FLORIDA POWER & LIGHT COMPANY

TURKEY POINT SIMULATOR

INITIAL CERTIFICATION

VOLUME I

SECTION I TURKEY POINT UNIT 3

SECTION II TURKEY POINT UNIT 4

9101080142
75 pp.

NRC FORM 474
(1-90)
10 CFR 55.45(b), 55.4 and 55.5

U.S. NUCLEAR REGULATORY COMMISSION

SIMULATION FACILITY CERTIFICATION

APPROVED BY OMB: NO. 3150-0138
EXPIRES: 9-30-92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 120 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0138), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

INSTRUCTIONS. This form is to be filed for initial certification, recertification (if required), and for any change to a simulation facility performance testing plan made after initial submittal of such a plan. Provide the following information, and check the appropriate box to indicate reason for submittal.

FACILITY
TURKEY POINT NUCLEAR GENERATING UNIT NUMBER 3

DOCKET NUMBER
50- 250

LICENSEE
FLORIDA POWER AND LIGHT COMPANY

DATE
12/31/90

This is to certify that:

1. The above named facility licensee is using a simulation facility consisting solely of a plant-referenced simulator that meets the requirements of 10 CFR 55.45.
2. Documentation is available for NRC review in accordance with 10 CFR 55.45(b).
3. This simulation facility meets the guidance contained in ANSI/ANS 3.5, 1985, as endorsed by NRC Regulatory Guide 1.149. If there are any exceptions to the certification of this item, check here [X] and describe fully on additional pages as necessary.

NAME *(or other identification)* AND LOCATION OF SIMULATION FACILITY
TURKEY POINT SIMULATOR
9½ MILES EAST OF FLORIDA CITY ON PALM DRIVE
FLORIDA CITY, FLORIDA 33034

[X] SIMULATION FACILITY PERFORMANCE TEST ABSTRACTS ATTACHED. *(For performance tests conducted in the period ending with the date of this certification)*

DESCRIPTION OF PERFORMANCE TESTING COMPLETED *(Attach additional page(s) as necessary, and identify the item description being continued)*

SEE ATTACHED DOCUMENT

[X] SIMULATION FACILITY PERFORMANCE TESTING SCHEDULE ATTACHED. *(For the conduct of approximately 25% of performance tests per year for the four year period commencing with the date of this certification.)*

DESCRIPTION OF PERFORMANCE TESTING TO BE CONDUCTED. *(Attach additional page(s) as necessary, and identify the item description being continued)*

SEE ATTACHED DOCUMENT

[ ] PERFORMANCE TESTING PLAN CHANGE. *(For any modification to a performance testing plan submitted on a previous certification)*

DESCRIPTION OF PERFORMANCE TESTING PLAN CHANGE *(Attach additional page(s) as necessary, and identify the item description being continued)*

INITIAL CERTIFICATION - NOT APPLICABLE

[ ] RECERTIFICATION *(Describe corrective actions taken, attach results of completed performance testing in accordance with 10 CFR § 55.45(b)(5)(iv). Attach additional page(s) as necessary, and identify the item description being continued.)*

INITIAL CERTIFICATION - NOT APPLICABLE

Any false statement or omission in this document, including attachments, may be subject to civil and criminal sanctions. I certify under penalty of perjury that the information in this document and attachments is true and correct.

SIGNATURE – AUTHORIZED REPRESENTATIVE	TITLE	DATE
	VICE PRESIDENT - TURKEY POINT	

In accordance with 10 CFR § 55.5, Communications, this form shall be submitted to the NRC as follows:

BY MAIL ADDRESSED TO: Director, Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

BY DELIVERY IN PERSON TO THE NRC OFFICE AT: One White Flint North
11555 Rockville Pike
Rockville, MD

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

GENERAL INFORMATION

The enclosed information supporting the Certification of the Turkey Point Unit 3 Simulator is an abstract of the information developed to demonstrate compliance with ANSI/ANS 3.5 and Regulatory Guide 1.149. Backup references are included in each Section.

The Certification submittal is organized into two volumes. Volume I contains the Certification submittals for Turkey Point Units 3 and 4. The Unit 3 section of Volume I is organized in a manner similar to ANSI/ANS 3.5 Appendix A, Guide for Documenting Simulator Performance. The Unit 4 section of Volume I references the Unit 3 Certification submittal and analyzes the differences between the two units. Volume II contains the abstracts of the Simulator Certification Tests which were performed to verify that the Turkey Point Simulator operates in accordance with the above references. Table 0-1 provides a cross-reference between ANSI/ANS 3.5 sections and the sections of this document.

This submittal will reference the Simulator Configuration Review Board (SCRB). The Turkey Point SCRB was established by administrative procedure 0-ADM-305, Simulator Configuration Management (Reference 0-1). The SCRB provides overall control and direction with respect to changes to the Simulator. It also provided overall review and approval of the Certification test program and test results. The membership on the SCRB was selected per the guidelines of the Institute of Nuclear Power Operations, "Simulator Configuration Management System," INPO 87-016, August 1987 (Reference 0-2). The SCRB comprises individuals with significant experience in Turkey Point operations, simulator engineering, and simulator training. The current SCRB includes the Plant Operations Supervisor, Simulator Engineering Coordinator, and Simulator License Training Coordinator. At least one alternate with equivalent capability is provided for each SCRB member. Figure 0-1 identifies the line organization responsible for the Simulator, the relationship of the SCRB to that organization, and the present composition of the SCRB.

The preparation of certification test procedures, performance of the tests, and documentation of the results were performed by an independent, dedicated certification team. Each test procedure was approved by the Simulator

Engineering Coordinator. Additional staff from the plant were used to support specific tests. For example, current licensed operators were used in many of the normal startup and shutdown evolutions, and reactor engineering staff were used during the startup physics tests. Figure 0-2 identifies this section of the organization and the composition of the Certification team. Future testing will be the responsibility of permanent Turkey Point Simulator engineering staff. Appendix A of the Unit 3 submittal contains abstracts of the resumes for the Certification team, the SCRB, and the SCRB alternates.

EXCEPTIONS TO ANSI/ANS 3.5 STANDARD

The Turkey Point Simulator meets all of the requirements of ANSI/ANS 3.5. The following exceptions to ANSI/ANS 3.5 are taken.

NON-APPLICABLE REQUIREMENTS

The items in this section are identified as exceptions based on their applicability to this facility.

ANSI/ANS 3.5 Section 3.1.1(7) " 3.1 Simulator Capabilities, 3.1.1 Normal Plant Evolutions, (7) Startup, shutdown, and power operations with less than full reactor coolant flow"

Technical Specifications at the Turkey Point Plant preclude normal power operation unless all three reactor coolant pumps are operating. Therefore, none of the simulator certification tests involving power operation were performed with partial RCP operating conditions. Transient tests involved tripping one, two, and three RC pumps and the fill and vent, heatup and cooldown operations tests were performed with partial flow operations in accordance with the applicable plant procedures. There are no limitations in the Turkey Point Simulator regarding the number of RC pumps that can be operating or disabled at any plant operating mode or during any malfunction.

ANSI/ANS 3.5 Section 3.1.2(12) " 3.1 Simulator Capabilities, 3.1.2 Plant Malfunctions, (12) Control rod failure including stuck rods, uncoupled rods, drifting rods, rod drops, and misaligned rods"

Drifting Rod malfunctions are not relevant to the Turkey Point Control Rod Drive design. All the other listed rod malfunctions were included in the test program.

ANSI/ANS 3.5 Section 3.1.2(25) *" 3.1 Simulator Capabilities, 3.1.2 Plant Malfunctions, (25) Reactor pressure control system failure including turbine bypass failure (BWR)"*

This item is specifically related to BWRs.

ANSI/ANS 3.5 Appendix B Section B2.1(2) *"B2 PWR Simulator Operability Test, B2.1 Steady State Performance, (2) Secondary Plant, Steam Generator Secondary side temperature."*

This temperature is not monitored in Westinghouse vertical Steam Generators.

