

ENCLOSURE

WATTS BAR NUCLEAR PLANT UNIT 1 SIMULATOR
FOUR YEAR CERTIFICATION UPDATE REPORT
TEST PERIOD 1995-1998

TENNESSEE VALLEY AUTHORITY

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TVA Watts Bar Simulator
Certification Update Report II
Test Period 1995-1998

Section I - Introduction

This report has been prepared and submitted in accordance with the requirements of 10CFR55.45(b)(5)(ii) and (b)(5)(vi). In this report one may find the Tennessee Valley Authority's Watts Bar Nuclear Plant Unit 1 Simulator certification tests performed during the second four year testing cycle, deviations from the scheduled tests, the test schedule for the next four year period, and any outstanding certification test problems with a schedule for correction.

Since the initial certification, the WBN Simulator has been used continually for various training at WBN. The simulator has been maintained in accordance with ANSI-3.5, and additional self-imposed requirements. Modifications and tuning adjustments are routinely made as plant data becomes available, maintaining the simulation models as close to the reference plant as practical. Plant data was incorporated into the simulator design database following Watts Bar Unit 1 commercial operation in accordance with ANSI-3.5.

In April of 1996, the simulator computer platform was upgraded from Encore 32/97 processors to VME based Mercury boards with i860 processors. In April of 1998, the thermal hydraulic and neutronics models were replaced to enhance plant data replication and transient fidelity. The computer platform was also upgraded at that time with an Alpha 433 processor to accommodate the upgraded models.

All the tests as described in ANSI 3.5-1985 are grouped into two time categories. One group must be performed every year during the cycle. The other group which includes simulator malfunction tests, plant general operating instructions, emergency operating instructions, and abnormal operating instructions are divided so that each item in the group is performed at least once within the four year test period.

The remainder of this report is divided into sections. The contents of each section are:

- Section 2 - Annual Tests
- Section 3 - Procedure Tests
- Section 4 - Malfunction Tests
- Section 5 - Reference Plant Data Incorporation
- Section 6 - Certification Test Problem Reports
- Section 7 - Exception Reports
- Section 8 - Four Year Test Plan (1999 - 2002)

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Section 2 - Annual Tests

Table 2.1 presents the tests performed every year during the testing cycle.

**Table 2.1
 Annual Tests and Performance Dates**

Test	Description	Date
1	Manual reactor trip from 100% power.	12/17/95 01/15/97 02/11/98 01/18/99
2	Simultaneous trip of all Feedwater Pumps.	12/14/95 01/15/97 02/11/98 01/18/99
3	Simultaneous closure of all Main Steam Isolation Valves.	12/19/95 01/15/97 01/16/98 01/18/99
4	Simultaneous trip of all Reactor Coolant Pumps.	12/19/95 01/16/97 01/16/98 01/18/99
5	Trip of any single Reactor Coolant Pump.	12/19/95 01/16/97 01/16/98 01/18/99
6	Main turbine trip which does not result in an immediate reactor trip.	01/02/96 01/16/97 02/12/98 01/15/99
7	Maximum rate power ramp from 100% to approximately 75% and back to 100%.	01/20/96 01/17/97 01/17/98 01/15/99
8	Maximum size reactor coolant system rupture combined with a loss of all offsite power.	01/02/96 01/16/97 01/16/98 01/18/99
9	Maximum size unisolatable main steam line rupture.	01/02/96 01/16/97 02/13/98 01/18/99

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Table 2.1
Annual Tests and Performance Dates

Test	Description	Date
10	Slow primary system depressurization to saturated condition using pressurizer relief valve stuck open. Inhibit activation of the high pressure Emergency Core Cooling Systems.	01/02/96
		01/16/97
		01/17/98
		01/18/99
11	100% Power Null Transient, 60 minute duration	10/18/95
		02/07/97
		02/17/98
		02/02/99
12	100% Power State Point	03/04/96
		02/27/97
		02/17/98
		02/02/99
13	75% Power State Point	03/04/96
		02/27/97
		02/17/98
		02/02/99
14	50% Power State Point	03/04/96
		02/27/97
		02/17/98
		02/02/99
15	Simulator Real Time Test	03/01/96
		02/28/97
		02/20/98
		02/02/99

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Section 3 - Procedure Tests

Tables 3.1 through 3.4 present the procedure tests performed during the indicated year of the four year test cycle.

