RETRAN two phase natural circulation conditions, but they have always been more random. The oscillations seem to be stimulated by the liquid and vapor relief phases in the pressurizer. This in combination with the magnitude of the void fraction in the system have produced a periodic and slowly damping oscillation. The impact of this on the temperature, particularly the cold leg, is significant because each time the flow decreases, the cooler SI flow pushes the temperature down.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The PORV liquid relief conductance is too large.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATION CONFIGURATION REVIEW BOARD***	
James S. Harrison	DATE: 12/7/90	R. E. Dodson	DATE: 12/7/90
Kenneth D. White	DATE: 12/7/90	D. Johnson	DATE: 12/7/90
	DATE:	[illegible]	DATE: 12-7-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: FEEDWATER LINE BREAK INSIDE CONTAINMENT

NUMBER: MFW-004

ANS 3.5 REFERENCE SECTIONS: 3.1.2(20) MAIN STEAM LINE AS WELL AS MAIN FEED LINE BREAKS (BOTH INSIDE AND OUTSIDE CONTAINMENT)

DESCRIPTION

This test replicates a Best Estimate Analysis (BEA) Feedwater Line Break Inside Containment performed by the FP&L Fuel Resources Department using the RETRAN02 program. As such the test is not intended to follow in detail the EOPs covering this type of transient. However, the operator action to turn off the RC pumps on low subcooling margin was programmed into the scenario. In addition, it was assumed that 10 minutes after the initiation of the break the operator isolates AFW in the affected loop, secures the atmospheric dump valve, and closes the MSIV on the affected loop. Since the RETRAN model does not include charging and letdown models, or accumulators, these paths were isolated in the Simulator. The event is initiated from full power at end-of-cycle conditions. All control systems are initially in automatic, safety systems function at full capability, and no additional malfunctions are included. Rod control is assumed to be in manual in order to simplify the interface between the simulator and the RETRAN model. A 50% severity break is assumed to occur in the loop B feedwater piping inside the containment.

OPTIONS

The simulator is capable of simulating variable severity feedwater line breaks at several locations inside and outside the containment.

INITIAL CONDITIONS

100% power steady state, end-of-cycle, equilibrium xenon

FINAL CONDITIONS

The transient is analyzed for approximately 20 minutes. At this time, the B steam generator is dry and the plant is trending toward a stable shutdown condition.

APPROVED FOR USE

R E Dodson III DATE: 7/10/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

James D Harrison DATE: 7/10/90

DATE: ____

DATE: ____

FEEDWATER LINE BREAK INSIDE CONTAINMENT: MFW-004

BASIS FOR EVALUATION

Best Estimate Analysis - The Simulator results will be compared to a Turkey Point RETRAN model.
Expert Evaluation - The overall response and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

Because of anomalous behavior in the RETRAN model prediction that could not be quickly resolved, two feedline break cases were analyzed. The RETRAN02 model predicts a drastic cooldown just as the affected steam generator dries out. While this appears to be a problem in RETRAN, the Fuels Resources group could not resolve that this behavior was correct or incorrect. Schedule contraints did not allow resolution at this time. Fuels Resources did find that the problem could be avoided by closing the break at 600 seconds. Hence, the two cases.

The overall response of the Simulator is as expected and consistent with the physical processes involved. The agreement between the RETRAN02 model predictions for the first 600 seconds is very good. For the case where the break remains open after 600 seconds, the Simulator affected loop cold leg temperature maintains a mild slope down as the affected steam generator dries out. On the other hand, the RETRAN02 model shows a sharp decrease in the cold leg temperature followed by a steady rise. The RETRAN model behavior is suspicious, but a specific error or problem could not be identified. For the case where the break is closed after 600 seconds, the Simulator affected loop cold leg temperature increases slightly when the break is closed then maintains a mild slope down as a result of steam generator heat losses. On the other hand, the RETRAN02 model, which does not have heat losses, shows a steady rise.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

There are spikes in the steam generator outlet flow rate in the 500 to 600 second range that do not appear to have any bearing on the transient or the ability to perform training on this scenario, but should be corrected.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
James S Harrison	DATE: 8/13/90	[illegible]	DATE: 8/17/90
Kenneth D. White	DATE: 8/14/90	[illegible]	DATE: 8/17/90
	DATE:	[illegible]	DATE: 8-17-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: MAIN FEEDWATER LINE BREAK OUTSIDE CONTAINMENT

NUMBER: MFW-005

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (20) MAIN STEAM LINE AS WELL AS MAIN FEED LINE BREAK (BOTH INSIDE AND OUTSIDE CONTAINMENT)

DESCRIPTION

This test will be run by implementing a .5 severity leak on the main feed header which is outside containment. The leak will be ramped in over a 30 second period. In addition, the 'A' feed regulating valve will be failed as is from the start. The only operator action to be simulated is the trip of the reactor coolant pumps if safety injection occurs and RCS subcooling goes below 25 degrees. The test will be run for about 10 minutes at which time the condenser should be empty which effectively stops the leak.

OPTIONS

There are several locations outside containment at which a leak can be initiated and any leak may be varied in size from very small to a double ended pipe rupture.

INITIAL CONDITIONS

MOL, 100% power, steady state.

FINAL CONDITIONS

Unit stable after both main feed pumps have tripped and the leak has stopped.

APPROVED FOR USE

[signature] DATE: 6/12/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 6/12/90

DATE: ______

DATE: ______

MAIN FEEDWATER LINE BREAK OUTSIDE CONTAINMENT: MFW-005

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

Initially, the leak was ramped in over a 30 second period. Additionally, the feed regulating valve for the 'A' steam generator was failed as is, which would be its 100% power position. As the leak increased in size, the leak flow increased and the pressure on the feed header decreased. The reduction in feed flow also caused Tavg to increase slightly. The increase in Tavg caused an increase in steam generator pressures so that, after the leak size stabilized, feed header pressure increased slightly. At approximately 60 seconds into the transient, the unit tripped on low steam generator level. The ensuing transient with its high feed flow rates caused the 'B' steam generator feed pump to trip on low suction pressure at about 70 seconds. With one feed pump running, the feed header pressure decreased to about 620 psia. At about this time, Tavg had dropped enough so that feed isolation occurred and the feed control valves shut so that all feed flow was now out the break. The secondary stabilized with feed header pressure at about 620 psia and leak flow at about 2100 lbm/sec. This flow rate equates to about 16,500 gallons per minute out of the hotwell. At about 320 seconds, the condensate pumps began to flash and the second feed pump tripped on low suction pressure. This caused the feed header pressure to quickly drop to near atmospheric. Leak flow oscillated as steam/water mixture until the header was empty and the leak stopped. No discrepancies were noted.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Sing	DATE: 7-27-90	[signature]	DATE: 8/17/90
James J. Harrison	DATE: 7-27-90	[signature]	DATE: 8/17/90
	DATE:	[signature]	DATE: 8-17-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: FAILURE OF STEAM GENERATOR LEVEL CHANNEL PROVIDING INPUT TO THE FEEDWATER CONTROLLER

NUMBER: MFW-006

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (9) Loss of Normal Feedwater
3.1.2 (22) Process Instrumentation, Alarm, and Control System Failures

DESCRIPTION

This test checks the response of the simulator to a failed steam generator level channel when that channel is controlling for the feedwater regulating valve. Two cases will be run, one in which no operator action is taken and one in which the operator takes corrective action by placing the associated feedwater regulating valve in manual to stabilize the plant.

OPTIONS

Any of the three steam generators may be used.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

Run 1 - Plant stable after the reactor trip
Run 2 - Plant stable with the associated channel in manual

APPROVED FOR USE

R E Dodson III DATE: 1/15/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J Sirley DATE: 1-15-90
Kenneth W. White DATE: 1/15/90
DATE: ________

FAILURE OF STEAM GENERATOR LEVEL CHANNEL PROVIDING INPUT TO THE FEEDWATER CONTROLLER: MFW-006

BASIS FOR EVALUATION

Expert evaluation of overall plant response and the response of selected parameters.

DISCUSSION OF TEST RESULTS

RUN 1

The plant responded as expected to the failure of the level channel. The affected steam generator's level rose as the feed reg valve opened in response to the sensed low level. The level rose until the trip setpoint of 80% was reached. The other two steam generators' levels went down slightly as feed flow went preferentially to the affected steam generator. After the trip, the steam dumps opened to reduce primary temperature to no load temperature, main feed isolated, and auxiliary feed began restoring the levels in the steam generators. The affected steam generator level recovered first since it had been high prior to the trip.

RUN 2

In this test the team responded to the failed level channel at the first alarm. The team placed the associated feed regulating valve in manual and restored level in the affected steam generator. Reactor power, pressure, and temperature stayed essentially constant throughout the transient. The steam generator level oscillated some as the operator attempted manual control, but it soon stabilized at the program level with steam and feed flows matched. At this point, the alternate control channel was selected. The team verified that this channel controlled level satisfactorily, then placed the simulator in freeze and ended the test.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
[signature]	DATE: 1/17/90	[signature]	DATE: 2/5/90
Kenneth W. White	DATE: 1/17/90	Richard J. [illegible]	DATE: 2-5-90
	DATE:	Leo [illegible]	DATE: 2-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF NORMAL FEEDWATER WITH AFW SYSTEM FAILURES AND STUCK OPEN PORV (TMI-2 EQUIVALENT)

NUMBER: MFW-007

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (1.c) Failure of Safety and Relief Valves
3.1.2 (9) Loss of All Feedwater (normal and emergency)

DESCRIPTION

This test will mimic the conditions of the accident at Three Mile Island Unit Two. Since TMI-2 is a different design plant, some modifications to the actual event will be necessary. The test will be performed by initiating a loss of all feedwater event. In order to simulate the different steam generators, the unit trip will be delayed until the steam generators are nearly dry. One pressurizer PORV will stick open, RCPs will be tripped when the loops void, and the safety injection pumps will be turned off to simulate the operator actions at TMI. The test will continue long enough to insure that the loops and vessel void, the core begins to heat up due to core uncovery, and the accumulators and RHR pumps have started injecting water to restore core cooling and pressurizer level.

OPTIONS

Several means are available to simulate the Three Mile Island 2 scenario. Conditions should be chosen which will simulate the plant and operator response as closely as possible. Included should be sufficient malfunctions and time to allow the core to reach melt conditions.

INITIAL CONDITIONS

100% power, MOL, steady state, with the AFW system isolated.

FINAL CONDITIONS

RCS being refilled by the accumulators and RHR pumps.

APPROVED FOR USE

R E Jackson III DATE: 11/13/89
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

R. J. Kinsley DATE: 12/1/90

DATE: ________

DATE: ________

LOSS OF NORMAL FEEDWATER WITH AFW SYSTEM FAILURES AND STUCK OPEN PORV (TMI-2 EQUIVALENT): MFW-007

BASIS FOR EVALUATION

Expert evaluation of the RCS, pressurizer and core response to the loss of coolant and failure of secondary heat sink conditions.

DISCUSSION OF TEST RESULTS

Overall the test results were very good and represented the type of possible core melt scenario which was desired. The initial stages of the transient looked like a loss of feed without trip transient due to the dryout of the steam generators prior to the trip. This is very similar to a TMI type system trip. Without the AFW system, the RCS stayed hot and the pressurizer stayed full and pressurized for about 45 minutes. At the same time, the high core temperatures caused voiding to begin in the vessel and loops. The RCPs were tripped when the loop void fractions reached 20% which corresponds to the actions taken at TMI. About 1 hour into the scenario, decay heat was low enough that the pressurizer level began dropping and RCS pressure began decreasing. This caused increased voiding in the core, and at about 70 minutes into the scenario, the core cladding temperatures began rapidly escalating. At 90 minutes into the scenario upper center clad temperatures had reached 900 degrees F. This was clear indication that fuel temperatures were responding to the core uncovery conditions. At this point, RCS pressure lowered to accumulator pressures so that the accumulators began dumping and cooling the system. This quickly lowered RCS pressure to the RHR pumps' shutoff head and allowed the pumps to begin filling the system. The addition of the cold water effectively ended the transient as planned. No discrepancies were noted in the final run of this test.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

[signature] DATE: 12/6/90

[signature] DATE: 12/6/90

DATE: ______

SIMULATOR CONFIGURATION REVIEW BOARD

[signature] DATE: 12-7-90

[signature] DATE: 12/7/90

[signature] DATE: 12-7-90

TITLE: LOSS OF FEEDWATER / ATWS

NUMBER: MFW-008

ANS 3.5 REFERENCE SECTIONS: 3.1.2(9) LOSS OF NORMAL FEEDWATER
3.1.2(24) FAILURE OF AUTOMATIC REACTOR TRIP

DESCRIPTION

This loss of normal feedwater transient without scram will be compared to a best estimate analysis (BEA) using the Turkey Point RETRAN model. This test examines a broad spectrum of models and conditions including core kinetics, water solid RCS behavior and the transient into two phase conditions, liquid relief through the pressurizer safeties, two phase degradation of the RCS pumps, and so on. In order to test the Simulator models through a severe pressure transient and water solid condition both pressurizer PORVs were failed closed. Procedures call for the operator to trip the turbine when the plant has tripped but the rods haven't been released, therefore, this action was simulated by the tripping of the turbine at 75 seconds. No other expected operator actions were simulated and no emergency boration was initiated. Several assumptions were made to provide consistency between models. Since the RETRAN model does not include charging and letdown models, these paths were isolated in the simulator. The transient was initiated by failing closed all of the feedwater control valves. All control systems were in automatic except the control rods.

OPTIONS

The main feedwater can be lost via a variety of mechanisms including the failing closed of the isolation or regulation valves, pump bearing failures, and motor breaker failures.

INITIAL CONDITIONS

100% Power Steady State, BOL, Equilibrium Xenon

FINAL CONDITIONS

The transient is analyzed for 15 minutes. At this time, safety injection has begun and a reasonable heat sink has been re-established in the steam generators.

APPROVED FOR USE

[signature] DATE: 12/1/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

James S. Harrison DATE: 12/1/90

DATE:

DATE:

LOSS OF FEEDWATER / ATWS: MFW-008

BASIS FOR EVALUATION

Best Estimate Analysis - The Simulator results will be compared to a Turkey Point RETRAN model.
Expert Evaluation - The overall response and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

In general, the overall trends and magnitudes of the results compare very well between the Simulator and the RETRAN model. The system response during the loss of feedwater without scram is a complex combination of how the RCS heats up (steam generator) and the core power response (reactivity feedbacks). The RCS pressure provides a picture that reflects the interaction of all of the phenomena. The trends and overall character of the pressure response compare very well between the Simulator and the RETRAN model. The Simulator RCS pressure peaks at 3600 psia vs 3400 psia in the RETRAN model, but considering the magnitude of the change and the complexity of the processes occuring this difference is not significant. The pressurizer safety relief valves reduce the pressure to around 2700 psia and the formation of voids in the core begin to drive the core power from about 20% toward a completely shutdown condition. At this point the auxiliary feedwater is sufficient to remove the heat load and a steady cooldown begins. At 680 seconds the reactor coolant pumps are tripped based on an SI signal from low pressurizer pressure and low subcooling.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATION CONFIGURATION REVIEW BOARD***	
James D. Harrison	DATE: 12/3/90	[signature]	DATE: 12/5/90
Robert [signature]	DATE: 12/5/90	[signature]	DATE: 12-5-90
	DATE:	Leo Goelzer	DATE: 12-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: GENERATOR TRIP

NUMBER: MGG-001

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (16) Generator Trip

DESCRIPTION

This test will consist of a plant trip initiated by a generator trip from 100% power.

OPTIONS

Several different means of tripping the generator are available on the simulator. Any means may be used so long as the generator trip is the initiating transient.

INITIAL CONDITIONS

100%, steady state, MOL

FINAL CONDITIONS

Plant stable at hot standby.

APPROVED FOR USE

[signature] DATE: 3/11/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Sims DATE: 3-11-90

Kenneth W. White DATE: 3/11/90

DATE: ________

GENERATOR TRIP: MGG-001

BASIS FOR EVALUATION

Expert evaluation of overall plant response and the response of specific parameters.

DISCUSSION OF TEST RESULTS

The plant trip initiated by the generator trip went as expected. Reactor power, temperature and pressure all responded as expected and no deficiencies were noted. All control systems acted as expected to bring the unit to hot standby.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
[illegible]	DATE: 7-12-90	[illegible]	DATE: 6/13/90
[illegible]	DATE: 3/30/90	[illegible]	DATE: 6-13-90
	DATE:	[illegible]	DATE: 6-13-90

TITLE: LOSS OF 4kV BUS 3A

NUMBER: MGG-002

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss of Electrical Power

DESCRIPTION

The purpose of this test is to verify proper simulator response to the loss of 4kV bus 3A. Since this bus supplies Load Centers 3A and 3C, and these supply vital MCC's 3A and 3C, all loads of 480 V or greater in this train will be tested with this test. In order to make it easier to start and stop loads, the test will be conducted from a hot standby condition.

OPTIONS

None.

INITIAL CONDITIONS

Steady State and Hot Standby, any time in life. 3A bus energized from the Startup transformer.

FINAL CONDITIONS

Hot standby with 3A deenergized.

APPROVED FOR USE

[signature] DATE: 2/2/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Simbey DATE: 2-2-90

DATE: ______

DATE: ______

LOSS OF 4kV BUS 3A: MGG-002

BASIS FOR EVALUATION

Expert evaluation of simulator response versus plant electrical drawings.

DISCUSSION OF TEST RESULTS

Overall, the test went as planned. Only two discrepancies between the load lists and the simulator response were noted. In both cases, plant drawings showed the simulator to be in error and Discrepancy Reports were generated. Although the problems must be fixed, they do not cause any serious training problems.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Two motor operated valves, MOV'S- 1433 and 1434 (MSR steam supply) deenergized when 4kV bus 3A was deenergized, even though they are both powered from MCC-3B (non-vital) which is not powered from bus 3A.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATION CONFIGURATION REVIEW BOARD	
[signature]	DATE: 3/20/90	[signature]	DATE: 3/21/90
Kenneth W. White	DATE: 3/20/90	[signature]	DATE: 3-21-90
	DATE:	[signature]	DATE: 3-21-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF 4kV BUS 3B

NUMBER: MGG-003

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss of Electrical Power

DESCRIPTION

The purpose of this test is to verify proper simulator response to the loss of 4kV bus 3B. Since this bus supplies Load Centers 3B and 3D, and these supply vital MCC's 3B and 3D, all loads of 480 V or greater in this train will be tested with this test. In order to make it easier to start and stop loads, the test will be conducted from a hot standby condition.

OPTIONS

None

INITIAL CONDITIONS

Steady State and Hot Standby, any time in life. 3B bus energized from the Startup transformer.

FINAL CONDITIONS

Hot standby with 3B deenergized.

APPROVED FOR USE

[signature] DATE: 2/2/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert [signature] DATE: 2-2-90

DATE:

DATE:

LOSS OF 4kV BUS 3B: MGG-003

BASIS FOR EVALUATION

Expert evaluation of simulator response versus plant electrical drawings.

DISCUSSION OF TEST RESULTS

The test was run without any problems. All loads on the load lists responded as predicted.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

DATE: 3/20/90

DATE: 3/20/90

DATE:

SIMULATION CONFIGURATION REVIEW BOARD

DATE: 4/12/90

DATE: 4-12-90

DATE: 4-12-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF ALL AC POWER

NUMBER: MGG-004

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss or Degraded Electrical Power to the Station

DESCRIPTION

This test will verify the ability to properly simulate plant conditions upon a loss of all AC power to the plant's electrical buses (480V and up). Included will be recovery from this condition with and without safety injection required. The plant's Emergency Operating Procedures Emergency Contingency Actions ECA-0.0, Loss of All AC Power, ECA-0.1, Loss of All AC Power Recovery without SI Required, and 0.2, Loss of All AC Power Recovery with SI Required, will be used.

For the recovery without SI required, a partial natural circulation cooldown per EOP ES-0.2, Natural Circulation Cooldown, and ES-0.3, Natural Circulation Cooldown with Steam Void in Vessel with RVLMS (QSPDS), will be performed to verify this capability.

OPTIONS

The loss of offsite power may be accomplished many different ways. Any suitable method may be used to deenergize the unit 3 4kV buses.

INITIAL CONDITIONS

100% power, equilibrium

FINAL CONDITIONS

Run 1, stop upon transition to E-1, Loss of Reactor or Secondary Coolant.

Run 2, stop after verifying the capability to cooldown under natural circulation conditions using both ES-0.2 and ES-0.3.

APPROVED FOR USE

[signature] DATE: 3/5/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Lowell W. Cox DATE: 3-5-90

[signature] DATE: 3-5-90

DATE:

LOSS OF ALL AC POWER: MGG-004

BASIS FOR EVALUATION

Expert evaluation of overall simulator response, the response of selected systems and parameters, and the ability to use the plant emergency procedures in the simulator.

DISCUSSION OF TEST RESULTS

RUN 1 - RCP SEALS FAIL, NO NC COOLDOWN: The scenario was initiated and caused a total loss of offsite and emergency power to unit 3. The plant procedure ECA-0.0 was used to respond except that no attempt to restore power was made. While the team was waiting to get 6% narrow range level in one steam generator, the RCP seals failed. RCP seal failure was indicated by high flows on the seal leakoff recorders and a little while later, by increased containment radiation and pressure. One deficiency was noted at this point; the seal leakoff recorders oscillated rapidly rather than simply going to a high reading. The team continued with ECA-0.0 by performing a rapid cooldown and depressurization to maintain RCS subcooling at 50 degrees. Safety injection actuated during the cooldown although no actual loads were energized. When the steam generators reached the hold pressure, the test team restored power to the buses in order to allow transition to the recovery procedure. The recovery procedure, ECA-0.2 Recovery from Loss of All AC Power with SI Required, was performed with no difficulty. The team stopped the test when the transition to the Loss of Coolant procedure was reached. One deficiency was noted in that the RCP seals returned to normal when seal injection was restored. They should have continued to leak.

RUN 2 - NO RCP SEAL FAILURE, NC COOLDOWNS: The initial part of this scenario was the same as in run one except that power was restored early in ECA-0.0. This allowed the test team to go straight to the end of ECA-0.0 bypassing the rapid cooldown and seal isolation steps. The plant was stable and SI was not required. The team transitioned to ECA-0.1 for recovery without SI required. The procedure was followed without any problems and the team was able to set up to perform the natural circulation cooldown of ES-0.2, Natural Circulation Cooldown. A natural circulation cooldown per ES-0.2 was conducted for about 40 degrees to verify this capability. When this had been done, the team transitioned to ES-0.3, Natural Circulation Cooldown with a Steam Void in the Reactor Vessel, for the more rapid cooldown allowed in that procedure. A 100 degree per hour cooldown was performed for about one hour without any problems. One deficiency was generated due to the lack of a steam void in the reactor vessel. The deficiency investigation will determine whether or not steam void should have formed. No other problems were noted.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Three deficiencies were noted that directly relate to this test. Two deficiencies concern the RCP seals. First, when RCP seals failed, the RCP seal leakoff recorders oscillated rapidly over their full ranges instead of going to a high reading. Second, when seal cooling is restored and seal temperature drops below 350 degrees, the seals stop leaking and return to normal. The last deficiency is open for study rather than being a definite problem. During the rapid natural circulation cooldown of ES-0.3, no void formed in the reactor vessel head as the procedure seems to expect. It is possible that the Turkey Point vessel would not experience void growth in this condition so the possibility is being examined.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Lowell W. Cox	*DATE:* 3-5-90	[signature]	*DATE:* 3/20/90
[signature]	*DATE:* 3-5-90	[signature]	*DATE:* 3-20-90
	DATE:	Leo Goebel	*DATE:* 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF VITAL BUS 3P06

NUMBER: MMP-001

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss of Electrical Power

DESCRIPTION

The purpose of this certification test is to verify proper simulated response to a loss of the 120 VAC vital buses 3PO6 and 3P21. These buses supply power to channel 1 of the plant's instrumentation. The test will be initiated from 100% power, steady state with all control systems lined up for normal operation. No other malfunctions will be present. After checking the boards for proper loss of power indications, the test team will operate the simulator in accordance with the plant Off-Normal Procedure for 10 minutes in order to verify that it can be used successfully in the simulator.

OPTIONS

The vital bus may be deenergized by opening its supply breaker or by failing the inverter to transformer automatic transfer and deenergizing the supply inverter. In order to provide an operationally realistic scenario, the latter method should be used.

INITIAL CONDITIONS

100% power, steady state, MOL

FINAL CONDITIONS

Simulator in freeze with 3P06 deenergized.

APPROVED FOR USE

R E Dodson [signature]

SIMULATOR ENGINEERING COORDINATOR

DATE: 2/12/90

TEST TEAM

Robert J. [signature] DATE: 2-13-90

DATE:

DATE:

LOSS OF VITAL BUS 3P06: MMP-001

BASIS FOR EVALUATION

Expert evaluation of simulator response versus the plant electrical drawings.

DISCUSSION OF TEST RESULTS

The simulator responded fairly well to the loss of 3P06 test. Only four items did not fail as they should have. These are listed below. None of the four items is significant enough to seriously degrade a training session, but they will be corrected in any case.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Four deficiencies were noted. Three indicators did not fail as they should have. Two of these were TI-3-610B and 607B, the CCW pumps inlet and outlet temperatures. The other was TI-3-140, the RHX letdown outlet temperature. Lastly, the Containment pressure recorder PR-6306B has a blue vice,a red stripe for power supply indication.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert Bird	DATE: 3-20-90	[signature]	DATE: 3/20/90
Kenneth D. White	DATE: 3/20/90	Richard L. Wend	DATE: 3-20-90
	DATE:	[signature]	DATE: 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF VITAL BUS 3PO7

NUMBER: MMP-002

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss of Electrical Power

DESCRIPTION

The purpose of this certification test is to verify proper simulated response to a loss of the 120 VAC vital buses 3P07 and 3P22. These buses supply power to channel 2 of the plant's instrumentation. The test will be initiated from 100% power, steady state with all control systems lined up for normal operation. No other malfunctions will be present. After checking the boards for proper loss of power indications, the test team will operate the simulator in accordance with the plant Off-Normal Procedure for 10 minutes in order to verify that it can be used successfully in the simulator.

OPTIONS

The vital bus may be deenergized by opening its supply breaker or by failing the inverter to transformer automatic transfer and deenergizing the supply inverter. In order to provide an operationally realistic scenario, the latter method should be used.

INITIAL CONDITIONS

100% power, steady state, MOL

FINAL CONDITIONS

Simulator in freeze with 3P07 deenergized.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 2/2/90

TEST TEAM

DATE: 2-2-90

DATE:

DATE:

LOSS OF VITAL BUS 3P07: MMP-002

BASIS FOR EVALUATION

Expert evaluation of simulator response as compared to plant electrical drawings.

DISCUSSION OF TEST RESULTS

The loss of 3P07 test went very smoothly. Only two discrepancies were generated as a result of this test, one minor and one which caused some confusion, but which can easily be fixed. The overall plant response was as expected and the Off-Normal Procedure was used to aid in controlling the plant. The major problem was that the Off-Normal procedure has several mistakes in it. Feedback has been provided to the plant to enable the ONOP to be updated.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The Auxiliary Feed Flow controllers train 2 failed instead of train 1. This still leaves one train of AFW to each SG.
On the RCP seal leakoff low range flow recorder, the red pen failed instead of the blue pen.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
Robert J. Ginn	DATE: 3-20-90	J E Dodson II	DATE: 3/20/90
Kenneth W. White	DATE: 3/20/90	Richard L Nunde	DATE: 3-20-90
	DATE:	Leo Joibes	DATE: 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF VITAL BUS 3P08

NUMBER: MMP-003

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss of Electrical Power

DESCRIPTION

The purpose of this certification test is to verify proper simulated response to a loss of the 120 VAC vital bus 3P08. This bus supplies power to channel 3 of the plant's instrumentation. The test will be initiated from 100% power, steady state with all control systems lined up for normal operation. No other malfunctions will be present. After checking the boards for proper loss of power indications, the test team will operate the simulator in accordance with the plant Off-Normal Procedure for 10 minutes in order to verify that it can be used successfully in the simulator.

OPTIONS

The vital bus may be deenergized by opening its supply breaker or by failing the inverter to transformer automatic transfer and deenergizing the supply inverter. In order to provide an operationally realistic scenario, the latter method should be used.

INITIAL CONDITIONS

100% power, steady state, MOL

FINAL CONDITIONS

Simulator in freeze with 3P08 deenergized.

APPROVED FOR USE

[signature] DATE: 2/2/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Linley DATE: 2-2-90

DATE:

DATE:

LOSS OF VITAL BUS 3P08: MMP-003

BASIS FOR EVALUATION

Expert evaluation of the simulator's response versus the plant drawings and the Off-Normal Operating Procedure.

DISCUSSION OF TEST RESULTS

The loss of 3P08 test went fairly well with four discrepancies being generated. The most significant problem is the train 2 AFW flow controllers, which did not lose power. The train 1 and 2 controllers' power supplies are reversed in the simulator. Since only one train fails with a given bus, the plant can still be operated and training can continue. The power supplies need to be corrected, however. The other discrepancies noted are considered minor in nature as they are indications only and do not hinder the ability to use the simulator for training.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

A Deficiency Report was generated for the train 2 AFW flow controllers which should have lost power with this bus, but instead lost power in the 3P07 test. A DR was generated for LI-3-6308B, Containment Sump level, as it had a yellow stripe, vice the blue stripe associated with 3P08. It lost power with the correct bus however. A DR was generated for the Condensate Storage Tank train B level detector which should have lost power, but instead lost power with 3P07. Lastly, the RCP seal leakoff recorders did not respond properly. On the low range recorder, the red and blue pens failed and on the high range recorder, no pens failed. On both recorders, the red pen only should have failed.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Robert J. Sindey	DATE: 2-2-90	L E Dodson	DATE: 3/20/90
Kenneth D. White	DATE: 2/2/90	Richard J. Wende	DATE: 3-20-90
	DATE:	Leo Goebel	DATE: 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF VITAL BUS 3PO9

NUMBER: MMP-004

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss of Electrical Power

DESCRIPTION

The purpose of this certification test is to verify proper simulated response to a loss of the 120 VAC vital bus 3P09. This bus supplies power to channel 4 of the plant's instrumentation. The test will be initiated from 100% power steady state with all control systems lined up for normal operation. No other malfunctions will be present. After checking the boards for proper loss of power indications, the test team will operate the simulator in accordance with the plant Off-Normal Procedure for 10 minutes in order to verify that it can be used successfully in the simulator.

OPTIONS

The vital bus may be deenergized by opening its supply breaker or by failing the inverter to transformer automatic transfer and deenergizing the supply inverter. In order to provide an operationally realistic scenario, the latter method should be used.

INITIAL CONDITIONS

100% power, steady state, MOL

FINAL CONDITIONS

Simulator in freeze with 3P09 deenergized.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 8/22/90

TEST TEAM

DATE: 8-23-90

DATE: ________

DATE: ________

LOSS OF VITAL BUS 3PO9: MMP-004

BASIS FOR EVALUATION

Expert evaluation of simulator response as compared to the plant electrical drawings.

DISCUSSION OF TEST RESULTS

The test ran almost perfectly with all but two items losing power as they should. Only the CCW temperature indicators, TI-607A and 610A did not fail as they should have.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

CCW temperature indicators TI-607A and 610A did not fail as they should have. A DR has been written to address this problem.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
[illegible]	DATE: 8-24-90	[illegible]	DATE: 8/24/90
Kenneth D. White	DATE: 8/24/90	Richard L. [illegible]	DATE: 8-24-90
	DATE:	[illegible]	DATE: 8-24-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF DC BUS 3A (3D01)

NUMBER: MMP-005

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss of Electrical Power

DESCRIPTION

The purpose of this test is to verify proper simulator response to the loss of DC bus 3A (3D01). DC bus 3A supplies safety related electrical loads with DC power for control and indication. The test will be initiated from 100% power, steady state with all control systems lined up for normal operation. No other malfunctions will be present. After deenergizing the bus, the test team will operate the simulator in accordance with the plant Off-Normal Procedure for 10 minutes. At that point, the simulator will be frozen to allow the team to walk down the boards and verify that all components responded properly to the loss of power.

OPTIONS

None

INITIAL CONDITIONS

100% power, steady state, MOL

FINAL CONDITIONS

Simulator in freeze with DC bus 3A deenergized.

APPROVED FOR USE

[signature] DATE: 2/13/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 2-13-90

DATE:

DATE:

LOSS OF DC BUS 3A (3D01): MMP-005

BASIS FOR EVALUATION

Expert evaluation of simulator response as compared to the plant electrical drawings.

DISCUSSION OF TEST RESULTS

The simulator responded exactly as predicted for the loss of 3D01. All components which should have failed did and those which shouldn't have failed continued to operate.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Sing	DATE: 3-20-90	[signature]	DATE: 3/20/90
Kenneth D. White	DATE: 3/20/90	Richard J. Wendo	DATE: 3-20-90
	DATE:	Leo [signature]	DATE: 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF DC BUS 3B (3D23)

NUMBER: MMP-006

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss of Electrical Power

DESCRIPTION

The purpose of this test is to verify proper simulator response to the loss of DC bus 3B (3D23). DC bus 3B supplies safety related electrical loads with DC power for control and indication. The test will be initiated from steady state 100% power with all control systems lined up for normal operation. No other malfunctions will be present. After checking the boards for proper loss of power indications, the test team will further deenergize some of the backup DC power supplies, to insure that the components with two sources of DC power are powered from the correct two sources. The Off-Normal Operating Procedure will be used to confirm the loads powered by bus 3D23.

OPTIONS

The DC bus may be deenergized by more than one method. The exact method is not important so long as only 3D23 is deenergized.

INITIAL CONDITIONS

100% power, steady state, MOL

FINAL CONDITIONS

Simulator in freeze with DC bus 3B deenergized.

APPROVED FOR USE

L C Dodson [signature]

SIMULATOR ENGINEERING COORDINATOR

DATE: 2/13/90

TEST TEAM

Robert J. Siniz [signature] DATE: 2-13-90

DATE:

DATE:

LOSS OF DC BUS 3B (3D23): MMP-006

BASIS FOR EVALUATION

Expert evaluation of simulator response as compared to plant Off-Normal Operating Procedures and the plant electrical drawings.

DISCUSSION OF TEST RESULTS

The loss of the 3D23 bus test was performed with only minor discrepancies. The plant tripped and the various components responded as predicted by the test team and the Off-Normal Operating Procedure. Only the two loads listed below did not fail as they should have.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Deficiency reports were written on two components which should have lost power, but didn't. The reactor trip bypass breaker 52/BYA and the RCS vent valve CV-3-6320B. Since neither of these components is normally operated for simulator training, these deficiencies have only minor impact on training and do not compromise the ability to use the simulator.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Siml	DATE: 3-20-90	R E Dodson	DATE: 3/20/90
Kenneth D. White	DATE: 3/20/90	Richard L. Illeuds	DATE: 3-20-90
	DATE:	Leo Goibel	DATE: 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF DC BUS 4A (4D01)

NUMBER: MMP-007

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss of Electrical Power

DESCRIPTION

The purpose of this test is to verify proper simulator response to the loss of DC bus 4A (4D01). DC bus 4A supplies certain unit 3 and common safety related electrical loads with DC power for control and indication. The test will be initiated from 100% power, steady state with all control systems lined up for normal operation. No other malfunctions will be present.

OPTIONS

The 4D01 bus may be deenergized by several methods. Any method which deenergizes 4D01 only is acceptable.

INITIAL CONDITIONS

100% power, steady state, MOL

FINAL CONDITIONS

100%, with bus 4D01 deenergized.

APPROVED FOR USE

R E Dodson III DATE: 2/13/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Sirody DATE: 2-13-90

DATE: ______

DATE: ______

LOSS OF DC BUS 4A (4D01): MMP-007

BASIS FOR EVALUATION

Expert evaluation of simulator response simulator response as compared to plant electrical drawings.

DISCUSSION OF TEST RESULTS

A total of five loads were checked in this test. These represent loads powered from unit 4 which impact the simulated operation of unit 3. All loads lost power as expected. There were no loads which lost power which shouldn't have and the simulator responded as expected.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Sinely	DATE: 3-20-90	R E Dedso	DATE: 3/20/90
Kenneth D. White	DATE: 3/20/90	Richard L. Wenck	DATE: 3-20-90
	DATE:	Leo Göbel	DATE: 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF DC BUS 4B (4D23)

NUMBER: MMP-008

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss of Electrical Power

DESCRIPTION

The purpose of this test is to verify proper simulator response to the loss of DC bus 4B (4D23). DC bus 4B supplies some safety related electrical loads on unit #3, including the normal inverter for vital bus 3P09. The test will be initiated from hot shutdown.

Since this a unit 4 bus, the Off-Normal Procedure for it will not be used. Only the correct backup powering will be checked in this test.

OPTIONS

None

INITIAL CONDITIONS

HSD, steady state, MOL.

FINAL CONDITIONS

HSD, various buses deenergized in order to check unit 3 response to loss of 4B.

APPROVED FOR USE

[signature] DATE: 2/14/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 2-14-90

DATE: ______

DATE: ______

LOSS OF DC BUS 4B (4D23): MMP-008

BASIS FOR EVALUATION

Expert evaluation of simulator response as compared to the plant electrical drawings.

DISCUSSION OF TEST RESULTS

The test went as expected, with no deficiencies noted.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Lindsey	DATE: 3-20-90	[signature]	DATE: 3/20/90
Kenneth D. White	DATE: 3/20/90	Richard L. Mende	DATE: 3-20-90
	DATE:	Leo [signature]	DATE: 3-20-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: STEAM GENERATOR TUBE RUPTURE

NUMBER: MRC-001

ANS 3.5 REFERENCE SECTIONS: 3.1.2(1,a) SIGNIFICANT PWR STEAM GENERATOR LEAKS

DESCRIPTION

This test replicates a Best Estimate Analysis (BEA) Steam Generator Tube Rupture performed by the FP&L Fuel Resources Department using the RETRAN02 program. As such the test is not intended to follow in detail the EOPs covering this type of transient. However, the operator action to turn off the RC pumps on low subcooling margin was programmed into the scenario. In addition, it was assumed that 10 minutes after the initiation of the rupture the operator isolates AFW in the affected loop, secures the atmospheric dump valve, and closes the MSIV on the affected loop. Since the RETRAN model does not include charging and letdown models, or accumulators, these paths were isolated in the Simulator. The event is initiated from full power at end-of-cycle conditions. All control systems are initially in automatic, safety systems function at full capability, and no additional malfunctions are included. The safety systems function at full capability, and no additional malfunctions are included. Rod control is assumed to be in manual in order to simplify the interface between the simulator and the RETRAN model. A split break of a single tube is assumed to occur in the loop B steam generator.