OTHER EXCEPTIONS

The items in this section are identified as exceptions for reasons other than their applicability to this facility. The specific reasons are identified in the justification for each exception.

ANSI/ANS 3.5 Section 4.1(3) *" 4. Performance Criteria, 4.1 Steady State Operation, (3) The simulator computed values of critical parameters shall agree within ±2% of the reference plant parameters and shall not detract from training."*

The Turkey Point Simulator Steady State certification tests used ±2% of the reference instrument loop range as the acceptance criteria for critical parameters and ±10% of the instrument loop range as the acceptance criteria for non-critical parameters. This criteria is based on the operator's ability to observe such differences on the control room indicators and realistically meets the training requirements for parameter accuracy. This approach is consistent with that of other facilities in the industry and was reviewed and approved by the SCRB. For the actual performance and analysis of the Steady State Tests, data was taken from plant control room logs and compared to the same log readings in the simulator. To obtain the matching set of conditions, the simulator was operated using approved plant procedures until it was in the same condition as the plant. The data from the two sets of logs was input to a series of calculations which compared the difference between the simulator and plant readings to the 2%

(10%) of the loop range criteria. In addition, instrument accuracies, where available, were taken into account by adding them to the computed values. All parameters were examined for errors which could detract from training in addition to the 2% (10%) criteria. No errors were found which would detract from training, however, if the simulator was in error by more than the 2% (10%) criteria, a Discrepancy Report was written.

ANSI/ANS 3.5 Section 5.3 "5. Simulator Design Control, 5.3 Simulator Modifications. The simulator shall be modified as required within 12 months following the annual establishment of the simulator update design data referenced in 5.2."

The following Plant Change/Modifications (PCM) have been identified as having simulator impact and have been completed in the plant for more than 12 months:

The systems affected by the following PCM's are expected to be impacted by a major control room re-configuration scheduled for 1991. The SCRB has deferred implementation on the simulator until the new configuration is finalized.

PCM 84-026, SWRN 8800276, Control Room Ventilation Emergency Filter System Modification.

PCM 85-001, SWRN 8800405, Control Room DC Lighting Modification.

PCM 88-587, SWRN 8900072, Temperature Controller (TC-6548) Manual Override.

Implementation of the following PCM is not yet complete due to delays encountered in identification and procurement of the required hardware. This change is scheduled to be completed on the simulator in early 1991. In the interim, activities have been initiated to implement a subset of the functions associated with this change, using currently installed equipment.

PCM 87-310, SWRN 8800343, Emergency Response Data Acquisition and Display Upgrade.

<u>ANSI/ANS 3.5 Appendix B Section B2.2(6)</u> "B2 PWR Simulator Operability Test, B2.2 Transient Performance, (6) Main Turbine Trip (maximum power level which does not result in immediate reactor trip)"

At Turkey Point, the power level below which a turbine trip does not result in a direct reactor trip is 10%. A turbine trip from 10% power level would be an extremely small transient and would add very little to the simulator certification process. Therefore, this test was run from a power level just below that for which rod control and steam dumps are designed to provide a controlled stabilization for the plant. This was done by disabling the reactor trip by turbine trip.

TABLE 0-1
ANSI/ANS 3.5 CROSS-REFERENCE

ANSI/ANS 3.5 SECTION		REPORT SECTION
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3.1.1	Normal Plant Evolutions	1.2.2 1.2.3 Table 3-2 Table 3-9
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3.2.1	Degree of Panel Simulation	1.2.1 1.2.2
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ANSI/ANS 3.5 SECTION		REPORT SECTION
3.4.1	Initial Conditions	1.3.1
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4.3	Simulator Operating Limits	1.3.4
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5.1	Simulator Design Data	2.0 4.0
5.2	Simulator Update Design Data	2.0 4.0
5.3	Simulator Modifications	2.0 4.0
5.4.1	Simulator Performance Testing	3.1
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A1.1	General	1.1