Approximately 25% of the procedure tests were performed each year of the four year cycle. The 25% represents the approximate amount of time to perform the procedures. The tests utilize the latest revision of the WBN plant controlled procedures.

Changes have been made to the procedure numbering system at Watts Bar since Update Report I for test period 1991-1994. If a new test was added this was indicated with a footnote at the end of the affected table of tests. If a test was deleted due to cancellation of a procedure this was indicated with a footnote at the end of the affected table of tests.

The test schedules for 1997 and 1998 were modified to include approximately 50% of the Emergency Procedures and 50% of Abnormal Operating Instructions in each test year. This was done to insure that tests impacted by replacement of the thermal hydraulic and neutronics models were performed with the upgrade models.

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Table 3.1
1995 Scheduled Tests and Performance Dates
General Operating Instructions - Plant Startup

Procedure	Description	Date
GO-1	Unit Startup from Cold Shutdown to Hot Standby	01/21/96- 01/31/96
GO-2	Reactor Startup	02/01/96
GO-3 ²	Unit Startup from less than 4% Reactor Power to 30% Reactor Power	02/12/96- 02/15/96
GO-4 ²	Normal Power Operation	02/15/96- 02/16/96
1-SI-0-11 ¹	Estimated Critical Position	02/01/96
TI-21	Inverse Count Rate Monitoring for Approach to Criticality	02/01/96

Note: All supporting SIs, SOIs, TIs, and GOs required for the performance of these procedures were performed.

- 1) Plant procedure 1-SI-0-5 was incorporated into 1-SI-0-11.
- 2) Plant Procedure GO-5 was rewritten as GO-3 and GO-4, both procedures were performed.

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Table 3.2
1996 Scheduled Tests and Performance Dates
General Operating Instructions - Plant Shutdown

Procedure	Description	Date
GO-4 ²	Normal Power Operation	01/22/97
GO-5 ²	Unit Shutdown from 30% Reactor Power to Hot Standby	01/22/97
GO-6 ²	Unit Shutdown from Hot Standby to Cold Shutdown	01/24/97- 01/30/97
1-SI-0-10 ¹	Shutdown Margin	01/22/97
TI-6.001 ³	Board Calorimetric	01/21/97

Note: All supporting SIs, SOIs, TIs, and GOs required for the performance of these procedures were performed.

- 1) Plant procedure TI-8 was incorporated into 1-SI-0-10.
- 2) Plant Procedures GOIs 3, 5 and 6 were rewritten as GOs 5, 4 and 6 respectively.
- 3) Plant procedure TI-6 was replaced by TI-6.001. TI-6, Calorimetric Calculation, was rewritten and is outside the scope of simulation.

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Table 3.3
1997 Scheduled Tests and Performance Dates
Emergency Operating Instructions