OPTIONS

The simulator is capable of simulating steam generator tube ruptures ranging from minute leaks to ruptures of many tubes in each of the steam generators. There are no restrictions regarding other ruptures of the primary or secondary system that may be assumed to occur simultaneously or cause the tube rupture itself.

INITIAL CONDITIONS

100% power steady state, end-of-cycle, equilibrium xenon

FINAL CONDITIONS

The transient is analyzed for approximately 30 minutes. At this time, the B steam generator is nearly full and recovery actions are now required by the operator.

APPROVED FOR USE

[signature] DATE: 5/9/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

James S. Harrison DATE: 5/9/90

DATE:

DATE:

STEAM GENERATOR TUBE RUPTURE: MRC-001

BASIS FOR EVALUATION

Best Estimate Analysis - The Simulator results will be compared to a Turkey Point RETRAN model.
Expert Evaluation - The overall response and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The overall response of the Simulator is as expected and consistent with the physical processes involved.

The pressurizer pressure agrees reasonably well throughout the 30 minute transient and the pressurizer level looks excellent. The RCS flow coastdown and natural circulation characteristics look much the same as several other transients we have studied. The simulator always seems to produce more natural circulation flow than the RETRAN model. In this test the Simulator shows the stagnation affects in the B loop although it does not completely stagnate in the 30 minutes examined here.

The timing and magnitude of the condenser dump flow agrees perfectly and a deficiency written on the steam dump capacity has been corrected.

All of the affected loop parameters agree reasonably well. The only inconsistency in the Simulator that may deserve some attention is the level response relative to the pressure response. The steam generator narrow range level is roughly 60% when the pressure reaches the setpoint of the lowest code valve. The RETRAN response seems more consistent in this regard. The affected loop temperatures compare very well between the two models. The cold leg temperature in the Simulator is beginning to show the impact of the flow stagnation in the B loop.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
James D. Harrison	DATE: 5/10/90	[illegible]	DATE: 5/17/90
Kenneth W. White	DATE: 5/10/90	[illegible]	DATE: 5/17/90
	DATE:	[illegible]	DATE: 5/17/90

TITLE: LARGE BREAK LOCA INSIDE CONTAINMENT WITH LOSS OF OFFSITE POWER

NUMBER: MRC-002

ANS 3.5 REFERENCE SECTIONS: 3.1.2(1)(B) Loss of Coolant Inside Primary Containment
3.1.2(1)(C) Large and Small Reactor Coolant Breaks Including Demonstration of Saturation Condition
B.2.2(8) Maximum Size Reactor Coolant System Rupture Combined with Loss of All Offsite Power

DESCRIPTION

The purpose of this test is to ascertain proper simulator behavior in response to a double-ended guillotine break on the B loop cold leg coincidental with a total loss of offsite power. All control systems are initially in automatic, the safety systems are fully functional, and there are no additional malfunctions in place. Because this is an ANS Appendix B test, it will be entirely scenario driven and there will be no operator follow up actions. The parameters listed in ANS Appendix B Section B2.2.3, along with several other relevant parameters, will be recorded with a .4 second resolution. Additionally, the control room alarms, indications, and interactions will be monitored to confirm that they are appropriate for this exercise.

OPTIONS

Leaks can be initiated on each of the hot legs and cold legs or at numerous other locations in the RCS, such as the pressurizer. All of the leaks are fully variable in size.

INITIAL CONDITIONS

EOL, 100% power with steady state conditions.

FINAL CONDITIONS

This test will run until the RWST has emptied to the point that the RHR pump suctions are about to switch to the containment sumps.

APPROVED FOR USE

R E [signature] DATE: 8/21/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

James D Harrison DATE: 8/21/90

DATE: ______

DATE: ______

LARGE BREAK LOCA INSIDE CONTAINMENT WITH LOSS OF OFFSITE POWER: MRC-002

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

Generally, this test went well. The control room indications and responses were appropriate except as noted below in the deficiency section. In less than a minute containment pressure had peaked at 49 psig and began a downwards trend. By the end of the test it had actually gone negative. Containment temperature started at 120F, peaked at 265F, and was flattening out near 175F at the end of the test. The responses for pressurizer pressure and level were appropriate. The pressurizer emptied in less than 15 seconds and never recovered. The RHR and accumulator flow went to 900 lb/sec in half a minute and then decayed to 500 lb/sec until the accumulators emptied after 4 minutes. RHR flow then went to about 350 lb/sec. Saturation margin went to -320F, but recovered to -50F by three minutes and had recovered to saturation after 12 minutes. The reactor vessel head emptied and remained empty for the duration of the test. Steam line flow experienced oscillations. They peak at 6 lb/second and eventually disappear. The most unique feature of the steam line flow is that C S/G does not oscillate and the oscillations in the A and B S/G's exactly oppose each other; i.e., as one generator's flow increases, the other's will decrease the same magnitude.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Containment pressure goes subatmospheric by the end of the test. A DR has been submitted to correct this problem.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
James D. Harrison	DATE: 11/20/90	L E Dobson III	DATE: 11/28/90
Kenneth W. White	DATE: 11/21/90	[illegible]	DATE: 11-28-90
	DATE:	[illegible]	DATE: 11-28-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: SMALL BREAK LOCA INSIDE CONTAINMENT

NUMBER: MRC-003

ANS 3.5 REFERENCE SECTIONS: 3.1.2(1,B AND C) LOSS OF COOLANT: LARGE AND SMALL BREAKS, INSIDE AND OUTSIDE CONTAINMENT

DESCRIPTION

This test replicates a Best Estimate Analysis (BEA) Small Break LOCA performed by the FP&L Fuel Resources Department using the RETRAN02 program. As such the test is not intended to follow in detail the EOPs covering this type of transient. However, the operator action to turn off the RC pumps on low subcooling margin was programmed into the scenario. No other operator actions were taken during the course of the event, and several assumptions were made to make the Simulator and the RETRAN model consistent. Since the RETRAN model does not include charging and letdown models, or accumulators, these paths were isolated in the Simulator. The event is initiated from full power at beginning-of-cycle conditions. A three inch diameter break is assumed to occur in the hot leg of loop B. All control systems are initially in automatic, safety systems function at full capability, and no additional malfunctions are included.

OPTIONS

The simulator is capable of simulating RCS breaks of any size at several locations. The three inch hot leg break was selected because it is one of the standard hot leg breaks that is used for LOCA and pressurized thermal shock analyses.

INITIAL CONDITIONS

100% power steady state, beginning of core life, equilibrium xenon

FINAL CONDITIONS

The transient is analyzed for approximately 30 minutes. At this time, the safety injection flow rate is approximately equal to the break flow rate and the system is depressurized.

APPROVED FOR USE

R E Dawson III DATE: 8/21/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

James D Harrison DATE: 8/21/90

DATE: ______

DATE: ______

SMALL BREAK LOCA INSIDE CONTAINMENT: MRC-003

BASIS FOR EVALUATION

Best Estimate Analysis - The Simulator results will be compared to a Turkey Point RETRAN model.
Expert Evaluation - The overall response and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The break flow predictions for the Simulator and RETRAN models agree very well for the duration of the transient. The agreement in the RCS pressure response is also very good although the Simulator does depressurize to a greater degree than the RETRAN model from about 15 to 20 minutes. The deviation reaches approximately 200 psi, but at this point in the transient it is not significant from a training standpoint.

Preliminary runs showed that an excessive two phase natural circulation flow in the Simulator resulted in cold leg temperatures that followed saturation throughout the test and did not exhibit the cooling due to stagnation of the injection flow in the cold legs as did the RETRAN model. The first SCRB meeting that discussed this transient resulted in a directive by the SCRB to correct this shortcoming. Subsequent modifications to the Simulator models have resulted in a reasonable agreement of the cold leg temperatures between the Simulator and the RETRAN models. The Simulator does not exhibit as erratic a behavior as the RETRAN model as it cools, but it does show a consistent overall magnitude and a tendency to return to saturation late in the transient when natural circulation begins to be restored.

The behavior of the balance of the secondary parameters is as expected and the Simulator and RETRAN model results agree reasonably well.

OUT OF BOUNDS CONDITIONS

None.

DEFICIENCIES

Oscillations in the break flow rate occur in the 25 to 30 minute range, as the loops are starting to refill and begin natural circulation. The magnitude of the oscillations is not excessive and cannot be observed by the trainee. However, the problem deserves some attention and will be entered as a discrepancy.

EXCEPTIONS TO ANS 3.5

None.

EVALUATION TEAM		SIMULATION CONFIGURATION REVIEW BOARD	
James S. Harrison	DATE: 9/10/90	[signature]	DATE: 11/28/90
Robert J. Sunley	DATE: 9/11/90	[signature]	DATE: 11-28-90
	DATE:	[signature]	DATE: 11-28-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: PORV FAILURE (OPEN) WITHOUT HIGH PRESSURE INJECTION

NUMBER: MRC-004

ANS 3.5 REFERENCE SECTIONS: 3.1.2(1,d) FAILURE OF SAFETY & RELIEF VALVES
B2.2(10) SLOW PRIMARY DEPRESSURIZATION TO SATURATED CONDITIONS
USING A PRESSURIZER RELIEF OR SAFETY STUCK OPEN WITHOUT ACTIVATION OF THE ECCS

DESCRIPTION

This test replicates a Best Estimate Analysis (BEA) of a single stuck open PORV without high pressure injection performed by the FP&L Fuel Resources Department using the RETRAN02 program. It should be noted that the Turkey Point plant does not have a high pressure ECCS system that will inject at normal system pressures as many of the newer plants. Therefore, this test has been performed with a failure of the Turkey Point system with the highest available delivery pressure (shutoff at approximately 1500 psi). This test is not intended to follow in detail the EOPs covering this type of transient. However, the operator action to turn off the RC pumps on low subcooling margin was programmed into the scenario. Since the RETRAN model does not include charging and letdown models, or accumulators, these paths were isolated in the Simulator. The event is initiated from full power at beginning-of-cycle conditions. All control systems are initially in automatic and no additional malfunctions are included. Rod control is assumed to be in manual in order to simplify the interface between the simulator and the RETRAN model.

OPTIONS

The simulator is capable of simulating one or both of the PORVs failing open or closed. Failures to an intermediate position may also be simulated.

INITIAL CONDITIONS

100% power steady state, beginning-of-cycle, equilibrium xenon

FINAL CONDITIONS

The transient is analyzed for approximately 30 minutes. At this time, the pressure is approximately 800 psia and has been drifting slowly down for approximately 1400 seconds.

APPROVED FOR USE

[signature] DATE: 5/13/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

James D. Harrison DATE: 5/14/90

DATE: ____________

DATE: ____________

PORV FAILURE (OPEN) WITHOUT HIGH PRESSURE INJECTION : MRC-004

BASIS FOR EVALUATION

Best Estimate Analysis - The Simulator results will be compared to a Turkey Point RETRAN model.
Expert Evaluation - The overall response and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The overall response of the Simulator is as expected and consistent with the physical processes involved. The agreement between the RETRAN02 model predictions is reasonably good for the entire duration of the transient. The RCS pressure drops rather quickly to approximately 1100 psia following opening of the PORV. The pressure then drifts slowly down over then remainder of the test. The pressurizer fills as a result of the two phase swell from the RCS loops. The loop temperatures follow the steam generator pressures until roughly 800 seconds when the cold legs flash. The natural circulation flow rate in the Simulator is larger than RETRAN, especially during the long two phase portion of the transient. This problem is not severe and is being studied via deficiency reports written against MRC-003, Small Break LOCA, MFW-007, TMI Equivalent, and MFW-003, Loss of Heat Sink.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
James D. Harrison	DATE: 8/12/90	[signature]	DATE: 11/28/90
Robert J. Lindsey	DATE: 8/12/90	[signature]	DATE: 11-28-90
	DATE:	[signature]	DATE: 11-28-90

TITLE: LOSS OF FORCED REACTOR COOLANT FLOW

NUMBER: MRC-005

ANS 3.5 REFERENCE SECTIONS: 3.1.2(4) LOSS OF FORCED CORE COOLANT FLOW DUE TO SINGLE OR MULTIPLE PUMP FAILURE
B2.2(4) SIMULTANEOUS TRIP OF ALL REACTOR COOLANT PUMPS
B2.2(5) TRIP OF ANY SINGLE REACTOR COOLANT PUMP

DESCRIPTION

This test comprises three loss of forced reactor coolant flow cases that result from tripping one, two, and three reactor coolant pumps. These three tests were run from full power, therefore, a reactor trip occurs immediately following the pump trip. Since this is an ANS 3.5 Appendix B transient, no operator actions were taken during the course of the event and all control systems were in automatic. The transient was initiated by failing the RC pump motor breakers open. The response of the overall primary and secondary parameters are much the same as many other trips. Hence, the emphasis in this test will be placed on the flow coastdown and the development of flow through the dead loops. Plant data is available for the early part of the transient. (A additional test (MRC-008) was performed to evaluate the two pump trip that occurred on 04/09/90 on Unit 4.)

OPTIONS

The tripping of the RC pumps may be accomplished by manual action from the control room, an override of the switch position, or the failing open of the motor breaker.

INITIAL CONDITIONS

100% Power Steady State, BOL, Equilibrium Xenon

FINAL CONDITIONS

The test will be run for 600 sec at which time the RC loop flows have reached a steady state and the overall system parameters are steadily recovering.

APPROVED FOR USE

[signature] DATE: 12/1/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

James D. Harrison DATE: 12/2/90

DATE: ____

DATE: ____

LOSS OF FORCED REACTOR COOLANT FLOW: MRC-005

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.
Plant Data - Data from startup tests is available for the loop flow rates for the early part of the test.

DISCUSSION OF TEST RESULTS

The overall trends and magnitudes of the transient results are as expected and meet the guidelines of ANS 3.5. The transition from forward to reverse flow in the dead loops for the one and two pump coastdowns is smooth and the magnitude of the reverse flow is reasonable. In the three pump coastdown case, the transition to natural circulation is smooth and the magnitude of natural circulation flow is reasonable.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
James J. Harrison	DATE: 12/4/90	[signature]	DATE: 12/5/90
Kenneth W. White	DATE: 12/4/90	[signature]	DATE: 12/5/90
	DATE:	[signature]	DATE: 12-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF A SINGLE REACTOR COOLANT PUMP WITH POWER BELOW P-8

NUMBER: MRC-006

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (4) Loss of Forced Coolant Flow Due to Single or Multiple Pump Failure

DESCRIPTION

This test will simulate a single loop loss of flow transient at a power level below which a reactor trip would not occur. In accordance with ANS-3.5, no operator action will be taken after the event occurs.

OPTIONS

Any of the three Reactor Coolant Pumps may be tripped.

INITIAL CONDITIONS

40% power, steady state, MOL

FINAL CONDITIONS

40% power, steady state, two loop operation.

APPROVED FOR USE

[signature] DATE: 1/16/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. [signature] DATE: 1-16-90

DATE: ________

DATE: ________

LOSS OF A SINGLE REACTOR COOLANT PUMP WITH POWER BELOW P-8: MRC-006

BASIS FOR EVALUATION

Expert evaluation of overall plant response and the response of selected variables.

DISCUSSION OF TEST RESULTS

The plant responded to the partial loss of flow event as expected. Initially power went down due to the increase in average temperature, but from steady state to steady state, the power of the core remained the same. Actual power, indicated power, coolant temperature, and axial flux difference all underwent the transients expected for this event.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
[signature]	*DATE:* 2-10-90	[signature]	*DATE:* 2/14/90
Kenneth D. White	*DATE:* 2/10/90	[signature]	*DATE:* 2-14-90
	DATE:	[signature]	*DATE:* 2-14-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: STUCK OPEN SPRAY VALVE

NUMBER: MRC-007

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (18) FAILURE OF REACTOR COOLANT PRESSURE AND VOLUME CONTROL SYSTEMS

DESCRIPTION

This test will simulate a sustained loss of pressure accident due to a stuck open spray valve. The valve will be stuck fully open via a mechanical failure. The plant should trip and eventually safety inject on low pressure. For this test, two scenarios will be run. First the normal plant Emergency Operating Procedures will be utilized with the exception that the RCP supplying the stuck open spray valve will not be stopped until after the SI. Second, the plant will be allowed to stabilize with no operator action.

OPTIONS

Either spray valve is acceptable.

INITIAL CONDITIONS

100% power, BOL

FINAL CONDITIONS

Run 1 - Plant pressure stable after the RCP supplying spray flow is stopped.

Run 2 - Plant pressure relatively stable with no operator action.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 1/16/90

TEST TEAM

Kenneth W. White DATE: 1/16/90

Robert Ginsberg DATE: 1/16/90

DATE:

STUCK OPEN SPRAY VALVE: MRC-007

BASIS FOR EVALUATION

Expert evaluation of overall plant response, capability of performing plant emergency procedures and response of selected plant parameters.

DISCUSSION OF TEST RESULTS

RUN 1

The overall plant response to the stuck open spray valve was as expected. Initially pressure drops steadily due to the spray. At about 300 seconds, a OT DT runback occurs as the lower pressure lowers the OTDT setpoint. At 600 seconds the low pressure trip occurs. This causes a large drop in pressure and causes the safety injection to occur just after the trip. At about 660 seconds, the 'C' RCP is stopped, thus making spray flow negligible and stopping the pressure decrease. At this point the simulator is frozen. The team was able to perform the emergency procedures without any problems.

RUN 2

The overall plant response to the stuck open spray valve with no operator action was as expected. The plant response before the safety injection is the same as in case one. After the SI, however, pressure continues to decrease due to spray flow.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

One possible deficiency was uncovered in run 2. With safety injection refilling the pressurizer, pressurizer surge line temperature indicated a value close to pressurizer temperature, vice RCS hot leg temperature. This is being investigated to determine whether there was an actual insurge occurring or if the flow of water in the surge line was due to the spray flow.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATION CONFIGURATION REVIEW BOARD***	
Robert J. Sindberg	***DATE:*** 2/11/90	R. E. [illegible]	***DATE:*** 2/14/90
Kenneth D. White	***DATE:*** 2/11/90	[illegible]	***DATE:*** 2-14-90
	DATE:	Leo [illegible]	***DATE:*** 2-14-90

TITLE: **LOSS OF B AND C REACTOR COOLANT PUMPS AT 100% POWER**

NUMBER: **MRC-008**

ANS 3.5 REFERENCE SECTIONS: **3.1.2(4) Loss of Forced Core Coolant Flow Due to Multiple Pump Failure**

DESCRIPTION

This test will simulate a loss of the B and C reactor coolant pumps with power at 100%, which will result in a reactor trip. This scenario has been chosen to compare simulator results with the Unit 4 trip on April 9, 1990 from the same cause. The Unit 4 trip was due to a failed under frequency relay, but the scenario will be started in the simulator by opening the B and C RCP breakers. Actions will be simulated to approximate those taken following the Unit 4 trip; e.g., the main steam stops to the moisture separator reheaters will be shut, an extra charging pump will be started, the auxiliary steam supply will be changed, the main steam isolation valves will be shut, main feed will be reinstated through the feed control valve bypasses, and AFW to B and C steam generators will be throttled after appropriate delays. All actions will be scenario driven.

An ERDADS tape has been obtained of the Unit 4 trip on 4/9/90 and several parameters have been plotted. The simulator responses will be also be plotted and compared to the ERDADS data.

OPTIONS

The RCP's can be tripped by a variety of mechanisms, including failing their breakers open, simulating the opening of their hand switches, and putting in a false over current condition. These failures are available for all three RCP's.

INITIAL CONDITIONS

100% power, all three reactor coolant pumps running.

FINAL CONDITIONS

0% power, hot standby with only A reactor coolant pump running. The test will run for 30 minutes after the loss of B and C reactor coolant pumps.

APPROVED FOR USE

C. Dodson Jr. DATE: 12/5/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth DW White DATE: 12/5/90

James D Harrison DATE: 12/5/90

DATE: ______

LOSS OF B AND C REACTOR COOLANT PUMPS AT 100% POWER: MRC-008

BASIS FOR EVALUATION

Plant Data. The simulator results will be compared to the ERDADS plots from the Unit 4 trip on 4/9/90.
Expert examination. The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The test was evaluated using ANS 3.5 criteria and meets all requirements. The plot comparisons between the simulator the Unit 4 event are extremely close. Many of the simulator plots lay on top of plant's and most of the differences can be explained by operator actions that cannot be determined from logs and the ERDADS tapes. These include such items as the position on the feedwater bypass valves and AFW flow settings in the lower ranges. Also, most of the differences occur more than ten minutes after the reactor coolant pumps were tripped and none of the differences have any significant impact on training or the performance of the simulator. Although the simulator doesn't have any steam leakage as a normal condition, a slight amount was put in for this test in order to match the plant and this produced favorable comparisons between steam generator pressures and levels. The initial steam pressure spike is about 40 pounds less on the simulator and the simulator doesn't drop as much as the plant, but the differences are minor. The pressurizer pressure and level are virtually identical for most of the transient. Pressure drops about 50 psi lower on the simulator. Again, this is a very minor difference and doesn't have any significant impact on training. The reverse flow indication was appropriate and the running pump current and amperage increased about the same as in the plant. Reactor coolant system temperatures corresponded very well to the slope, magnitude, and direction of change that occurred in the plant.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The RCP current is 60 amps too low on the simulator. The feed control valve modelling takes slightly too long to shut the valves when they are less than fully open.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
Kenneth W. White	DATE: 12/6/90	[signature]	DATE: 12/7/90
James O. Harrison	DATE: 12/6/90	[signature]	DATE: 12/7/90
	DATE:	[signature]	DATE: 12-7-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: SPURIOUS ROD POSITION INDICATION RESULTING IN MAXIMUM RATE RUN TO 70% POWER AND MAXIMUM RATE RETURN TO FULL POWER

NUMBER: MRX-001

ANS 3.5 REFERENCE SECTIONS: B.2.2 (7) MAXIMUM RATE POWER RAMP (100% DOWN TO 75% AND BACK UP TO 100%)
3.1.2 (22) PROCESS INSTRUMENTATION, ALARM, AND CONTROL SYSTEM FAILURES

DESCRIPTION

This test will evaluate the ability of the simulator to support a return to 100% power at a rapid rate after a runback due to a failed rod position detector.

OPTIONS

Any condition which would cause a 200 %/minute runback could be used to initiate this test.

INITIAL CONDITIONS

100% power, steady state, BOL

FINAL CONDITIONS

100% Power, after recovery.

APPROVED FOR USE

L E Dodson IV

SIMULATOR ENGINEERING COORDINATOR

DATE: 10/11/90

TEST TEAM

DATE: 10/11/90

Kenneth W. White DATE: 10/11/90

DATE:

SPURIOUS ROD POSITION INDICATION RESULTING IN MAXIMUM RATE RUN TO 70% POWER AND MAXIMUM RATE RETURN TO FULL POWER: MRX-001

BASIS FOR EVALUATION

Expert evaluation of overall plant response, simulator operability and the response of selected parameters.

DISCUSSION OF TEST RESULTS

The team utilized the plant Off-Normal procedures for a Dropped Rod and for the Runback to aid in stabilizing the plant at 70% power. After the plant was stabilized, the malfunction was cleared and the return to 100% power begun. Rods were used for the initial power increase, after which the ramp up in power was limited by the maximum dilution rate achievable. The test team was able to recover the plant back to 100% power within 40 minutes after the initial spurious runback without any problems.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
R J King	DATE: 10/17/90	R E Dodson	DATE: 11/28/90
Kenneth W. White	DATE: 10/17/90	Mende	DATE: 11-28-90
	DATE:	Leo Joibe	DATE: 11-28-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF PROTECTION SYSTEM CHANNEL

NUMBER: MRX-002

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (11) Loss of Protection System Channel

DESCRIPTION

In this test a failure of a protection channel while a second channel is in test will cause a reactor trip. For the test, one channel of narrow range coolant temperature will be placed in test and a second channel will fail.

OPTIONS

There are several protection channels in the plant and any channel can be failed in any direction by several different means. The failure of just one channel will not cause a plant transient, however, so a redundant channel should be placed in test.

INITIAL CONDITIONS

100%, MOL, steady state

FINAL CONDITIONS

Hot standby.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 5/13/90

TEST TEAM

DATE: 6-3-90

DATE:

DATE:

LOSS OF PROTECTION SYSTEM CHANNEL: MRX-002

BASIS FOR EVALUATION

Expert evaluation of plant response as compared to protection system logic diagrams and a normal plant trip transient.

DISCUSSION OF TEST RESULTS

The test went as planned. With channel one temperature bistables in trip, the failure of channel two hot leg narrow range temperature caused a trip on overtemperature and overpower delta temperatures. Since only the protection channels of temperature were affected, the control channels operated normally to bring the unit to hot standby.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Lindy	DATE: 6-3-90	John E. Crockford	DATE: 6/4/90
Kenneth W. White	DATE: 6/3/90	Kay D. Howell	DATE: 6/4/90
	DATE:	Leo Gaibel	DATE: 6-4-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: NUCLEAR INSTRUMENTATION FAILURE DURING STARTUP

NUMBER: MRX-003

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (21) Nuclear Instrumentation Failures

DESCRIPTION

This test will examine the simulator's ability to model malfunctions of nuclear instrumentation, specifically during startup conditions. Two cases will be run. In the first case, both intermediate ranges will fail low such that P-6 will not be satisfied and the source range high flux trip cannot be blocked. The reactor will trip when the source range high flux trip setpoint is reached. In the second case, three power range nuclear instruments will be failed low such that the P-10 interlock cannot be satisfied and the intermediate range high flux trip and the power range low high flux trip cannot be blocked. The power range low flux trip will be inoperable with 3 power range detectors failed low. The reactor should trip at about 25% by intermediate range high flux. It is not intended to test the ability of the simulator to perform a startup with this test. The Normal Plant Evolution series of test will perform that function.

OPTIONS

Any three of the four power range instruments may failed low in run 2.

INITIAL CONDITIONS

Case 1: Hot shutdown, any time in life.
Case 2: Approximately 20% power during startup, any time in life.

FINAL CONDITIONS

Plant at hot shutdown after source range high flux trip.
Plant at hot shutdown after intermediate range high flux trip.

APPROVED FOR USE

L E Dodson JR DATE: 1/17/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Simberg DATE: 1/17/90
Kenneth D. White DATE: 1/17/90
________ DATE: ________

NUCLEAR INSTRUMENTATION FAILURE DURING STARTUP: MRX-003

BASIS FOR EVALUATION

Expert evaluation of plant response with the nuclear instrumentation failures inserted.

DISCUSSION OF TEST RESULTS

RUN 1

The reactor was went critical on the shutdown banks due to the low boron concentration. As expected, the reactor tripped at 10^5 CPS on the source range instruments. No problems were encountered.

RUN 2

Reactor power was raised using rods along with the maximum dilution rate possible with three letdown orifices in service. As expected, the reactor tripped on intermediate range high flux at 25% power. No problems were encountered.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

DATE: 2/12/90

DATE: 2/12/90

DATE:

SIMULATION CONFIGURATION REVIEW BOARD

DATE: 2/14/90

DATE: 2-14-90

DATE: 2-14-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: STUCK CONTROL ROD

NUMBER: MRX-004

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (12) Control Rod Failure Including Stuck Rods, Uncoupled Rods, Drifting Rods, Rod Drops, and Misaligned Rods

DESCRIPTION

This test will demonstrate the simulator's ability to correctly model the plant parameters which would be evident when one control rod sticks in one position and becomes misaligned from its group. The test will be run from two different power levels, one which will require a power reduction and one which will not. Both tests will be run from initial conditions shot during the power escalation test, NPE-003. In both cases, the plant Off Normal Operating Procedure will be used.

OPTIONS

The simulator will support sticking any rod in any position. A rod should be chosen so that it will have a fairly significant effect on nuclear instrumentation when the test is run.

INITIAL CONDITIONS

For run one, the initial power will be 30% during a power escalation.
For run two, the initial power will be 75% during a power escalation.

FINAL CONDITIONS

The test will be terminated when the team has determined the response of the nuclear instruments to the stuck rod.

APPROVED FOR USE

[signature] DATE: 4/8/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 4-8-90
Kenneth D. White DATE: 4/8/90
DATE:

STUCK CONTROL ROD: MRX-004

BASIS FOR EVALUATION

Expert evaluation of nuclear instrument and annunciator response.

DISCUSSION OF TEST RESULTS

RUN 1: POWER ESCALATION FROM 35%

The team recalled IC-21 for about 35% power and implemented the malfunction to stick rod H-4 (in D bank) in its current position. This rod is positioned symmetrically between power range channels N-41 and N-43. Next, a power escalation was begun. D bank started at 80 steps. When D bank was at 92 steps, annunciator G-9-2 (rod deviation) was received. The IRPI indications confirmed the problem. The team stopped the ramp and performed Off-normal operating procedure 3-ONOP-028.1 for RCC misalignment. At the reduced power level, the ONOP basically has the team maintain power less than 75%, perform notifications, and have engineering confirm the stuck rod. At this point, the team restarted the power escalation to insure that the nuclear instruments would eventually alarm in response to a flux tilt. When the alarm B-6-4 (Power range channel deviation) was received, the team stopped the test. This occurred with the rest of D bank at 160 steps. Power range channel indications confirmed the alarm as N-41 and N-43 gradually diverged from N-42 and N-44. The only possible deficiency is that the power ranges should have shown the flux deviation sooner. A Deficiency Report is outstanding to investigate this problem.

RUN 2: POWER ESCALATION FROM 75%

The team recalled IC-16 for 75% power and implemented the malfunction to stick rod H-4 again. D bank was initially at 210 steps. The power escalation was begun, but with the rods already out so close to the top, the team did not expect the flux deviation alarm. When the rest of D bank reached 222 steps, however, the rod deviation alarm (G-9-2) was received. At this point, the team implemented the ONOP again, but this time the ONOP required the team to reduce power to less than 75%. This was done, and power and rod positions were reduced far enough to insure that the rod deviation alarm was received with D bank 12 steps below the stuck rod. The rod deviation alarm was received as expected. No other deficiencies were noted.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Flux deviation between the nuclear instrument channels did not respond as soon as expected to the rod misalignment.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
	DATE: 4-11-90		***DATE:*** 6/4/90
Kenneth D. White	***DATE:*** 4/11/90		***DATE:*** 6/4/90
	DATE:		***DATE:*** 6-4-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: UNCOUPLED CONTROL ROD TEST

NUMBER: MRX-005

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (12) CONTROL ROD FAILURE INCLUDING STUCK RODS, UNCOUPLED RODS, DRIFTING RODS, ROD DROPS, AND MISALIGNED RODS

DESCRIPTION

This test will verify proper simulator response to a rod which drops due to a broken shaft. Since the drive shaft extension will be unaffected, there will be no rod position runback. Also, since the nuclear instrument runback is normally disable, no runback will occur. There will be no operator action taken in this test, only indications and automatic responses will be checked. Other tests check the ability of the operators to diagnose and recover from a dropped rod.

OPTIONS

Any rod may be uncoupled in the simulator. A rod should be used which will have a fairly significant effect on nuclear instrumentation indications.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

Plant stable after the rod has dropped.

APPROVED FOR USE

[signature] DATE: 4/4/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. [signature] DATE: 6-3-90

DATE: ______

DATE: ______

UNCOUPLED CONTROL ROD TEST: MRX-005

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevent parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The test was run from 100% power with the rod H-4, which is in D bank, dropping to the bottom via the uncoupled malfunction. This rod is positioned symmetrically between power range channels N-41 and N-43. The dropped rod did not cause a turbine runback since the NIS runback function is defeated in the simulator as in the plant, and the IRPI does not change when the rod drops due to uncoupling. Channels N-41 and N-43 did show a lower final power than N-42 and N-44 as expected. In addition, their delta flux was less negative than the other channels. The rest of the plant responded to the transient as expected. No deficiencies were noted.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		**SIMULATOR CONFIGURATION REVIEW BOARD**	
Robert G. Sinberg	DATE: 6-3-90	[illegible]	DATE: 6/4/90
Kenneth D. White	DATE: 6/3/90	[illegible]	DATE: 6/1/90
	DATE:	Leo [illegible]	DATE: 6-4-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: DROPPED CONTROL ROD

NUMBER: MRX-006

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (12) Control Rod Failures Including Stuck, Uncoupled, Misaligned, and Dropped Rods

DESCRIPTION

The full length control rod from Bank C at location F-4 is assumed to experience a failure of unspecified origin, causing it to drop into the core. The transient is initiated from 100% power at the beginning of cycle and with equilibrium xenon. All control systems are in automatic and no additional malfunctions are included. Upon indication of the dropped rod, the turbine will runback to approximately 70% power. It will be assumed that the problem is located immediately and that a recovery of the dropped rod is performed. The test is complete when the rod has been restored to its original position and the plant is stable.

There are basically two phases in this transient: the runback transient due to the rod drop, and second, the conduct of the rod recovery procedure. The rod recovery portion of the test will be performed from the control panels using 3-ONOP-028.3, Dropped RCC. The transient response of the second phase of the test is not particularly significant, whereas, the performance of various discrete logic, lights, switches, and the like is important.

OPTIONS

The simulator is capable of simulating a variety of failures that would result in any, as well as any number, of the 45 control and shutdown control rod drive mechanisms to fail.

INITIAL CONDITIONS

100% power steady state, beginning of core life, equilibrium xenon

FINAL CONDITIONS

Rod recovery procedure complete, Off Normal Procedures have been exited, and the plant tending toward a steady state.

APPROVED FOR USE

[signature] DATE: 1/31/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

James D. Harrison DATE: 1/31/90

[signature] DATE: 1/31/90

DATE: ________

DROPPED CONTROL ROD: MRX-006

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The overall trends and magnitudes of the transient results are as expected and meet the guidelines of ANS 3.5. The specific responses during the rod recovery procedure were proper and the procedure was completed as intended.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATION CONFIGURATION REVIEW BOARD*	
James L. Harrison	DATE: 1/31/90	[signature]	DATE: 2/6/90 ~~2/16/90~~
Ralph Sirley	DATE: 1/31/90	[signature]	DATE: 2-6-90
	DATE:	Leo Iäibel	DATE: 2-6-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: DROPPED ROD WITH INABILITY TO DRIVE CONTROL RODS

NUMBER: MRX-007

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (12) Control Rod Failures Including Stuck, Uncoupled, Misaligned, and Dropped Rods
3.1.2 (13) Inability to Drive Control Rods

DESCRIPTION

This test will simulate a dropped rod with all other rods stuck full out. The stuck rods will be simulated by placing the rod control switch in manual and not allowing manual control during the test. The plant will be stabilized using boration alone in accordance with Off Normal Operating Procedures.

OPTIONS

Any rod may be dropped, but the most information will be gathered by dropping an asymmetric rod so that the nuclear instruments will show some flux tilt.

INITIAL CONDITIONS

100% power, steady state, rods in manual.

FINAL CONDITIONS

Plant stable at about 70% power after the dropped rod runback.

APPROVED FOR USE

R E Dodson III DATE: 1/16/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J Ziurbany DATE: 1/16/90

Kenneth R. White DATE: 1/16/90

DATE:

DROPPED ROD WITH INABILITY TO DRIVE CONTROL RODS: MRX-007

BASIS FOR EVALUATION

Expert evaluation of overall plant response, simulator operability, and the response of selected parameters.
Comparison with actual plant data for flux tilt calculations.

DISCUSSION OF TEST RESULTS

The plant responded as expected by the team. The turbine ran back to 70% in response to the NIS and RPI dropped rod signals. The nuclear instruments clearly showed which quadrant the dropped rod was in and confirmed the RPI rod botton bistable indication. The steam dumps opened in response to the runback and minimized the load rejection effects. Then the steam dumps slowly modulated shut over the next 200 seconds to bring power down below 70% and temperature back to reference temperature. The feed regulating valves were a little sluggish in responding to the reduction in steam flow, so the team placed them in manual until the plant had stabilized and they were able to control better in automatic. This is a fairly standard operator action on a runback. The team had no trouble controlling the transient.

The calculated flux tilt for this run was 4.7% which agrees favorably with the flux tilt received in the plant for a drop of rod K-8 on August 20, 1985. That plant event resulted in a flux tilt of 5.1% for a rod which was relatively close to the one dropped in this simulator test.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATION CONFIGURATION REVIEW BOARD*	
[signature]	DATE: 3/20/90	[signature]	DATE: 3/20/90
[signature]	DATE: 3/20/90	[signature]	DATE: 3-20-90
	DATE:	[signature]	DATE: 3-20-90

TITLE: FUEL CLADDING FAILURE RESULTING IN HIGH REACTOR COOLANT ACTIVITY

NUMBER: MRX-008

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (14) Fuel Cladding Failure Resulting In High Activity In Reactor Coolant and the Associated High Radiation Alarms

DESCRIPTION

This test will consist of a small fuel cladding failure followed by a small RCS leak. The test will verify that the proper activity response is seen in the RCS, letdown and in the containment building.

OPTIONS

The cladding failure size and the size of the RCS leak can vary from extremely small to full failures. Small failures should be used in order to check the response of the systems in a reasonable manner.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

The test will terminate when the test team has verified the response of the simulator to the event. (About 20 minutes expected.)

APPROVED FOR USE

[signature] DATE: 5/13/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 6-3-90

DATE: ____________

DATE: ____________

FUEL CLADDING FAILURE RESULTING IN HIGH REACTOR COOLANT ACTIVITY: MRX-008

BASIS FOR EVALUATION

Expert evaluation of RCS and containment radiation level responses.