ANSI/ANS 3.5 SECTION		*REPORT SECTION*
A1.2	*Control Room*	*1.2*
A1.3	*Instructor Interface*	*1.3*
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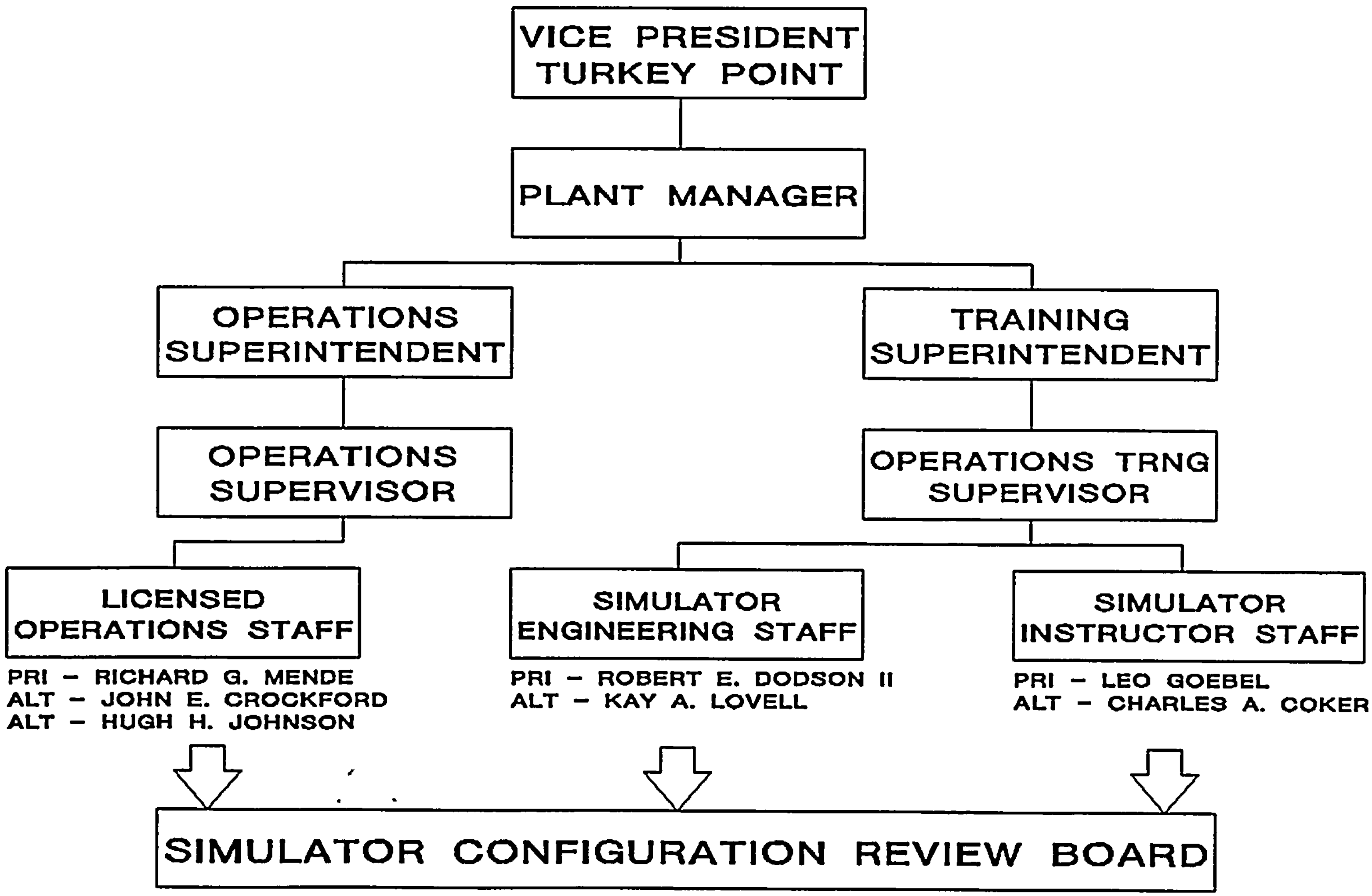
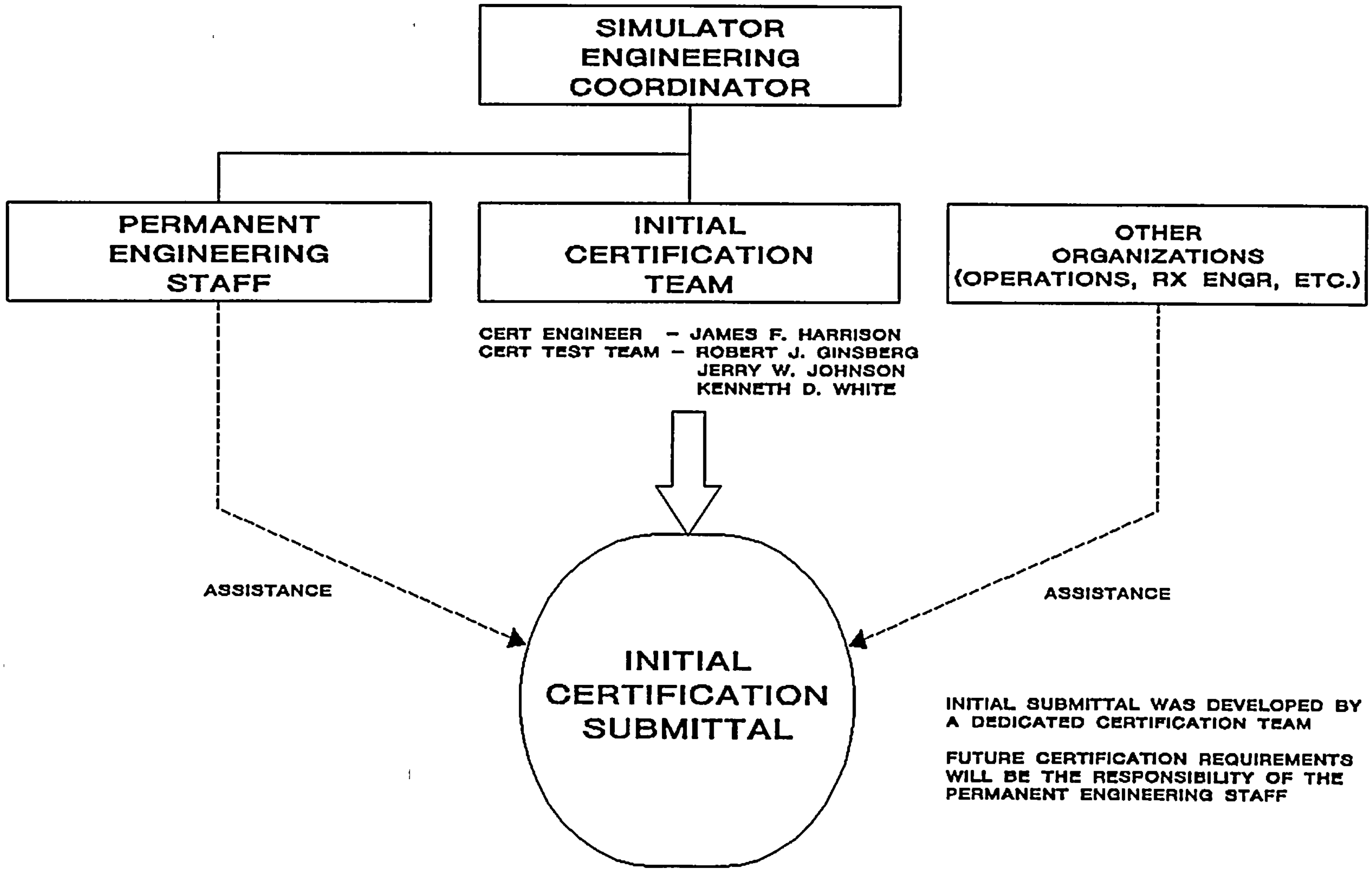
A1.5	*Changes Since Last Report*	*1.5*
A2	*Simulator Design Data*	*2.0*
A3.1	*Computer Real Time Test*	*Table 3-1* *Volume II, section 1*
A3.2	*Steady State and Normal Operations Tests*	*Table 3-1* *Volume II, section 2* *Volume II, section 3* *Volume II, section 4*
A3.3	*Transient Tests*	*Table 3-1* *Volume II, section 5*
A3.4	*Malfunction Tests*	*Table 3-1* *Volume II, section 5*
A4	*Simulator Discrepancy Resolution and Upgrade Program*	*4.0*
B2.1	*Steady State Performance*	*Table 3-1* *Volume II, section 2*
B2.2	*Transient Performance*	*Table 3-1* *Volume II, section 5*

SIMULATOR CONFIGURATION REVIEW BOARD



INITIAL CERTIFICATION ORGANIZATION



REFERENCES

0-1 *Turkey Point Administrative Procedure 0-ADM-305, Simulator Configuration Management, November 1, 1990.*

0-2 *Institute of Nuclear Power Operations, "Simulator Configuration Management System," INPO 87-016, August 1987.*

1.0 SIMULATOR INFORMATION

1.1 GENERAL INFORMATION

Owner: Florida Power and Light Co. (FPL), Turkey Point Plant.

Operator: The conduct of training programs is the responsibility of the Nuclear Training Department's Training Program Coordinators and their staff. Simulator maintenance is the responsibility of the Training Department's Simulator Engineering Coordinator and his staff.

Manufacturer: CAE Electronics of Montreal, Quebec.

Reference Plant/Type/Rating: Turkey Point Unit 3, is a three loop Westinghouse PWR licensed for 2200 Mwt. The plant began commercial operation in 1972 under Docket 50-250 License DPR-31. The NSSS and Turbogenerator were supplied by Westinghouse, with Bechtel as the A/E.

Date Available for Training: Training of students began in May 1988.

Type of Report: This is the initial certification report.

1.2 CONTROL ROOM INFORMATION

1.2.1 PHYSICAL ARRANGEMENT

FLOOR PLAN COMPARISON

The Simulator control room panels are oriented and arranged to duplicate the Plant control room panels. Figure 1-1, Plant and Simulator Control Room Floor Plan, provides a top view with dimensions of the Simulator and Plant control room panels. Small dimensional differences between the Simulator and Plant control rooms exist due to the building arrangement and the omission of Unit 4 in the Simulator control room. These differences in room dimensions cause slight variances in panel layout distances. The maximum deviation in layout dimensions in the control room surveillance area is 0.5 inches. The typical deviation is significantly less. (References 1-1 & 1-2)

The heavy metal outer entry door is not included in the Simulator control room, however the inner entry door is duplicated. The Unit 4 side of the Plant control room is simulated by the insertion of a one-way-glass wall behind which resides the instructor facility.

All main control room panels within the surveillance area are functionally simulated. Panels outside the surveillance area are functionally simulated where operator interaction is required. The following panels are included:

Flux Mapping Panels,
Loose Parts Monitoring System,
Rod Position Cabinet,
Rod Deviation and Axial Flux Monitoring System,
Containment Isolation Cabinets,
Protection Rack Bistable Trip Switches, associated lights, and door alarm switches, (remainder of protection racks are cosmetic)
Safeguards Logic Test Racks,
Rod Disconnect Panel,
Spare Annunciator Power Supply Switch Panel,
Page Emergency Power Supply Switch,
Reactivity Computer,
Remote Lighting Control Panels,
Control Room Area Radiation Monitor local readout,
All Control Racks are cosmetically simulated.

The vertical panel's common section located above the opening in the vertical panels between Units 3 and 4 is functionally simulated along with the system and Quartz clocks. A small portion of the Unit 4 vertical panel to the right of this opening is simulated. This partial panel houses the "B" Emergency Diesel watt-hour meter and common containment level recorder. The barometer and vacuum indicator on the end of the vertical panel are functionally simulated with digital indicators.