Procedure	Description	Date
E-0	Reactor Trip or Safety Injection	12/11/97
E-1	Loss of Reactor or Secondary Coolant	11/28/97
E-2	Faulted Steam Generator Isolation	12/04/97
E-3	Steam Generator Tube Rupture	05/23/97
ECA-0.0	Loss of Shutdown Power	07/01/97
ECA-0.1	Recovery from Loss of Shutdown Power Without SI Required	07/01/97
ECA-0.2 ¹	Recovery from Loss of Shutdown Power With SI Required	02/06/99
ECA-1.1	Loss of RHR Sump Recirculation	04/15/97
ECA-1.2	LOCA Outside Containment	07/02/97
ECA-2.1	Uncontrolled Depressurization of All Steam Generators	05/21/97
ECA-3.1	SGTR and LOCA - Subcooled Recovery	11/28/97
ECA-3.2 ¹	SGTR and LOCA - Saturated Recovery	01/31/99
ECA-3.3 ¹	SGTR Without PZR Pressure Control	01/31/99
ES-0.1	Reactor Trip Response	11/06/97
ES-0.2 ¹	Natural Circulation Cooldown	01/25/99
ES-0.3 ¹	Natural Circulation Cooldown With Steam Void in Vessel (With RVLIS)	01/27/99
ES-0.4 ¹	Natural Circulation Cooldown With Steam Void in Vessel (Without RVLIS)	01/27/99
ES-1.1	SI Termination	05/23/97
ES-1.2	Post LOCA Cooldown and Depressurization	12/11/97
ES-1.3	Transfer to RHR Containment Sump	11/06/97
ES-1.4 ¹	Transfer to Hot Leg Recirculation	01/30/99
ES-3.1 ¹	Post-SGTR Cooldown Using Backfill	01/30/99
ES-3.2 ¹	Post-SGTR Cooldown Using Blowdown	01/31/99
ES-3.3 ¹	Post-SGTR Cooldown Using Steam Dump	01/31/99
FR-C.1	Inadequate Core Cooling	07/03/97
FR-C.2	Degraded Core Cooling	12/04/97
FR-C.3 ¹	Saturated Core Cooling	01/30/99
FR-H.1	Loss of Secondary Heat Sink	06/16/97
FR-H.2 ¹	Steam Generator Overpressure	02/06/99
FR-H.3 ¹	Steam Generator High Level	01/31/99
FR-H.4 ¹	Loss of Normal Steam Release Capabilities	02/06/99

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Table 3.3
1997 Scheduled Tests and Performance Dates
Emergency Operating Instructions

Procedure	Description	Date
FR-H.5 ¹	Steam Generator Low Level	02/06/99
FR-I.1 ¹	High Pressurizer Level	01/30/99
FR-I.2 ¹	Low Pressurizer Level	01/28/99
FR-I.3 ^{1,2}	Voids in Reactor Vessel	01/28/99
FR-P.1	Pressurized Thermal Shock	12/04/97
FR-P.2 ^{1,2}	Cold Overpressure Condition	02/06/99
FR-S.1	Nuclear Power Generation / ATWS	12/11/97
FR-S.2 ¹	Loss of Core Shutdown	01/31/99
FR-Z.1	High Containment Pressure	12/04/97
FR-Z.3 ¹	High Containment Radiation	01/29/99

- 1) Approximately 50% of the scheduled Emergency Operating Instruction tests were delayed until the 1998 test year. This was done to coincide with model changes which affected these procedures.
- 2) Plant procedures FR-I.3 and FR-P.2 are new procedures added to the test plan.

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Table 3.4
1998 Scheduled Tests and Performance Dates
Abnormal Operating Instructions

Procedure	Description	Date
AOI-2	Malfunction of Reactor Coolant System	01/15/99
AOI-3	Malfunction of Reactor Makeup Control	01/15/99
AOI-4	Nuclear Instrumentation Malfunction	01/16/99
AOI-5	Unscheduled Removal of One RCP below P-8	01/16/99
AOI-6	Small Reactor Coolant System Leak	01/16/99
AOI-10 ¹	Loss of Control Air	02/16/98
AOI-11	Loss of Condenser Vacuum	01/16/99
AOI-12 ¹	Loss of Containment Integrity	02/16/98
AOI-13 ¹	Loss of Essential Raw Cooling Water	02/16/98
AOI-14	Loss of RHR Shutdown Cooling	01/17/99
AOI-15 ¹	Loss of Component Cooling System	02/16/98
AOI-16	Loss of Normal Feedwater	01/17/99
AOI-17 ¹	Turbine Trip	02/16/98
AOI-18	Malfunction of Pressurizer Pressure Control System	01/17/99
AOI-20	Malfunction of Pressurizer Level Control Channel	01/17/99
AOI-21.01 ¹	Loss of 125VDC Vital Battery Board 1-I	02/15/98
AOI-21.02 ¹	Loss of 125VDC Vital Battery Board 1-II	02/15/98
AOI-21.03 ¹	Loss of 125VDC Vital Battery Board 1-III	02/15/98
AOI-21.04 ¹	Loss of 125VDC Vital Battery Board 1-IV	02/15/98
AOI-24	RCP Seal Abnormalities During Pump Operation	01/17/99
AOI-25.01 ¹	Loss of 120VDC Vital Instrument Board 1-I	02/15/98
AOI-25.02 ¹	Loss of 120VDC Vital Instrument Board 1-II	02/15/98
AOI-25.03 ¹	Loss of 120VDC Vital Instrument Board 1-III	02/15/98
AOI-25.04 ¹	Loss of 120VDC Vital Instrument Board 1-IV	02/15/98
AOI-26 ¹	Loss of Control Room Alarms	02/16/98
AOI-27 ¹	Main Control Room Inaccessibility	02/16/98
AOI-28	High Activity in Reactor Coolant	01/18/99
AOI-31	Abnormal Release of Radioactive Material	02/07/99
AOI-33	Steam Generator Tube Leak	01/18/99
AOI-34	Immediate Boration	01/18/99
AOI-35 ¹	Loss of Offsite Power	02/16/98
AOI-37	Turbine Runback Response	01/18/99
AOI-38	Main Steam of Feedwater Line Break	01/18/99
AOI-39 ²	Rapid Load Reduction	02/15/99
AOI-40 ^{1,2}	Station Blackout	02/16/98
AOI-41 ²	Condenser Tube Leak	02/15/99