DISCUSSION OF TEST RESULTS

The test went as planned with no problems noted. The fuel failure caused RCS activity to increase, and when the leak was initiated, containment activities increased as expected. The leak was set to .00001 which coorsponds to about a 3 gallon per minute leak rate. The appropriate radiation alarms were received also.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

Robert J. Rimbey DATE: 6-3-90

Kenneth V. White DATE: 6/3/90

DATE:

SIMULATION CONFIGURATION REVIEW BOARD

Kent Howell DATE: 6/4/90

John Blackburn DATE: 6/4/90

Leo Doebel DATE: 6-4-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: MANUAL REACTOR TRIP FROM 100% POWER

NUMBER: MRX-009

ANS 3.5 REFERENCE SECTIONS: 3.1.2(19) Reactor Trip
B2.2(1) Manual Reactor Trip

DESCRIPTION

In this test the simulator will be manually tripped from the control room floor. Since this is an ANS Appendix B test, no operator actions will be taken after the reactor has been tripped. Additionally, specified parameters will be monitored at .4 second intervals. Because no manual actions are to be taken the reactor trip recovery procedure will not be used. Also, because no manual actions are taken, the simulator will cool down more than the plant would post trip. For a test involving the use of reactor trip recovery procedures along with normal post trip actions see NPE-004.

OPTIONS

This test can be performed at BOL, MOL, OR EOL.

INITIAL CONDITIONS

MOL, steady state at 100% power

FINAL CONDITIONS

This test will run for 15 minutes after the reactor trips.

APPROVED FOR USE

[signature] DATE: 10/25/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth W. White DATE: 10/26/90

________________ DATE: ________

________________ DATE: ________

MANUAL REACTOR TRIP FROM 100% POWER: MRX-009

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The test went well. The reactor was manually tripped from the bench console and the first out tile for manual reactor trip flashed red. All other alarms, interactions, and indications on the control room floor were appropriate for this exercise. The plots all show reasonable trends. Pressurizer pressure quickly drops to 1900 psia due to the shrink caused by the RCS cooldown. After the cooldown has stopped and backup heaters are energized the pressurizer pressure recovers. Pressurizer level drops, but stays above 20% for the short term as the single charging pump increases in speed. With the long term cooldown, however, pressurizer level does go below 20%. Pressurizer temperatures follow saturation, but the liquid space does go slightly subcooled on an insurge. Steam generator narrow range levels promptly shrink to less than 15%, causing AFW to actuate. After the initial steam generator pressure increase and with the AFW actuation, steam generator levels begin to recover.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth R. White	DATE: 10/26/90	[signature]	DATE: 11/28/90
James D. Harrison	DATE: 10/26/90	Richard A. [signature]	DATE: 11-28-90
	DATE:	[signature]	DATE: 11-28-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: MAIN STEAM LINE BREAK INSIDE CONTAINMENT

NUMBER: MSG-001

ANS 3.5 REFERENCE SECTIONS:
3.1.2(20) MAIN STEAM LINE AS WELL AS MAIN FEED LINE BREAKS (BOTH INSIDE AND OUTSIDE CONTAINMENT)
B2.2 (9) MAXIMUM SIZE UNISOLABLE MAIN STEAM LINE RUPTURE

DESCRIPTION

This steam line break transient will be compared to a best estimate analysis using the Turkey Point RETRAN model. As such the test is not intended to use the EOPs covering this type of transient. However, the operator action to turn off the RC pumps on low subcooling margin and isolation of AFW to the affected steam generator was programmed into the scenario. No other operator actions were taken during the course of the event, and several assumptions were made to make the Simulator and the RETRAN model consistent. Since the RETRAN model does not include charging and letdown models or accumulators, these paths were isolated in the Simulator. All other control systems were in automatic. Two tests were performed, the first with the RC pumps being turned off at the appropriate time, and a second with the RC pumps left operating throughout the transient. A steam line break equivalent to the area of the flow restrictor at the steam generator outlet is assumed to occur in the B steam line inside containment.

OPTIONS

The simulator is capable of simulating steam line breaks of any size at several locations inside containment.

INITIAL CONDITIONS

100% Power Steady State, BOL, Equilibrium Xenon

FINAL CONDITIONS

The transient is analyzed for approximately 10 minutes. The affected steam generator is completely depressurized, the primary system cooldown is very slow, and the upper head void has been collapsed.

APPROVED FOR USE

R E Dodson D   DATE: 1/19/99

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

James D Harrison   DATE: 1/19/90

__________ DATE: ______

__________ DATE: ______

MAIN STEAM LINE BREAK INSIDE CONTAINMENT: MSG-001

BASIS FOR EVALUATION

Best Estimate Analysis - The Simulator results will be compared to a Turkey Point RETRAN model.
Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The overall response and control room indications were as expected. The response of the affected loop cold leg in the original RETRAN 'pumps off' case showed a greater cooldown and different trend than the Simulator near the end of the cooldown period. Subsequent study of the Simulator did not identify problems that would indicate that the trend was anomalous. The test was again discussed with the SCRB and it was concluded that additional studies with RETRAN should be performed to attempt to pinpoint the basis for the differences. The subsequent RETRAN analyses have shown that amount of liquid left in the steam generator when the pumps are turned off at 100 seconds is the source of the difference. Two RETRAN runs, one that dried out the steam generator slightly before the pumps were turned off and a second that still had liquid in the steam generator when the pumps were turned off provided the required clue to the difference in trends. Both of the trends are equally physical depending on the extent of dryout at the time when the RC pumps are turned off. The dryout point depends on the initial steam generator mass and the amount of liquid carried out the break. Neither of the RETRAN runs in the test file represent a completely consistent comparison, but the differences are understood and demonstrate that the Simulator behavior is consistent with the physical processes occurring and are in the proper range.

The 'pumps on' case was performed as a sensitivity study to examine the general response and the ability of the Simulator pump models to handle this situation. Normal plant procedures prevent operation in this mode. The overall agreement between the Simulator and RETRAN models is good and the trends and magnitudes of the change are consistent with the physical processes occurring.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
James S. Harrison	*DATE:* 12/6/90	R E Dodson	*DATE:* 12/7/90
Robert J. Tinsley	*DATE:* 12/7/90	W H Johnson	*DATE:* 12/7/90
	DATE:	Leo Goeltz	*DATE:* 12-7-90

TITLE: MAIN STEAM LINE BREAK OUTSIDE CONTAINMENT

NUMBER: MSG-002

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (20) MAIN STEAM LINE AS WELL AS MAIN FEED LINE BREAK (BOTH INSIDE AND OUTSIDE CONTAINMENT)

DESCRIPTION

This test will simulate a main steam line break which is isolable and occurs outside the containment structure. Operator action will be taken to trip the reactor coolant pumps if the trip criteria of the emergency procedures is met. The simulator response will be analyzed to insure that applicable parameters trend in the correct direction, that the parameters do not obtain unreasonable values or violate the laws of nature.

OPTIONS

There are several locations in the main steam system outside containment at which a leak may be initiated. In addition, any leak is variable in size from very small to a full pipe rupture.

INITIAL CONDITIONS

100% power, MOL, steady state.

FINAL CONDITIONS

Plant stable at hot standby.

APPROVED FOR USE

R E Dodson III

SIMULATOR ENGINEERING COORDINATOR

DATE: 8/20/90

TEST TEAM

Robert J. Tindley DATE: 8/20/90

DATE: ____

DATE: ____

MAIN STEAM LINE BREAK OUTSIDE CONTAINMENT: MSG-002

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevent parameters will be evaluated.

DISCUSSION OF TEST RESULTS

For this test, a leak was initiated in the main steam header, outside containment. The leak initially caused increased steam flow, decreased steam generator pressures, falling reactor coolant system temperature and an increase reactor power due to the moderator temperature decrease. The decrease in RCS cold leg temperature caused an increase in reactor power, and led to a high flux trip. Shortly thereafter, within seconds, the OPdT trip setpoint was reached also. The reactor trip caused a turbine trip which momentarily caused an increase in main steam header and steam generator pressures. Shortly thereafter, however, RCS temperature reached the low setpoint which combined with the high steam flow out the break to give a safety injection signal. This signal also shut the main steam isolation valves, thereby terminating the accident as the remaining steam in the main steam header quickly bled out the leak. All parameters responded as expected and no deficiencies were noted.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Robert J. Stanley	DATE: 8/27/90	[signature]	DATE: 9/11/90
Kenneth D. White	DATE: 8/30/90	[signature]	DATE: 9/11/90
	DATE:	[signature]	DATE: 9-11-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: SIMULTANEOUS CLOSURE OF ALL MSIVs

NUMBER: MSG-003

ANS 3.5 REFERENCE SECTIONS: B2.2(3) SIMULTANEOUS CLOSURE OF ALL MSIVs

DESCRIPTION

This test examines the Simulator response to the simultaneous closure of all of the main steam line isolation valves. Two cases were studied: one with the control rods in automatic, and a second with the control rods in manual. Per ANS 3.5 Appendix B, no followup operator actions were taken.

OPTIONS

N/A

INITIAL CONDITIONS

100% power steady state, beginning of core life, equilibrium xenon

FINAL CONDITIONS

The transient is analyzed for approximately 15 minutes. By this time, the system is trending toward a hot shutdown condition. The lack of followup actions results in some fairly non-standard level conditions in the steam generators.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 5/13/90

TEST TEAM

DATE: 5/13/90

DATE: ~~5~~ 5/17/90

5-17-90 DATE:

SIMULTANEOUS CLOSURE OF ALL MSIVs: MSG-003

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The overall response and control room indications were as expected. The results were consistent with the physical processes involved.

With the control rods in manual, the reactor scrammed on overtemperature delta-T at approximately 20 seconds. The action of the atmospheric dumps and the safety valves reduced the pressure to a normal range and the post trip transient was typical.

However, with the control rods in automatic the rods began moving almost immediately and, although it was quite close, managed to keep the delta-T from touching the overtemperature delta-T setpoint. Since the reference temperature dropped to 547 degF very shortly after the MSIVs closed, the rods kept on driving until the average temperature went below setpoint. The shrink due to the secondary pressurization caused the feedwater controller to respond lethargically to the decreasing steam flow, thus filling the generators to the high level trip setpoint for the main feed pumps. This activated the AFW system which continued to cool and fill the system.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
James D. Harrison	DATE: 5/13/90	[signature]	DATE: 5/17/90
Kenneth R. White	DATE: 5/13/90	[signature]	DATE: 5/17/90
	DATE:	[signature]	DATE: 5/17/90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: TRANSMITTER FAILURE RESULTING IN MAXIMUM ATMOSPHERIC DUMP DEMAND

NUMBER: MSG-004

ANS 3.5 REFERENCE SECTIONS: 3.1.2(20) MAIN STEAM LINE AS WELL AS MAIN FEED LINE BREAKS (BOTH INSIDE AND OUTSIDE CONTAINMENT)
3.1.2(22) PROCESS INSTRUMENTATION, ALARM, AND CONTROL SYSTEM FAILURES

DESCRIPTION

This test examines the response of the simulator to a transmitter failure that results in a maximum demand to one of the atmospheric steam dump valves. The atmospheric dump valve opens fully and remains open for the duration of the transient. The dump flow rate is small relative to the total steam demand. Hence, it is a fairly mild transient and the system comes to a new steady state at the higher steam load without operator intervention. Two cases were examined, one at BOL and a second at EOL.

OPTIONS

The simulator is capable of simulating instrument, transmitter, and controller failures of different types and varying degrees for each of the atmospheric dump valves.

INITIAL CONDITIONS

Run 1: 100% power steady state, BOL, equilibrium xenon
Run 2: 100% power steady state, EOL, equilibrium xenon

FINAL CONDITIONS

The transient is analyzed for approximately 10 minutes. At that time the primary system has adjusted to the additional heat load and all system parameters are steady.

APPROVED FOR USE

[signature] DATE: 3/8/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 3/8/90

DATE: ________

DATE: ________

TRANSMITTER FAILURE RESULTING IN MAXIMUM ATMOSPHERIC DUMP DEMAND: MSG-004

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The overall response and control room indications were as expected. Because the atmospheric dump valve capacity is small relative to the full power steam load, the changes in system parameters is quite small. The additional steam demand caused by the stuck open valve on the A steam generator, results in a drop in pressure in the steam header and each steam generator. During the transient the primary average temperature decreases slightly and reactor power increases to provide the additional load. The difference in response for the BOL and EOL cases was consistent with expectations. The decrease in primary average temperature is slightly larger in BOL case.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
James S. Harrison	DATE: 3/8/90	[signature]	DATE: 3/21/90
Robert J. Ginsberg	DATE: 3/8/90	[signature]	DATE: 3-21-90
	DATE:	[signature]	DATE: 3-21-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: FAILURE OF REFERENCE TEMPERATURE TO STEAM DUMPS

NUMBER: MSG-005

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (22) Process Instrumentation, Alarms, and Control System Failures

DESCRIPTION

This test will check the response of the simulator to a loss of feed pump runback in which the turbine first stage impulse pressure channel which supplies the reference temperature circuit is failed low. This will keep the steam dumps open on the runback and will cause automatic rod insertion to bring average temperature down to 547 degrees. The test will run until the plant is stable at 547 degrees but is still on line at about 60% indicated power, the power which normally terminates a runback due to the loss of a main feed pump.

OPTIONS

Several methods for failing the reference channel are available. The actual failure method is not critical so long as the reference channel fails low. Also, several runback signals are available, any may be used.

INITIAL CONDITIONS

75% power, all systems in automatic.

FINAL CONDITIONS

Plant stable after the runback.

APPROVED FOR USE

R E Dodson [signature] DATE: 4/4/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. [signature] DATE: 4-5-90

Kenneth D. White DATE: 4/5/90

DATE:

FAILURE OF REFERENCE TEMPERATURE TO STEAM DUMPS: MSG-005

BASIS FOR EVALUATION

Expert evaluation of overall plant response and the response of selected parameters.

DISCUSSION OF TEST RESULTS

The simulator responded as expected. The trip of the feed pump caused the initiation of a runback which should stop at 60% power. The runback did stop at 60% power as based on channel 4 impulse pressure, but because channel 3 was failed low, the dumps stayed open and the rods continued to drive in to reduce average temperature to 547 degrees. As shown by the plots, this is what happened. Actual generator megawatts stabilized at a level well below 60% power since the reduction in average temperature caused an abnormally low steam pressure.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

Rudolf Sink DATE: 4-5-90

Kenneth W. White DATE: 4/5/90

DATE:

SIMULATOR CONFIGURATION REVIEW BOARD

Kay Howell DATE: 6/4/90

John B. Crockford DATE: 6/4/90

Leo Doiler DATE: 6-4-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: CLOSURE OF A SINGLE MSIV AT SEVERAL DIFFERENT POWER LEVELS

NUMBER: MSG-006

ANS 3.5 REFERENCE SECTIONS: 3.1.2(22) Process Instrumentation, Alarm, and Control System Failures

DESCRIPTION

This series of tests will examine the simulator's response to the closure at different power levels of one of the three main steam isolation valves (MSIV's). The tests will be run at 100%, 75, and 30% power. The test will be run at three different power levels in order to insure a good range of conditions for checking the simulator's dynamic response. The 75% and 30% power levels were chosen because they correspond to hold points during the power ascension and snapshots have been stored for these power levels. Several parameters will be monitored, recorded, and plotted in order to compare simulator results with expected plant results.

OPTIONS

Any or all of the three MSIV's can be failed closed by a variety of mechanisms. This test can be performed at any power level.

INITIAL CONDITIONS

100%, 75%, and 30% power.

FINAL CONDITIONS

Each test will run for 15 minutes after closure of the A MSIV.

APPROVED FOR USE

L E Dodson Jr DATE: 9/4/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth W. White DATE: 9/4/90

DATE: ______

DATE: ______

CLOSURE OF A SINGLE MSIV AT SEVERAL DIFFERENT POWER LEVELS: MSG-006

BASIS FOR EVALUATION

Expert examination. The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

All three runs went well with no noticeable incidents that would have a negative impact on training. The trends were analyzed and all seem reasonable and the control room indications and alarms were appropriate in all three tests. The first alarm in all cases was A feed flow > A steam flow, followed closely by numerous others. A S/G would shrink and B and C would swell, the magnitude of which depended on the starting power level. From 100% power the shrink resulted in a trip, and OTDT just barely missed also causing one. An automatic runback was initiated on this run also, but the effects were minimal and it could not prevent a trip. A S/G pressure was limited by the actuation of the appropriate atmospheric dump and steam line safety valves. At 100% power these valves opened before the trip and shut shortly thereafter. At 75% these valves opened and stayed open. At 30% only the atmospheric dump valve opened. The FRV's were in automatic in all cases and before the end of the 75% and 30% runs, main feedwater flow was balanced with steam flow in order to maintain steam generator levels on program. In the 100% run AFW actuated after the reactor tripped. In the two higher power runs pressurizer spray actuated to limit the pressure increase. In the 30% run the pressure increase was not enough to cause spray to actuate. After the plant tripped from 100% power and the RCS delta T's approached a minimal value, the conditions in all three loops were approximately equal. In the 30% run and, especially, in the 75% run, the delta T's changed drastically and A loop differed significantly from B and C loops. All differences were analyzed and were appropriate.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

In the 30% run, when feedwater flow was resumed to A S/G after having been isolated for about 10 minutes, the feedwater temperature dropped about 20F instead of increasing to B and C feedwater temperatures. A DR will be submitted against this.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

Kenneth D. White DATE: 9/7/90

James J. Harrison DATE: 9/26/90

DATE:

SIMULATOR CONFIGURATION REVIEW BOARD

[illegible] DATE: 10/11/90

Richard L. McNeely DATE: 10-11-90

[illegible] DATE: 10-11-90

TITLE: BUS STRIPPING AND LOAD SEQUENCING TESTS

NUMBER: MSP-001

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (3) Loss or Degraded Power to the Station

DESCRIPTION

The bus stripping and load sequencing tests are designed to verify proper operation of the undervoltage bus stripping circuits, bus clearing relays, and the load sequencer. The test will check for proper load handling, time delays, and operation under failure of the power supply circuits.

OPTIONS

There is an infinite number of combinations of time delays and failures which could be run to check this system. The fifteen different cases will be run in order to provide a variety of data points for this test.

INITIAL CONDITIONS

Hot Standby, any time in life, normal electric plant lineup with all normal loads running.

FINAL CONDITIONS

Each test will be run for approximately 2-2 1/2 minutes to allow time for the sequencers to time out.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 8/19/90

TEST TEAM

Robert J. Simberg DATE: 8/19/90

DATE: ______

DATE: ______

BUS STRIPPING AND LOAD SEQUENCING TESTS: MSP-001

BASIS FOR EVALUATION

The results of each run will be compared with the plant drawings to verify that the loads tripped and started as designed.

DISCUSSION OF TEST RESULTS

The test proved very successful with only 3 problems showing up in the final runs. Fifteen different cases were run to test the load sequencing and bus stripping circuits with only three deficiencies being generated. One of these deficiencies was not related to the sequencer or the bus stripping circuits.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Breakers 30107 (Pressurizer backup heaters) and 30312 (Turbine auxiliary lube oil pump) failed to trip and lockout on the loss of power events as they should. The containment spray pumps started, but then tripped on overcurrent, then restarted and kept running on the loss of coolant combined with a loss of offsite power scenarios. Deficiency reports have been written on these three problems.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Dinsley	DATE: 9-1-90	[illegible signature]	DATE: 9/11/90
Kenneth D. White	DATE: 9/2/90	John E. Rockford	DATE: 9/11/90
	DATE:	[illegible signature]	DATE: ~~9-10-9~~ 9-11-90

TITLE: SMALL LEAK IN SAFETY INJECTION PIPING OUTSIDE CONTAINMENT

NUMBER: MSS-001

ANS 3.5 REFERENCE SECTIONS:
3.1.2(1)(b) Loss of Coolant Outside Primary Containment
3.1.2(23) Passive Malfunctions in Engineered Safety Features System

DESCRIPTION

The purpose of this test to verify proper simulator modelling with a leak on the safety injection system outside of the containment building. This test will consist of two runs. In the first run a leak will be instated on the reactor coolant system, causing a safety injection. The leak will cause part of the SI flow to go the auxiliary building sump. This malfunction will be camouflaged by the other actions and alarms inherent with an SI. This test will run for twenty minutes. In the second run two check valves will leakby, allowing flow from the RCS to the auxiliary building sump as soon as the leak is placed on the SI piping. 3-ONOP-041.3, Excessive Reactor Coolant System Leakage, will be used to isolate the leak and stabilize the simulator. Several parameters will be monitored and recorded in order to compare the simulator results with expected plant results.

OPTIONS

The safety injection piping leak size is variable and so is the amount of check valve leakage. Leaks can be placed on the safety injection piping in several locations.

INITIAL CONDITIONS

100% power.

FINAL CONDITIONS

RUN 1: This test will run for twenty minutes, fifteen of which will be after the RCS break has been put in place.

RUN 2: The leak has been isolated and the simulator has been stabilized.

APPROVED FOR USE

R E Dodson [signature] DATE: 6/25/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth W. White [signature] DATE: 6/25/90

______________________ DATE: ________

______________________ DATE: ________

SMALL LEAK IN SAFETY INJECTION PIPING OUTSIDE CONTAINMENT: MSS-001

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The first run went well. Approximately 180 gpm of SI flow went to the auxiliary building basement, but due to other alarms and the break location, there was no indication in the control room of the leak. It would be some time before the loss of SI mass showed up. The second run also went well. Indications, alarms, and interactions were as expected. Pressurizer level and pressure fell rapidly. A second charging pump was started, letdown isolated, and a third pump started to slow the pressurizer level decrease. The VCT level also fell rapidly, a makeup was started and flowrates to the VCT were doubled to keep VCT level up. This only slowed the rate of decrease and the charging pump suction swapped to the RWST. This resulted in the injection of borated water into the RCS, which caused a drop in TAV. The leak was isolated after the pressurizer level dropped below 30%. The pressurizer started refilling, a charging pump was stopped and letdown returned to service. The VCT level recovered and charging pump suction returned to the VCT. Boron flow rate to the VCT was reduced to almost zero, resulting in TAV being less than 1 degree below setpoint at the end of the scenario. With pressurizer level almost at setpoint a second charging pump was stopped. At the end of the simulation pressurizer level was increasing only slightly and all other parameters returned to normal. The pressurizer level increase caused a pressure increase, actuating spray. The pressure was decreasing slightly at the end of the scenario and was under control. Manual valve 868A had to be shut, isolating one train of safety injection. But it enabled the operators to place the plant in a stable condition.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

There were not any auxiliary building area monitor alarms or plant process monitor alarms during run 2.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM

Kenneth D. White DATE: 6/25/90

Robert J. Sinzbeig DATE: 7/6/90

DATE:

SIMULATOR CONFIGURATION REVIEW BOARD

R E Dodson DATE: 8/15/90

Richard J Manke DATE: 8-15-90

Leo Goebel DATE: 8-15-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: ***ACCUMULATOR OPERATIONS AND MALFUNCTIONS***

NUMBER: ***MSS-002***

ANS 3.5 REFERENCE SECTIONS: ***3.1.2(23) Passive Malfunctions in Engineered Safety Features Systems***

DESCRIPTION

This test will consist of two runs. In the first run the plant will be in cold shutdown with the pressurizer drained. In the second run the plant will be at operating temperature and pressure. In the first run the normal operating procedure 3-OP-064, Safety Injection Accumulators, will be used for various routine operations on C accumulator. It will be manually drained to below the alarm setpoints for low pressure and low level, then filled to above the high pressure and high level alarm setpoints, then vented to below the low pressure alarm setpoint and drained to clear the high level alarm. Then nitrogen will be added to clear the low pressure alarm. Finally, all three accumulator outlet valves will be manually opened. The second run will be scenario driven. The check valve for C safety injection accumulator outlet will be given a small leakby failure, then five minutes later the downstream check valve for the RHR/accumulator interface with the RCS will be given a leakby failure, also. Several parameters will be monitored and recorded in order to compare simulator results with expected results.

OPTIONS

The safety injection accumulators are fully modelled and the routine operations can be performed on any or all of them. The check valve out of either safety injection accumulator can be failed and the size of the leak is variable. The same holds for the check valves into the RCS.

INITIAL CONDITIONS

Run 1: Cold shutdown with a drained pressurizer.

Run 2: 100% power, normal operating temperature and pressure.

FINAL CONDITIONS

Run 1: This test will end 10 minutes after the accumulator outlet valves have been opened.

Run 2: This test will run for 10 minutes.

APPROVED FOR USE

[signature] DATE: 4/9/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth W. White DATE: 4/9/90

RQ Nimby DATE: 4/9/90

DATE:

ACCUMULATOR OPERATIONS AND MALFUNCTIONS: MSS-002

BASIS FOR EVALUATION

Expert examination.

DISCUSSION OF TEST RESULTS

The first run went well. The procedure 3-OP-064 worked on the simulator, the accumulator level and pressure responded properly to changes and the associated alarms came in at the proper setpoints. As C accumulator was drained, its pressure also came down. When it was filled, the pressure went up. Venting the accumulator dropped the pressure. Adding nitrogen raised the pressure. When the accumulator outlet valves were opened all three levels and pressures dropped, counts decreased, and the RCS temperatures decreased slightly and held steady. LI-6421 and pressurizer level went to 100%. The RCS pressure equalized with accumulator pressure around 200 psig and then both steadily decreased to atmospheric pressure due to the vent solenoids being lined up to containment atmosphere. The second run did not go quite as well. With the first check valve failure the C accumulator level and pressure increased. There was no flowpath into the accumulator at this point and level and pressure should have held steady. With the second check valve failure the pressurizer pressure and level started decreasing. This was rapid enough to cause a plant trip and eventually an SI. The A and B accumulator levels did not increase during either check valve failure, but the pressures did. The A and B pressures started a .5 pound oscillation about 2 minutes into Run 2, increased about 1 pound after the second check valve failure, dropped back to the original values, then started a slow, steady increase. By the end of the test they were about 1.5 pounds higher than at the start of the test. This phenomena was due the leakage from C accumulator heating up the containment, which in turned heated A and B accumulators, causing their pressures to increase.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The C accumulator level increased with only one check valve failure.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth R. White	DATE: 4/9/90	R. E. [illegible]	DATE: 6/6/90
[illegible]	DATE: 4/10/90	[illegible]	DATE: ~~6/9/90~~ 6/6/90
	DATE:	Leo [illegible]	DATE: 6-6-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF RHR WHILE IN COLD SHUTDOWN

NUMBER: MSS-003

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (7) Loss of Shutdown Cooling

DESCRIPTION

This test will simulate a loss of RHR cooling by tripping both RHR pumps with the plant in cold shutdown and partially drained. The case of CCW isolation to the RHR heat exchangers will be checked in the test of loss of CCW.

OPTIONS

Various options exist in the simulator to cause the RHR pumps to trip. The actual method used is irrelevant in this test.

INITIAL CONDITIONS

CSD, 149 F, plant in partial drain.

FINAL CONDITIONS

Core at saturation conditions at near atmospheric pressure.

APPROVED FOR USE

R. I. Dodson

SIMULATOR ENGINEERING COORDINATOR

DATE: 4/8/90

TEST TEAM

Robert J. Sirody DATE: 4-8-90

Kenneth D. White DATE: 4/8/90

DATE:

LOSS OF SHUTDOWN COOLING: MSS-003

BASIS FOR EVALUATION

Expert evaluation of plant response to the loss of shutdown cooling condition.

DISCUSSION OF TEST RESULTS

The test was initiated by tripping both RHR pumps while the plant was in cold shutdown and partial drain. This caused the core temperatures to begin rising immediately at a steady rate. Over the first 60 minutes, the core exit rose from 150 degrees to 200 degrees. The rise in temperature cause the RCS to expand and this was indicated in the reactor vessel plenum and on the RCS draindown level indicator. There expansion caused a minor effect on reactor vessel pressure, but the vents were open and the vessel stayed at near atmospheric. Despite the two small problems with subcooling and core exit temperatures noted below, the test went satisfactorily and the scenario could be used for training on loss of RHR events.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Two problems were noted. First, the subcooling monitor registered zero subcooling while the core exit thermocouple was still at just 175 degrees. At atmospheric pressure, it should not be at zero subcooling until about 212 degrees. Second, the core exit thermocouple registered a temperature much greater than 212 degrees. With the unit at atmospheric pressure, temperature should not exceed 212 degrees. Discrepancies have been written to identify these problems.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Robert J. Sinele	DATE: 9-11-90	Karl Hoadl	DATE: 6/4/90
Kenneth D. White	DATE: 4/11/90	John Brockford	DATE: 6/4/90
	DATE:	Leo Goebel	DATE: 6-4-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: LOSS OF INVENTORY DURING A SHUTDOWN AND PARTIAL DRAINDOWN CONDITION

NUMBER: MSS-004

ANS 3.5 REFERENCE SECTIONS: 3.1.2(7) Loss of Shutdown Cooling

DESCRIPTION

This test will be performed with the reactor coolant system on residual heat removal cooling and in a partially drained condition. The RHR to letdown control valve, HCV-145, and letdown pressure control valve, PCV-145, will both be failed open. Flow will be thereby be diverted from RHR to the waste holdup tanks. This will have the effect of reducing RCS inventory with the plant already in a drained condition. The letdown pressure and flow indicators along with draindown level indication will be failed as is, providing no apparent indication inside the control room that inventory is being lost. After RCS level has dropped sufficiently to cause the RHR pumps to cavitate or bring in the low RHR flow alarm, off normal operating procedures 3-ONOP-050, Loss of RHR, and ONOP-3208.1, Malfunction of Residual Heat Removal System, will be entered to recover from this incident. Basically, the RHR pumps will be stopped, core exit temperatures will be monitored, charging will be used to recover the lost RCS inventory, and an RHR pump will be restarted.

OPTIONS

Besides being failed open, HCV-142 and PCV-145 can be given a variable leakby signal.

INITIAL CONDITIONS

RHR is in service and the RCS is partially drained.

FINAL CONDITIONS

This test will run until inventory has been restored sufficiently to allow restarting an RHR pump and RCS temperatures have been stabilized.

APPROVED FOR USE

[signature] DATE: 12/1/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 12/1/90

DATE: ______

DATE: ______

LOSS OF INVENTORY DURING A SHUTDOWN AND PARTIAL DRAINDOWN CONDITION: MSS-004

BASIS FOR EVALUATION

Expert examination. The control room alarms, indications, and interactions will be monitored and several parameters will be recorded in order to compare simulator responses with expected responses.

DISCUSSION OF TEST RESULTS

The plant responses were appropriate for this scenario. When RCS level dropped below nozzle level, RHR flow was lost and A RHR pump amps dropped appreciably. RCS and core temperatures started to rise, but dropped when charging put more mass into the system. Plenum level, draindown level, and RCS mass all go down until charging is placed in service. When charging was stopped, level dropped until the RHR to letdown control valve was shut. After level was restored, RCS and core temperatures responded to changes in RHR cooler flow. The plant procedures worked on the simulator to recover from this scenario.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Kenneth W. White	DATE: 12/3/90	L E Dodson	DATE: 12/5/90
James D. Harrison	DATE: 12/4/90	Hugh Johnson	DATE: 12/5/90
	DATE:	Leo Goebel	DATE: 12-5-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: TURBINE TRIP WHICH DOES NOT CAUSE REACTOR TRIP

NUMBER: MTU-001

ANS 3.5 REFERENCE SECTIONS: 3.1.2(15) Turbine Trip
Appendix B2.2(6) Turbine Trip (maximum power level which does not result in immediate reactor trip)

DESCRIPTION

This test will involve a turbine trip from 35% power with the reactor trip by turbine trip blocked to that the reactor does not trip. This will test the ability of the steam dumps and rods to handle a load rejection transient. In the actual plant configuration, any turbine trip above 10% power will cause a reactor trip, but in order to gather as much meaningful information as possible, this test will be run from a power level just below that which the steam dumps and rod control system could handle. Two cases will be run. In the first case, rods will be left in manual so that the reactor should stabilize near its power level. In the second case, the rods will be in automatic and should bring reactor power down to near zero percent.

OPTIONS

For the loop variable monitoring requirements, any loop of the 3 may be recorded, but the same loop must be used for all the variables. The turbine trip can be caused by many different means, the simplest of which is to press the turbine trip buttons.

INITIAL CONDITIONS

Reactor at 35% power, MOL

FINAL CONDITIONS

Run 1: Plant stable with turbine off line and power at 35%.
Run 2: Plant stable with the turbine off the line and the reactor at or near zero power

APPROVED FOR USE

[signature] DATE: 3/11/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Sinclair DATE: 3/11/90
Kenneth D. White DATE: 3/11/90
__________ DATE: ______

TURBINE TRIP WHICH DOES NOT CAUSE AUTOMATIC REACTOR TRIP: MTU-001

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevent parameters will be evaluated.

DISCUSSION OF TEST RESULTS

RUN 1: ROD CONTROL IN MANUAL

In this run, the total transient was controlled by the action of the condenser steam dumps. When the turbine is initially tripped, there is a rapid decrease in steam flow and a corresponding rise in cold leg temperature. The turbine trip signal also sends a signal to the condenser dumps which causes them all to trip fully open. The combined effect is a small decrease in reactor power for the first twenty seconds of the transient, then a slow return to a power level near the initial value. Since there is no rod motion to decrease average temperature, the final RCS temperatures are slightly higher than the initial. This leads to a slightly higher steam pressure with a corresponding lower final steam flow. But the overall effect is that reactor power steadies out near its initial value as would be expected. Pressurizer level and pressure follow the changes in coolant temperature as would be expected.

RUN 2: ROD CONTROL IN AUTOMATIC

In this run, the combined action of rods and dumps acted as expected to bring the reactor to a zero power condition after the turbine was tripped. As soon as the turbine is tripped, the rods begin driving in and the steam dumps open in order to reduce average temperature. The net effect is a controlled reduction of power, temperature and steam flow over the next 10 minutes to hot standby conditions.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

Appendix B to ANS-3.5 requires that a test be run where the turbine is tripped from the maximum power level which does not cause an automatic reactor trip. At Turkey Point, this power level is 10%. A turbine trip from 10% power level would be an extremely small transient and would provide very little certification data. Therefore, this test is being run from a power level just below that for which rod control and steam dumps are designed to provide a controlled stabilization of the plant.

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
Robert A. Sinby	***DATE:*** 3/13/90	[signature]	***DATE:*** 6/13/90
Kenneth W. White	***DATE:*** 3/29/90	[signature]	***DATE:*** 6-13-90
	DATE:	[signature]	***DATE:*** 6-13-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: TURBINE TRIP FROM 100% POWER

NUMBER: MTU-002

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (15) Turbine Trip

DESCRIPTION

This test will consist of a manual trip of the turbine from 100% power. Data will be collected per ANSI-3.5.

OPTIONS

Several different means of tripping the turbine are available in the simulator. The simplest is to press the trip button from the console. The turbine trip should be performed with as little other system pertubations as possible.

INITIAL CONDITIONS

100% power, MOL, steady state.

FINAL CONDITIONS

Plant steady state at hot standby.

APPROVED FOR USE

[signature] DATE: 3/11/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

[signature] DATE: 3 11-90

[signature] DATE: 3/11/90

DATE:

TURBINE TRIP FROM 100% POWER: MTU-002

BASIS FOR EVALUATION

Expert evaluation of overall plant response and the response of specific parameters.

DISCUSSION OF TEST RESULTS

The plant trip initiated by the turbine trip went as expected. Reactor power, temperature and pressure all responded as expected and no deficiencies were noted. All control systems acted as expected to bring the unit to hot standby.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

Since the manual turbine trip will instantly generate a reactor trip from 100% power, this test will be used to satisfy the requirements of Appendix B section 2.2(1) for the reactor trip from 100% power.

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Robert J. Sinly	DATE: 3-13-90	R. E. Dodson	DATE: 6/13/90
Kenneth D. White	DATE: 3/13/90	[illegible]	DATE: 6-13-90
	DATE:	[illegible]	DATE: 6-13-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: TURBINE LUBE OIL SYSTEM (BEARINGS)

NUMBER: MTU-003

ANS 3.5 REFERENCE SECTIONS: 3.1.1 Normal Plant Evolutions
3.1.2 Plant Malfunctions

DESCRIPTION

This test is designed to exercise the normal controls for that portion of the turbine lube oil system which supplies the main turbine and generator bearings. In addition, this test will exercise some of the available malfunctions for the system to insure proper simulator modelling. In one run the control valve for TPCW from the lube oil coolers (CV-2200) will be adjusted to two different positions to verify the effect that this has on turbine bearing drain temperatures. In another run the main oil pump shaft will be sheared with the auxiliary oil pump (AOP) running and the turbine generator will be verified not to trip. The AOP will then be stopped and the turning gear oil pump (TGOP) will be verified to start at 10 psig bearing oil header and the emergency oil pump (EOP) will be verified to start at 8 psig. Finally, the oil cooler inlet valve will be ramped shut and simulator response will be verified. Several parameters will be monitored and recorded in order to compare simulator responses to expected responses.

OPTIONS

CV-2200 is fully adjustable and can be put at any position. The oil cooler inlet or outlet valve could be used to isolate oil to the bearing oil header and both are also fully adjustable. Although not used in this test, the main oil reservoir could be drained to get a response similar to closing the cooler isolation valves.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

RUN 1: This test will run for 10 minutes after CV-2200 is shut.

RUN 2: This test will run for 10 minutes after the lube oil cooler inlet valve has been fully shut.

APPROVED FOR USE

[signature] DATE: 5/17/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth H. W [signature] DATE: 5/17/90

_______________ DATE: ________

_______________ DATE: ________

TURBINE LUBE OIL SYSTEM (BEARINGS): MTU-003

BASIS FOR EVALUATION

Expert examination. The control room alarms, indications, and interactions will be monitored and several parameters will be recorded in order to compare simulator responses with expected responses.