Within the Simulator, the office area designated in the plant for the Shift Technicians is used for replication of some equipment not located in the reference plant control room. This equipment includes Reactor Coolant Pump Vibration Instrumentation, the Alternate Shutdown Control Panel, and the Control Room

Ventilation Controls. In addition, the Reactor Protection Test Panels are simulated within Miscellaneous Relay Racks.

The simulator control room includes the Shift Supervisor's office, Communications Booth, and the Watch Engineer's office. The Simulator does not include the kitchen or restrooms located on Unit 4 side of Plant control room.

1.2.2 PANELS/EQUIPMENT

Simulator control room panels were originally fabricated to duplicate the existing Plant control room drawings as of August 1984. Photographs of all simulated control room equipment were taken at the plant in July 1990, in order to establish the current status of the control room panels and equipment. The plant control room photographs have been compared with the Simulator control room using Simulator Engineering Instruction Number 9, Simulator Physical Fidelity Validation (Reference 1-3). The results of this review are documented in the Physical Fidelity Validation Report (Reference 1-4). Discrepancies resulting from the review were entered into the Simulator Configuration Management System and Work Orders issued for their correction. Those discrepancies not corrected as of the 474 form submittal date are included in Figure 4-2. All fidelity discrepancies will be corrected in a timely manner in accordance with their assigned priority.

1.2.3 SIMULATED SYSTEMS

The Turkey Point Plant Simulator includes the simulation of all systems necessary for training in plant normal, off normal, and emergency modes of operation. The simulation accommodates all related panel controls, indications and alams found in the control room. Provisions for interactions between systems and system remote functions are included.

The Simulator Procurement Specification (Reference 1-5) provided the initial definition of the scope of systems to be simulated. During simulator development, a color coded set of plant drawings was prepared that shows the scope of simulation for each system. (Reference 1-6). These drawings are archived with the Simulator drawings. The final definition of the scope of simulation for each system is included in the "Scope of Simulation" section of each model report. A complete listing of the model reports is included in Reference 1-7.

1.2.4 CONTROL ROOM ENVIRONMENT

The Simulator environment comprises five systems: lighting, sound, audio, telephone, and furnishings. Each system and the differences between the Plant and Simulator control rooms will be briefly discussed. Software documentation on these systems includes a complete description of the simulated scope.

LIGHTING SYSTEM - Every effort has been made to exactly duplicate the location and type of lights available within the control room surveillance area. Replication of one row of fluorescent lighting is not currently possible in the Simulator control room due to the location of ventilation ductwork. The missing row of lighting does not have any visible impact on the lighting levels in the Simulator surveillance area. In addition lighting in the control and protection rack areas behind the main control panels is fluorescent in the Simulator control room and incandescent in the plant control room. The Simulator lighting system is programmed to swap normal fluorescent lighting to emergency incandescent lighting upon simulated loss of voltage to control room lighting busses. The simulator also duplicates the dimming of control room fluorescent lighting during voltage transients on the lighting busses, such as during the startup of large motors.

SOUND SYSTEM - The Simulator sound system consists of replication of the Source Range Audio Count Rate and unique steam sounds for operating and accident environments. Each sound is driven by its initiating model software with the capability to disable individual sounds or the entire sound system from the instructor facility. Simulated steam sounds include steam line break, moisture separator/reheater relief lifting, main steam safety valves lifting, and operation of atmospheric steam dump valves. Sound replication of step counters is not necessary since the mechanical step counters utilized in the Simulator are identical to those used in the Plant control room.

ALARM SYSTEM - The alarm system consists of the site evacuation alarm and the fire alarm. Each alarm is activated from its respective push button located on the control room operators desk. The page system alarm power switch is also functionally simulated. Either or both of the alarms may be disabled from the instructor facility.

AUDIO SYSTEM - The audio system consists of three components: the Gaitronics

page system, the Local Government Radio (GE Deskon II), and the maintenance jack/headset system. All of these components duplicate their plant control room counterparts in appearance and operation. The system dispatcher radio is not included in the simulation since it is physically located on the Unit 4 operator desk.

TELEPHONE SYSTEM - All telephone communications available in the control room at the Unit 3 Operator's desk, Watch Engineer's desk, Shift Supervisor's desk, and Communications booth are functionally replicated in the Simulator control room. Numbers dialed, other than those replicated, ring in the instructor facility. The telephone system is capable of producing a dead line or a busy signal through local programming. All communications from the simulator control room go to the instructor facility and adequate indication is provided to the instructor to role play the proper response.

FURNISHINGS - Major plant control room furnishings such as desks, chairs, and carpeting have been duplicated in the Simulator in both model and color. The chairs in the plant control room have been updated; therefore, presently the Simulator chairs are different. The impact of the different chairs is minimal and following the planned re-configuration of the control room, matching furnishings will be ordered. Small furnishings such as stationary supplies, waste baskets, etc., are supplied, although no attempt has been made to duplicate plant materials. The plant work order tracking system and the computerized clearance systems located in the Watch Engineer's office have not been replicated.

1.3 INSTRUCTOR INTERFACE

1.3.1 INITIAL CONDITIONS

The Turkey Point Simulator has the storage capacity for 60 initialization condition (IC) points. The number containing valid active conditions at any given time depends upon training needs. IC points 1 through 15 are protected and are the basis for development of all other points. Points 16 through 30 are also password protected and are under the control of the Simulator Training Coordinator. These are generally points created for specific training scenarios which have continuing use. IC points 31 through 60 are unprotected and are used for specific training

needs or for the storage of conditions for use in discrepancy clearance. Table 1-1 presents a summary of the first 15 IC's.

All IC points are created from a Full Power Steady State Middle of Life condition. This plant condition is stored in Initial Condition 1. Initial Conditions 6 and 11 are full power steady state conditions for beginning of core life and end of core life. These points are created using utilities to modify core life dependent constants to produce the proper operating characteristics.

Each of the three hot full power conditions are maneuvered using plant operating procedures to produce four other operating conditions for each point in core life:

50% Power Steady State
Hot Standby
Cold Shutdown or Heatup/Cooldown
Startup Conditions

Figure 1-2 graphically presents the approach described above.

1.3.2 MALFUNCTIONS

The Turkey Point Simulator is capable of performing all required Malfunctions for PWR's as specified in ANSI/ANS-3.5, 1985. The malfunctions which the Simulator is capable of producing are all based on specific component failures. Specific failure mechanisms are represented for each component. Hence, a particular failure to a specific component affects the interfacing components and systems in the same manner as it would in the plant. In other words, there are no programmed "causes and effects." This approach provides many thousands of failures and allows for a wide range of combinations of failures without the danger of violating pre-conceived ideas of how failures proceed.

Where the operator actions are a function of the degree of severity of malfunction (eg., loss of condenser vacuum, steam line break, loss of coolant, degraded feed water flow, etc.) the simulator has variable severity capability for the malfunction of such range to represent plant capabilities. Malfunction insertion and termination are easily controlled through the instructor facility. The simulator can be programmed for 130 active malfunctions/failures. The introduction of a malfunction does not alert the operator in any manner other than that which would occur in the Plant control room.

Table 1-2 illustrates the component specific failure approach and summarizes most of the major malfunctions. A complete list of failures that may be imposed on the Simulator by the instructor is included in Reference 1-9. The failures are also addressed in each applicable software model report. Reference 1-7 provides a complete list of the simulator software model reports.

1.3.3 LOCAL OPERATOR CONTROLS

Local Operator Actions (LOA's) are provided to allow the instructor to simulate actions which would be performed by field equipment operators in the Plant. Simulation is included for systems that are operated outside the control room, that provide input to the simulation models, or are necessary for the performance of the plant normal and off-normal evolutions and plant malfunctions. These actions are controlled from the Instructor Facility and the trainee interfaces with the instructor in the same manner as he would address the field operators within the Plant.