- 1) Approximately 50% of the Abnormal Operating Instruction tests were pulled up into the 1997 test year. This was done to coincide with model changes which affected these procedures.
- 2) Plant procedures AOIs 39, 40 and 41 are new procedures added to the test plan.

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Section 4 - Malfunction Tests

Approximately 25% of the certified simulator malfunctions were tested each year as laid out in Update Report I for test period 1991-1994. The tests performed and the year performed are listed in Table 4.1.

**Table 4.1
 Malfunction Test Schedule and Performance Date**

Test Period	Index	Malfunction Description	Malf. Name	ANS 3.5 Reference	Date Performed
1995	1	VCT Level Transmitter Fails High	CV09	3.1.2(18)	01/20/96
	2	Steam Generator Tube Leak	TH05	3.1.2(1a)	01/20/96
	3	Letdown Line Break Inside Auxiliary Building	CV04	3.1.2(1b)	01/20/96
	4	LOCA Small Leak	TH03	3.1.2(1c)	01/04/96 01/08/96
	5	Pressurizer Safety Failure	TH04	3.1.2(1d)	01/08/96
	6	Stuck Rod	RD13	3.1.2(12)	01/20/96
	7	Loss of Non-Essential Control Air	IA02	3.1.2(2)	01/12/96
	8	Total Loss of Offsite Power	ED01	3.1.2(3)	01/17/96
	9	Loss of 6.9KV Shutdown Board	ED06	3.1.2(3)	01/17/96
	10	Loss of 480V Shutdown Board	ED08	3.1.2(3)	01/17/96
1996	1	Loss of 250 VDC Batt Bd	ED15	3.1.2(3)	12/05/96
	2	RCP Locked Rotor	RC01	3.1.2(4)	12/06/96
	3	RCCA Misalignment	RD05	3.1.2(12)	12/09/96
	4	RCW Pump Trip	RW02	3.1.2(6)	12/09/96
	5	RCW Heat Exchanger Fouling	RW04	3.1.2(6)	12/11/96
	6	RHR Loop Suction Line Blockage	RH04	3.1.2(7)	12/17/96
	7	Reactor Trip Signal Failure	RP01	3.1.2(24)	12/18/96
	8	Component Cooling Pipe Break Inside Containment	CC04	3.1.2(8)	12/20/96
	9	Condensate Booster Pump Trip	FW02	3.1.2(9)	12/04/96
	10	Main Steam Line Break Inside Containment	MS01	3.1.2(20)	01/14/96
	11	Loss of <u>All</u> Feedwater			01/09/96
	• Trip of Standby MFWP	FW06	3.1.2(10)		
	• Trip of Turbine MFWP	FW05	3.1.2(10)		
	• Trip of Electric AFWP	FW07	3.1.2(10)		
	• Airbound AFWP	FW22 ²	3.1.2(10)		

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Table 4.1
Malfunction Test Schedule and Performance Date