DISCUSSION OF TEST RESULTS

RUN 1: ADJUSTMENT OF CV-2200. In this run all control room indications were as expected. The first change to CV-2200 opened it further than it had been. Bearing drain temperatures decreased slightly. The second change to CV-2200 shut the valve. Quite shortly thereafter alarms E/2/2, turbine bearing high temp, and E/4/3, turbine lube oil high temp, came in. Recorder R-3-340, turbine lube oil temperatures, and R-3-345, turbine thrust bearing temperature indicated a steady increase in temperature. There was an immediate increase of temperature out of the lube oil cooler of about 10F, followed by a slow, steady climb.

RUN 2: TEST OF LUBE OIL PUMPS. When the MOP shaft was sheared the turbine stayed on the line, but there was a sudden, slight drop in hydraulic oil pressure. This perturbation was enough to cause arming of the steam dumps. When the AOP was tripped the TGOP and the EOP did start at the proper pressures. When the cooler inlet valve was shut the bearing drain temperatures experienced an immediate temperature increase of about 200F then showed a gradual decrease back towards their original values. This seems proper. Turbine vibrations were not effected by a loss of oil pressure.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

Turbine vibrations were not effected by a loss of oil pressure. A DR has been submitted against this.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
Kenneth D. White	DATE: 5/18/90	[illegible]	DATE: 6/6/90
Robert J. Sibley	DATE: 6/3/90	[illegible]	DATE: 6/6/90
	DATE:	[illegible]	DATE: 6-6-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: *TURBINE GLAND SEAL SYSTEM*

NUMBER: *MTU-004*

ANS 3.5 REFERENCE SECTIONS: *3.1.1 Normal Plant Evolutions*
3.1.2 Plant Malfunctions

DESCRIPTION

This test will verify the simulator's modelling of the system used to prevent steam from leaking out of the turbine glands and air from leaking into the turbines. The test will consist of a normal control test which will check proper operation of the system control valves, followed by a transient test which will fail portions of the system to insure proper simulator response. The simulator will be initialized at a low power level and power will be increased. The spillover valve will come open at 4 psig in the gland seal header. Each gland exhaust fan will be turned off from the control room floor to verify proper control room annunciation and the gland exhaust condenser receiver drain pump will be turned off from the instructor's facility and proper annunciation will again be verified when the receiver level increases to the alarm point. The auxiliary steam supply to the gland steam system will be shut to verify that the turbines are self-sealing.

OPTIONS

None

INITIAL CONDITIONS

The simulator is stable at 19% power. Gland sealing steam is being provided by auxiliary steam.

FINAL CONDITIONS

The simulator is at a higher power level with gland steam being provided by the high pressure turbine and the spillover valve is open or the simulator has been brough to 100% power. The gland exhaust fans and the gland exhaust condenser receiver drain pump have been tested.

APPROVED FOR USE

______________________ DATE: 5/17/90
SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

______________________ DATE: 5/17/90

______________________ DATE: __________

______________________ DATE: __________

TURBINE GLAND SEAL SYSTEM: MTU-004

BASIS FOR EVALUATION

Expert examination. The control room alarms, indications, and interactions will be monitored and several parameters will be recorded in order to compare simulator responses with expected responses.

DISCUSSION OF TEST RESULTS

When a gland exhauster is stopped the control room annunciation is correct. The drain pump, drain tank, and associated alarm worked properly. With the pump running at the end of the test the high level alarm had not cleared, but level was trending down. The turbines do not become self-sealing, even at 100% power. When the auxiliary steam isolation to gland sealing steam was shut the gland seal header pressure dropped to a slight vacuum.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

The turbines do not become self-sealing, even at 100% power. When the auxiliary steam isolation to gland sealing steam was shut the gland seal header pressure dropped to a slight vacuum. A DR has been written against this.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
Kenneth D. White	*DATE:* 5/18/90	[signature]	*DATE:* 6/6/90
Robert J. Tinsley	*DATE:* 6/2/90	John Buckford	*DATE:* 6/6/90
	DATE:	Leo Goldorf	*DATE:* 6-6-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: TURBINE TURNING GEAR OPERATION

NUMBER: MTU-005

ANS 3.5 REFERENCE SECTIONS: 3.1.1 Normal Plant Evolutions
3.1.2 Plant Malfunctions

DESCRIPTION

In this test the turbine will be tripped from 1800 rpm and the proper operation of the turning gear, turning gear oil pump, auxiliary oil pump, bearing lift oil pump, and system interlocks and setpoints will be verified. With turbine speed at 500 rpm the auxiliary oil pump will be stopped and the turning gear oil pump will auto start. The turning gear will auto engage and start after the turbine reaches zero speed. The turning gear oil pump will be stopped, causing the bearing oil lift pump and the turning gear to auto stop. The emergency oil pump will auto start and the lift pump and turning gear will restart. The bearing lift oil pump will then be stopped and the turning gear will again stop. The bearing lift oil pump will be restarted and the turning gear will also restart. During all of this the turning gear will remain engaged.

OPTIONS

This test could be conducted from any power level with the turbine at 1800 rpm; i.e., synchronized to the grid.

INITIAL CONDITIONS

100% power, turbine speed is 1800 rpm.

FINAL CONDITIONS

The turbine is on the turning gear.

APPROVED FOR USE

[signature] DATE: 5/23/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Kenneth W. White DATE: 5/23/90

DATE: ______

DATE: ______

TURBINE TURNING GEAR OPERATION: MTU-005

BASIS FOR EVALUATION

Expert examination. The control room alarms, indications, and interactions will be monitored and several parameters will be recorded in order to compare simulator responses with expected responses.

DISCUSSION OF TEST RESULTS

During the turbine coastdown the BOLP started at 600 rpm and the AOP started slightly later when oil pressure dropped to 12 psig. When the AOP was stopped the TGOP started at 10 psig to maintain header pressure. When the TGOP was stopped the BOLP stopped, the TG stopped but remained engaged, the EOP started, the BOLP then restarted when pressure had built back to 9 psig and then the TG restarted. The TG did not restart immediately, but waited a few seconds until the BOLP had increased its discharge to above 800 psig. The TG stopped when the BOLP was tripped and remained idle until after the BOLP was restarted and again repressurized its header.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		***SIMULATOR CONFIGURATION REVIEW BOARD***	
Kenneth A. White	DATE: 5/30/90	[signature]	DATE: 6/6/90
Robert J. Sinberg	DATE: 6/7/90	John Crockford	DATE: 6/6/90
	DATE:	Leo Joiboy	DATE: 6-6-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: HYDROGEN SEAL OIL

NUMBER: MTU-006

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (22) PROCESS INSTRUMENTATION, ALARMS, CONTROLS, AND CONTROL SYSTEM FAILURES

DESCRIPTION

This test will exercise various malfunctions in the hydrogen seal oil system. Proper system response to the malfunctions will be verified. Malfunctions will be run on the both the air side and the hydrogen side of the system.

OPTIONS

Various malfunctions are available in the simulator. Only a sample will be tested with this test.

INITIAL CONDITIONS

100% power, steady state

FINAL CONDITIONS

Each run will be allowed to continue for 5 to 10 minutes in order for the test team to verify system response.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 6/1/90

TEST TEAM

DATE: 6-5-90

DATE: ______

DATE: ______

HYDROGEN SEAL OIL: MTU-006

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevent parameters will be evaluated.

DISCUSSION OF TEST RESULTS

RUN 1: FAILURE OF AIR SIDE SEAL OIL PUMP, AIR SIDE BACKUP PUMP AND BACKUP REGULATOR
In the first part of this run, the air side seal oil pump was tripped. When this happened, the backup regulator momentarily opened to supply air side seal oil from the turbine lube oil system while the backup pump was starting. When the backup pump began supplying sufficient oil to the air side seal oil lines, the backup regulator closed. Next, the backup air side pump was tripped. When this happened, the backup regulator opened to supply the air side as expected. No deficiencies were noted.

RUN 2: FAILURE OF V-217, V-210, AND HYDROGEN SIDE SEAL OIL PUMP
All portions of this run went satisfactorily. Valves V-217 and V-210, the hydrogen side differential pressure regulators, were alternately failed open and closed. The system responded correctly to the valve failures with the other pressure regulating valves responding in the correct directions and the drain regulator and loop seal tanks' levels changing accordingly. The hydrogen seal oil pump was tripped and again, the pressure regulating valves and system tanks responded as expected.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J Sinbe	DATE: 6.5.90	R C Dodson	DATE: 7/18/90
Kenneth D White	DATE: 6/5/90	Richard L Wende	DATE: 7-16-90
	DATE:	Leo Göebel	DATE: 7-16-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: HYDROGEN COOLING

NUMBER: MTU-008

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (22) PROCESS INSTRUMENTATION, ALARMS, AND CONTROL SYSTEM FAILURES

DESCRIPTION

This test will exercise two representative malfunctions in the hydrogen cooling system and will verify proper simulator response to the malfunctions.

OPTIONS

Various malfunctions are available in the hydrogen cooling system. Representative malfunctions which exercise the system should be chosen.

INITIAL CONDITIONS

100% power, steady state

FINAL CONDITIONS

Each run will proceed until the test team can verify that proper response has occurred.

APPROVED FOR USE

[signature] DATE: 6/1/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert J. Sively DATE: 6-11-90

DATE:

DATE:

HYDROGEN COOLING: MTU-008

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevent parameters will be evaluated.

DISCUSSION OF TEST RESULTS

In the first part of the test, one of the generator RTDs was failed HI. This caused the generator hi temperature and generator RTD recommend trip annunciators to alarm as expected. In the second part of the test, a leak from the turbine plant cooling system to the generator was created in one of the generator hydrogen coolers. This malfunction caused the simulator variables for generator liquid level and generator liquid level detectors to show increasing level and mass, but no alarm was received in the control room. A DR has been written on the lack of alarms in the control room.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

A deficiency report was written on the failure of the alarm to annunciate on the high generator liquid level.

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Sinley	DATE: 6-11-90	J. E. Dodson III	DATE: 7/16/90
Kenneth D. White	DATE: 6/11/90	Richard L. Mende	DATE: 7-16-90
	DATE:	Lee Tirlund	DATE: 7-16-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: TURBINE LUBE OIL CONTROL AND AUTO-STOP OIL

NUMBER: MTU-009

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (22) PROCESS INSTRUMENTATION, ALARMS, AND CONTROL SYSTEM FAILURES

DESCRIPTION

This test will exercise various malfunctions in the turbine control oil and auto-stop oil sytems. Normal operation of these systems are thoroughly checked in other certification tests such as plant startup and shutdown.

OPTIONS

Various malfunctions are available for these systems. Several representative malfunctions will be chosen to exercise the system failures.

INITIAL CONDITIONS

Any power level with the turbine on line.

FINAL CONDITIONS

Hot standby.

APPROVED FOR USE

[signature]
SIMULATOR ENGINEERING COORDINATOR

DATE: 6/1/90

TEST TEAM

[signature] DATE: 6-11-90

DATE: ______

DATE: ______

TURBINE LUBE OIL CONTROL AND AUTO-STOP OIL: MTU-009

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevent parameters will be evaluated.

DISCUSSION OF TEST RESULTS

Overall, this test went as planned with no deficiencies noted. The failures to fail the #2 stop valve 'as is' worked as the valve did not close on turbine trip. The failure of all manual and automatic trips of the turbine worked to keep the turbine from tripping on low vacuum and by the manual pushbutton. When the manual trip pushbutton was pushed, however, the turbine did runback as the pushbutton also causes the turbine overspeed protection control valve OPC-20 to open. The failure of OPC-20 open caused a runback to 600 megawatts as planned. When the failure of all trips was removed, the turbine tripped as planned on low vacuum. Lastly, the bearing failure malfunction worked to rapidly cause increasing vibrations and oil outlet temperature at the failed bearing.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		*SIMULATOR CONFIGURATION REVIEW BOARD*	
[illegible]	DATE: 6-11-90	[illegible]	DATE: 8/15/90
Kenneth D. White	DATE: 6/11/90	[illegible]	DATE: 8-15-90
	DATE:	[illegible]	DATE: 8-15-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: TURBINE LUBE OIL PUMP AND MOTOR

NUMBER: MTU-010

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (22) PROCESS INSTRUMENTATION, ALARMS, AND CONTROL SYSTEM FAILURES

DESCRIPTION

This test will place various malfunctions on the feed pump lube oil system to insure that it properly responds. The low oil pressure trips, interlocks, and auto-start will be checked as well as the thermodynamic response of the system to a loss of cooling and to a leak.

OPTIONS

None

INITIAL CONDITIONS

Hot Standby, 1 main feed pump running.

FINAL CONDITIONS

The run will be terminated after the test team has seen the desired system response.

APPROVED FOR USE

R E [signature] DATE: 6/1/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

Robert [signature] DATE: 6-11-90

DATE:

DATE:

TURBINE LUBE OIL PUMP AND MOTOR: MTU-010

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevent parameters will be evaluated.

DISCUSSION OF TEST RESULTS

This test ran as planned with no deficiencies. A failed open relief valve, coupled with failure of the auxiliary oil pump, caused the 'A' Steam Generator Feed Pump to trip on low oil pressure. The 'A' SGF pump trip caused the 'B' pump to automatically start. The tube fouling on the 'B' SGF pump oil cooler caused the oil temperatures to rise rapidly. When the tube fouling malfunction was cleared, the temperatures returned to normal. The lube oil leak on the 'B' pump caused it to trip on low oil pressure. The 'A' pump then auto started when the malfunctions on it were cleared and its control switch was cycled from auto to off and back to auto.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
Robert J. Sinkling	DATE: 6-11-90	L E Dodson II	DATE: 7/16/90
Kenneth D. White	DATE: 6/11/90	Richard L. Woods	DATE: 7-16-90
	DATE:	Fred Goebel	DATE: 7-16-90

TURKEY POINT SIMULATOR CERTIFICATION TEST PROCEDURE

TITLE: FAILURE OF TURBINE CONTROL VALVE SPRING

NUMBER: MTU-011

ANS 3.5 REFERENCE SECTIONS: 3.1.2 (22) PROCESS INSTRUMENTATION, ALARMS, AND CONTROL SYSTEM FAILURES

DESCRIPTION

This test will simulate the failure of a turbine control valve spring. This failure will cause the valve to remain open when the turbine is ramped off the line and will make it difficult to bring the unit off line. Since the actual springs are not modelled in the simulator, the effects on the valve of spring failure will be simulated by failing the valve full open at 100% power. The turbine will then be ramped down in order to see the failure's effects.

OPTIONS

Any of the control valves may be failed open. For this test, a valve which is already full open should be chosen so that no transient ensues when the valve is failed.

INITIAL CONDITIONS

100% power, steady state.

FINAL CONDITIONS

Unit at hot standby after the turbine trip.

APPROVED FOR USE

SIMULATOR ENGINEERING COORDINATOR DATE: 6/12/90

TEST TEAM

Robert J. [signature] DATE: 6/11/90

DATE:

DATE:

FAILURE OF TURBINE CONTROL VALVE SPRING: MTU-011

BASIS FOR EVALUATION

Expert Evaluation - The control room indications, overall response, and specific relevent parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The test went as expected with no new deficiencies identified. As the turbine control oil pressure was lowered, the control valves which weren't failed closed while the failed valve stayed open. The turbine megawatts did not decrease as much as would normally be expected for the same governor switch movement due to the two valves having to be closed further than normal for the same power decrease. At about 430 MW, 3 valves were fully closed with the failed valve full open. At this point, control oil pressure was lowered even further, which then caused the intercept valves to begin closing. As the intercept valves closed, megawatts began decreasing again. At a bit lower control oil pressure, the intercept valves were fully shut which resulted in the reheat steam safeties opening and the turbine tripping after 30 seconds on the anti-motoring trip.

OUT OF BOUNDS CONDITIONS

None

DEFICIENCIES

None

EXCEPTIONS TO ANS 3.5

None

EVALUATION TEAM		SIMULATOR CONFIGURATION REVIEW BOARD	
[illegible]	DATE: 6-13-90	[illegible]	DATE: 8/15/90
Kenneth D. White	DATE: 6/13/90	[illegible]	DATE: 8-15-90
	DATE:	[illegible]	DATE: 8-15-90

APPENDIX A

SAMPLE

COMPLETE

CERTIFICATION

TEST

PROCEDURE

TITLE: SMALL BREAK LOCA INSIDE CONTAINMENT

NUMBER: MRC-003

ANS 3.5 REFERENCE SECTIONS: 3.1.2(1,B AND C) LOSS OF COOLANT: LARGE AND SMALL BREAKS, INSIDE AND OUTSIDE CONTAINMENT

DESCRIPTION

This test replicates a Best Estimate Analysis (BEA) Small Break LOCA performed by the FP&L Fuel Resources Department using the RETRAN02 program. As such the test is not intended to follow in detail the EOPs covering this type of transient. However, the operator action to turn off the RC pumps on low subcooling margin was programmed into the scenario. No other operator actions were taken during the course of the event, and several assumptions were made to make the Simulator and the RETRAN model consistent. Since the RETRAN model does not include charging and letdown models, or accumulators, these paths were isolated in the Simulator. The event is initiated from full power at beginning-of-cycle conditions. A three inch diameter break is assumed to occur in the hot leg of loop B. All control systems are initially in automatic, safety systems function at full capability, and no additional malfunctions are included.

OPTIONS

The simulator is capable of simulating RCS breaks of any size at several locations. The three inch hot leg break was selected because it is one of the standard hot leg breaks that is used for LOCA and pressurized thermal shock analyses.

INITIAL CONDITIONS

100% power steady state, beginning of core life, equilibrium xenon

FINAL CONDITIONS

The transient is analyzed for approximately 30 minutes. At this time, the safety injection flow rate is approximately equal to the break flow rate and the system is depressurized.

APPROVED FOR USE

R E Dodson III DATE: 8/21/90

SIMULATOR ENGINEERING COORDINATOR

TEST TEAM

James D Harrison DATE: 8/21/90

DATE: ______

DATE: ______

SMALL BREAK LOCA INSIDE CONTAINMENT: MRC-003

BASIS FOR EVALUATION

Best Estimate Analysis - The Simulator results will be compared to a Turkey Point RETRAN model.
Expert Evaluation - The overall response and specific relevant parameters will be evaluated.

DISCUSSION OF TEST RESULTS

The break flow predictions for the Simulator and RETRAN models agree very well for the duration of the transient. The agreement in the RCS pressure response is also very good although the Simulator does depressurize to a greater degree than the RETRAN model from about 15 to 20 minutes. The deviation reaches approximately 200 psi, but at this point in the transient it is not significant from a training standpoint.

Preliminary runs showed that an excessive two phase natural circulation flow in the Simulator resulted in cold leg temperatures that followed saturation throughout the test and did not exhibit the cooling due to stagnation of the injection flow in the cold legs as did the RETRAN model. The first SCRB meeting that discussed this transient resulted in a directive by the SCRB to correct this shortcoming. Subsequent modifications to the Simulator models have resulted in a reasonable agreement of the cold leg temperatures between the Simulator and the RETRAN models. The Simulator does not exhibit as erratic a behavior as the RETRAN model as it cools, but it does show a consistent overall magnitude and a tendency to return to saturation late in the transient when natural circulation begins to be restored.

The behavior of the balance of the secondary parameters is as expected and the Simulator and RETRAN model results agree reasonably well.

OUT OF BOUNDS CONDITIONS

None.

DEFICIENCIES

Oscillations in the break flow rate occur in the 25 to 30 minute range, as the loops are starting to refill and begin natural circulation. The magnitude of the oscillations is not excessive and cannot be observed by the trainee. However, the problem deserves some attention and will be entered as a discrepancy.

EXCEPTIONS TO ANS 3.5

None.

EVALUATION TEAM		*SIMULATION CONFIGURATION REVIEW BOARD*	
James S. Harrison	DATE: 9/10/90	[illegible]	DATE: 11/28/90
Robert J. Gumbay	DATE: 9/11/90	W. H. Wende	DATE: 11-28-90
	DATE:	[illegible]	DATE: 11-28-90

TABLE OF CONTENTS

1. REFERENCES

1.1 Procedures

3-EOP-E-0, Reactor Trip or Safety Injection

1.2 Industry Experience

N/A

1.3 Turkey Point Significant Event/Abnormal Occurrence

N/A

1.4 FSAR

N/A

1.5 Other

Ramos, J., Arpa, J., Small Break LOCA Analysis With the RETRAN Computer Code, NTH-TP-51-R3, Rev 0, February 12, 1990.
Cheung, A.C., et. al., A Generic Assessment of Significant Flaw Extension, Including Stagnant Loop Conditions, From Pressurized Thermal Shock of Reactor Vessels on Westingouse Nuclear Power Plants, WCAP-10319, December 1983.
Report on Small Break Accidents for Westinghouse NSSS, WCAP-9600, June 1979.
Skwarek, R.J., et.al., Westinghouse Emergency Core Cooling System Small Break Model, WCAP-8971-P-A, October 1975.

2. DESCRIPTION

2.1 Approach

This test replicates a Best Estimate Analysis (BEA) Small Break LOCA performed by the FP&L Fuel Resources Department using the RETRAN02 program. As such the test is not intended to use the EOPs covering this type of transient. However, the operator action to turn off the RC pumps on low subcooling margin was programmed into the scenario. No other operator actions were taken during the course of the event, and several assumptions were made to make the Simulator and the RETRAN model consistent. Since the RETRAN model does not include charging and letdown models or accumulators, these paths were isolated in the Simulator. The event is initiated from full power at beginning-of-cycle conditions. A three inch diameter break is assumed to occur in the hot leg of loop B. With the exception of the rod controller, all control systems are initially in automatic. The safety systems function at full capability, and no additional malfunctions are included.

The severity was calculated using the Simulator equation as follows:

XAREAH(I) = TVHHHLB * XCARE275
Where: I=2 for LOOP B
XCARE275= 4.124705 sq ft
XAREAH = .04909 sq ft (3 inch diameter break)
Hence, TVHHHLB = .0119

The operator's response to turn off the RC pumps on low RCS subcooling per Reference 1.1(1) was accomplished via the scenario. The scenario was set up to trip the pumps if there is an indication of an SI signal and subcooling less than 25 degF. Two composites were used to accomplish this: (L30SSIPA OR L30SSIPB) AND JQATMRC LT 25. , and (L30SSIPA OR L30SSIPB) AND JQBTMRC LT 25. (See Section 3.0 for the entire Scenario)

The transient is analyzed for approximately 30 minutes. At this time, the safety injection flow rate is approximately equal to the break flow rate and the system is depressurized.

2.2 Objectives

The objectives of this test are as follows:

- Evaluate the Simulator response to a Small Break LOCA in the RCS, and
- Replicate the BEA Small Break LOCA Analysis performed with RETRAN02.

2.3 Limitations and Assumptions

Charging and letdown, as well as accumulators, were isolated. Control rods were in manual.

3. SCENARIO INPUT

@CAE.3(CERT)FPXSD005.DAT

Previous user = JFH
Scenario description = MRC-003 SMALL BREAK LOCA - 3IN DIA LOOP B HOT LEG BRK 08/21/90

INITIAL CONDITION TO RESTORE
IC NUMBER = 11

MODIFICATION TO IC

TFBVC23	T	BM-CV-310A FAIL CLOSED
TFBVC24	T	BM-CV-310B FAIL CLOSED
TFBVC25	T	BM-CV-311 FAIL CLOSED
TFBVC01	T	BH-LCV-460 FAIL CLOSED
TFBVC10	T	BH-387 FAIL CLOSED
TFMVV49C	T	MH-MOV-865A FAIL CLOSED
TFMVV50C	T	MH-MOV-865B FAIL CLOSED
TFMVV51C	T	MH-MOV-865C FAIL CLOSED

TIME MODE SELECTION
NONE

MONITORED PARAMETERS SELECTION

LABEL NAME = HPPRES	PRESSURIZER PRESSURE	PS
LABEL NAME = H1B:0006	PRESSURIZER LEVEL CH 1 LT-459	
LABEL NAME = HSTCL	COLD LEG A TEMPERATURE	DEG F
LABEL NAME = HSTCLB	COLD LEG B TEMPERATURE	DEG F
LABEL NAME = HSTCLC	COLD LEG C TEMPERATURE	DEG F
LABEL NAME = SGPDOM	PRESSURE OF STEAM DOME	PSIA
LABEL NAME = SGPDOM2	PRESSURE OF STEAM DOME	PSIA
LABEL NAME = SGPDOM3	PRESSURE OF STEAM DOME	PSIA
LABEL NAME = F1LT474O	LT-474 OUTPUT	
LABEL NAME = F1LT484O	LT-484 OUTPUT	
LABEL NAME = F1LT494O	LT-494 OUTPUT	
LABEL NAME = SGWDOM	FLOW:DOME TO MAIN STEAM	LB/S
LABEL NAME = SGWDOM2	FLOW:DOME TO MAIN STEAM	LB/S
LABEL NAME = SGWDOM3	FLOW:DOME TO MAIN STEAM	LB/S

LABEL NAME = FAW84 S/G-1 FEED FLOW
LABEL NAME = FAW90 S/G-2 FEED FLOW
LABEL NAME = FAW96 S/G-3 FEED FLOW
LABEL NAME = HHWLHB LEAK FLOW HOT LEG LOOP B
LABEL NAME = YNACTIME CURRENT AC CLOCK TIME

PERFORMANCE INDICATORS SELECTION

NONE

PARAMETER CONTROLLER : SINGLE EVENT SELECTION

TVHHHLB .011900 *HH-HLB HOT LEG LOOP B LEAKAGE
COND = YNACTIME GT 2.0
YNACTIME CURRENT AC CLOCK TIME
DELAY TIME = 00:00
RAMP TIME = 00:00

COMPOSITE MALFUNCTION SELECTION

COMPOSITE NAME = RCP-OFF1
COND = (L30SSIPA OR L30SSIPB) AND JQATMRC LT 25.
L30SSIPA SI PRZR PRESSURE LIGHT TR.A
L30SSIPB SI PRZR PRESSURE LIGHT TR.B
JQATMRC CET TEMP SAT MARGIN
DELAY TIME = 00:30
COMPOSITE DESCRIP. = TURN OFF RCPS WHEN SI IS ON AND SUBCOOLING LT 25

TFH2FTRA T H2-3AA01 BKR 3AA01 FAIL TRIP
DIRECT TRIGGER
DELAY TIME = 00:00
RAMP TIME = 00:00

TFH2FTRB T H2-3AB01 BKR 3AB01 FAIL TRIP
DIRECT TRIGGER
DELAY TIME = 00:01
RAMP TIME = 00:00

TFH2FTRC T H2-3AB06 BKR 3AB06 FAIL TRIP

DIRECT TRIGGER
DELAY TIME = 00:02
RAMP TIME = 00:00

COMPOSITE NAME = RCP-OFF2
COND = (L30SSIPA OR L30SSIPB) AND JQBTMRC LT 25.
L30SSIPA SI PRZR PRESSURE LIGHT TR.A
L30SSIPB SI PRZR PRESSURE LIGHT TR.B
JQBTMRC CET TEMP SAT MARGIN
DELAY TIME = 00:30
COMPOSITE DESCRIP. = TURN RCPS OFF ON SI WITH SUBCOOLING LT 25

TFH2FTRA T H2-3AA01 BKR 3AA01 FAIL TRIP
DIRECT TRIGGER
DELAY TIME = 00:00
RAMP TIME = 00:00

TFH2FTRB T H2-3AB01 BKR 3AB01 FAIL TRIP
DIRECT TRIGGER
DELAY TIME = 00:01
RAMP TIME = 00:00

TFH2FTRC T H2-3AB06 BKR 3AB06 FAIL TRIP
DIRECT TRIGGER
DELAY TIME = 00:02
RAMP TIME = 00:00

GRAPHIC RECORDER ENTRY

GRAPHIC RECORDER : MENU 1

HPPRES	Ymin.=	.000000	Ymax.=	2500.000000	PRESSURIZER PRESSURE	PS
H1B:0006	Ymin.=	.000000	Ymax.=	100.000000	PRESSURIZER LEVEL CH 1 LT-459	
JQATMAR	Ymin.=	-100.000000	Ymax.=	100.000000	RCS TEMP SAT MARGIN	
N1D:A128	Ymin.=	.000000	Ymax.=	120.000000	TOTAL AVERAGE NUCLEAR POWER	

Xaxis time : 00:10:00

GRAPHIC RECORDER : MENU 2

SGPDOM	Ymin.=	.000000	Ymax.=	1000.000000	PRESSURE OF STEAM DOME	PSIA
SGWDOM	Ymin.=	.000000	Ymax.=	1000.000000	FLOW:DOME TO MAIN STEAM	LB/S
FAW84	Ymin.=	.000000	Ymax.=	1000.000000	S/G-1 FEED FLOW	

F1LT474O	Ymin.=	.000000 Ymax.=	100.000000	LT-474 OUTPUT	

Xaxis time : 00:10:00

GRAPHIC RECORDER : MENU 3

HSTCL	Ymin.=	200.000000 Ymax.=	700.000000	COLD LEG A TEMPERATURE DEG F	
HSTHL	Ymin.=	200.000000 Ymax.=	700.000000	HOT LEG A TEMPERATURE DEG F	
FFW13	Ymin.=	.000000 Ymax.=	10.000000	STEAM LINE 1 FLOW - FROM SG.A	
H1B:0131	Ymin.=	.000000 Ymax.=	100.000000	RCS FLOW LOOP A CH 1 FT-414	

Xaxis time : 00:10:00

GRAPHIC RECORDER : MENU 4

SGPDOM2	Ymin.=	.000000 Ymax.=	1000.000000	PRESSURE OF STEAM DOME	PSIA
SGWDOM2	Ymin.=	.000000 Ymax.=	1000.000000	FLOW:DOME TO MAIN STEAM	LB/S
FAW90	Ymin.=	.000000 Ymax.=	1000.000000	S/G-2 FEED	FLOW
F1LT484O	Ymin.=	.000000 Ymax.=	100.000000	LT-484 OUTPUT	

Xaxis time : 00:10:00

GRAPHIC RECORDER : MENU 5

HSTCLB	Ymin.=	200.000000 Ymax.=	700.000000	COLD LEG B TEMPERATURE DEG F	
HSTHLB	Ymin.=	200.000000 Ymax.=	700.000000	HOT LEG B TEMPERATURE DEG F	
FFW12	Ymin.=	.000000 Ymax.=	10.000000	STEAM LINE 2 FLOW - FROM SG.B	
H1B:0134	Ymin.=	.000000 Ymax.=	100.000000	RCS FLOW LOOP A CH 1 FT-424	

Xaxis time : 00:10:00

GRAPHIC RECORDER : MENU 6

SGPDOM3	Ymin.=	.000000 Ymax.=	1000.000000	PRESSURE OF STEAM DOME	PSIA
SGWDOM3	Ymin.=	.000000 Ymax.=	1000.000000	FLOW:DOME TO MAIN STEAM	LB/S
FAW96	Ymin.=	.000000 Ymax.=	1000.000000	S/G-3 FEED	FLOW
F1LT494O	Ymin.=	.000000 Ymax.=	100.000000	LT-494 OUTPUT	

Xaxis time : 00:10:00

GRAPHIC RECORDER : MENU 7

HSTCLC	Ymin.=	200.000000 Ymax.=	700.000000	COLD LEG C TEMPERATURE DEG F	
HSTHLC	Ymin.=	200.000000 Ymax.=	700.000000	HOT LEG C TEMPERATURE DEG F	
FFW11	Ymin.=	.000000 Ymax.=	10.000000	STEAM LINE 3 FLOW - FROM SG.C	
H1B:0137	Ymin.=	.000000 Ymax.=	100.000000	RCS FLOW LOOP A CH 1 FT-434	

Xaxis time : 00:10:00

GRAPHIC RECORDER : MENU 8

HHP08	Ymin.=	500.000000 Ymax.=	2500.000000	RCP COLD LEG LOOP A PRESSURE	

MRWN26	Ymin.=	.000000 Ymax.=	100.000000	MASS FLOW RHR LINK 26
HHP09	Ymin.=	500.000000 Ymax.=	2500.000000	RCP COLD LEG LOOP B PRESSURE
MRWN27	Ymin.=	.000000 Ymax.=	100.000000	MASS FLOW RHR LINK 27

Xaxis time : 00:10:00

GRAPHIC RECORDER : MENU 9

HHP10	Ymin.=	500.000000 Ymax.=	2500.000000	RCP COLD LEG LOOP C PRESSURE
MRWN29	Ymin.=	.000000 Ymax.=	100.000000	MASS FLOW RHR LINK 29
HSXQHLB	Ymin.=	.000000 Ymax.=	1.000000	HOT LEG B QUALITY XQ –
HHWLHB	Ymin.=	.000000 Ymax.=	5000.000000	LEAK FLOW HOT LEG LOOP B

Xaxis time : 00:10:00

GRAPHIC RECORDER : MENU 10

SGMTOT2	Ymin.=	.000000 Ymax.=	100000.000000	TOTAL STEAM GENERATOR MASS LB
MRHN13	Ymin.=	.000000 Ymax.=	200.000000	ENTHALPY RHR NODE 13
MRHN15	Ymin.=	.000000 Ymax.=	200.000000	ENTHALPY RHR NODE 15
MRHN16	Ymin.=	.000000 Ymax.=	200.000000	ENTHALPY RHR NODE 16

Xaxis time : 00:10:00

GRAPHIC RECORDER : MENU 11

SBW24	Ymin.=	.000000 Ymax.=	1000.000000	CONDENSER STM DUMP 2827-28 (A24) LB
SBW26	Ymin.=	.000000 Ymax.=	1000.000000	CONDENSER STM DUMP 2829-30 (A26) LB
HRVTLIQ	Ymin.=	.000000 Ymax.=	1000.000000	RV-HEAD LIQUID VOLUME
HRVTVAP	Ymin.=	.000000 Ymax.=	1000.000000	RV-HEAD VAPOUR VOLUME

Xaxis time : 00:10:00

GRAPHIC RECORDER : MENU 12

DTHLIQ	Ymin.=	.000000 Ymax.=	500.000000	ENTHALPY AT SGU A (BTU/LBM)
DTHLIQ2	Ymin.=	.000000 Ymax.=	500.000000	ENTHALPY AT SGU B (BTU/LBM)
DTHLIQ3	Ymin.=	.000000 Ymax.=	500.000000	ENTHALPY AT SGU C (BTU/LBM)
SGMTOT	Ymin.=	.000000 Ymax.=	100000.000000	TOTAL STEAM GENERATOR MASS LB

Xaxis time : 00:10:00

SCENARIO SEQUENCE

NONE

SCENARIO ABSTRACT

NONE

4. CERTIFICATION TEST INSTRUCTIONS

This test is controlled completely by the scenarios shown in Section 3.0.

4.1 INITIATE SCENARIO 5. Activate the IC in the scenario, resolve the switch checks on the panels. (From the control panel, set the rod control to manual, and the turbine runback switch to defeat. In the future this can be handled via the Scenario, if the test engineer chooses to do so.)