A number of LOA's are modelled via generic modules called "handlers." Using handlers provides a standardized approach for all similar hardware. The following list includes the LOA's that are accessed via the Valve and Breaker handlers.

BREAKERS - LOCAL OPERATOR ACTIONS -
Local close/trip mechanical, local close/norm/trip electrical, rackout, alarm reset, breaker position, manual spring charging, isolate switch (isolate/normal), selector switch (remote/local), transfer switch (normal/isolate).

VALVES - LOCAL OPERATOR ACTION - Local Handswitch/Local Pushbutton Position
BREAKER LOCAL OPERATOR ACTIONS - Local Close/Trip (Mechanical), Rackout, Isolation Switch
MANUAL VALVE POSITION

Note: Not all Failures or LOA's are applicable to all breakers or valves.

The complete list of available LOA's is included in reference 1-9. They are also addressed in each applicable software model report. Reference 1-7 provides a complete list of the Simulator software model reports.

1.3.4 INSTRUCTOR STATION FEATURES

The instructor facility (I/F) controls, monitors, and presents information about the status of the simulator, its simulated plant systems and equipment. The instructor station has three displays (CRT's) with touch sensitive screens and associated keyboards, three keypads, and communications equipment. The complete description of instructor station features and its operation can be found in Reference 1-8.

The touch screen CRT's are the primary vehicle the instructor uses to monitor and control the simulator training activities. The CRT's display the following:

1) *Menus of items for selection via the touch screen.*
2) *Piping and instrumentation diagrams (P&ID'S) of simulated systems, showing status and key parameter values. These include electrical wiring diagrams.*
3) *Plots of up to eight variables at a time.*
4) *Text or numerical data pages.*
5) *Bar chart diagrams.*
6) *Stylized instrument pages. These are diagrams of control panels which dynamically display device status and provide the instructor with access to main control panel interface overrides, described later in this section.*

Many of the features of the Simulator are activated from the keypads at the I/F. Table 1-3 summarizes most of the instructor station functions that are activated from these keypads.

There are three video cameras hanging from the overhead inside the Simulator. These provide input to three television screens in the I/F. The instructor has the ability to move the cameras and zoom in for a closeup look at an individual instrument or control. The cameras can provide an overview of the control room or an individual instrument can be read when a camera is zoomed in. Also, a training session can be video recorded for playback.

Foreground (Real Time) Features

The instructor is responsible for the operation and control of the simulator during training sessions in such a way that it provides adequate and complete training for control room personnel. The instructor controls the operation of the training activities via the following foreground features:

1) *Initial conditions, snapshots, and backtrack points*
2) *Performance monitoring, review and replay*
3) *Failure activation*
4) *Task speed up or slow down*
5) *Sound effects*
6) *Parameter controller*
7) *Main control panel interface overrides*
8) *Simulator status alarms*

The instructor may also develop a scenario that will drive the training sessions with a pre-programmed sequence of events. Individual events may be set to actuate by the instructor, at a given time in the scenario, or be conditional on other events or operator actions.

Initial Conditions, Snapshots, and Backtrack Points

Initial conditions (IC's) and backtrack points are recordings of the simulator common data base stored on disc. The instructor has the capability of initializing the simulator to any of 60 IC points. Backtrack points are made at preset intervals and can be recalled during a training session for review or to re-perform a portion of the scenario. An IC can be saved at any time by utilizing the SNAP key on the instructor's keypad.

Performance Monitoring, Review and Replay

There are five features which allow the instructor to review data which has been stored during an exercise:

Replay allows the instructor to play back a training exercise. It starts from a backtrack point and will replay all inputs made from the time the point

was stored until the present. It is also possible to replay an earlier training session saved to tape. It should be emphasized that this function records inputs rather than outputs and is actually a re-run of the simulation. This capability makes the function a valuable tool for testing the simulator in addition to its training uses.

Performance Review allows the instructor to enter data about a lesson (students' names, date, etc.) and have this data, along with all inputs made during an exercise, stored on tape for later review or printed on the line printer.

Review Reports allows an instructor to review data which has been stored on a Performance Review tape.

Monitored Parameters allows the user to monitor the values of up to twenty variables.

The Graphic Recorder allows the instructor to create scenario specific plotting menus. There can be a total of twelve menus of four parameters each plotted against time.

Failure Activation

Failures may be set up from any workstation of the I/F by selecting the P&ID display with the target component and then selecting the failure from the menu for the particular device (e.g. valve, pump, etc.). Failures can also be setup via a Scenario and be activated via the Control Parameters page.

Task Speed Up or Slow Down

The simulation may be slowed or speeded if necessary for training on certain transients. Speed up is possible only for certain systems, and by a factor of up to 10 maximum. The speedup factors cause the simulation to appear to be running faster than real time. Speedup factors are included for the following systems:

1) *Reactor system*
2) *Boration and dilution*

3) *Condenser vacuum*
4) *Conductivity*
5) *Main steam line metal temperature.*

Time can also be slowed by any factor from 1 to 10. In this case all simulated systems are slowed.

Sound Effects

Certain sounds that impart a degree of realism to the control room environment are available. Any or all of these may be enabled or disabled by the instructor.

Parameter Controller

The parameter controller permits the instructor to manipulate any parameter in the common data base. The parameter controller works via SINGLE and COMPOSITE EVENT entries. An EVENT consists of a parameter, a trigger and possibly a ramp time or delay time. A TRIGGER is the criteria for an EVENT to be inserted into the system. The instructor can TRIGGER the event himself or have the system do it via an expression. A COMPOSITE is a single event which can consist of up to ten parameter changes. Each parameter change in turn has its own TRIGGER.

Main Control Panel Interface Overrides

The stylized instrument feature provides CRT displays of all the control and alarm panels. A feature of the stylized instrument displays is that they permit the instructor to override the status of any panel component, alarm, switch, meter, fuse, etc. If this is done, that component will show the value or status entered by the instructor if it is an output device; i.e., one that supplies information to the operators. If the device overridden is an input device such as a switch or controller, the simulation will respond as if the device were in the position to which it is overridden.

Simulator Status Alarms

The purpose of the simulator status monitor is to satisfy the requirements of ANSI/ANS 3.5 Section 4.3 by detecting when modules are operating at or beyond

physical or simulation limits, and to signal the discrepancy to the instructor. Parameters were evaluated and, where appropriate, assigned a minimum and maximum value. There are 153 active values that when exceeded will cause an out of limits alarm. When an out of limits condition is detected, an audible alarm is sounded in the Instructor Facility and the SOS button on the keypad will be lit. Pressing the keypad button will silence the instructor facility alarm and will display the STATUS page. Training may continue or be terminated at the instructor's discretion.

If the simulator is not operating in real time, simulation will stop and give the instructor an appropriate abort message. Certification tests were performed to demonstrate that the simulator will operate in real time under conceivable loading conditions and that it would abort if simulation did not remain in real time. The abstracts of these tests, RTT-001 and RTT-002, are in included Volume II of this submittal.

Background Features

Scenario Development

This utility allows the instructor to develop a scenario for use in a future training session. The instructor may input some or all of the following information:

1) *Initial Conditions, and modifications on a label by label basis.*
2) *Speed-up or slow-down of Time.*
3) *Parameter controller.*
4) *Monitored parameters and performance indicators.*
5) *Graphic recorder parameters.*

Instructor Data Book

The Instructor Data Book (IDB) provides on-line access to documents and utilities which will aid an instructor in preparing a lesson or scenario. IDB will allow the instructor to list files, print files and locate variables required for scenarios.

1) *Disk file menus*
2) *Longword/shortword dictionary*

3) Abstracts menu
4) Data base manager
5) Scratchpad
6) Scenario abstracts

Of these features, the longword/shortword dictionary is the primary feature used by instructors in the development of scenarios or lessons. It will search for common data base labels given a longword description (maximum 45 characters). When prompted for a longword, enter parts of a longword or the whole longword and the dictionary will be searched. If any of the words entered appear in valid longwords, the associated labels will be returned.