Test Period	Index	Malfunction Description	Malf. Name	ANS 3.5 Reference	Date Performed
1997	1	LOCA Hot Leg	TH01	3.1.2(1c)	01/17/98
	2	Main Turbine High Vibration	TU02	3.1.2(15)	01/21/98
	3	Main Generator Trip	EG01	3.1.2(16)	01/17/98
	4	Loss of 120 VAC Inverter	ED10	3.1.2(11)	01/19/98
	5	Tavg Control Signal Failure	RX18	3.1.2(17)	01/17/98
	6	Pzr Pressure Transmitter Fails Hi	RX07	3.1.2(18)	01/17/98
	7	RHR Pump Trip	RH01	3.1.2(7)	01/19/98
	8	False Auto Reactor Trip Signal	RP05	3.1.2(19)	01/17/98
	9	Main Steam Line Break Outside Containment	MS02	3.1.2(20)	01/19/98
	10	Main Feedwater Line Break Inside Containment	FW23	3.1.2(20)	01/19/98
	11	Dropped Rod	RD07	3.1.2(12)	01/19/98
1998	1	Loss of 125 VDC Vital Battery Board	ED12	3.1.2(3)	01/11/99
	2	Power Range Channel Output Signal Failure	NI07	3.1.2(21)	11/11/98
	3	Feedwater Heater #1 Level Control Fails Low	FW12	3.1.2(22)	11/16/98
	4	Loss of Vacuum	FW09	3.1.2(5)	11/16/98
	5	Pressurizer Level Transmitter Failure	RX05 ¹	3.1.2(22)	09/10/98
	6	Auto SI Initiation Signal Failure	RP02	3.1.2(23)	01/11/99
	7	Loss of Essential Control Air	IA03	3.1.2(2)	01/11/99
	8	Rods Fail to Move on Demand	RD08	3.1.2(13)	11/09/98
	9	Fuel Cladding Failure	TH09	3.1.2(14)	11/03/98
	10	Main Feedwater Line Break Outside Containment	FW20	3.1.2(20)	03/15/98
	11	Failure of PRZR PORV	RC07	3.1.2(1d)	03/10/98
	12	Loss of Emergency Generators	EG02	3.1.2(3)	01/11/99
	13	Loss of Condenser Level Control	FW36 FW37	3.1.2(5)	11/16/98

- 1) Malfunction CV15, Charging Flow Control Problem PRZR Level Swings, was replaced with malfunction RX05, Pressurizer Level Transmitter Failure. The effects of CV15 were minimal, limiting it's training value. RX05 is used in training and produces a more significant Pressurizer level control system transient.
- 2) Malfunction added to produce loss of Turbine Driven Auxiliary Feedwater Pump. Previous tests were performed using a remote function.

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Section 5 - Reference Plant Data Incorporation

ANSI/ANS-3.5-1985, Section 5.1, requires that available actual plant data be included in the simulator design data base within 18 months of commercial operation. Plant data incorporation for the WBN simulator was accomplished through the collection of data and generation of Problem Reports for any discrepancies or deficiencies. Table 5.1 summarizes the type and quantity of Problem Reports written for this purpose.

As part of the effort to make the simulator more capable of matching the plant, the simulator model has gone through an extensive upgrade. This has included the neutronics, thermal hydraulics, main steam, condenser, and feedwater models. The new model has been tested to verify response by performing the following tests:

- All ten transient tests performed for annual certification.
- All certified malfunctions which were determined to be affected by the model change.
- 100% power certification drift test.
- 25%, 50%, 75% and 100% certification steady state comparison tests.
- Comparison to plant transients and startup tests.
- Core comparison to NuPOP design data.
- Unit shutdown from 100% power to refueling conditions.
- Unit startup from refueling conditions to 100% power.

Table 5.1
Reference Plant Data Incorporation Problem Reports

Data Source	Opened	Closed	Remaining
Plant photo comparisons at 100%, 75%, 50%, 25%	44	44	0
Steady state data at 100%, 75%, 50%	21	21	0
Power ascension test and plant transients	28	28	0
Plant personnel	106	106	0
Plant Design Change Notices	70	70	0

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Section 6 - Certification Test Problem Reports

The following is a breakdown of the number of certification Problem Reports (PRs) written and closed during each test year from 1995 through 1998.