4.2 Activate the CDB OPTIONS via the Vistagraphics.

4.3 RESET THE SCENARIO via the Vistagraphics.

4.4 Enter RECORDER, pre-process the MRC003.VAR file, start recording, and place the simulator in run.

4.5 The RECORDER will stop automatically at 30 min. When it stops, save the output file.

(SEL File Name MRCΦΦ3.RUNF.OUT)

5. ARCHIVE RECORDS

MRC003.RUNF.OUT
%%
DATA RECORDED ON 08/21/90 AT 20:36:27
VARIABLES DEFINED IN FILE MRC003.VAR
COMMON DATABASE USED WAS @CAE.1^(CDB)FPTP.XSL.001
WORK.ACF

AIINIT.ASM.001	CPU0.S00	FPTPB2.FOR.003	IPU3.S03	FPTPEI.FOR.004	CPU2.S06	FPTPK3.FOR.003	IPU1.S01
AOINIT.ASM.001	CPU0.S00	FPTPBB.FOR.004	IPU3.S05	FPTPEL.FOR.002	CPU2.S03	FPTPK4.FOR.003	IPU1.S03
FPTP00.EXE.001	CPU0.S00	FPTPBH.FOR.003	IPU3.S03	FPTPF1.FOR.005	IPU1.S05	FPTPK5.FOR.002	IPU1.S01
FPTP03.EXE.001	CPU0.S00	FPTPBM.FOR.009	IPU3.S03	FPTPF2.FOR.003	IPU1.S05	FPTPK6.FOR.002	CPU2.S08
FPTP05.EXE.001	CPU0.S00	FPTPBT.FOR.003	IPU3.S03	FPTPF4.FOR.003	IPU1.S06	FPTPK7.FOR.002	CPU2.S08
FPTP22.EXE.001	CPU0.S00	FPTPBU.FOR.002	IPU3.S03	FPTPF5.FOR.005	IPU1.S06	FPTPK8.FOR.002	CPU2.S07
FPTP24.EXE.001	CPU0.S00	FPTPBV.FOR.004	IPU3.S00	FPTPFA.FOR.006	IPU1.S05	FPTPKA.FOR.004	IPU1.S04
FPTP26.EXE.001	CPU0.S00	FPTPC1.FOR.006	IPU2.S06	FPTPFB.FOR.002	IPU1.S06	FPTPKB.FOR.003	IPU1.S03
FPTP28.EXE.001	CPU0.S00	FPTPC2.FOR.002	IPU2.S06	FPTPFC.FOR.003	IPU1.S06	FPTPKC.FOR.003	IPU1.S03
FPTP30.EXE.001	CPU0.S00	FPTPC4.FOR.005	IPU2.S06	FPTPFF.FOR.005	IPU1.S06	FPTPKD.FOR.003	IPU1.S01
FPTP32.EXE.001	CPU0.S00	FPTPCA.FOR.008	IPU2.S06	FPTPFK.FOR.004	IPU1.S06	FPTPKE.FOR.002	CPU2.S08
FPTP34.EXE.001	CPU0.S00	FPTPCC.FOR.003	IPU2.S06	FPTPFL.FOR.002	IPU1.S06	FPTPKF.FOR.004	IPU1.S01
FPTP36.EXE.001	CPU0.S00	FPTPCM.FOR.014	IPU2.S06	FPTPFV.FOR.006	IPU1.S05	FPTPKG.FOR.002	CPU2.S08
FPTP38.EXE.001	CPU0.S00	FPTPCP.FOR.003	IPU2.S06	FPTPFX.FOR.005	IPU1.S06	FPTPKH.FOR.002	CPU2.S07
FPTP40.EXE.001	CPU0.S00	FPTPCV.FOR.003	IPU2.S06	FPTPFY.FOR.004	IPU1.S06	FPTPKI.FOR.003	CPU2.S08
FPTP67.EXE.001	CPU0.S00	FPTPCX.FOR.002	IPU2.S06	FPTPG1.FOR.005	CPU2.S06	FPTPKJ.FOR.005	CPU2.S07
FPTP68.EXE.001	CPU0.S00	FPTPD2.FOR.002	IPU1.S02	FPTPGF.FOR.002	CPU2.S06	FPTPKK.FOR.002	IPU1.S03
FPTP69.EXE.001	CPU0.S00	FPTPD3.FOR.002	IPU1.S00	FPTPGG.FOR.003	CPU2.S03	FPTPKN.FOR.002	CPU2.S07
FPTP70.EXE.001	CPU0.S00	FPTPDD.FOR.005	IPU1.S02	FPTPH1.FOR.009	IPU3.S01	FPTPKP.FOR.002	CPU2.S07
FPTP71.EXE.001	CPU0.S00	FPTPDF.FOR.005	IPU1.S00	FPTPH2.FOR.004	IPU3.S01	FPTPKQ.FOR.002	CPU2.S08
FPTP72.EXE.001	CPU0.S00	FPTPDG.FOR.003	IPU1.S00	FPTPHH.FOR.014	IPU3.S06	FPTPKR.FOR.002	CPU2.S07
FPTP73.EXE.001	CPU0.S00	FPTPDQ.FOR.003	IPU1.S02	FPTPHK.FOR.002	IPU3.S04	FPTPKT.FOR.002	CPU2.S08
FPTP90.EXE.001	CPU0.S00	FPTPDT.FOR.006	IPU1.S00	FPTPHN.FOR.009	IPU3.S04	FPTPKV.FOR.004	IPU1.S04
FPTP92.EXE.001	CPU0.S00	FPTPE2.FOR.004	CPU2.S04	FPTPHP.FOR.010	IPU3.S04	FPTPKX.FOR.004	IPU1.S01
FPTP94.EXE.001	CPU0.S00	FPTPE3.FOR.006	CPU2.S04	FPTPHQ.FOR.005	IPU3.S01	FPTPKY.FOR.003	IPU1.S03
FPTPA1.FOR.002	IPU2.S02	FPTPE4.FOR.002	CPU2.S04	FPTPHR.FOR.020	IPU3.S05	FPTPKZ.FOR.005	IPU1.S01
FPTPA2.FOR.006	IPU2.S02	FPTPE6.FOR.005	CPU2.S04	FPTPHS.FOR.005	IPU3.S06	FPTPL1.FOR.002	CPU1.S00
FPTPAA.FOR.002	IPU2.S02	FPTPE7.FOR.002	CPU2.S04	FPTPHU.FOR.007	IPU3.S04	FPTPL2.FOR.002	CPU1.S00
FPTPAB.FOR.005	IPU2.S02	FPTPE9.FOR.002	CPU2.S04	FPTPHV.FOR.005	IPU3.S04	FPTPL2.FOR.002	CPU2.S00
FPTPAV.FOR.003	IPU2.S02	FPTPEB.FOR.002	CPU2.S06	FPTPJ5.FOR.001	IPU0.S03	FPTPL3.FOR.002	CPU1.S00
FPTPAW.FOR.005	IPU2.S02	FPTPEC.FOR.001	CPU2.S06	FPTPK1.FOR.003	IPU1.S04	FPTPL3.FOR.002	CPU2.S00
FPTPB1.FOR.006	IPU3.S00	FPTPEE.FOR.003	CPU2.S06	FPTPK2.FOR.005	IPU1.S03	FPTPLI.FOR.002	CPU1.S00

FPTPLK.FOR.002	CPU3.S00	FPTPU7.FOR.003	IPU2.S03	FPTPX8.ASM.001	CPU0.A00	JBSOUT.FOR.001	IPU0.S03
FPTPM1.FOR.004	CPU1.S06	FPTPU8.FOR.002	IPU2.S03	FPTPX8.ASM.001	CPU0.A01	JBSPEU.FOR.001	IPU0.S03
FPTPM2.FOR.003	CPU1.S06	FPTPU9.FOR.008	IPU2.S03	FPTPX8.ASM.001	CPU0.A02	JBSREV.FOR.001	IPU0.S03
FPTPMC.FOR.005	CPU1.S01	FPTPUA.FOR.007	IPU2.S05	FPTPX8.ASM.001	CPU0.A03	JBSRRK.FOR.001	IPU0.S03
FPTPMH.FOR.003	CPU1.S01	FPTPUC.FOR.008	IPU2.S01	FPTPX8.ASM.001	CPU0.A04	JBSSPR.FOR.001	IPU0.S03
FPTPMR.FOR.004	CPU1.S01	FPTPUF.FOR.002	IPU2.S03	FPTPX8.ASM.001	CPU0.A06	JBSSTA.FOR.001	IPU0.S03
FPTPMS.FOR.002	CPU1.S05	FPTPUI.FOR.005	IPU2.S03	FPTPX8.ASM.001	CPU0.A32	JBSSTO.FOR.001	IPU0.S03
FPTPMU.FOR.003	CPU1.S06	FPTPUJ.FOR.002	IPU2.S03	FPTPX9.ASM.001	CPU0.A01	JBSSTS.FOR.001	IPU0.S03
FPTPMV.FOR.003	CPU1.S06	FPTPUK.FOR.002	IPU2.S03	FPTPX9.ASM.001	CPU0.A02	JBSTIM.FOR.001	IPU0.S03
FPTPN1.FOR.002	CPU1.S04	FPTPUT.FOR.005	IPU2.S03	FPTPX9.ASM.001	CPU0.A03	JBSUDR.FOR.001	CPU0.A16
FPTPN2.FOR.004	CPU1.S04	FPTPUV.FOR.002	IPU2.S01	FPTPXB.FOR.001	CPU0.A01	JBSUDT.FOR.001	IPU0.S03
FPTPND.FOR.002	CPU1.S04	FPTPUZ.FOR.003	IPU2.S03	FPTPXC.FOR.001	CPU0.A04	JBSVAL.FOR.001	IPU0.S03
FPTPP1.FOR.002	CPU2.S03	FPTPV8.FOR.004	IPU0.S00	FPTPXE.FOR.001	CPU0.A03	JBSWIP.FOR.001	IPU0.S03
FPTPP8.FOR.003	CPU2.S05	FPTPX2.FOR.001	CPU0.A01	FPTPXG.FOR.001	CPU0.A07	YP1C00.FOR.001	CPU1.S00
FPTPP9.FOR.002	CPU2.S05	FPTPX2.FOR.001	CPU0.A02	FPTPXM.FOR.001	CPU0.A03	YP1C01.FOR.001	CPU1.S01
FPTPPC.FOR.003	CPU2.S05	FPTPX2.FOR.001	CPU0.A03	FPTPXO.FOR.001	CPU0.A00	YP1C02.FOR.001	CPU1.S02
FPTPPG.FOR.002	CPU2.S05	FPTPX2.FOR.001	CPU0.A04	FPTPXR.FOR.001	CPU0.A08	YP1C03.FOR.001	CPU1.S03
FPTPQ1.FOR.002	CPU2.S06	FPTPX2.FOR.001	CPU0.A05	FPTPXS.FOR.001	CPU0.A01	YP1C04.FOR.001	CPU1.S04
FPTPQ4.FOR.005	CPU2.S04	FPTPX2.FOR.001	CPU0.A06	FPTPXT.FOR.001	CPU0.A09	YP1C05.FOR.001	CPU1.S05
FPTPQ5.FOR.006	CPU2.S04	FPTPX2.FOR.001	CPU0.A09	FPTPYB.FOR.001	CPU0.A16	YP1C06.FOR.001	CPU1.S06
FPTPQ6.FOR.006	CPU2.S01	FPTPX2.FOR.001	CPU3.S00	FPTPYB.FOR.001	IPU0.S00	YP1I00.FOR.001	IPU1.S00
FPTPQ6.FOR.006	CPU2.S06	FPTPX4.FOR.003	CPU0.A00	FPTPYB.FOR.001	IPU0.S03	YP1I01.FOR.001	IPU1.S01
FPTPQD.FOR.003	CPU2.S04	FPTPX4.FOR.003	CPU0.A01	FPTPYE.FOR.003	IPU0.S00	YP1I02.FOR.001	IPU1.S02
FPTPQE.FOR.003	CPU2.S04	FPTPX4.FOR.003	CPU0.A02	FPTPYL.FOR.002	IPU0.S00	YP1I03.FOR.001	IPU1.S03
FPTPQF.FOR.003	CPU2.S04	FPTPX4.FOR.003	CPU0.A04	FPTPYN.FOR.004	IPU0.S00	YP1I04.FOR.001	IPU1.S04
FPTPQG.FOR.003	CPU2.S04	FPTPX4.FOR.003	CPU0.A06	FPTPYS.FOR.111	IPU0.S02	YP1I05.FOR.001	IPU1.S05
FPTPQS.FOR.002	CPU2.S06	FPTPX4.FOR.003	CPU0.A32	J5PAPS.FOR.001	IPU0.S03	YP1I06.FOR.001	IPU1.S06
FPTPRA.FOR.002	CPU1.S02	FPTPX5.FOR.001	CPU0.A01	J5SAPS.FOR.001	IPU0.S03	YP2C00.FOR.001	CPU2.S00
FPTPRL.FOR.002	CPU1.S03	FPTPX5.FOR.001	CPU0.A02	JBSALA.FOR.001	IPU0.S03	YP2C01.FOR.001	CPU2.S01
FPTPRR.FOR.006	CPU1.S02	FPTPX5.FOR.001	CPU0.A03	JBSALR.FOR.001	IPU0.S03	YP2C02.FOR.001	CPU2.S02
FPTPS1.FOR.009	IPU3.S02	FPTPX6.ASM.001	CPU0.A01	JBSCDA.FOR.001	IPU0.S03	YP2C03.FOR.001	CPU2.S03
FPTPS2.FOR.002	IPU2.S00	FPTPX6.ASM.001	CPU0.A02	JBSCEU.FOR.001	IPU0.S03	YP2C04.FOR.001	CPU2.S04
FPTPSB.FOR.003	IPU2.S00	FPTPX6.ASM.001	CPU0.A03	JBSCLE.FOR.001	IPU0.S03	YP2C05.FOR.001	CPU2.S05
FPTPSD.FOR.005	IPU2.S00	FPTPX6.ASM.001	CPU0.A04	JBSCPW.FOR.001	IPU0.S03	YP2C06.FOR.001	CPU2.S06
FPTPSG.FOR.008	IPU2.S00	FPTPX6.ASM.001	CPU0.A05	JBSCSG.FOR.001	IPU0.S03	YP2C07.FOR.001	CPU2.S07
FPTPSR.FOR.004	IPU2.S04	FPTPX6.ASM.001	CPU0.A06	JBSGET.FOR.001	IPU0.S03	YP2C08.FOR.001	CPU2.S08
FPTPSV.FOR.003	IPU3.S02	FPTPX6.ASM.001	CPU0.A07	JBSLDV.FOR.001	IPU0.S03	YP2I00.FOR.001	IPU2.S00
FPTPSW.FOR.003	IPU2.S00	FPTPX7.ASM.001	CPU0.A01	JBSLED.FOR.001	CPU0.A16	YP2I01.FOR.001	IPU2.S01
FPTPU1.FOR.003	IPU2.S01	FPTPX7.ASM.001	CPU0.A02	JBSLSD.FOR.001	CPU0.A16	YP2I02.FOR.001	IPU2.S02
FPTPU4.FOR.003	IPU2.S05	FPTPX7.ASM.001	CPU0.A03	JBSLSS.FOR.001	IPU0.S03	YP2I03.FOR.001	IPU2.S03

YP2I04.FOR.001	IPU2.S04
YP2I05.FOR.001	IPU2.S05
YP2I06.FOR.001	IPU2.S06
YP3I00.FOR.001	IPU3.S00
YP3I01.FOR.001	IPU3.S01
YP3I02.FOR.001	IPU3.S02
YP3I03.FOR.001	IPU3.S03
YP3I04.FOR.001	IPU3.S04
YP3I05.FOR.001	IPU3.S05
YP3I06.FOR.001	IPU3.S06
DCUFORG.FOR.001	CPU0.A10
FPTPX10.FOR.001	CPU0.A02
FPTPX10.FOR.001	CPU0.A04
FPTPX10.FOR.001	CPU0.A05
FPTPX10.FOR.001	CPU0.A06
FPTPX10.FOR.001	CPU0.A07
FPTPX3M.FOR.001	CPU0.A03
FPTPX3S.FOR.001	CPU0.A00
FPTPX3S.FOR.001	CPU0.A03
FPTPX3S.FOR.001	CPU0.A04
FPTPX4A.FOR.001	CPU0.A01
FPTPXCD.FOR.001	CPU0.A06
FPTPXFS.FOR.001	CPU0.A07
FPTPXGT.FOR.001	CPU0.A01
FPTPXHO.FOR.003	CPU0.A03
FPTPXHS.FOR.004	CPU0.A00
FPTPXIS.FOR.001	CPU0.A01
FPTPXJB.FOR.001	CPU0.A34
FPTPXJD.FOR.001	CPU0.A31
FPTPXJG.FOR.001	CPU0.A34
FPTPXJM.ASM.001	CPU0.A32
FPTPXJQ.FOR.001	CPU0.A33
FPTPXJT.FOR.001	CPU3.S00
FPTPXJU.FOR.001	CPU0.A32
FPTPXJX.FOR.001	CPU0.A31
FPTPXOD.FOR.001	CPU0.A01
FPTPXOE.FOR.001	CPU0.A01
FPTPXOH.FOR.001	CPU0.A09
FPTPXP1.FOR.001	CPU0.A02
FPTPXP2.FOR.001	CPU0.A02
FPTPXPC.FOR.003	CPU0.A06
FPTPXPW.FOR.001	CPU0.A08
FPTPXRB.FOR.001	CPU0.A08
FPTPXRP.FOR.002	CPU0.A09
FPTPXRT.FOR.001	CPU0.A23
FPTPXS0.FOR.001	CPU0.A01
FPTPXS1.FOR.001	CPU1.A00
FPTPXS2.FOR.001	CPU2.A00
FPTPXS3.FOR.001	CPU3.A00
FPTPXSA.FOR.004	CPU0.A04
FPTPXSE.FOR.001	CPU0.A05
FPTPXSL.FOR.001	CPU0.A02
FPTPXSS.FOR.001	CPU0.A02
FPTPXTC.FOR.001	CPU0.A07
FPTPXTD.FOR.001	CPU0.A04
FPTPXTF.FOR.001	CPU0.A03
FPTPXTI.FOR.004	CPU3.S00
FPTPXTP.FOR.001	CPU3.S00
FPTPXTS.FOR.001	CPU0.A02
FPTPXTT.FOR.001	CPU0.A09
FPTPXVS.FOR.001	CPU0.A06
FPTPYAI.FOR.001	CPU0.S00
FPTPYAO.FOR.003	CPU0.S00
FPTPYDI.FOR.001	CPU3.S00
FPTPYDO.FOR.001	CPU3.S00
FPTPYTO.FOR.001	CPU0.S00
FPTPYWI.FOR.001	CPU0.S00
FPTPYWO.FOR.001	CPU0.S00
J5CKLOW.FOR.001	IPU0.S03
J5VALID.FOR.001	IPU0.S03
JBMAPAN.FOR.001	IPU0.S01
JBMAPDI.FOR.001	IPU0.S01
PARVGIO.ASM.001	CPU0.A00
PARVGIO.ASM.001	CPU0.A01
PARVGIO.ASM.001	CPU0.A07
PARVGIO.ASM.001	CPU0.A09
PARVGIO.ASM.001	CPU0.A31
PARVGIO.ASM.001	CPU0.A32
PARVGIO.ASM.001	CPU0.A34
SDCFORG.FOR.001	CPU0.A10
XV45OUT.FOR.001	CPU0.A00
XV45OUT.FOR.001	CPU0.A01
XV45OUT.FOR.001	CPU0.A07
XV45OUT.FOR.001	CPU0.A09
XV45OUT.FOR.001	CPU0.A31
XV45OUT.FOR.001	CPU0.A32
XV45OUT.FOR.001	CPU0.A34
ASYNC000.ASM.001	CPU0.A00
ASYNC001.ASM.001	CPU0.A01
ASYNC002.ASM.001	CPU0.A02
ASYNC003.ASM.001	CPU0.A03
ASYNC004.ASM.001	CPU0.A04
ASYNC005.ASM.001	CPU0.A05
ASYNC006.ASM.001	CPU0.A06
ASYNC007.ASM.001	CPU0.A07
ASYNC008.ASM.001	CPU0.A08
ASYNC009.ASM.001	CPU0.A09
ASYNC010.ASM.001	CPU0.A10
ASYNC011.ASM.001	CPU0.A11
ASYNC012.ASM.001	CPU0.A12
ASYNC013.ASM.001	CPU0.A13
ASYNC014.ASM.001	CPU0.A14
ASYNC015.ASM.001	CPU0.A15
ASYNC016.ASM.001	CPU0.A16
ASYNC023.ASM.001	CPU0.A23
ASYNC031.ASM.001	CPU0.A31
ASYNC032.ASM.001	CPU0.A32
ASYNC033.ASM.001	CPU0.A33
ASYNC034.ASM.001	CPU0.A34
ASYNC100.ASM.001	CPU1.A00
ASYNC200.ASM.001	CPU2.A00
ASYNC300.ASM.001	CPU3.A00
ASYNCNF1.ASM.001	CPU0.A00
ASYNCNF1.ASM.001	CPU0.A01
ASYNCNF1.ASM.001	CPU0.A02
ASYNCNF1.ASM.001	CPU0.A03
ASYNCNF1.ASM.001	CPU0.A04
ASYNCNF1.ASM.001	CPU0.A05
ASYNCNF1.ASM.001	CPU0.A06
ASYNCNF2.ASM.001	CPU0.A07
ASYNCNF2.ASM.001	CPU0.A08
ASYNCNF2.ASM.001	CPU0.A09
ASYNCNF2.ASM.001	CPU0.A23
ASYNCNF3.ASM.001	CPU0.A10
ASYNCNF3.ASM.001	CPU0.A11
ASYNCNF3.ASM.001	CPU0.A12
ASYNCNF3.ASM.001	CPU0.A13
ASYNCNF3.ASM.001	CPU0.A14
ASYNCNF3.ASM.001	CPU0.A15
ASYNCNF3.ASM.001	CPU0.A16
ASYNCNF4.ASM.001	CPU0.A31
ASYNCNF4.ASM.001	CPU0.A32
ASYNCNF4.ASM.001	CPU0.A33
ASYNCNF4.ASM.001	CPU0.A34
ASYNCNF6.ASM.001	CPU1.A00
ASYNCNF7.ASM.001	CPU2.A00
ASYNCNF8.ASM.001	CPU3.A00
CPU0_A00.EXE.322	CPU0.A00
CPU0_A01.EXE.205	CPU0.A01
CPU0_A02.EXE.142	CPU0.A02
CPU0_A03.EXE.113	CPU0.A03
CPU0_A04.EXE.266	CPU0.A04
CPU0_A05.EXE.160	CPU0.A05

CPU0_A06.EXE.035	CPU0.A06	DISPCONF.ASM.001	CPU0.S00	DISPCONF.ASM.001	IPU3.S01	DISPRTOM.ASM.001	CPU2.S02
CPU0_A07.EXE.176	CPU0.A07	DISPCONF.ASM.001	CPU1.S00	DISPCONF.ASM.001	IPU3.S02	DISPRTOM.ASM.001	CPU2.S03
CPU0_A08.EXE.163	CPU0.A08	DISPCONF.ASM.001	CPU1.S01	DISPCONF.ASM.001	IPU3.S03	DISPRTOM.ASM.001	CPU2.S04
CPU0_A09.EXE.268	CPU0.A09	DISPCONF.ASM.001	CPU1.S02	DISPCONF.ASM.001	IPU3.S04	DISPRTOM.ASM.001	CPU2.S05
CPU0_A10.EXE.033	CPU0.A10	DISPCONF.ASM.001	CPU1.S03	DISPCONF.ASM.001	IPU3.S05	DISPRTOM.ASM.001	CPU2.S06
CPU0_A11.EXE.022	CPU0.A11	DISPCONF.ASM.001	CPU1.S04	DISPCONF.ASM.001	IPU3.S06	DISPRTOM.ASM.001	CPU2.S07
CPU0_A12.EXE.077	CPU0.A12	DISPCONF.ASM.001	CPU1.S05	DISPDUMY.FOR.001	CPU1.S00	DISPRTOM.ASM.001	CPU2.S08
CPU0_A13.EXE.031	CPU0.A13	DISPCONF.ASM.001	CPU1.S06	DISPRTOM.ASM.001	CPU0.S00	DISPRTOM.ASM.001	CPU2.A00
CPU0_A14.EXE.028	CPU0.A14	DISPCONF.ASM.001	CPU2.S00	DISPRTOM.ASM.001	CPU0.A00	DISPRTOM.ASM.001	CPU3.S00
CPU0_A15.EXE.034	CPU0.A15	DISPCONF.ASM.001	CPU2.S01	DISPRTOM.ASM.001	CPU0.A01	DISPRTOM.ASM.001	CPU3.A00
CPU0_A16.EXE.078	CPU0.A16	DISPCONF.ASM.001	CPU2.S02	DISPRTOM.ASM.001	CPU0.A02	DISPRTOM.ASM.001	IPU0.S00
CPU0_A23.EXE.027	CPU0.A23	DISPCONF.ASM.001	CPU2.S03	DISPRTOM.ASM.001	CPU0.A03	DISPRTOM.ASM.001	IPU0.S01
CPU0_A31.EXE.124	CPU0.A31	DISPCONF.ASM.001	CPU2.S04	DISPRTOM.ASM.001	CPU0.A04	DISPRTOM.ASM.001	IPU0.S02
CPU0_A32.EXE.111	CPU0.A32	DISPCONF.ASM.001	CPU2.S05	DISPRTOM.ASM.001	CPU0.A05	DISPRTOM.ASM.001	IPU0.S03
CPU0_A33.EXE.165	CPU0.A33	DISPCONF.ASM.001	CPU2.S06	DISPRTOM.ASM.001	CPU0.A06	DISPRTOM.ASM.001	IPU0.S04
CPU0_A34.EXE.076	CPU0.A34	DISPCONF.ASM.001	CPU2.S07	DISPRTOM.ASM.001	CPU0.A07	DISPRTOM.ASM.001	IPU0.S05
CPU0_S00.EXE.213	CPU0.S00	DISPCONF.ASM.001	CPU2.S08	DISPRTOM.ASM.001	CPU0.A08	DISPRTOM.ASM.001	IPU0.S06
CPU1_A00.EXE.033	CPU1.A00	DISPCONF.ASM.001	CPU3.S00	DISPRTOM.ASM.001	CPU0.A09	DISPRTOM.ASM.001	IPU1.S00
CPU1_S00.EXE.120	CPU1.S00	DISPCONF.ASM.001	IPU0.S00	DISPRTOM.ASM.001	CPU0.A10	DISPRTOM.ASM.001	IPU1.S01
CPU1_S01.EXE.147	CPU1.S01	DISPCONF.ASM.001	IPU0.S01	DISPRTOM.ASM.001	CPU0.A11	DISPRTOM.ASM.001	IPU1.S02
CPU1_S02.EXE.081	CPU1.S02	DISPCONF.ASM.001	IPU0.S02	DISPRTOM.ASM.001	CPU0.A12	DISPRTOM.ASM.001	IPU1.S03
CPU1_S03.EXE.051	CPU1.S03	DISPCONF.ASM.001	IPU0.S03	DISPRTOM.ASM.001	CPU0.A13	DISPRTOM.ASM.001	IPU1.S04
CPU1_S04.EXE.096	CPU1.S04	DISPCONF.ASM.001	IPU0.S04	DISPRTOM.ASM.001	CPU0.A14	DISPRTOM.ASM.001	IPU1.S05
CPU1_S05.EXE.077	CPU1.S05	DISPCONF.ASM.001	IPU0.S05	DISPRTOM.ASM.001	CPU0.A15	DISPRTOM.ASM.001	IPU1.S06
CPU1_S06.EXE.100	CPU1.S06	DISPCONF.ASM.001	IPU0.S06	DISPRTOM.ASM.001	CPU0.A16	DISPRTOM.ASM.001	IPU2.S00
CPU2_A00.EXE.030	CPU2.A00	DISPCONF.ASM.001	IPU1.S00	DISPRTOM.ASM.001	CPU0.A23	DISPRTOM.ASM.001	IPU2.S01
CPU2_S00.EXE.068	CPU2.S00	DISPCONF.ASM.001	IPU1.S01	DISPRTOM.ASM.001	CPU0.A31	DISPRTOM.ASM.001	IPU2.S02
CPU2_S01.EXE.070	CPU2.S01	DISPCONF.ASM.001	IPU1.S02	DISPRTOM.ASM.001	CPU0.A32	DISPRTOM.ASM.001	IPU2.S03
CPU2_S02.EXE.015	CPU2.S02	DISPCONF.ASM.001	IPU1.S03	DISPRTOM.ASM.001	CPU0.A33	DISPRTOM.ASM.001	IPU2.S04
CPU2_S03.EXE.105	CPU2.S03	DISPCONF.ASM.001	IPU1.S04	DISPRTOM.ASM.001	CPU0.A34	DISPRTOM.ASM.001	IPU2.S05
CPU2_S04.EXE.238	CPU2.S04	DISPCONF.ASM.001	IPU1.S05	DISPRTOM.ASM.001	CPU1.S00	DISPRTOM.ASM.001	IPU2.S06
CPU2_S05.EXE.118	CPU2.S05	DISPCONF.ASM.001	IPU1.S06	DISPRTOM.ASM.001	CPU1.S01	DISPRTOM.ASM.001	IPU3.S00
CPU2_S06.EXE.139	CPU2.S06	DISPCONF.ASM.001	IPU2.S00	DISPRTOM.ASM.001	CPU1.S02	DISPRTOM.ASM.001	IPU3.S01
CPU2_S07.EXE.054	CPU2.S07	DISPCONF.ASM.001	IPU2.S01	DISPRTOM.ASM.001	CPU1.S03	DISPRTOM.ASM.001	IPU3.S02
CPU2_S08.EXE.068	CPU2.S08	DISPCONF.ASM.001	IPU2.S02	DISPRTOM.ASM.001	CPU1.S04	DISPRTOM.ASM.001	IPU3.S03
CPU3_A00.EXE.013	CPU3.A00	DISPCONF.ASM.001	IPU2.S03	DISPRTOM.ASM.001	CPU1.S05	DISPRTOM.ASM.001	IPU3.S04
CPU3_S00.EXE.076	CPU3.S00	DISPCONF.ASM.001	IPU2.S04	DISPRTOM.ASM.001	CPU1.S06	DISPRTOM.ASM.001	IPU3.S05
CTSFPENS.FOR.022	CPU0.S00	DISPCONF.ASM.001	IPU2.S05	DISPRTOM.ASM.001	CPU1.A00	DISPRTOM.ASM.001	IPU3.S06
CTSFPLTS.FOR.036	CPU0.S00	DISPCONF.ASM.001	IPU2.S06	DISPRTOM.ASM.001	CPU2.S00	FPTPJBAP.FOR.001	IPU0.S01
CTSFRMPS.FOR.022	CPU0.S00	DISPCONF.ASM.001	IPU3.S00	DISPRTOM.ASM.001	CPU2.S01	FPTPJBEC.FOR.001	IPU0.S03

FPTPJBIF.FOR.001	CPU0.A16
FPTPJBLS.FOR.001	CPU0.A16
FPTPJBMV.FOR.001	IPU0.S01
FPTPJBOI.FOR.001	IPU0.S03
FPTPJBPF.FOR.001	CPU0.A16
FPTPJBR2.FOR.001	CPU0.A13
FPTPJBR3.FOR.001	CPU0.A13
FPTPJBR4.FOR.001	CPU0.A13
FPTPJBRP.FOR.001	CPU0.A14
FPTPJBSC.FOR.001	IPU0.S03
FPTPJBSL.FOR.001	CPU0.A16
FPTPJBSR.FOR.001	CPU0.A14
FPTPJBUT.FOR.001	CPU0.A15
FPTPJBW2.FOR.001	IPU0.S01
FPTPJBW3.FOR.001	IPU0.S01
FPTPJBW4.FOR.001	CPU0.A11
FPTPJBW5.FOR.001	CPU0.A11
FPTPJBW6.FOR.001	CPU0.A11
FPTPJBWA.FOR.001	IPU0.S01
FPTPJBWP.FOR.001	IPU0.S01
FPTPJD10.FOR.001	IPU0.S05
FPTPJD20.FOR.001	IPU0.S05
FPTPJD30.FOR.001	IPU0.S06
FPTPJD40.FOR.001	IPU0.S00
FPTPJD41.FOR.001	IPU0.S06
FPTPJD42.FOR.001	IPU0.S06
FPTPJD43.FOR.001	IPU0.S06
FPTPJD50.FOR.001	IPU0.S05
FPTPJD51.FOR.001	IPU0.S05
FPTPJD52.FOR.001	IPU0.S05
FPTPJD53.FOR.001	IPU0.S05
FPTPJD60.FOR.001	IPU0.S06
FPTPJD61.FOR.001	IPU0.S06
FPTPJD62.FOR.001	IPU0.S06
FPTPJD63.FOR.001	IPU0.S06
FPTPJD64.FOR.001	IPU0.S06
FPTPJD80.FOR.001	IPU0.S06
FPTPJDPT.FOR.001	CPU0.A15
FPTPJQ1A.FOR.002	IPU0.S04
FPTPJQ1B.FOR.002	IPU0.S04
FPTPJQ1L.FOR.001	IPU0.S04
FPTPJQ2A.FOR.001	IPU0.S04
FPTPJQ2B.FOR.001	IPU0.S04
FPTPJQ3A.FOR.001	IPU0.S04
FPTPJQ3B.FOR.001	IPU0.S04
FPTPJQAN.FOR.001	IPU0.S04
FPTPJQDA.FOR.001	IPU0.S04
FPTPJQDB.FOR.001	IPU0.S04
FPTPJQFD.FOR.001	IPU0.S04
FPTPJQR1.FOR.001	IPU0.S04
FPTPJQSA.FOR.001	IPU0.S04
FPTPJQSB.FOR.001	IPU0.S04
FPTPJTAQ.FOR.001	IPU0.S04
FPTPJTFL.FOR.001	IPU0.S04
FPTPJTLA.FOR.001	IPU0.S04
FPTPJTPS.FOR.001	IPU0.S04
FPTPJTRP.FOR.001	IPU0.S04
FPTPJTUC.FOR.001	IPU0.S04
FPTPJTUH.FOR.001	IPU0.S04
FPTPTPIO.FOR.002	CPU0.A04
FPTPTPIO.FOR.002	CPU0.A09
FPTPXFIO.FOR.001	CPU0.A04
FPTPXFIO.FOR.001	CPU0.A07
FPTPXFIO.FOR.001	CPU0.A08
FPTPXFIO.FOR.001	CPU0.A09
FPTPXFIO.FOR.001	CPU0.A23
FPTPXHIO.FOR.001	CPU0.A03
FPTPXJG1.FOR.001	CPU0.A34
FPTPXJG2.FOR.001	CPU0.A34
FPTPXJG3.FOR.001	CPU0.A34
FPTPXJQV.FOR.001	CPU0.A32
FPTPXJQV.FOR.001	CPU0.A34
FPTPXJS1.FOR.001	CPU0.A33
FPTPXJS2.FOR.001	CPU0.A33
FPTPXJU1.FOR.001	CPU0.A32
FPTPXJVG.FOR.001	CPU0.A31
FPTPXMOV.ASM.001	CPU0.A00
FPTPXMOV.ASM.001	CPU0.A01
FPTPXMOV.ASM.001	CPU0.A02
FPTPXMOV.ASM.001	CPU0.A03
FPTPXMOV.ASM.001	CPU0.A08
FPTPXMOV.ASM.001	CPU0.A32
FPTPXMOV.ASM.001	CPU0.A34
FPTPXQIO.FOR.001	CPU0.A00
FPTPXQIO.FOR.001	CPU0.A01
FPTPXQIO.FOR.001	CPU0.A03
FPTPXQIO.FOR.001	CPU0.A04
FPTPXQIO.FOR.001	CPU0.A05
FPTPXQIO.FOR.001	CPU0.A09
FPTPXQIO.FOR.001	CPU0.A31
FPTPXQIO.FOR.001	CPU0.A32
FPTPXQIO.FOR.001	CPU0.A33
FPTPYGPT.FOR.001	CPU0.A12
FPTPYGRD.FOR.001	CPU0.A12
FPTPYHPT.FOR.001	CPU0.A12
FPTPYHRD.FOR.001	CPU0.A12
FPTPYIPT.FOR.001	CPU1.A00
FPTPYIRD.FOR.001	CPU1.A00
FPTPYMDD.FOR.003	IPU0.S00
FPTPYMDI.FOR.001	CPU3.S00
FPTPYPAL.FOR.001	IPU0.S00
FPTPYPCM.FOR.001	CPU0.A23
FPTPYPCP.FOR.001	CPU0.A23
FPTPYPEP.FOR.001	IPU2.S04
FPTPYPES.FOR.001	IPU3.S06
FPTPYRND.FOR.001	CPU0.S00
FPTPYSDC.FOR.001	CPU3.S00
FPTPYSN1.FOR.001	CPU0.S00
FPTPYSN2.FOR.001	CPU0.S00
IPU0_S00.EXE.222	IPU0.S00
IPU0_S01.EXE.042	IPU0.S01
IPU0_S02.EXE.079	IPU0.S02
IPU0_S03.EXE.091	IPU0.S03
IPU0_S04.EXE.152	IPU0.S04
IPU0_S05.EXE.133	IPU0.S05
IPU0_S06.EXE.120	IPU0.S06
IPU1_S00.EXE.125	IPU1.S00
IPU1_S01.EXE.138	IPU1.S01
IPU1_S02.EXE.053	IPU1.S02
IPU1_S03.EXE.091	IPU1.S03
IPU1_S04.EXE.111	IPU1.S04
IPU1_S05.EXE.205	IPU1.S05
IPU1_S06.EXE.260	IPU1.S06
IPU2_S00.EXE.360	IPU2.S00
IPU2_S01.EXE.137	IPU2.S01
IPU2_S02.EXE.152	IPU2.S02
IPU2_S03.EXE.219	IPU2.S03
IPU2_S04.EXE.085	IPU2.S04
IPU2_S05.EXE.143	IPU2.S05
IPU2_S06.EXE.345	IPU2.S06
IPU3_S00.EXE.138	IPU3.S00
IPU3_S01.EXE.211	IPU3.S01
IPU3_S02.EXE.115	IPU3.S02
IPU3_S03.EXE.192	IPU3.S03
IPU3_S04.EXE.419	IPU3.S04
IPU3_S05.EXE.374	IPU3.S05
IPU3_S06.EXE.172	IPU3.S06
J5CKHIGH.FOR.001	IPU0.S03
J5CKHILO.FOR.001	IPU0.S03
J5GAVDTY.FOR.001	IPU0.S03
J5INGLOB.FOR.001	IPU0.S03
J5INITCB.FOR.001	IPU0.S03
J5POSTPR.FOR.001	IPU0.S03
J5PURSAS.FOR.001	IPU0.S03
J5RATOCH.FOR.001	IPU0.S03
J5RVLUM1.FOR.001	IPU0.S03
J5RVLUM2.FOR.001	IPU0.S03
J5RVLUM3.FOR.001	IPU0.S03
J5RVLUM4.FOR.001	IPU0.S03
J5SRGION.FOR.001	IPU0.S03
J5TRNPRO.FOR.001	IPU0.S03
JBCALPNT.FOR.001	IPU0.S01
SYNC0S00.ASM.001	CPU0.S00
SYNC1S00.ASM.001	CPU1.S00
SYNC1S01.ASM.001	CPU1.S01
SYNC1S02.ASM.001	CPU1.S02
SYNC1S03.ASM.001	CPU1.S03
SYNC1S04.ASM.001	CPU1.S04
SYNC1S05.ASM.001	CPU1.S05
SYNC1S06.ASM.001	CPU1.S06

SYNC2S00.ASM.001	CPU2.S00
SYNC2S01.ASM.001	CPU2.S01
SYNC2S02.ASM.001	CPU2.S02
SYNC2S03.ASM.001	CPU2.S03
SYNC2S04.ASM.001	CPU2.S04
SYNC2S05.ASM.001	CPU2.S05
SYNC2S06.ASM.001	CPU2.S06
SYNC2S07.ASM.001	CPU2.S07
SYNC2S08.ASM.001	CPU2.S08
SYNC3S00.ASM.001	CPU3.S00
SYNI0S00.ASM.001	IPU0.S00
SYNI0S01.ASM.001	IPU0.S01
SYNI0S02.ASM.001	IPU0.S02
SYNI0S03.ASM.001	IPU0.S03
SYNI0S04.ASM.001	IPU0.S04
SYNI0S05.ASM.001	IPU0.S05
SYNI0S06.ASM.001	IPU0.S06
SYNI1S00.ASM.001	IPU1.S00
SYNI1S01.ASM.001	IPU1.S01
SYNI1S02.ASM.001	IPU1.S02
SYNI1S03.ASM.001	IPU1.S03
SYNI1S04.ASM.001	IPU1.S04
SYNI1S05.ASM.001	IPU1.S05
SYNI1S06.ASM.001	IPU1.S06
SYNI2S00.ASM.001	IPU2.S00
SYNI2S01.ASM.001	IPU2.S01
SYNI2S02.ASM.001	IPU2.S02
SYNI2S03.ASM.001	IPU2.S03
SYNI2S04.ASM.001	IPU2.S04
SYNI2S05.ASM.001	IPU2.S05
SYNI2S06.ASM.001	IPU2.S06
SYNI3S00.ASM.001	IPU3.S00
SYNI3S01.ASM.001	IPU3.S01
SYNI3S02.ASM.001	IPU3.S02
SYNI3S03.ASM.001	IPU3.S03
SYNI3S04.ASM.001	IPU3.S04
SYNI3S05.ASM.001	IPU3.S05
SYNI3S06.ASM.001	IPU3.S06
XV45QOUT.FOR.001	CPU0.A01
XV45QOUT.FOR.001	CPU0.A32
XV45QOUT.FOR.001	CPU0.A34