The scenario abstracts option permits any abstract to be read but not modified.

1.4 OPERATING PROCEDURES

All certification testing and all training utilizes the actual current plant procedures. A controlled set of all normal, off-normal, and emergency procedures is maintained in the simulator control room.

1.5 CHANGES SINCE LAST REPORT

This is the initial Simulator certification report; therefore there are no changes to report.

TABLE 1-1

SUMMARY OF INITIAL CONDITIONS 1 - 15

IC	CORE AGE	RCS TEMP DEG F	REACTOR POWER %	RCS PRESSURE PSIG	XENON WORTH PCM	DESCRIPTION
1	MOL	574	100	2235	-2818	100% STEADY STATE
2	MOL	560	55	2235	-2248	50% STEADY STATE
3	MOL	547	0	2235	0	HOT STANDBY
4	MOL	118	0	322	0	COLD SHUTDOWN
5	MOL	547	0	2235	0	S/U, S/D RODS OUT
6	EOL	574	100	2235	-2929	100% STEADY STATE
7	EOL	561	55	2235	-2446	50% STEADY STATE
8	EOL	547	0	2235	0	HOT STANDBY
9	EOL	135	0	365	0	COLD SHUTDOWN
10	EOL	547	0	2235	-4890	S/U, PEAK XENON
11	BOL	574	100	2235	-2794	100% STEADY STATE
12	BOL	560	53	2235	-2285	50% STEADY STATE
13	BOL	547	0	2235	0	HOT STANDBY
14	BOL	265	0	377	0	HEATUP AND COOLDOWN
15	BOL	547	0	2235	0	S/U, POSITIVE MTC

NOTE: Values for the listed parameters may vary slightly from the stated values when the IC's are re-established as a result of normal simulator maintenance.

TABLE 1-2
SUMMARY OF MALFUNCTIONS

SYSTEM LEAKS - Variable to Double Ended Guillotine

RCS - Cold Legs, Hot Legs, Pump Suction Legs, RTD Bypass Loops
CVCS - Charging and Letdown Line - Multiple Locations
RHR - Suction and Discharge Line - Inside & Outside Containment
PRESSURIZER - Spray and Surge Line
COMPONENT COOLING - Header Leaks, Heat Exchanger Leaks
MAIN STEAM - Main Steam Line - Inside Containment
Main Steam Line - Outside Containment/Upstream of MSIV
Main Steam Line - Between MSIV & NRV
Main Steam Header Downstream of MSIV

CONDENSER - Vacuum Leak and Tube Leak
CONDENSATE - Pump Seal Leaks, Header Leak
FEEDWATER - Header, Individual Lines Inside & Outside Containment
AUXILIARY FEEDWATER - Pump Discharge, Each Header
STEAM GENERATOR TUBE LEAKS - Variable Single to Multi-Tube
ACCUMULATOR CHECK VALVE LEAKAGE - Variable to 100%
HEAT EXCHANGER TUBE LEAKS - Variable to Multi-Tube
RCP Thermal Barrier
CVCS Non-Regenerative Heat Exchanger
CVCS Seal Water Heater Exchanger

REACTOR COOLANT PUMP SEAL FAILURES - Variable to 100%, Seals 1/2/3

TANK LEAKS - All Simulated Tanks

FUEL FAILURE/RCS ACTIVITY INCREASE - Variable

FILTER BLOCKAGE - Variable to 100%, Filters, Strainers, and Screens

NUCLEAR INSTRUMENTATION FAILURES

Power Range - Detector Failures - High & Low

Bistable Failures

Intermediate Range - Detector Failures - High & Low
Incorrect Compensation - Variable Over & Under
Bistable Failures

Source Range - Detector Failures - High & Low
Incorrect Discrimination - Variable High & Low
Excessive Noise
Bistable Failures

TURBINE RUNBACK FAILURES - Fail to Actuate, Spurious Actuation

ROD STOP FAILURES - Fail to Actuate, Spurious Actuation

REACTOR TRIP RELAY FAILURES - Fail to Actuate, Spurious Actuation

PROTECTION RELAY - Fail to Actuate, Delayed or Spurious Actuation

SI RELAY FAILURES - Train A/Train B - Manual/Auto
Fail to Actuate, Spurious Actuation

REACTOR TRIP BREAKERS FAILURES - Fail Open, Fail Closed, Fail As-Is

CONTROL ROD FAILURES - (All Rods) Ejection, Slip to Any Position - Variable to Fully Inserted, Dropped Rod, Dropped Group , Mechanically Stuck, Blown Fuses, Stationary Gripper, Movable Gripper, Lift Coil, Uncoupled Rod, Rods Fail to Move or Continuous Motion-Auto or Manual

TURBINE FAILS TO TRIP

GENERATOR VOLTAGE REGULATOR FAILURE

DIESEL GENERATOR FAIL TO START - A and/or B

ELECTRICAL BUS FAILURES - Ground Fault, Phase to Phase Short - Variable

BREAKERS

GENERIC FAILURES - Fail Close, Fail Open, Fail As Is, Fail to Reset, Ground Fault (Load Side)
Note: Not all Failures are applicable to all breakers.

VALVES

GENERIC FAILURES - Fail Open, Fail Closed, Fail As Is, Leak By, Mechanical Overload, Loss of Electric Power, Loss of Pneumatic Power, Loss of Control or Conditioning Signal

BREAKER FAILURES - Fail Closed, Fail Open, Fail As Is, Ground Fault
Note: Not all Failures are applicable to all valves.

INSTRUMENTATION GENERIC FAILURES

INDICATOR - Power Loss, Signal Loss, Fail High, Fail Low, Fail As Is, Drift

ALARM RELAY - Energized, De-energized, As Is

B/S TRIP UNIT - Loss of Power, Loss of Signal, Alarm Relay Fail Energized, De-energized, As Is

DIFFERENTIAL COMP - Loss of Power, Loss of Signal 1, 2, or Both, Alarm #1/#2
- Relay Fail Energized, De-energized, As Is, Spurious On

SIGNAL CONDITIONER - Power Loss

TRANSMITTERS - Loss of Power, Loss of Air, Fail High, Fail Low, Fail As Is, Drift Coefficient, Lag Coefficient

SENSORS - Noise Amplitude, Fail Coefficient Multiplier, Offset in Output

CONTROLLERS - Fail High, Low, or As Is, Loss of Power, Loss of Air, Loss of Input Signal