**Table 6.1
 Number of Certification Problem Reports**

Year	Opened	Closed	Remaining
1995	14	14	0
1996	46	46	0
1997	70	70	0
1998	20	4	16

The oldest of the eight remaining certification problem reports was opened 01/27/99. A schedule for closing these PRs may be found in Table 6.2.

**Table 6.2
 Outstanding Certification Testing Problem Reports
 and Schedule for Correction**

Number	Description	Schedule
2163	Add capability to close 1-ISV-62-927	01/27/00
2164	Condenser delta T does not match procedure values	01/27/00
2165	Radiation monitor response on high activity in RCS	01/27/00
2166	Verify flow rates and radiation monitors respond on TSC EFF1 page	01/27/00
2174	RV flange leakoff temp cycles on transfer to hot leg recirculation	02/01/00
2175	AFW oscillations with low SG pressures	02/01/00
2183	Add capability to perform ECA-0.2 App B & ECA-0.0 App. A	02/08/00
2192	Investigate oscillations when running Reactor trip.	02/17/00
2194	Steam generator level oscillations during loss of feed.	02/17/00
2195	Condenser backpressure zone A oscillations.	02/17/00
2197	Indication of CLA boil off during LOCA.	02/19/00
2198	Cold leg temperature indication with ECCS flow.	02/19/00
2199	Source range count rate oscillations during LOCA.	02/19/00
2200	Oscillations in surge line temperature and RCS flow during LOCA.	02/19/00
2201	Investigate Main Steam header pressure fluctuation.	02/19/00
2202	Tune generator MWe to match plant reference.	02/22/00

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Section 7 - Exception Reports

During the 1995-1998 test period one new exception was noted in addition to the fourteen detailed in previous submittals. It is denoted as ER-15. It was determined that this exception did not result in negative training. ER-15 was reviewed and concurred with by the members of the WBN Simulator Configuration Review Board.

ER-15

Electrical Control Board 5 houses six meters for displaying A, B and C phase voltage for Bus 1 Section 1 and Bus 2 Section 3 of the WBN switchyard. Plant Design Change Notice S-39868-A procured replacement voltage meters for these indications. Identical meters could not be purchased due to obsolescence. The replacement meters have two buttons which can be used to display the minimum and maximum voltage detected by the instrumentation (Newport model INFCAC-0000-V5). These functions will not be utilized by Operations personnel. The plant replacement meters could not be used for simulation due to incorrect input voltage ranges. The simulator replacement meters do not have the minimum and maximum voltage buttons but are the same size and shape with similar display digits (Newport model 202A-E2).

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Section 8 - Four Year Test Plan (1999 - 2002)

The test plan for the upcoming four year period is presented in the tables found within this section. The contents of each table is listed below.

Table 8.1 - Annual Tests

Table 8.2 - Procedure Test Schedule

Table 8.3 - Malfunction Test Schedule

**Table 8.1
Annual Tests**

Test	Description
1	Manual reactor trip from 100% power.
2	Simultaneous trip of all Feedwater Pumps.
3	Simultaneous closure of all Main Steam Isolation Valves.
4	Simultaneous trip of all Reactor Coolant Pumps.
5	Trip of any single Reactor Coolant Pump.
6	Main turbine trip which does not result in an immediate reactor trip.
7	Maximum rate power ramp from 100% to approximately 75% and back to 100%.
8	Maximum size reactor coolant system rupture combined with a loss of all offsite power.
9	Maximum size unisolatable main steam line rupture.
10	Slow primary system depressurization to saturated condition using pressurizer relief valve stuck open. Inhibit activation of the high pressure Emergency Core Cooling Systems.
11	100% Power Null Transient, 60 minute duration
12	100% Power State Point
13	75% Power State Point
14	50% Power State Point
15	Simulator Real Time Test

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Table 8.2
Procedure Test Schedule

Annual Test Period	Description
1999 ¹	Emergency instructions, including the Functional Restoration Guides, and the Emergency Contingency Actions.
2000	Plant startup from midloop refueling conditions to 100% power using General Operating Instructions.
2001	Plant shutdown from 100% power to refueling conditions using General Operating Instructions.
2002	Abnormal Operating Instructions

Note: A detailed list is not given since procedure numbers do change. The schedule above indicates which set of procedures will be performed during a particular test year.