RECORDING INTERVALS

.0	.4
300.0	1.0
900.0	2.0
1800.0	-1.0

LABELS RECORDED

%%

HHWLHB	LEAK FLOW HOT LEG LOOP B	LBM/S
HSXQCL	COLD LEG A QUALITY XQ	–
HSXQCLB	COLD LEG B QUALITY XQ	–
HSXQCLC	COLD LEG C QUALITY XQ	–
HSXQHL	HOT LEG A QUALITY XQ	–
HSXQHLB	HOT LEG B QUALITY XQ	–
HSXQHLC	HOT LEG C QUALITY XQ	–
HRVTLIQ	RV-HEAD LIQUID VOLUME	ft3
HRVTVAP	RV-HEAD VAPOUR VOLUME	ft3
HSXVRC	CORE NODE 01 VOID FRACTION	–
HSXVRC2	CORE NODE 02 VOID FRACTION	–
HSXVRC3	CORE NODE 03 VOID FRACTION	–
HSXVRC4	CORE NODE 04 VOID FRACTION	–
HSXVRC5	CORE NODE 05 VOID FRACTION	–
HSXVRC6	CORE NODE 06 VOID FRACTION	–
HSXVRC7	CORE NODE 07 VOID FRACTION	–
HSXVUP	UPPR PLNM A VOID FRACTION	–
HSXVUPB	UPPR PLNM B VOID FRACTION	–
HSXVUPC	UPPR PLNM C VOID FRACTION	–
HPPRES	PRESSURIZER PRESSURE	PSIA
H1B:0006	PRESSURIZER LEVEL CH 1 LT-459	%LEVEL
JQATMRC	CET TEMP SAT MARGIN	
HRSWT	TOTAL CORE THERMAL POWER	MWt
H1B:0131	RCS FLOW LOOP A CH 1 FT-414	%FLOW
H1B:0134	RCS FLOW LOOP A CH 1 FT-424	%FLOW
H1B:0137	RCS FLOW LOOP A CH 1 FT-434	%FLOW
SGPDOM	PRESSURE OF STEAM DOME	PSIA
SGWDOM	FLOW:DOME TO MAIN STEAM	LB/S
FFW13	STEAM LINE 1 FLOW - FROM SG.A	LB/S
FAW84	S/G-1 FEED FLOW	lb/s
DTHLIQ	ENTHALPY AT SGU A (BTU/LBM)	
F1LT474O	LT-474 OUTPUT	%
SGMTOT	TOTAL STEAM GENERATOR MASS	LB

HSTCL	COLD LEG A TEMPERATURE DEG F	
HSTHL	HOT LEG A TEMPERATURE DEG F	
H2:TI28	PROT Tave LOOP A IND.	AO0221
H2:TI12	PROT DELTA T LOOP A IND.	AO0190
SGPDOM2	PRESSURE OF STEAM DOME	PSIA
SGWDOM2	FLOW:DOME TO MAIN STEAM	LB/S
FFW12	STEAM LINE 2 FLOW - FROM SG.B	LB/S
FAW90	S/G-2 FEED FLOW	lb/s
DTHLIQ2	ENTHALPY AT SGU B (BTU/LBM)	
F1LT484O	LT-484 OUTPUT	%
SGMTOT2	TOTAL STEAM GENERATOR MASS	LB
HSTCLB	COLD LEG B TEMPERATURE DEG F	
HSTHLB	HOT LEG B TEMPERATURE DEG F	
H2:TI30	PROT Tave LOOP B IND.	AO0222
H2:TI18	PROT DELTA T LOOP B IND.	AO0193
SGPDOM3	PRESSURE OF STEAM DOME	PSIA
SGWDOM3	FLOW:DOME TO MAIN STEAM	LB/S
FFW11	STEAM LINE 3 FLOW - FROM SG.C	LB/S
FAW96	S/G-3 FEED FLOW	lb/s
DTHLIQ3	ENTHALPY AT SGU C (BTU/LBM)	
F1LT494O	LT-494 OUTPUT	%
SGMTOT3	TOTAL STEAM GENERATOR MASS	LB
HSTCLC	COLD LEG C TEMPERATURE DEG F	
HSTHLC	HOT LEG C TEMPERATURE DEG F	
H2:TI32	PROT Tave LOOP C IND.	AO0223
H2:TI24	PROT DELTA T LOOP C IND.	AO0196
HHP08	RCP COLD LEG LOOP A PRESSURE	PSIA
MRWN26	MASS FLOW RHR LINK 26	LBM/S
MRHN13	ENTHALPY RHR NODE 13	BTU/LBM
HHP09	RCP COLD LEG LOOP B PRESSURE	PSIA
MRWN27	MASS FLOW RHR LINK 27	LBM/S
MRHN15	ENTHALPY RHR NODE 15	BTU/LBM
HHP10	RCP COLD LEG LOOP C PRESSURE	PSIA
MRWN29	MASS FLOW RHR LINK 29	LBM/S
MRHN16	ENTHALPY RHR NODE 16	BTU/LBM
SBW24	CONDENSER STM DUMP 2827-28 (A24)	LB/S
SBW26	CONDENSER STM DUMP 2829-30 (A26)	LB/S
CAPATM	CTMT PRESSURE	PSI
HRPHEAD	PRESSURE IN RV-HEAD CONTROL VOLUME	psia
HRMVAP	RV-HEAD VAPOUR MASS	#

HRHSVAP	SP ENTH IN RV-HEAD VAP PHASE	Btu/#
HRHV	WATER VAPOUR SP ENTH IN RV-HEAD	Btu/#
HRTVAP	RV-HEAD VAPOUR TEMPERATURE	deg F
HRTLIQ	RV-HEAD LIQUID TEMPERATURE	deg F
HRWAKV	RV-HEAD CORE BARREL FLANGE VAP FLOW	#/s
HRWAKL	RV-HEAD CORE BARREL FLANGE LIQ FLOW	#/s
HRWCEAV	RV-HEAD CRDM VAP FLOW	#/s
HRWCEAL	RV-HEAD CRDM LIQ FLOW	#/s
HRWHUPV	RV-HEAD UPPER SUP PLATE VAP FLOW	#/s
HRWHUPL	RV-HEAD UPPER SUP PLATE LIQ FLOW	#/s
HRWVENTV	RV-HEAD VAP VENT FLOW	#/s
HRWVENTL	RV-HEAD LIQ VENT FLOW	#/s
HRWALKEY	FLOW FROM INLET NOZZLE TO RV-HEAD	#/s
HRWRVHUP	FLOW FROM RV-HEAD TO UPPER PLNUM	#/s
HRWEVAP	RV-HEAD EVAPORATION FLOW	#/s
HRWCOND	RV-HEAD VAPOUR CONDENSATION FLOW	#/s

6. EVALUATION

6.1 Basis for Evaluation

This test will be evaluated based on expert examination and comparison to best estimate analysis performed with the RETRAN02 program. The results will be evaluated using the guidelines in ANS 3.5, examined for consistency and reasonableness for the physical processes occurring, and their importance with respect to training.

Since this activity involves comparing one model against another, neither model will automatically be presumed to be the best representation of the plant response. The basis for any significant differences will be determined.

6.2 Discussion of Results

The test results are presented graphically in Appendix B.

The following parameters are plotted:

HHWLHB LEAK FLOW HOT LEG LOOP B LBM/S
HPPRES RCP COLD LEG LOOP A PRESSURE PSIA
HSXQCLB COLD LEG B QUALITY XQ –

The break flow predictions for the Simulator and RETRAN models agree very well for the duration of the transient. At approximately 20 minutes, the Simulator flow rate drops below the RETRAN model. The pressure agrees reasonable well although the Simulator predicts a lower pressure in the 20 to 30 minute period. The magnitude of the deviation is acceptable from a training standpoint particularly considering the time frame when it occurs. The Simulator break quality follows the same trend as the RETRAN model but doesn't reach the same magnitude.

The oscillations in the break flow and break quality near the end of the transient are a result of the Simulator beginning to refill the break node and re-establish natural circulation. The magnitude of the oscillations are not overwhelming and cannot be observed in the pressure or other measured parameters.

H1B:0006 PRESSURIZER LEVEL CH 1 LT-459 %LEVEL
HRSWT TOTAL CORE THERMAL POWER MWt

The pressurizer level and core thermal power comparisons are unremarkable.

JQATMRC CET TEMP SAT MARGIN

The saturation margin comparison is difficult to interpret because the transient progresses so quickly initially. The trends and magnitudes are comparable.

H1B:0131 RCS FLOW LOOP A CH 1 FT-414 %FLOW
H1B:0134 RCS FLOW LOOP B CH 1 FT-424 %FLOW
H1B:0137 RCS FLOW LOOP C CH 1 FT-434 %FLOW

The RCS flow rates compare reasonably well. Because of the nature of the modelling, the Simulator does not show the erratic behavior in the flow rate that the RETRAN model does. In the range of 400 to 1600 seconds the natural circulation flow is completely broken in the simulator. After 1600 seconds the loops begin trying to re-establish a natural circulation loop.

MRWN26 MASS FLOW RHR LINK 26 LBM/S
MRWN27 MASS FLOW RHR LINK 27 LBM/S
MRWN29 MASS FLOW RHR LINK 29 LBM/S

The SI flow vs pressure characteristic is determined from the simulator and input to RETRAN as a boundary condition. Hence, the differences in this comparison reflects the difference in RCS pressure.

SGPDOM PRESSURE OF STEAM DOME PSIA
SGWDOM FLOW:DOME TO MAIN STEAM LB/S
FAW84 S/G-1 FEED FLOW lb/s
DTHLIQ ENTHALPY AT SGU A (BTU/LBM)
SGMTOT TOTAL STEAM GENERATOR MASS LB
SBW24 CONDENSER STM DUMP 2827-28 (A24) LB/S
SBW26 CONDENSER STM DUMP 2829-30 (A26) LB/S

SGPDOM2 PRESSURE OF STEAM DOME PSIA
SGWDOM2 FLOW:DOME TO MAIN STEAM LB/S
FAW90 S/G-2 FEED FLOW lb/s
DTHLIQ2 ENTHALPY AT SGU B (BTU/LBM)
SGMTOT2 TOTAL STEAM GENERATOR MASS LB

The secondary parameters for both the broken and intact loops are pretty much unremarkable. The difference in the initial steam generator mass and the difference in steam dump capacity were discussed in MFW-002, Loss of Normal Feedwater. As of 03/03/90, the steam dump capacity has been corrected. A deficiency on the steam generator mass is in process. In this transient, the steam generator pressure is following the RCS down. Both of the models seem to agree on the path this process should follow. The feedwater flow rate and enthalpy are both boundary conditions taken from the Simulator to the RETRAN model. The spike in the RETRAN model enthalpy is a result of the RETRAN code logic selecting the steam enthalpy when the flow is zero. Therefore, it is of no consequence.

HSTCLB COLD LEG B TEMPERATURE DEG F
HSTHLB HOT LEG B TEMPERATURE DEG F
HSTCL COLD LEG A TEMPERATURE DEG F
HSTHL HOT LEG A TEMPERATURE DEG F

The loop temperature comparisons illustrate the two phase hydraulic model differences between the Simulator and the RETRAN model. The hot leg temperatures follow the saturation temperature in the system for the duration of the transient. The cold leg temperatures follow the saturation line until significant separation begins to occur. Once the circulating loop is broken, the cold legs begin cooling from the cold SI flow. As can be seen in the figures, the Simulator models don't demonstrate the erratic behavior as the flow begins to break. The Simulator shows both the A and B loops beginning to re-establish natural circulation at approximately 1400 seconds. The RETRAN model B loop follows at roughly 1600 seconds and the A loop is just beginning at the end of the test.

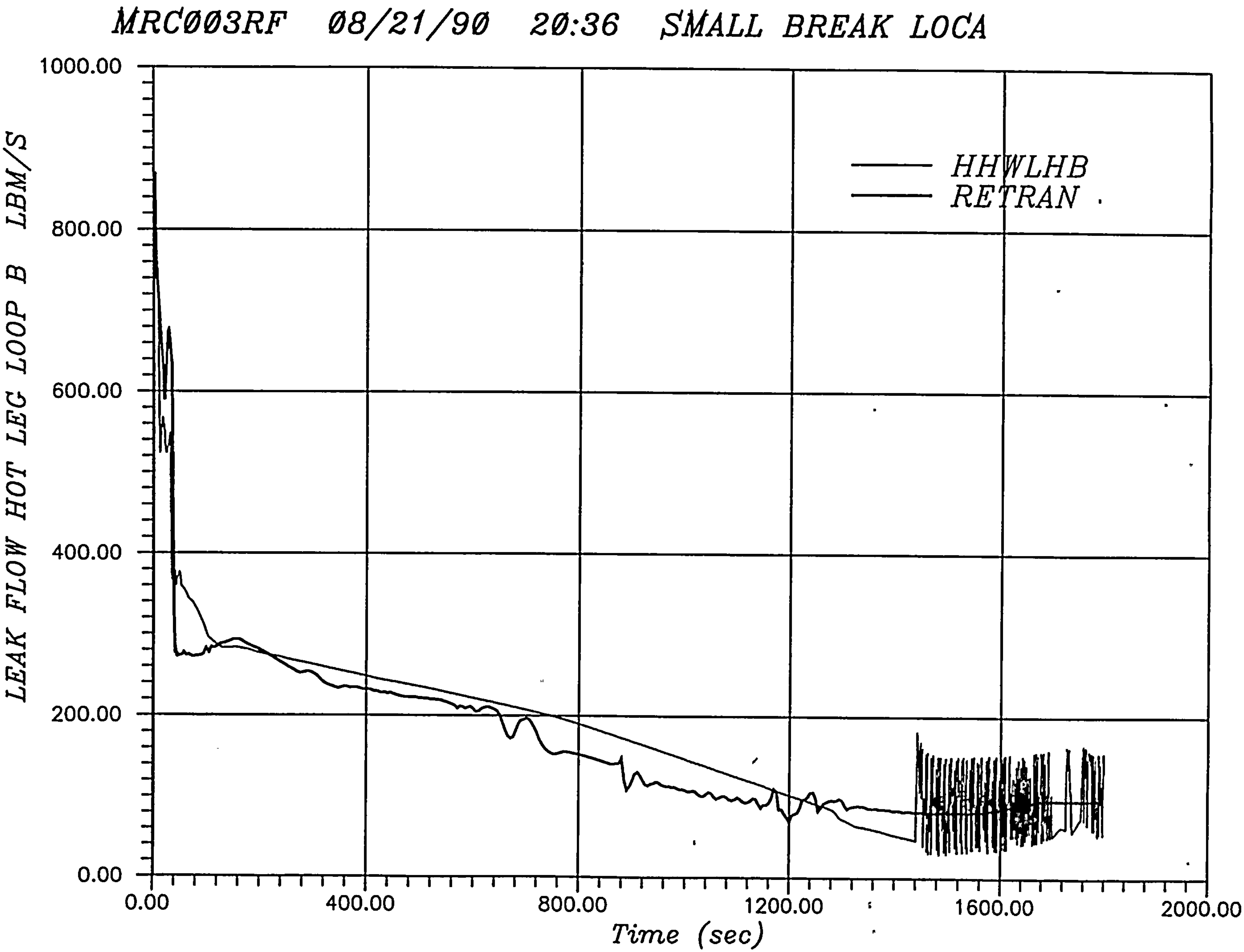
APPENDIX A - TEST TEAM COMMENTS AND OBSERVATIONS

DATE: 08/21/90

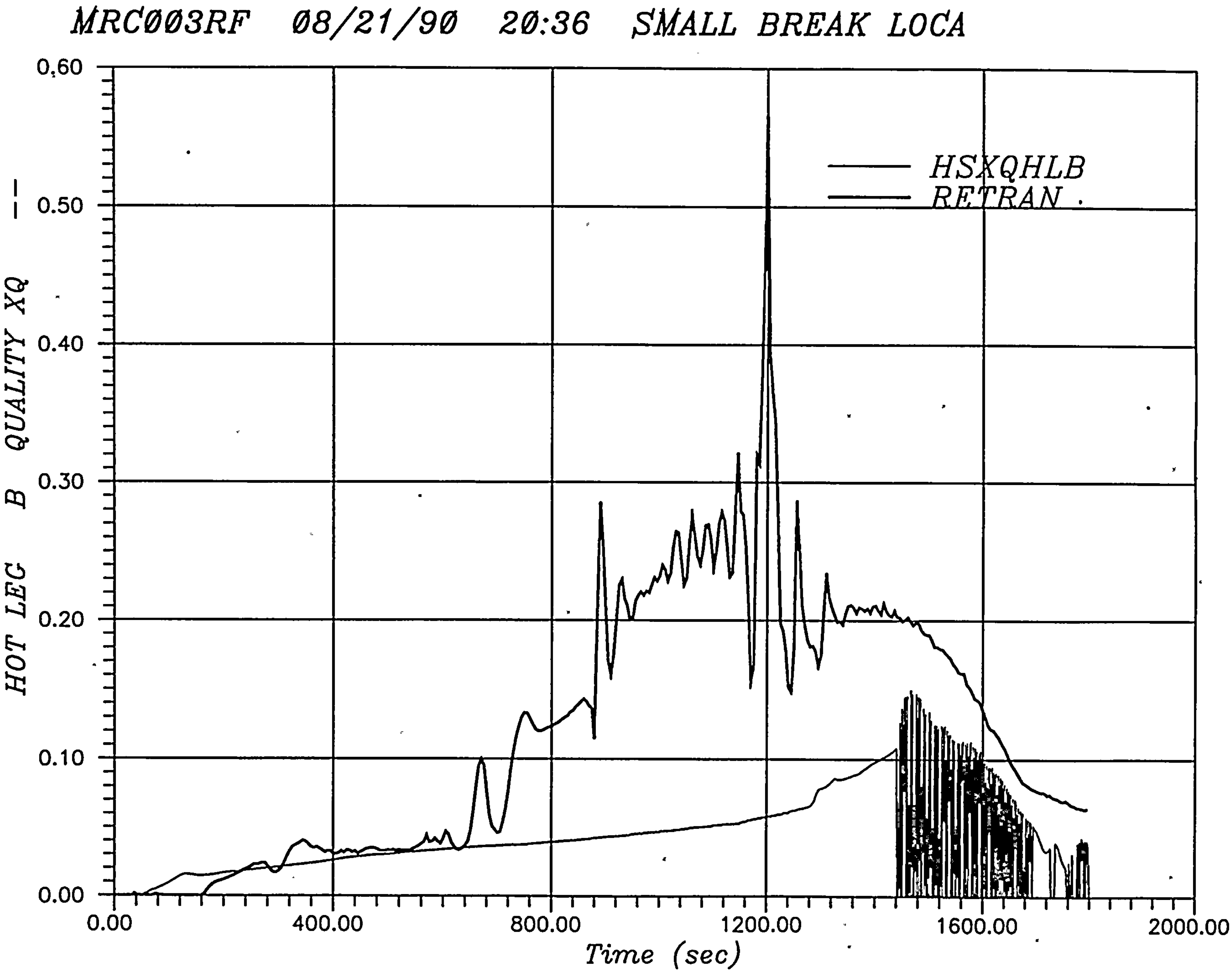
MEMBERS OF TEST TEAM	INITIALS
James F Harrison	JFH

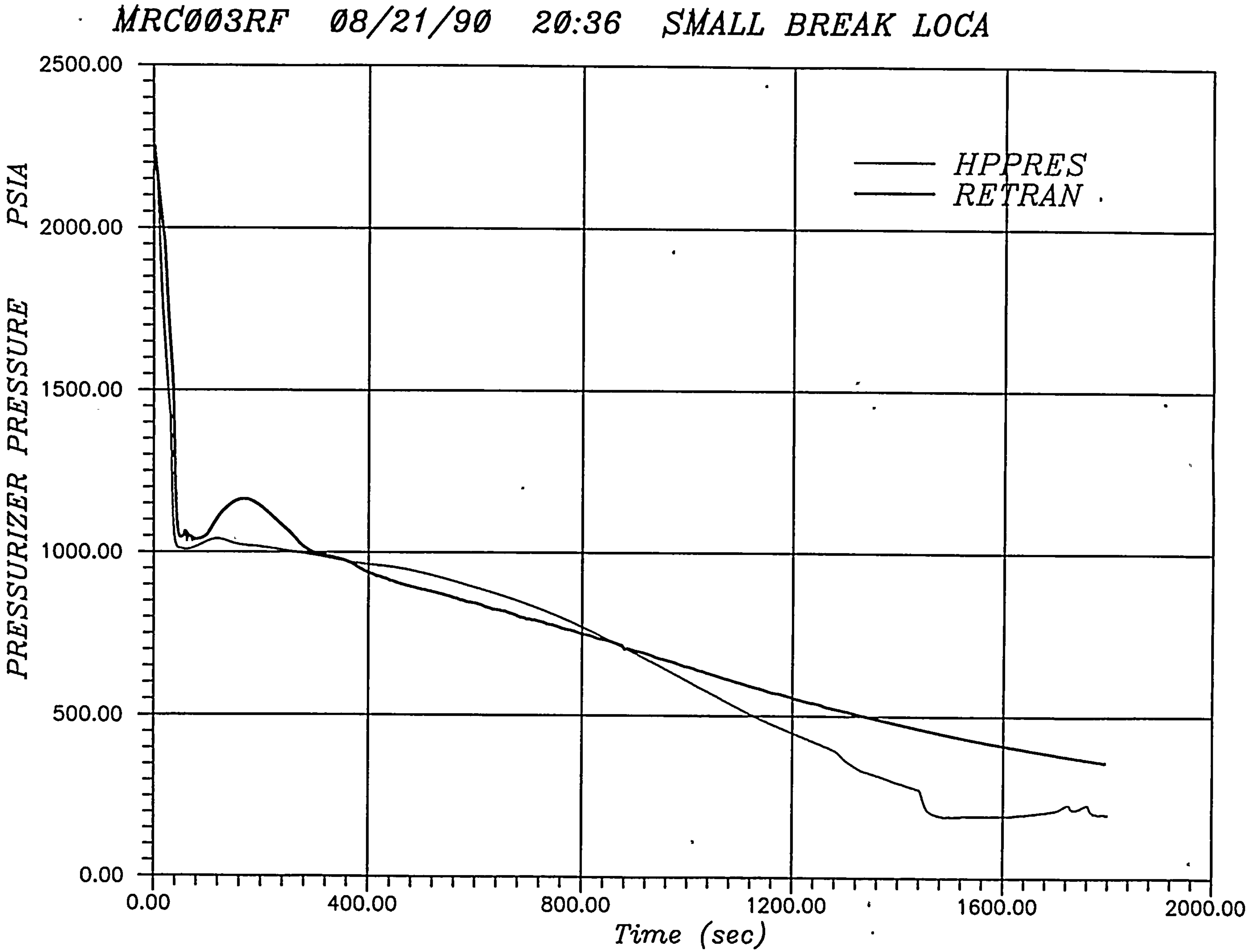
COMMENTS

The FATHER configuration was copied to WORK and the following updates were included: HH.014, H1.009, HR.020, and HQ.005. These modifications addressed previously reported discrepancies regarding break flow rate and cold leg temperatures during safety injection. Variable XCWFRAC2 was set to 40. in Module HQ.005 using RTD. The oscillations in break flow rate at the end of the transient are not particularly significant from a training standpoint, but should be addressed at a low priority.

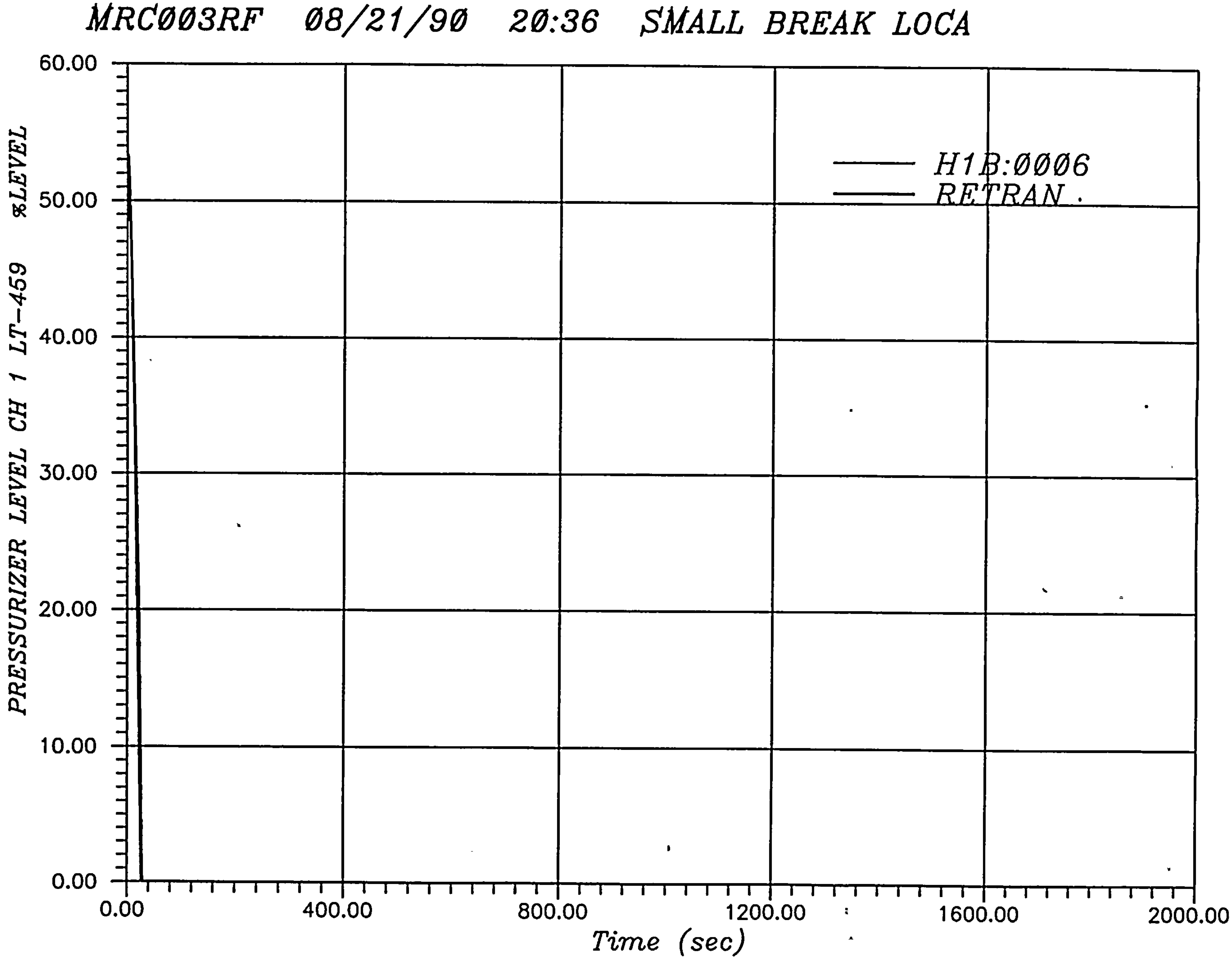


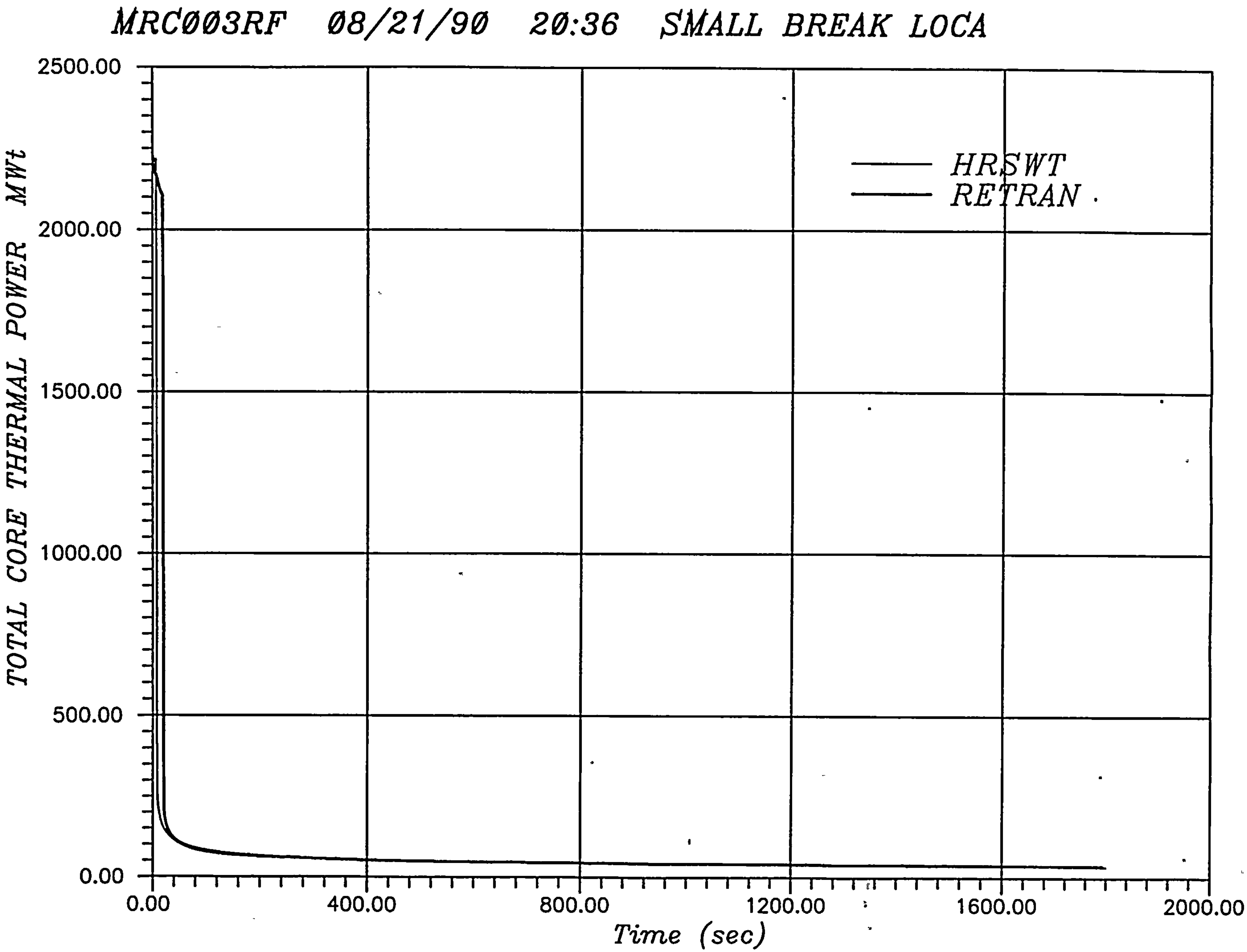
MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
HHWLHB
RETRAN
LEAK FLOW HOT LEG LOOP B LBM/S
0.00
200.00
400.00
600.00
800.00
1000.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)


MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
HSXQHLB
RETRAN
HOT LEG B QUALITY XQ
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)

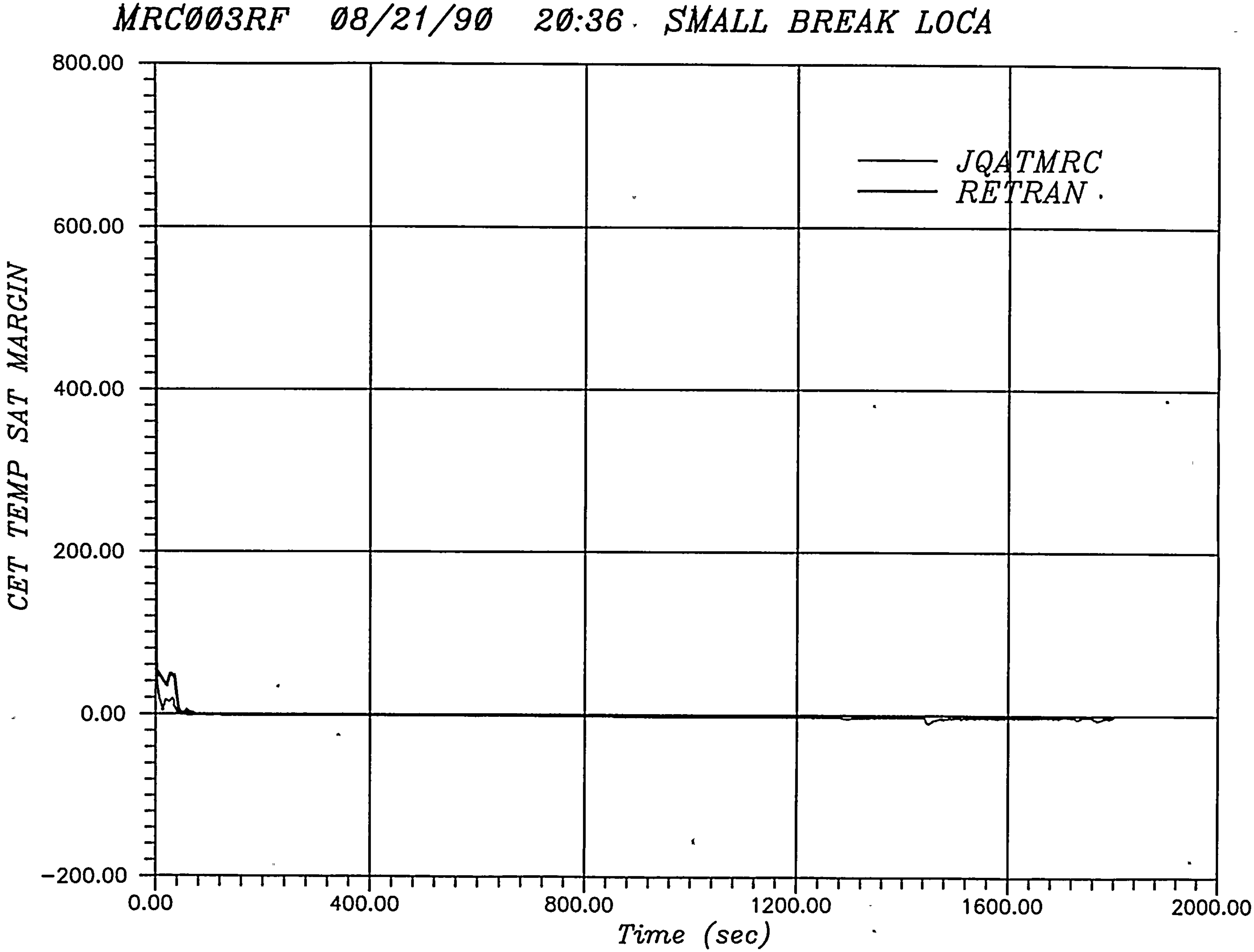


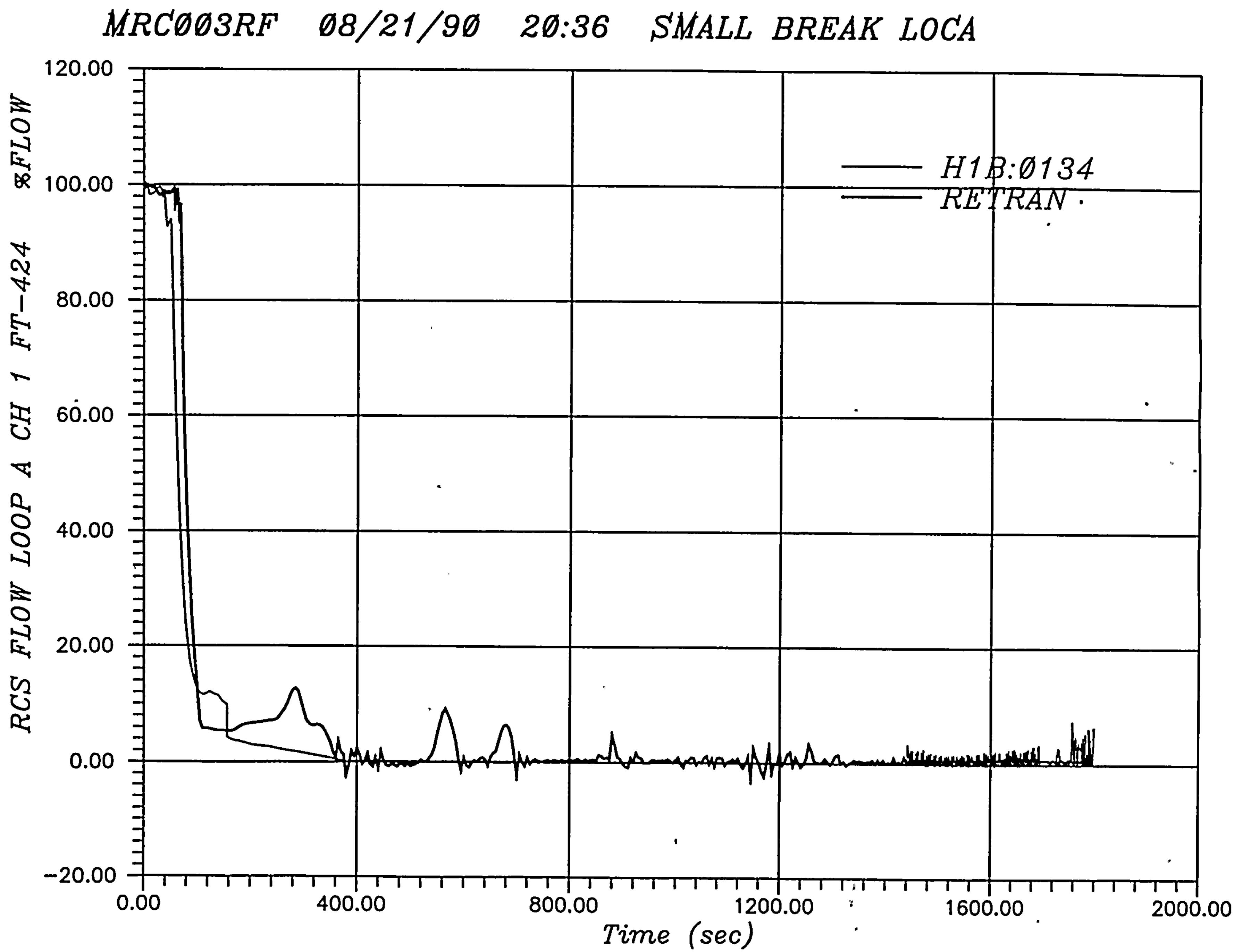
MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
PRESSURIZER PRESSURE PSIA
Time (sec)
HPPRES
RETRAN
2500.00
2000.00
1500.00
1000.00
500.00
0.00
400.00
800.00
1200.00
1600.00
2000.00


MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
H1B:0006
RETRAN
PRESSURIZER LEVEL CH 1 LT-459 %LEVEL
Time (sec)
0.00
10.00
20.00
30.00
40.00
50.00
60.00
400.00
800.00
1200.00
1600.00
2000.00

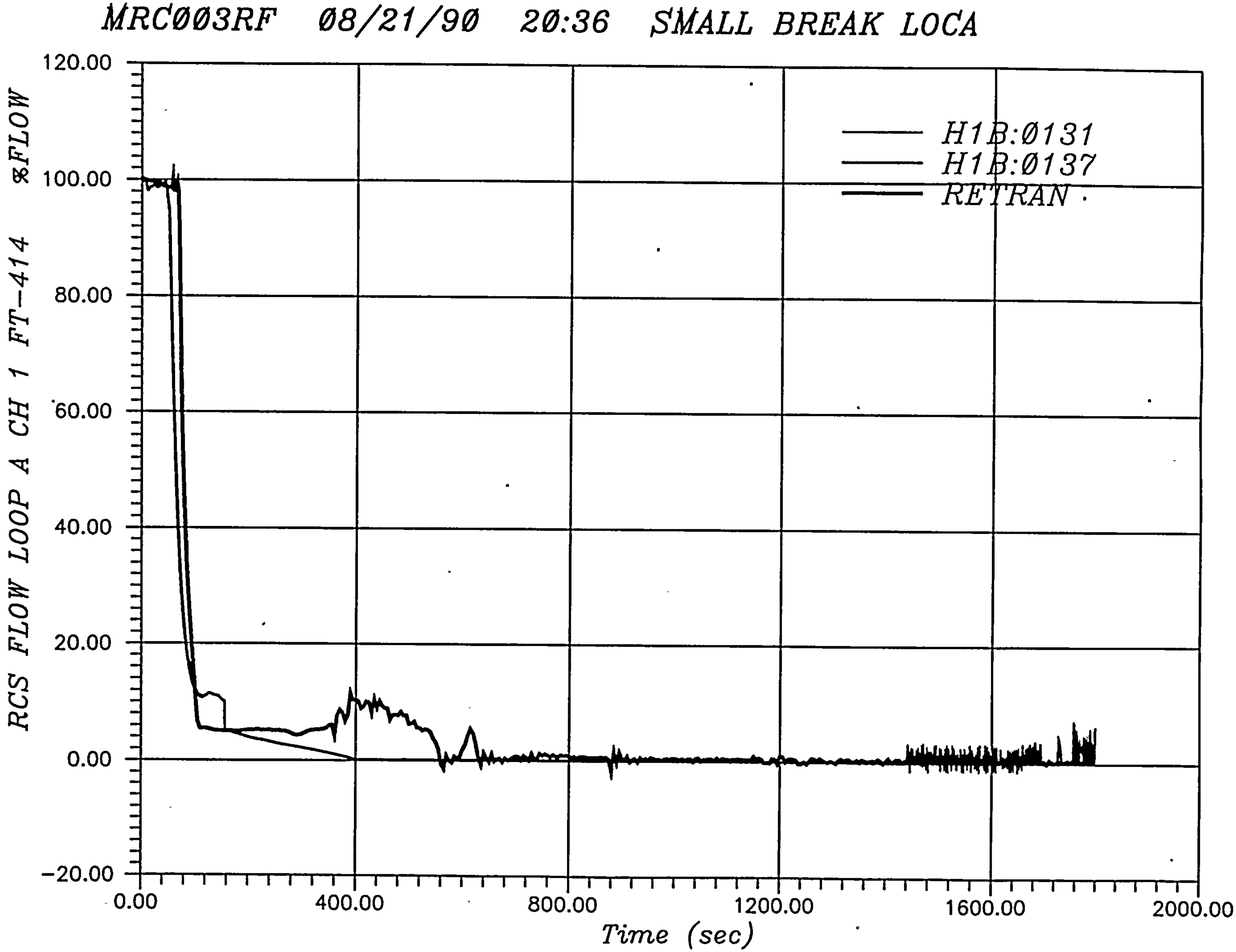


MRCØØ3RF 08/21/90 20:36 SMALL BREAK LOCA
HRSWT
RETRAN
TOTAL CORE THERMAL POWER MWt
2500.00
2000.00
1500.00
1000.00
500.00
0.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)

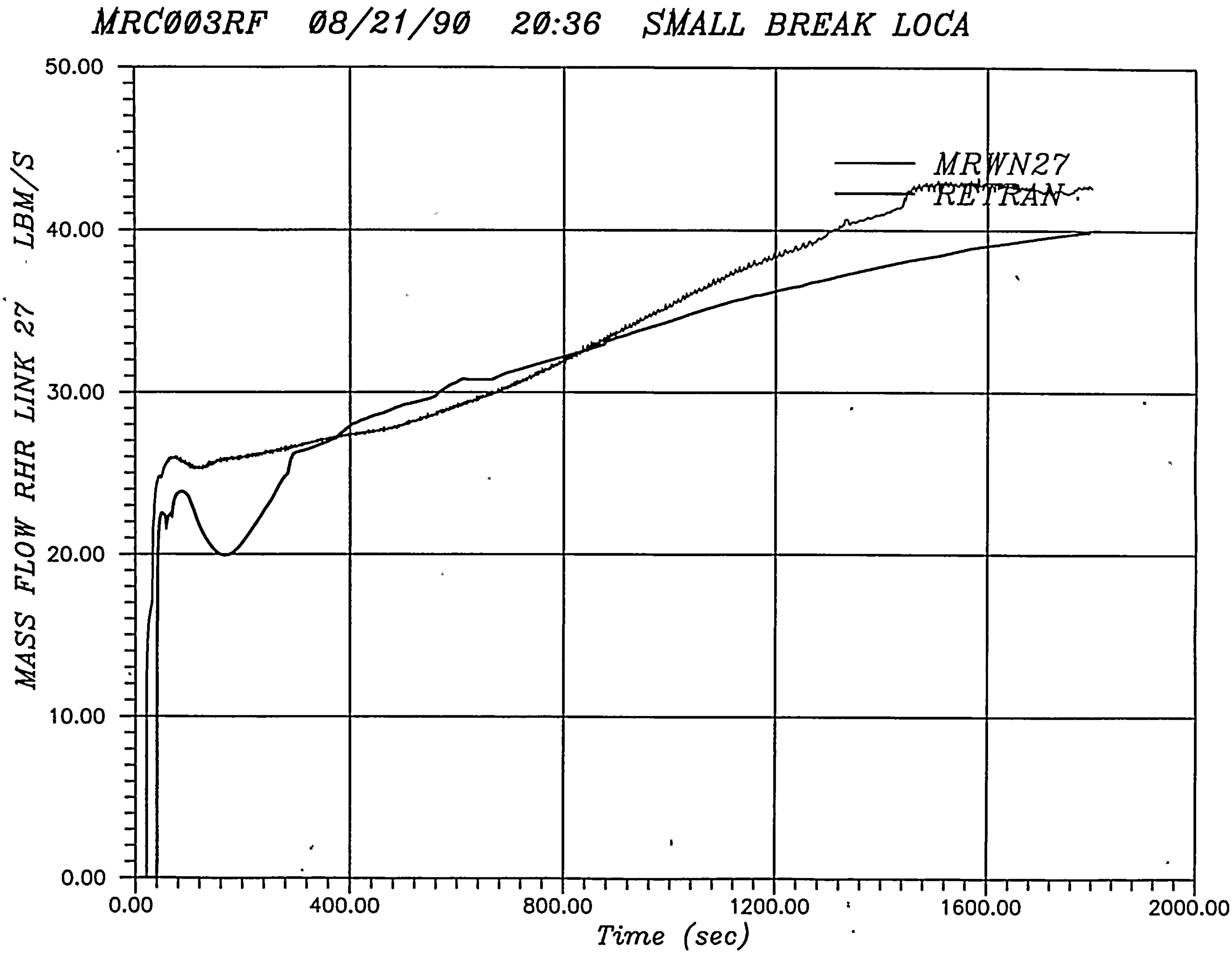

MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
JQATMRC
RETRAN
CET TEMP SAT MARGIN
800.00
600.00
400.00
200.00
0.00
-200.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)

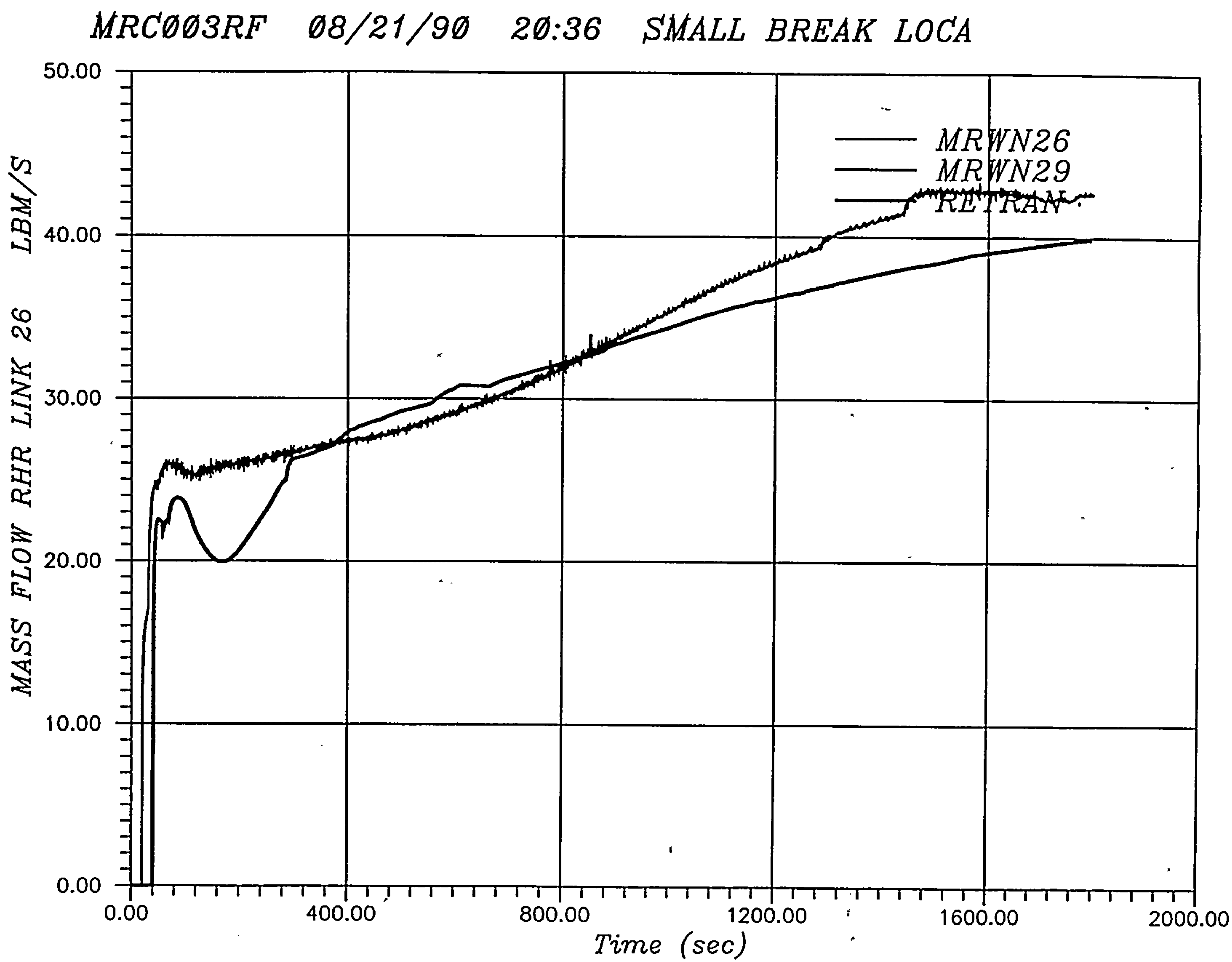


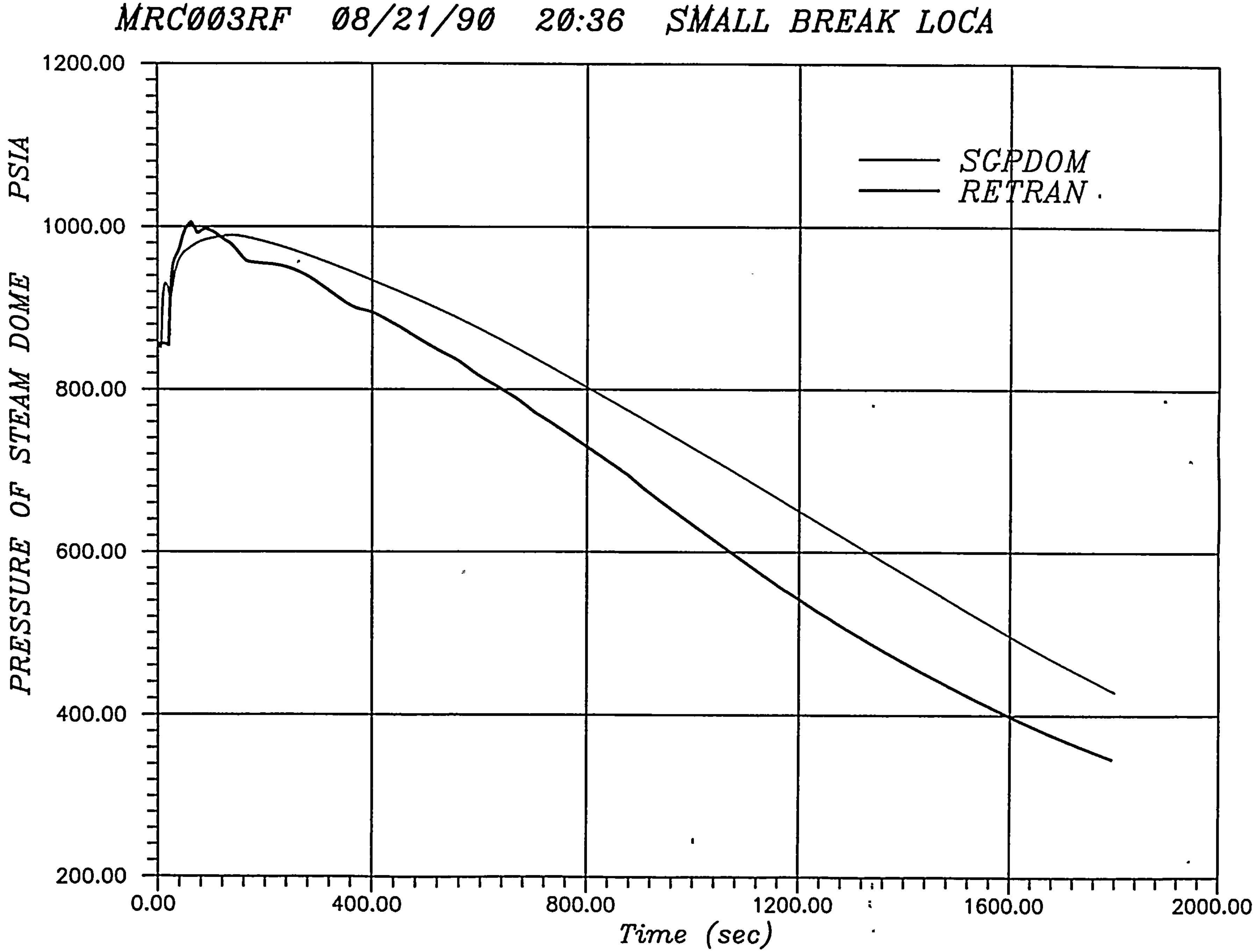
MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
RCS FLOW LOOP A CH 1 FT-424 %FLOW
H1B:0134
RETRAN
120.00
100.00
80.00
60.00
40.00
20.00
0.00
-20.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)

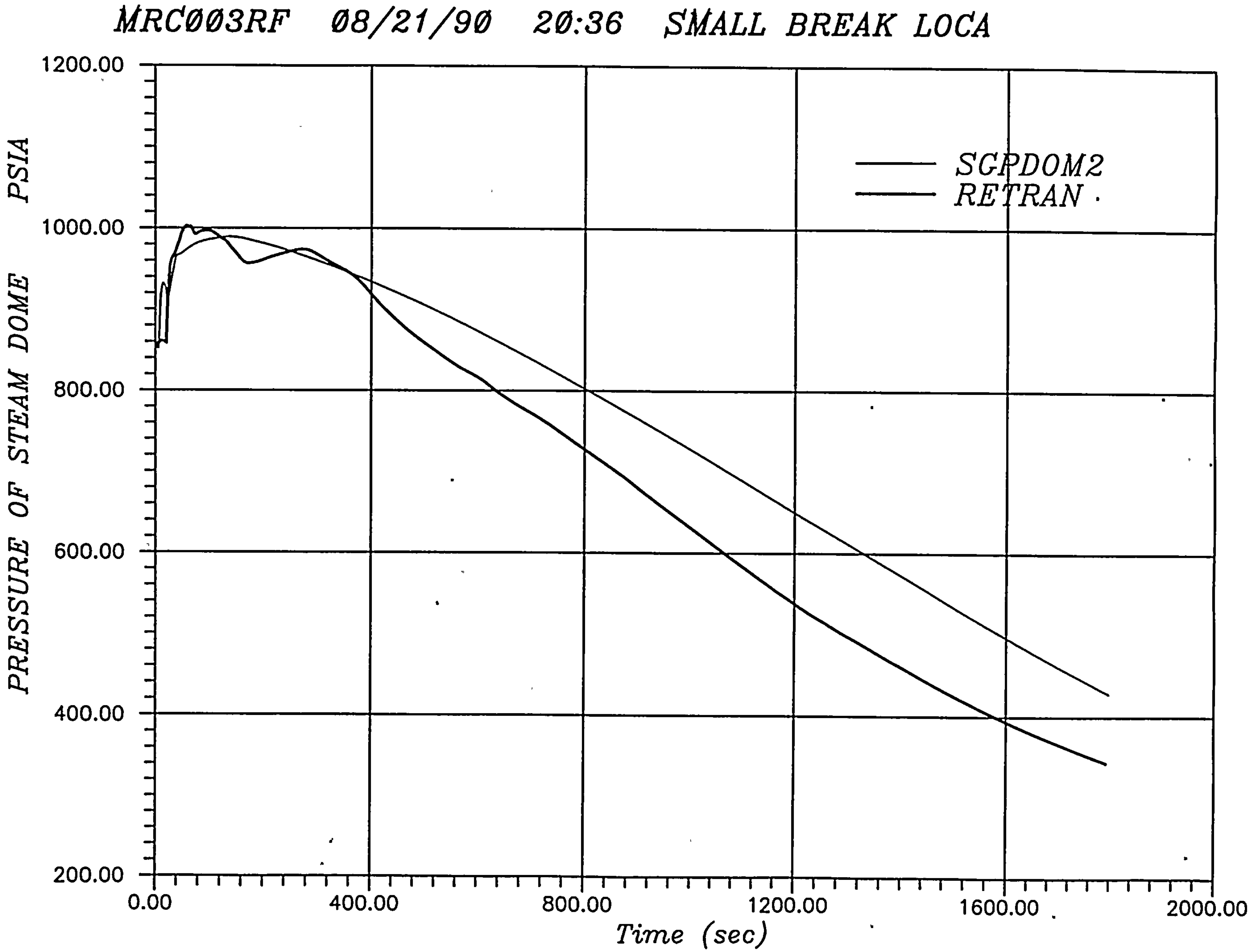


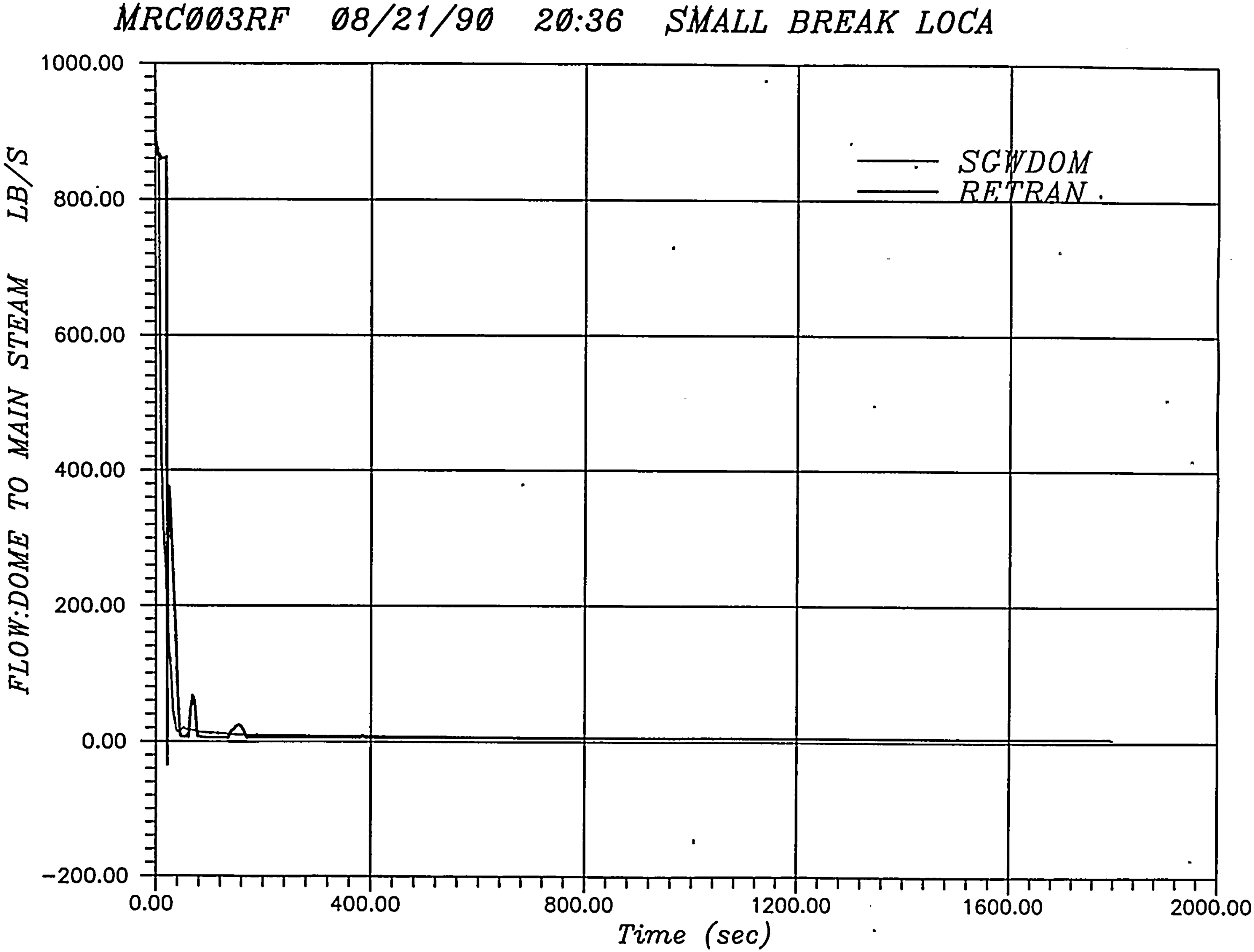
MRCØØ3RF 08/21/90 20:36 SMALL BREAK LOCA
RCS FLOW LOOP A CH 1 FT-414 %FLOW
H1B:Ø131
H1B:Ø137
RETRAN
120.00
100.00
80.00
60.00
40.00
20.00
0.00
-20.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)

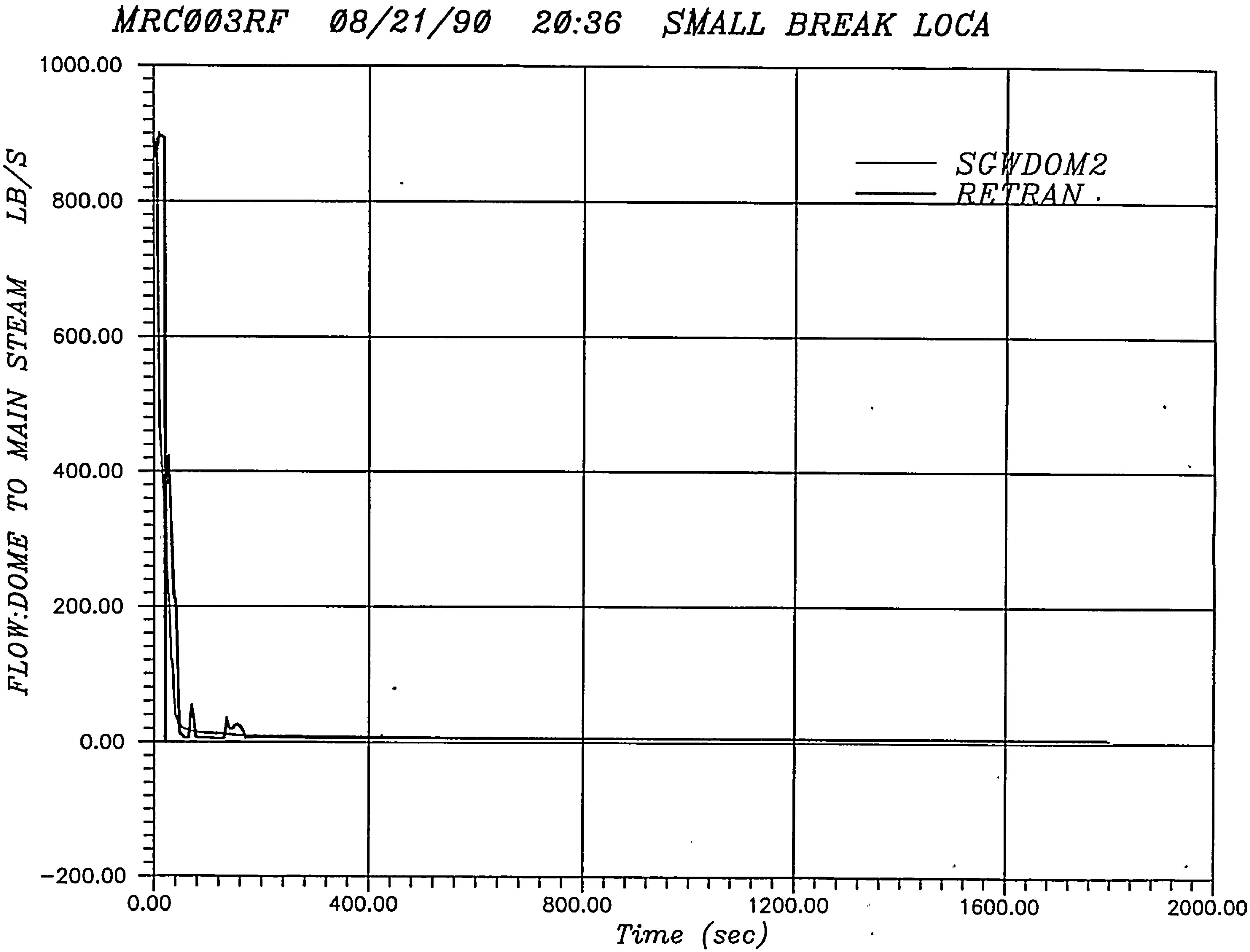

MRCØØ3RF 08/21/90 20:36 SMALL BREAK LOCA
MASS FLOW RHR LINK 27 LBM/S
MRWN27
RETRAN
50.00
40.00
30.00
20.00
10.00
0.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)


MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
MASS FLOW RHR LINK 26 LBM/S
50.00
40.00
30.00
20.00
10.00
0.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)
MRWN26
MRWN29
RETRAN

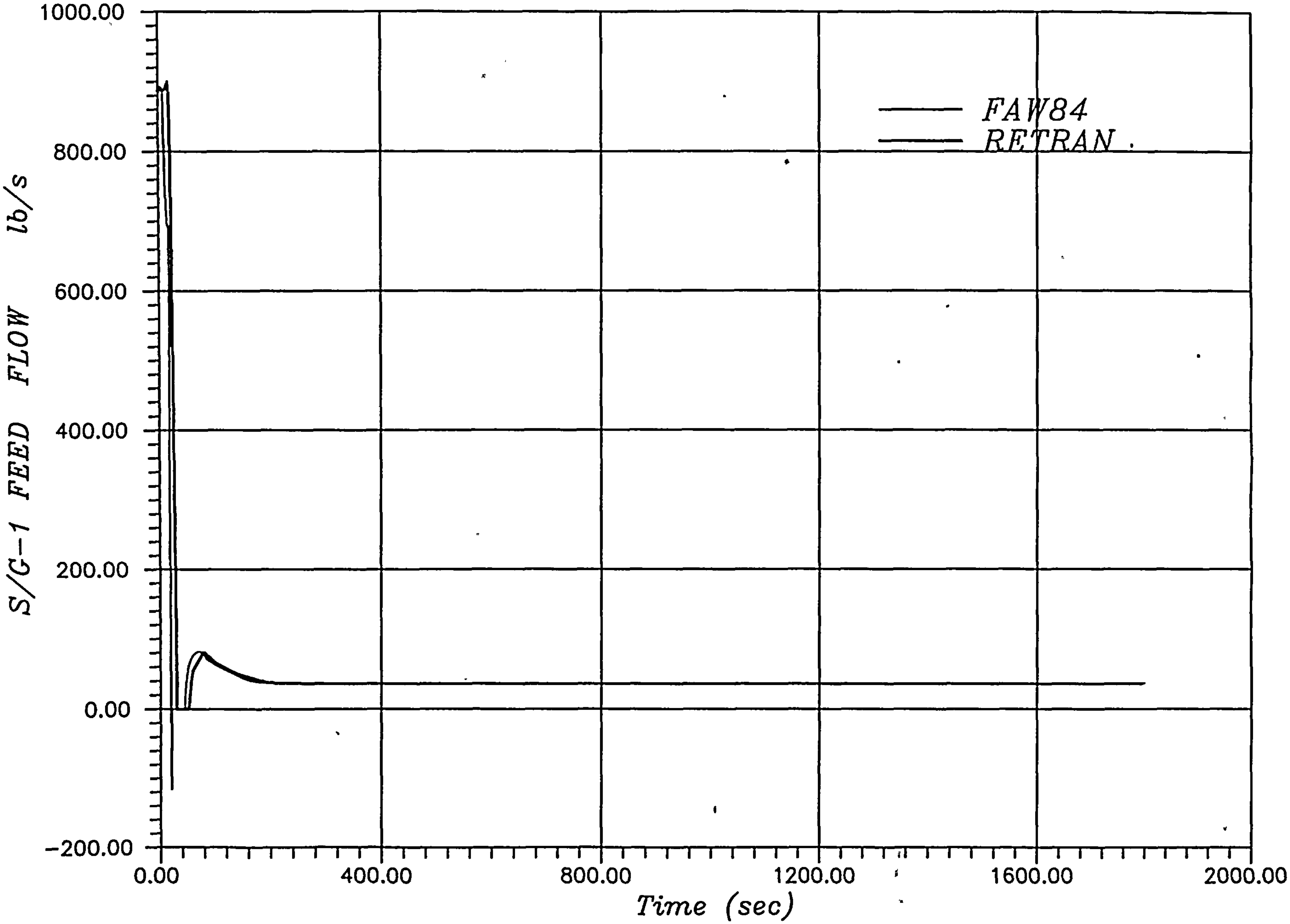

MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
1200.00
1000.00
800.00
600.00
400.00
200.00
PRESSURE OF STEAM DOME PSIA
SGPDOM
RETRAN
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)


MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
PRESSURE OF STEAM DOME PSIA
SGPDOM2
RETRAN
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)

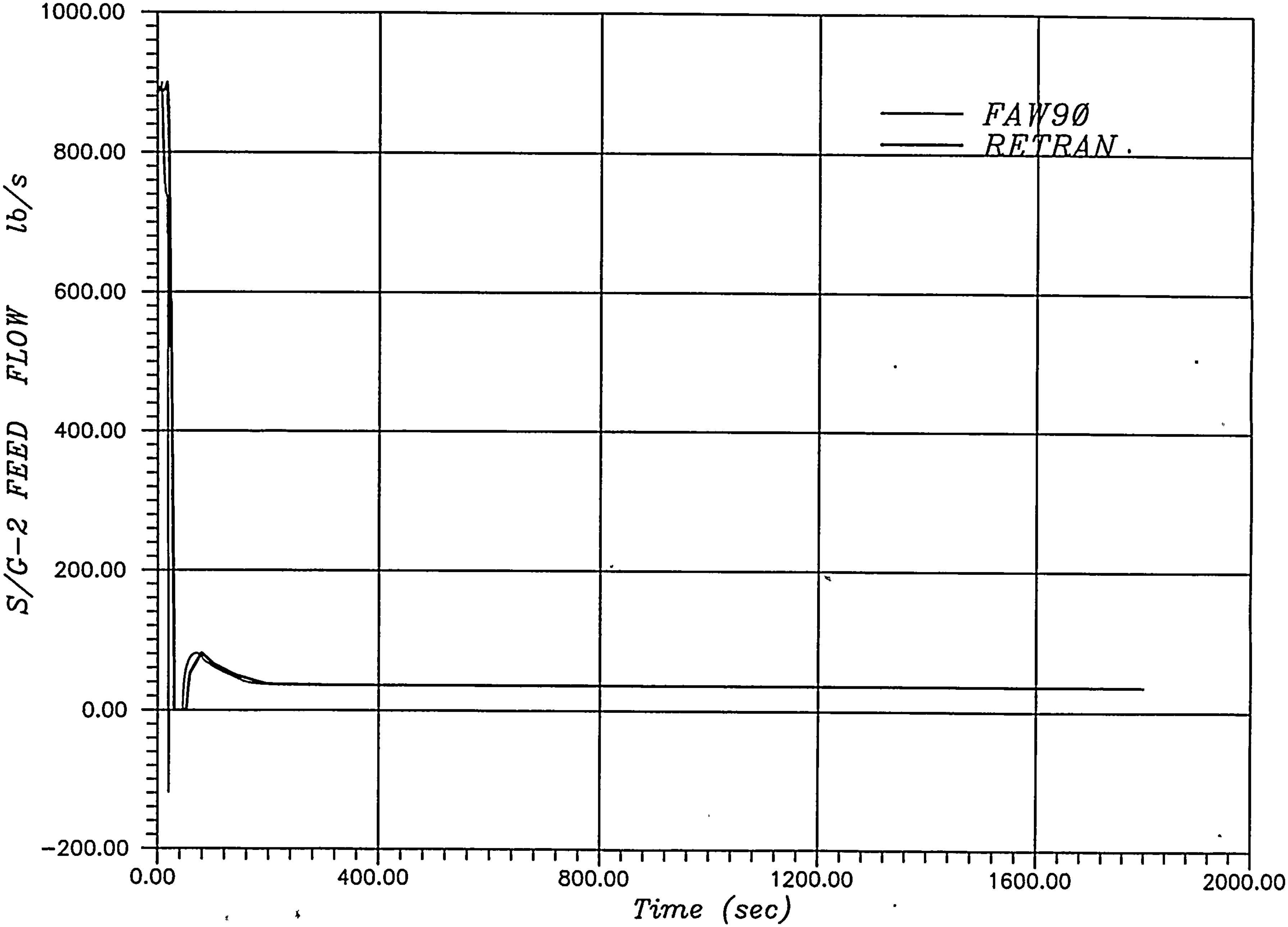

MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
FLOW:DOME TO MAIN STEAM LB/S
1000.00
800.00
600.00
400.00
200.00
0.00
-200.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)
SGWDOM
RETRAN


MRCØØ3RF 08/21/90 20:36 SMALL BREAK LOCA
FLOW:DOME TO MAIN STEAM LB/S
1000.00
800.00
600.00
400.00
200.00
0.00
-200.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)
SGWDOM2
RETRAN