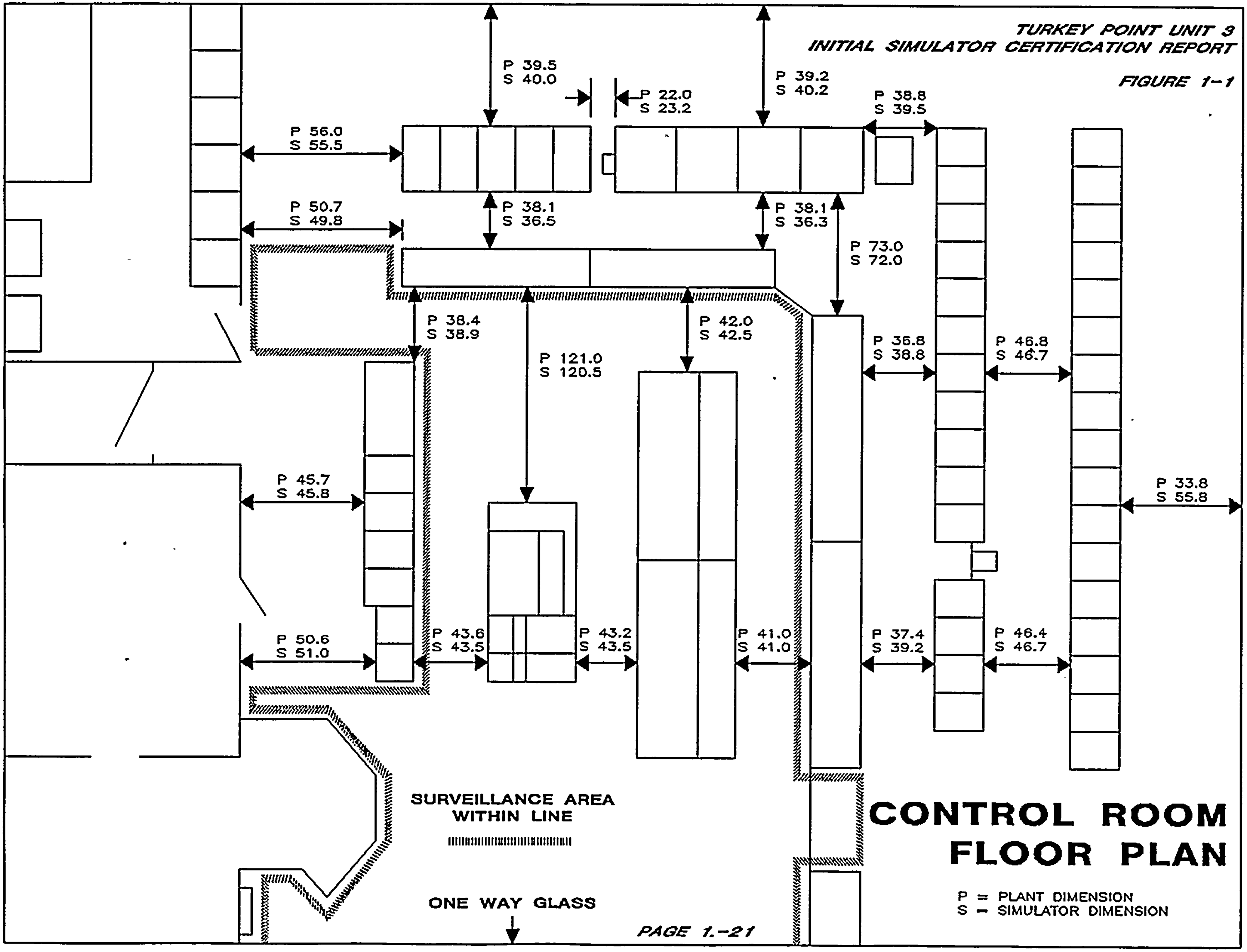
Note: Not all Failures are applicable to all instrumentation.

TABLE 1-3
INSTRUCTOR STATIONS MAIN KEYPAD FUNCTIONS

PUSHBUTTON	FUNCTION
F/R	Freeze/run. This switch resumes simulation software, if it is pressed when the switch is LIT. If LIT no real time simulation software is active.
ANN DIS	To disable/re-enable the audible alarms. If depressed while the simulation is frozen, flashing annunciator windows will be lit.
RESET	Causes the simulator to be restored to the selected initial condition.
STEP	When the operation is in step mode, pressing this key causes the simulation software to cycle through one "step".
PG	Page Forward/Page Backward Schematics are displayed successively in numerical order of their occurrence. In data book mode, these keys scroll through the document being displayed
PRT COPY	Print current contents of the CRT screen at the line printer. The key remains lit and the CRT locked during the memory read cycle. The light goes off when the CRT unlocks again.
SNAP	Calls up the page which allows for the creation of initial conditions.
OVR CHX	Override switch check. Permits the instructor to accept any mispositioned device on the menu during switch check.
DEA SCE	Places all parameter controls which are not yet active on hold and stops any controls that are ramping or in time delays.
REC PWR	Power shutdown of all control room chart recorders.
MAST FAIL	Activates all armed failures.
GLB CLR	Global clear of all active failures.
SYS MAT	To call up the overall Master System Matrix.
BAK TRK	Calls up a menu page that enables the instructor to: a) Set backtrack time (interval between backtrack points), b) Initialize the simulator to any backtrack point, c) Initiate replay from any backtrack point, d) Restore to the autostore point.
INI SCE	Brings up a menu of scenarios on to the CRT. Instructor then makes a selection using the touch sensitive screen.
IC SEL	Brings up a summary of existing initial conditions. The instructor can restore the simulator to any point.
TEST	Brings up a menu of simulation tests including: a) Daily readiness b) Simulator diagnostics
SOS	If lit displays the simulator system status of all out of tolerance parameters. If not lit, there is nothing to display. Must be depressed to silence IF alarm

	when out of bounds status alarm occurs.
MON PAR	Parameters being monitored are displayed on the screen. The instructor can add and delete parameters being monitored to a maximum of 20.
CON PAR	Brings up the control parameter page onto the screen. Parameter controller values may be entered.
SIM CTRL	Calls up the Level 0 simulator control menu. Functions include level 1 pages: a) Armed failure summary, b) Environmental effects, c) Switch check messages, d) Local Operator Actions Index e) Plant performance factors, f) Environmental factors, g) Timed failure, h) Part task, j) Function Keyboard Control.
REPLAY	Brings up a menu from which to start a replay.
NOOP	Brings up a menu so that the instructor may disable one or more real time software modules.
PERF REV	Brings up a menu of performance review function so that the instructor can make a selection, using the touch sensitive screen.
SOUND	Brings up the tableau allowing the instructor to enable/disable sound effects.
STYL INST	Stylized instruments. Brings up the index, so that selected panel sections can be displayed on the touch sensitive screen. The status of all devices, or the indicated reading of an instrument can be read, or overridden.
IDB	Sets CRT to Instructor Data Book mode. Instructor data book files are only open if this button is lit.
DEV SCE	Enter scenario development mode. This enables the instructor to build scenarios for use in future training sessions.
TIME	Time control mode. Brings up a menu of modules that can be sped up by a factor of between 1 and 10. The menu includes the possibility of the initiation of the step mode or of slowing the simulation down by a factor of between 1 and 10.
GRAF	Brings up an index of control room ERDADS graphic displays. One selection from the index is made by means of the touch sensitive screen.
PERF IND	Brings up a display of Performance Indicators. Selections are made by means of the touch sensitive screen.
ANN ACK	Acknowledges annunciators as if from the control room.
BYP CHX	Bypasses Switch Check mode following IC reset.