- 1) The Emergency Instructions were moved to the first test period due to planned procedure changes for that year.

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Table 8.3
Malfunction Test Schedule

Test Period	Index	Malfunction Description	Malf. Name	ANS 3.5 Reference
1999	1	VCT Level Transmitter Fails High	CV09	3.1.2(18)
	2	Steam Generator Tube Leak	TH05	3.1.2(1a)
	3	Letdown Line Break Inside Auxiliary Building	CV04	3.1.2(1b)
	4	LOCA Small Leak	TH03	3.1.2(1c)
	5	Pressurizer Safety Failure	TH04	3.1.2(1d)
	6	Stuck Rod	RD13	3.1.2(12)
	7	Loss of Non-Essential Control Air	IA02	3.1.2(2)
	8	Total Loss of Offsite Power	ED01	3.1.2(3)
	9	Loss of 6.9KV Shutdown Board	ED06	3.1.2(3)
	10	Loss of 480V Shutdown Board	ED08	3.1.2(3)
2000	1	Loss of 250 VDC Batt Bd	ED15	3.1.2(3)
	2	RCP Locked Rotor	RC01	3.1.2(4)
	3	RCCA Misalignment	RD05	3.1.2(12)
	4	RCW Pump Trip	RW02	3.1.2(6)
	5	RCW Heat Exchanger Fouling	RW04	3.1.2(6)
	6	RHR Loop Suction Line Blockage	RH04	3.1.2(7)
	7	Reactor Trip Signal Failure	RP01	3.1.2(24)
	8	Component Cooling Pipe Break Inside Containment	CC04	3.1.2(8)
	9	Condensate Booster Pump Trip	FW02	3.1.2(9)
	10	Main Steam Line Break Inside Containment	MS01	3.1.2(20)
	11	Loss of <u>All</u> Feedwater <ul style="list-style-type: none"> • Trip of Standby MFWP • Trip of Turbine MFWP • Trip of Electric AFWP • Airbound AFWP 	FW06 FW05 FW07 FW22	3.1.2(10) 3.1.2(10) 3.1.2(10) 3.1.2(10)

TVA Watts Bar Simulator
 Certification Update Report II
 Test Period 1995-1998

Table 8.3
Malfunction Test Schedule

Test Period	Index	Malfunction Description	Malf. Name	ANS 3.5 Reference
2001	1	LOCA Hot Leg	TH01	3.1.2(1c)
	2	Main Turbine High Vibration	TU02	3.1.2(15)
	3	Main Generator Trip	EG01	3.1.2(16)
	4	Loss of 120 VAC Inverter	ED10	3.1.2(11)
	5	Tavg Control Signal Failure	RX18	3.1.2(17)
	6	Pzr Pressure Transmitter Fails Hi	RX07	3.1.2(18)
	7	RHR Pump Trip	RH01	3.1.2(7)
	8	False Auto Reactor Trip Signal	RP05	3.1.2(19)
	9	Main Steam Line Break Outside Containment	MS02	3.1.2(20)
	10	Main Feedwater Line Break Inside Containment	FW23	3.1.2(20)
	11	Dropped Rod	RD07	3.1.2(12)
2002	1	Loss of 125 VDC Vital Battery Board	ED12	3.1.2(3)
	2	Power Range Channel Output Signal Failure	NI07	3.1.2(21)
	3	Feedwater Heater #1 Level Control Fails Low	FW12	3.1.2(22)
	4	Loss of Vacuum	FW09	3.1.2(5)
	5	Pressurizer Level Transmitter Failure	RX05	3.1.2(22)
	6	Auto SI Initiation Signal Failure	RP02	3.1.2(23)
	7	Loss of Essential Control Air	IA03	3.1.2(2)
	8	Rods Fail to Move on Demand	RD08	3.1.2(13)
	9	Fuel Cladding Failure	TH09	3.1.2(14)
	10	Main Feedwater Line Break Outside Containment	FW20	3.1.2(20)
	11	Failure of PRZR PORV	RC07	3.1.2(1d)
	12	Loss of Emergency Generators	EG02	3.1.2(3)
	13	Loss of Condenser Level Control	FW36 FW37	3.1.2(5)