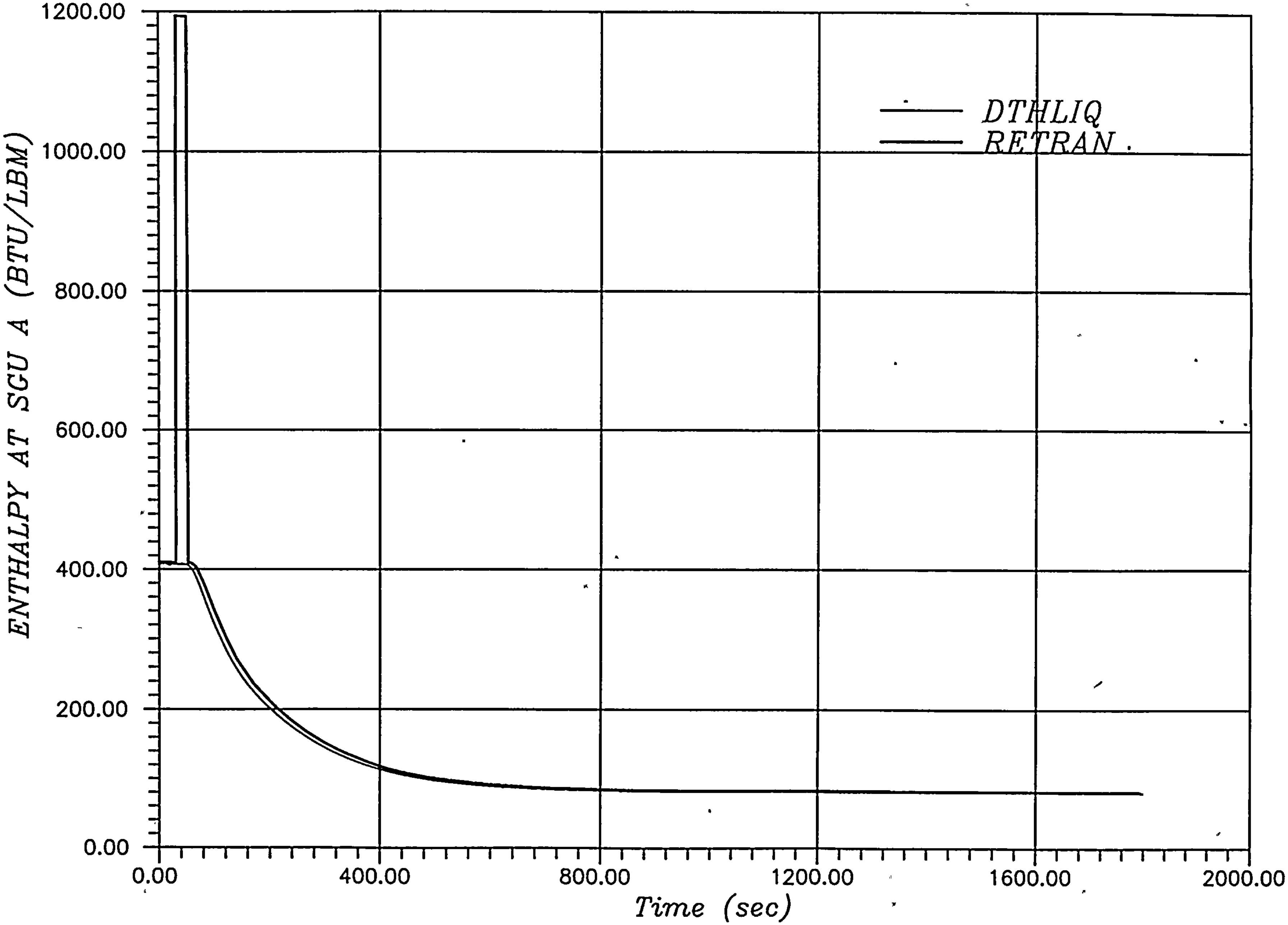
MRCØØ3RF 08/21/90 20:36 SMALL BREAK LOCA

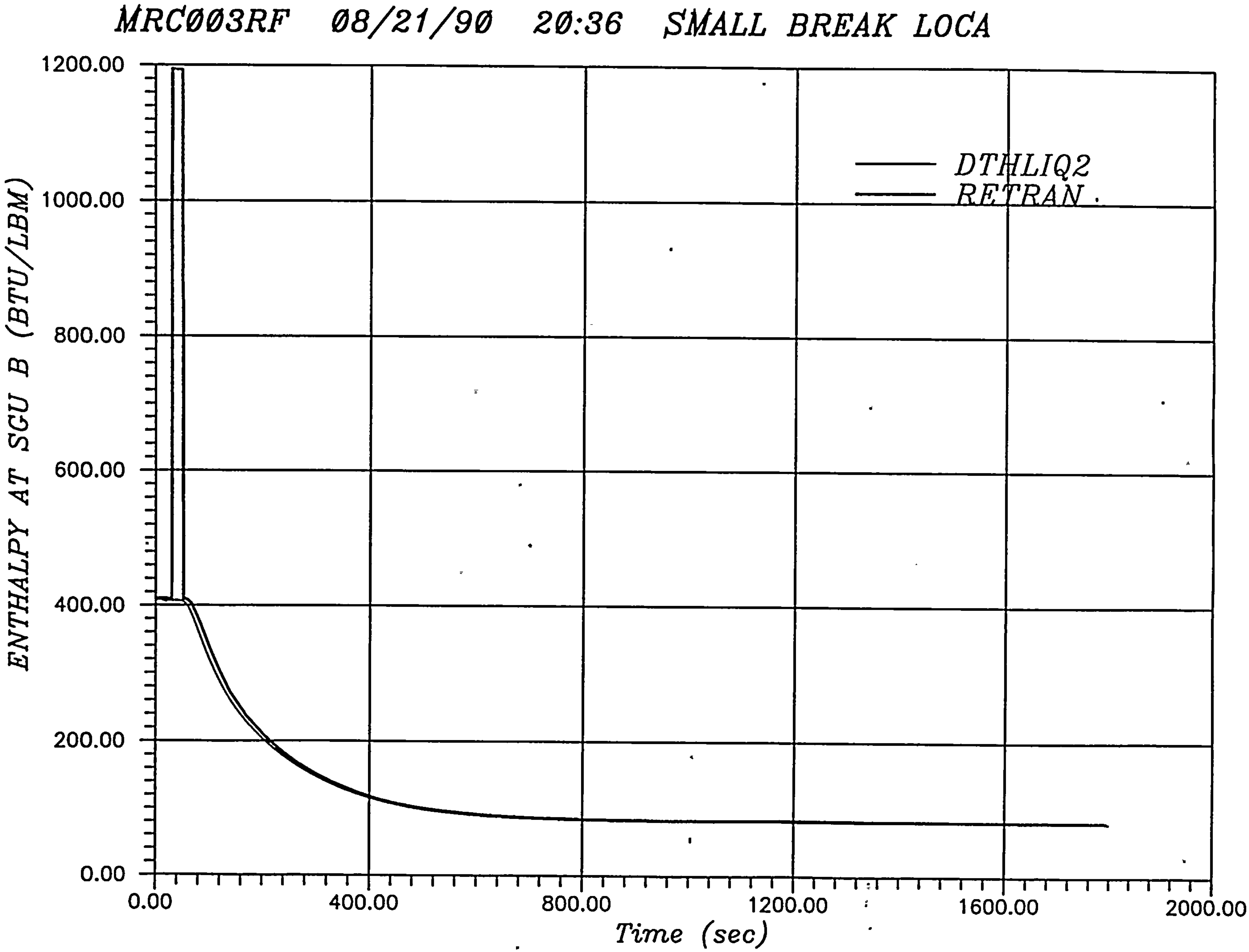


MRC003RF 08/21/90 20:36 SMALL BREAK LOCA

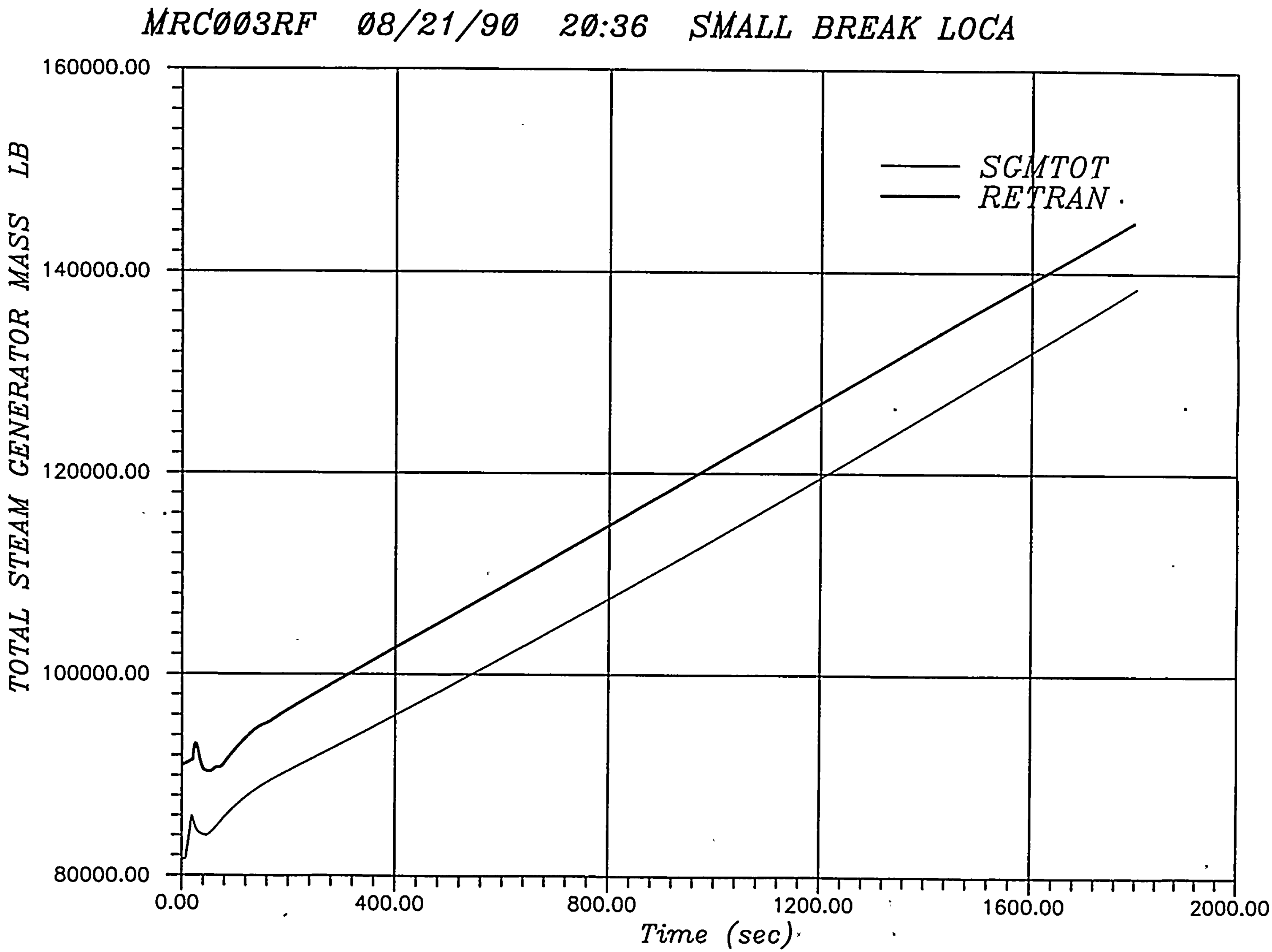


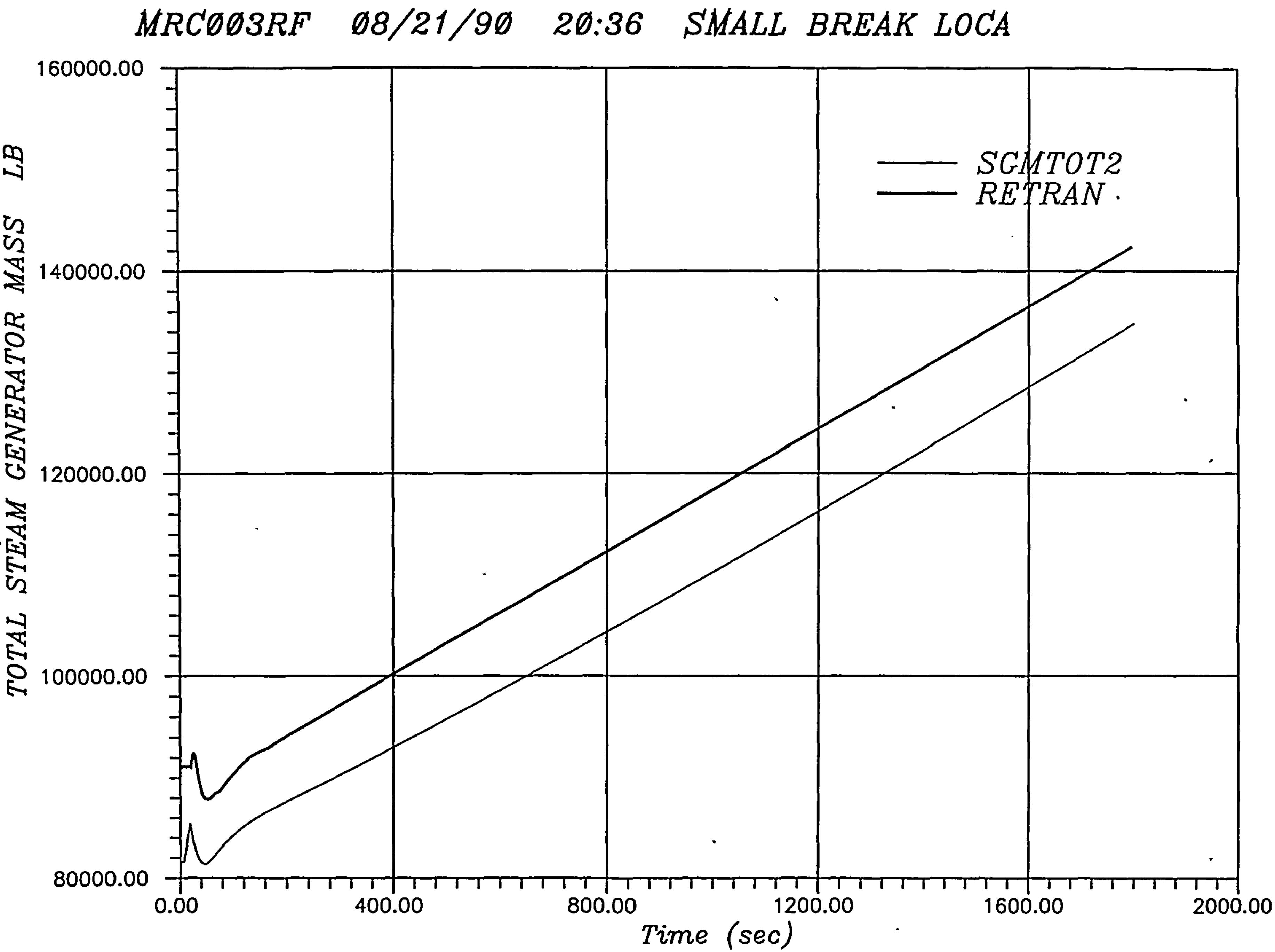
MRCØØ3RF 08/21/90 20:36 SMALL BREAK LOCA



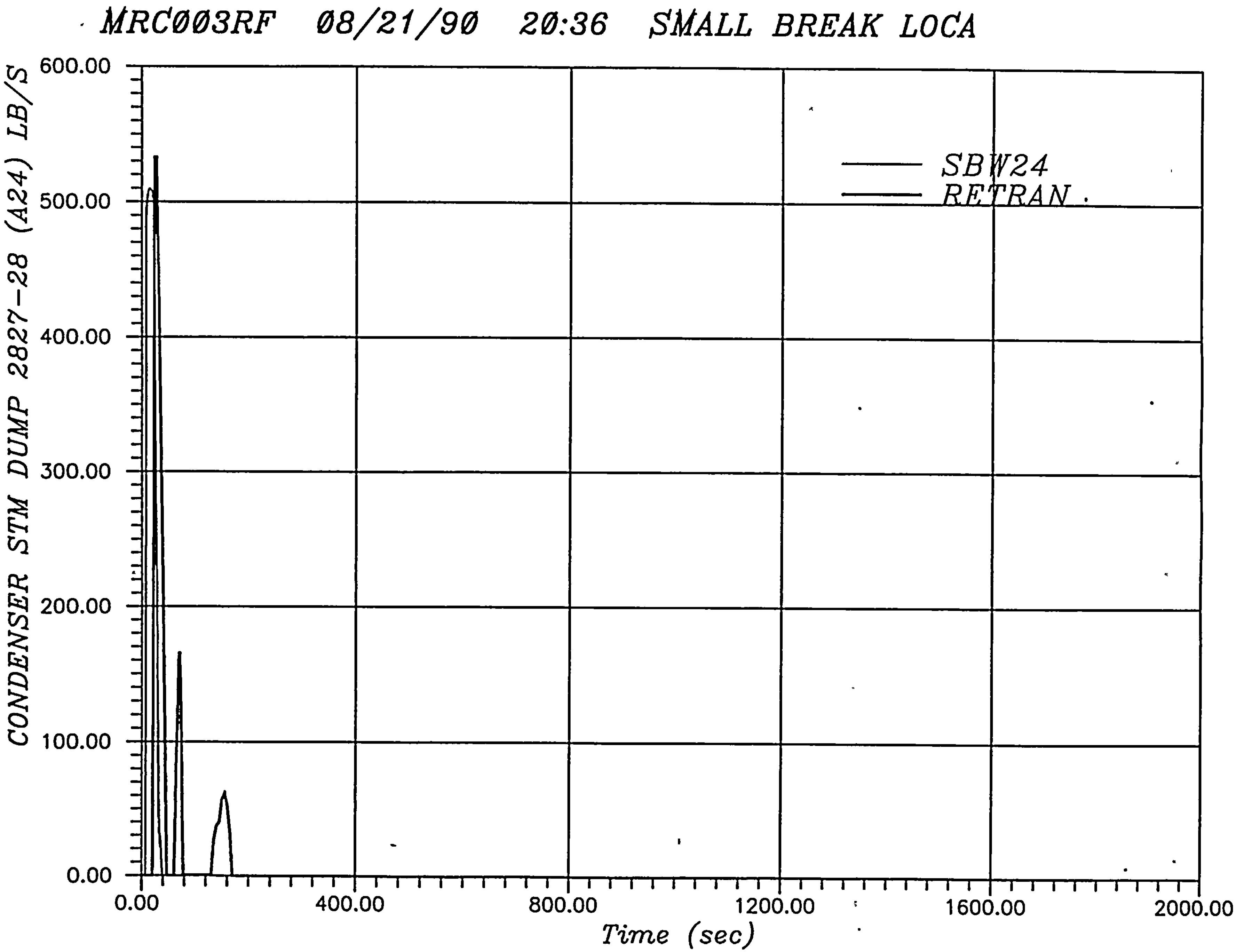


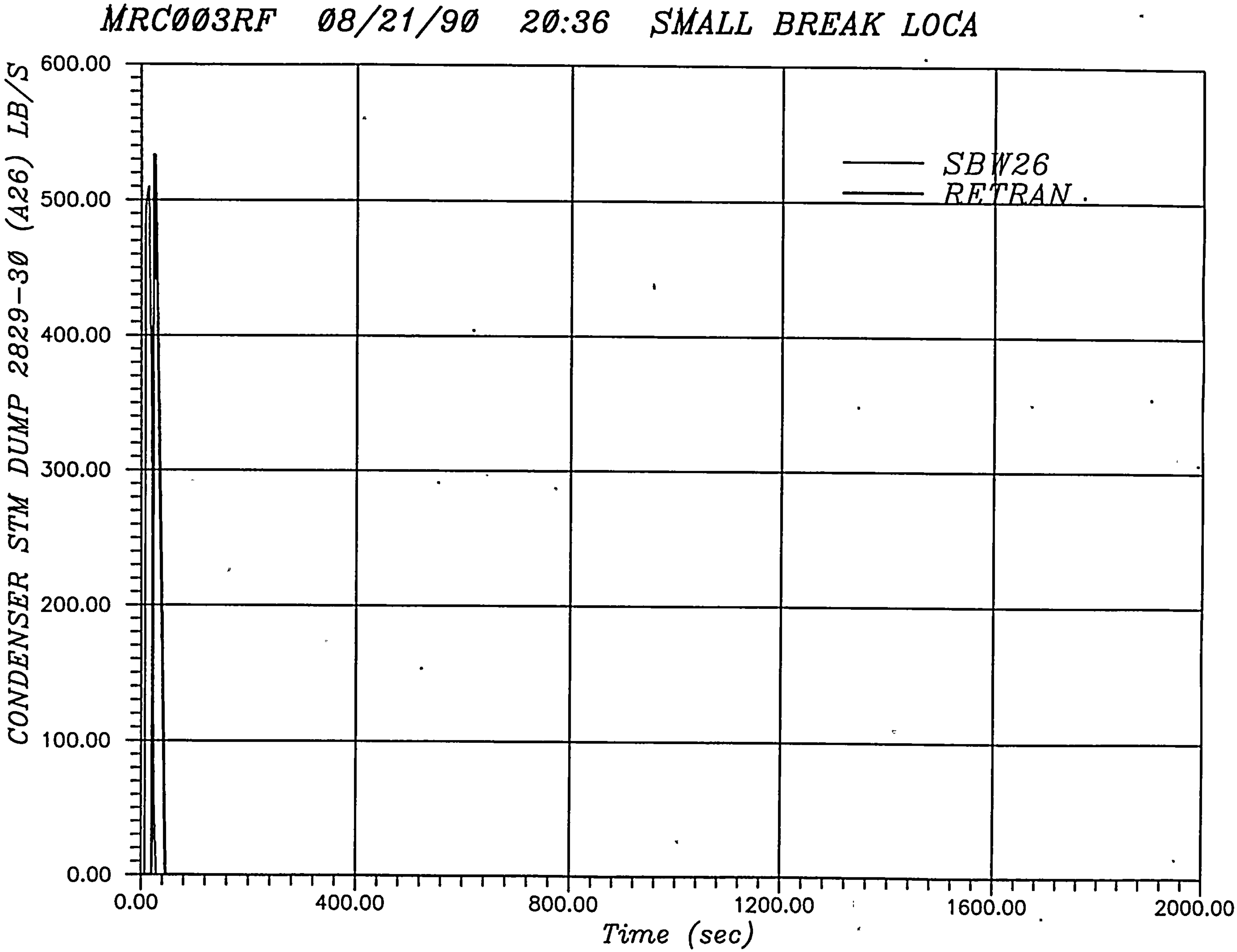
MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
DTHLIQ2
RETRAN
ENTHALPY AT SGU B (BTU/LBM)
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)


MRCØØ3RF 08/21/90 20:36 SMALL BREAK LOCA
SGMTOT
RETRAN
TOTAL STEAM GENERATOR MASS LB
160000.00
140000.00
120000.00
100000.00
80000.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)

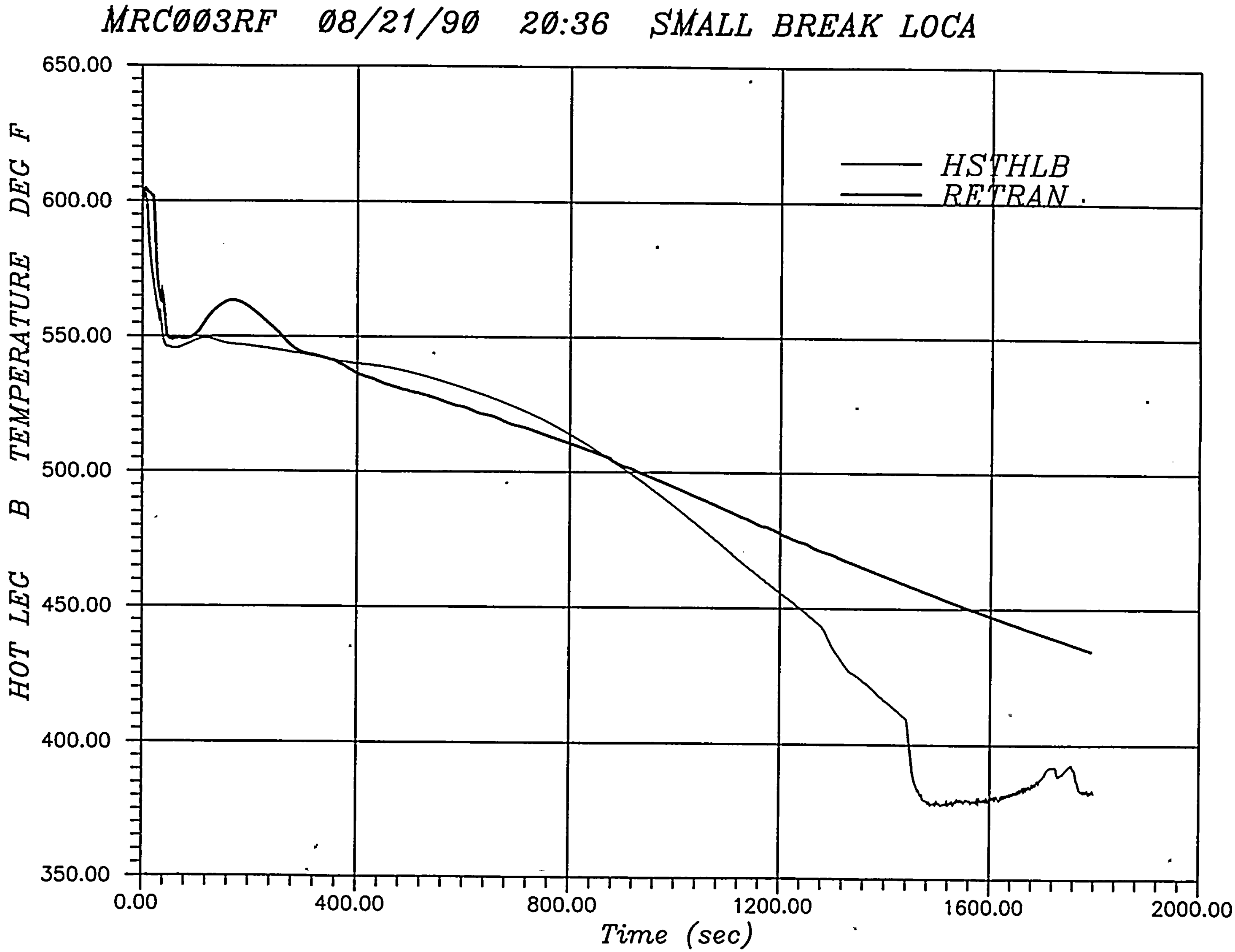


MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
160000.00
140000.00
120000.00
100000.00
80000.00
TOTAL STEAM GENERATOR MASS LB
SGMTOT2
RETRAN
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)

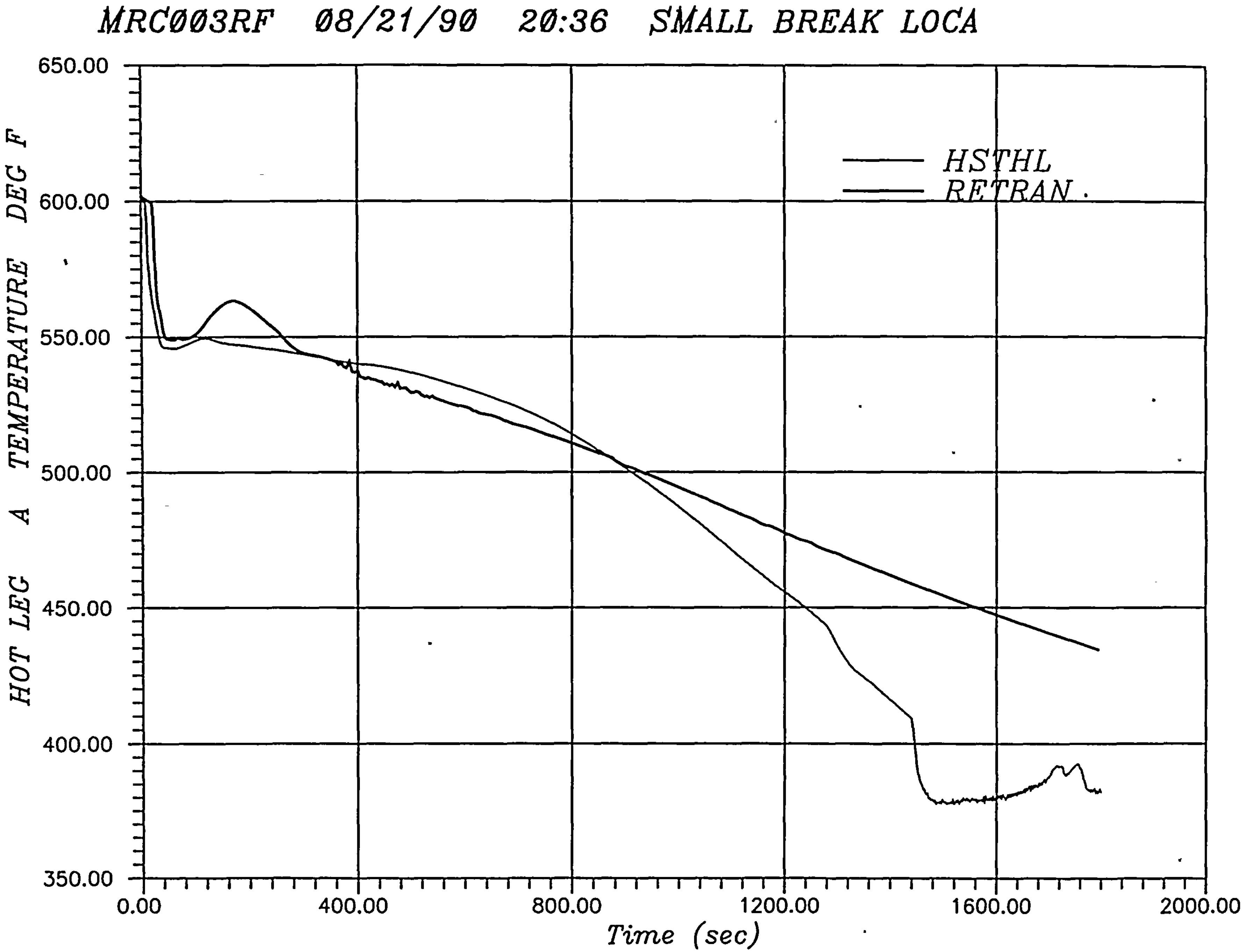

MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
CONDENSER STM DUMP 2827-28 (A24) LB/S
600.00
500.00
400.00
300.00
200.00
100.00
0.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)
SBW24
RETRAN



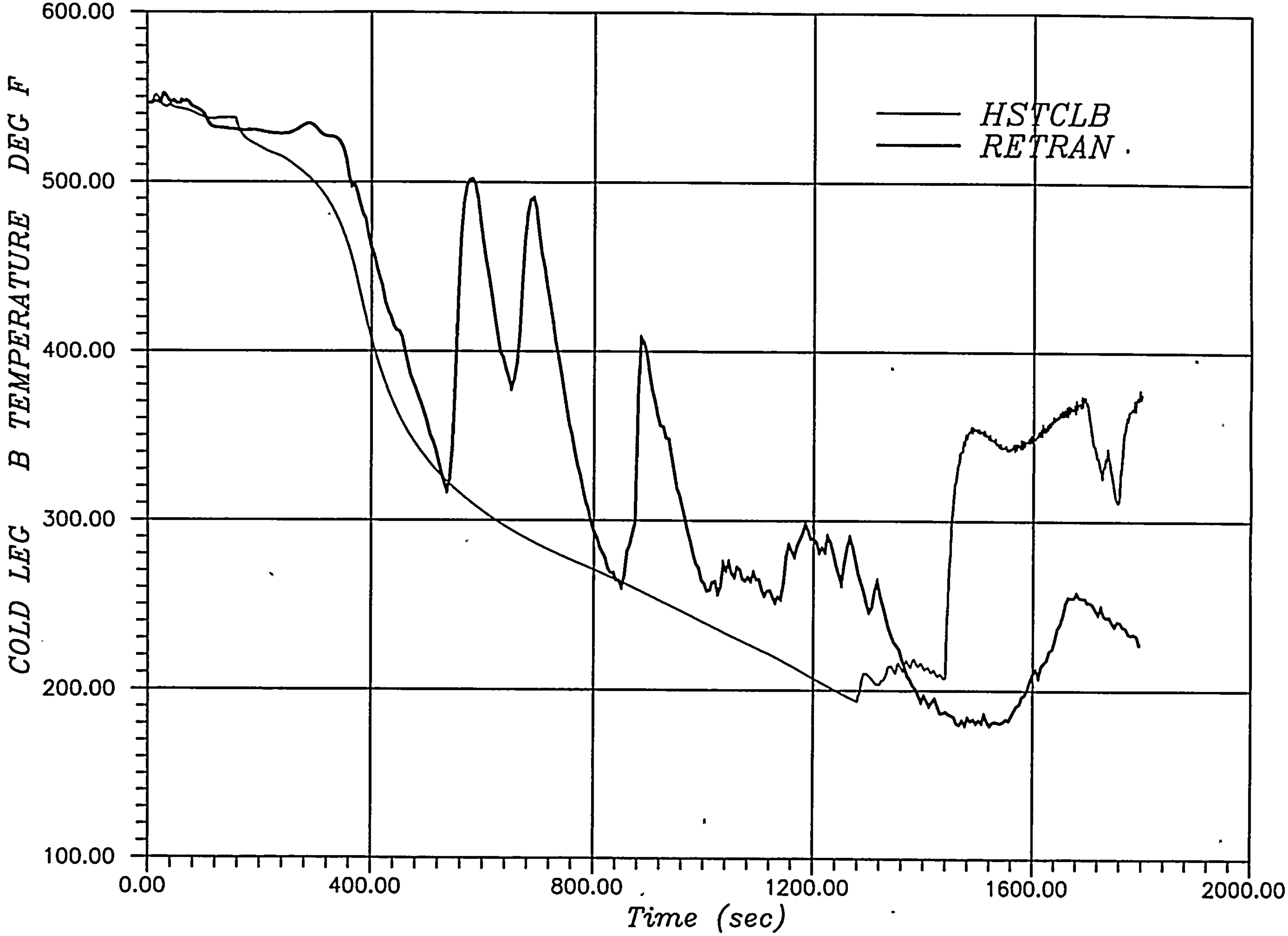
MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
CONDENSER STM DUMP 2829-30 (A26) LB/S
600.00
500.00
400.00
300.00
200.00
100.00
0.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)
SBW26
RETRAN

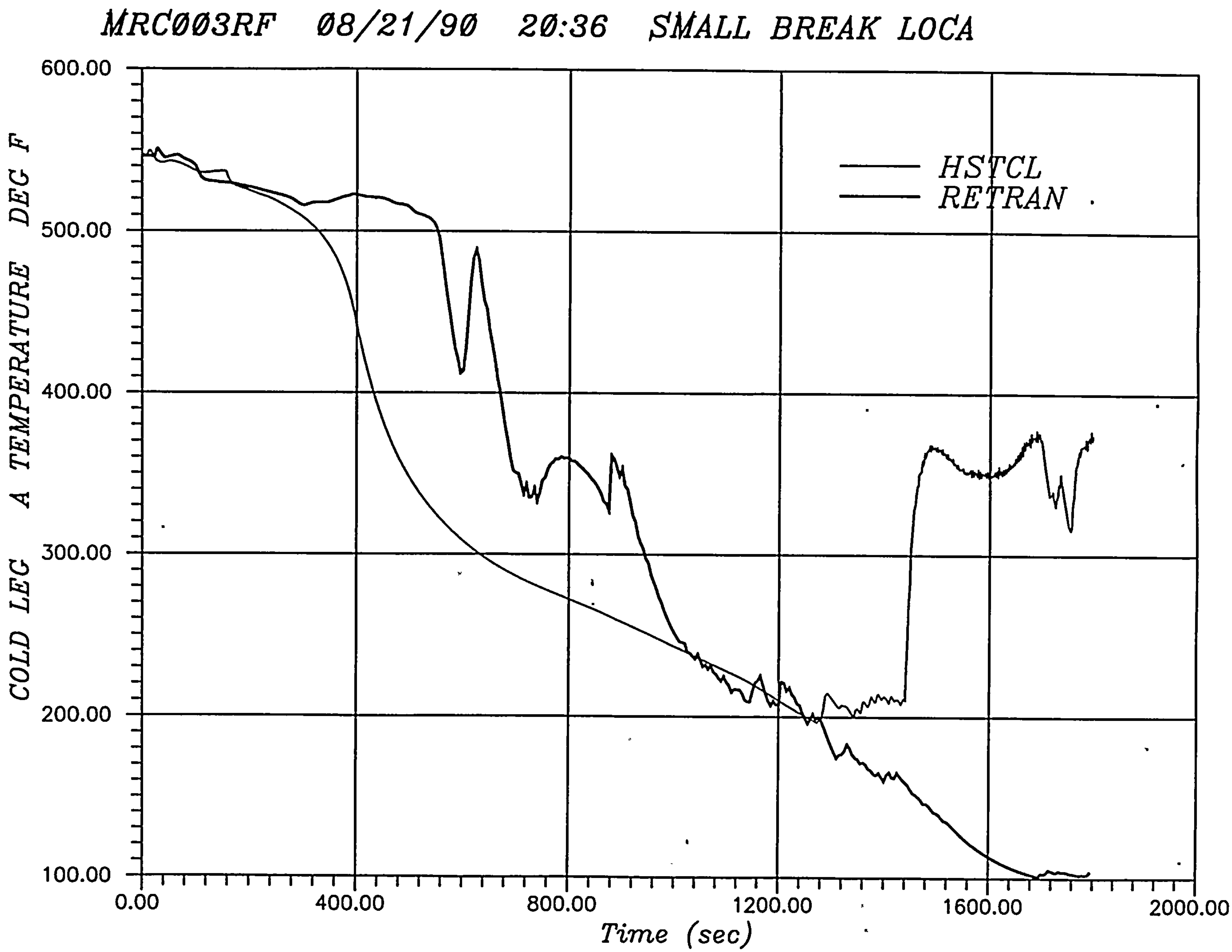


MRCØØ3RF 08/21/9Ø 20:36 SMALL BREAK LOCA
HOT LEG B TEMPERATURE DEG F
650.00
600.00
550.00
500.00
450.00
400.00
350.00
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)
HSTHLB
RETRAN


MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
650.00
600.00
550.00
500.00
450.00
400.00
350.00
HOT LEG A TEMPERATURE DEG F
HSTHL
RETRAN
0.00
400.00
800.00
1200.00
1600.00
2000.00
Time (sec)

MRCØØ3RF Ø8/21/9Ø 2Ø:36 SMALL BREAK LOCA





MRC003RF 08/21/90 20:36 SMALL BREAK LOCA
HSTCL
RETRAN
COLD LEG A TEMPERATURE DEG F
Time (sec)
600.00
500.00
400.00
300.00
200.00
100.00
0.00
400.00
800.00
1200.00
1600.00
2000.00