FIGURE 1-1

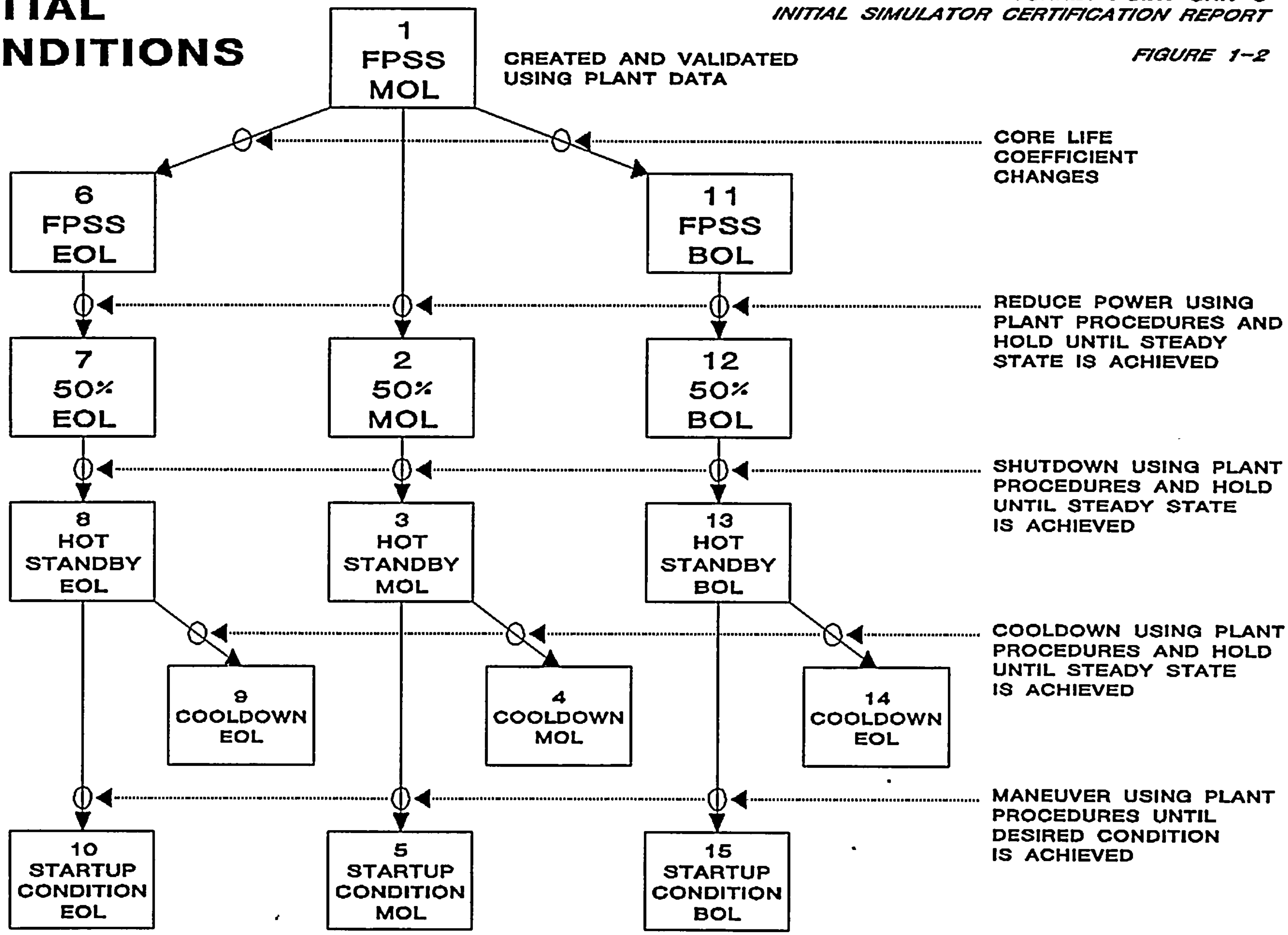


CONTROL ROOM FLOOR PLAN

P = PLANT DIMENSION
S = SIMULATOR DIMENSION

INITIAL CONDITIONS

FIGURE 1-2



REFERENCES

1-1 Plant and Simulator Control Room Floor Plan Drawing.

1-2 CAE Drawing UD139985.01.7.879, Turkey Point Control Room Complex Site Layout.

1-3 Simulator Physical Fidelity Validation, Simulator Engineering Instruction 9, August 1, 1990.

1-4 1990 Simulator Physical Fidelity Validation Report

1-5 Simulator Procurement Specification.

1-6 Color Coded Simulator Scope Drawings.

1-7 Index of Process Model Documentation.

1-8 Instructor Station Manual.

1-9 Listing of Common Data Base Global Partitions for Instructor Controls Including GLOBTA, GLOBTC, GLOBTF1, GLOBTF2, GLOBTF3, GLOBTF4, and GLOBTV.

2.0 SIMULATOR DESIGN DATA BASE

Each module of the Turkey Point Simulator is fully described in its associated model report published by the simulator vendor. The model reports describe the methodology used to develop the individual module and explain the FORTRAN code used to implement this methodology. These model reports are kept in the Turkey Point simulator library. One complete set is maintained as a library reference document and one set is kept for a working reference.

The model reports list 1373 separate references from which Turkey Point specific technical information was obtained. These references include technical manuals, drawings, plant operating data, and other relevant material. Over 90% of the references listed in the model reports are also available for use in the simulator library or are obtainable from the FP&L document centers. The remaining references are plant specific information provided to the vendor, which is described in the associated model report.

Simulator Engineering Instruction Number 10, Plant Design Change Tracking, requires design changes to be downloaded once per quarter from the Florida Power & Light corporate information system (Reference 2-1). These changes are reviewed for impact on the Simulator and when a change impacts the Simulator, it is scheduled for implementation by the Simulator Engineering Coordinator and entered into the Simulator configuration management system.

The SCRB meets at least once per quarter. This board reviews all Simulator modification packages, including those that have been authorized by the Simulator Engineering Coordinator for immediate implementation (Reference 2-2).

REFERENCES

2-1 Plant Design Change Tracking, Simulator Engineering Instruction Number 10, September 12, 1990.

2-2 Simulator Configuration Management, Turkey Point Plant Procedure 0-ADM-305, Revision Date November 1, 1990.

3.0 SIMULATOR TESTS

3.1 CERTIFICATION TEST DEVELOPMENT AND FORMAT

At the initiation of the Simulator Certification project a reference test program was designed to meet the requirements of ANSI/ANS 3.5. This program was then approved by the Simulator Configuration Review Board (SCRB). The testing process involved the following elements:

- *Preparation of a test procedure,*
- *Its review and approval for use by the Simulator Engineering Coordinator,*
- *Performance of the test by the test team and supporting staff from the plant, if necessary,*
- *Evaluation of the test results and preparation of the completed test report,*
- *Review of the test report by the review team and other plant staff, as necessary, and*
- *Presentation of the test report to the Simulator Configuration Review Board for approval.*

Figure 3-1 is a flow chart showing the process used in the Certification test process.

Simulator Certification testing was conducted by an experienced team of individuals with diverse and complementary talents. Staff from plant operations and engineering were utilized where particular special expertise or plant specific knowledge was desired to improve the experience base applied to the test. Examples of these situations include normal operations, where current control room operators were used, and startup physics tests where plant reactor engineering staff were used. This process applied the proper expertise to each test and provided a multi-level review culminating in a committee style review and approval by the SCRB.

For the purposes of the Certification effort, data recording and processing systems were developed for the Simulator, the plant ERDADS systems, and to interface with RETRAN best estimate information. In order to compare the Simulator results with plant data via the ERDADS archive system and with RETRAN best estimate information, a PC based data processing and plotting system was developed to allow the production of high quality plots on a volume basis. (Reference 3-1). Figure 3-2 illustrates the various paths from the three inputs to the test document.

The recording system on the Simulator provides the facility to record up to 100 variables at a frequency as small as 0.2 seconds. Up to four different recording frequencies may be specified over the duration of a test, such that the frequency may be changed consistent with transient phenomena occurring. Per ANSI/ANS-3.5, the Appendix B transient data was recorded at a 0.4 second frequency. The other tests were recorded at frequencies appropriate for the transient.

The evaluation basis for the tests follows the following order of preference:

1) *Plant Data*
2) *Analytical Data (RETRAN)*
3) *Data from similar plant*
4) *Expert Examination*

The Evaluation Team consisted of at least one member of the Test Team and such additional expertise as was judged appropriate for the test. In some cases no additional expertise was necessary and the evaluation was performed by the Test Team. The responsibility of the Evaluation Team was to review data collected from the test to determine acceptability of the test results.

The test team performed 106 tests. Thirteen used plant data, eight used analytical data (RETRAN), none used data from similar plants, and eighty two used expert examination. Additionally, three of the tests had special qualifications; RTT-001, Simulator Real Time Test - simulator does not abort on overruns, RTT-002, Simulator Real Time Test Validation Test - simulator responds correctly to forced overruns, and SST-004, 100% Power 60 Minute Null Transient - stable and parameters vary less than 2% from their original values.

RETRAN comparisons were used for some of the major accidents not likely to be encountered in plant operations. Plant data was used when available. In the future, more tests will be run using plant data as our PC based data processing system is used to analyze future plant transients. Of the sixty nine tests using expert examination, twenty three were in the operator conducted surveillance testing (SUR) category. The SUR'S were conducted by using controlled plant procedures and in addition to expert examination the procedure had to be able to be performed on the simulator and any acceptance criteria that could be observed from the control room had to be met. Three of the SUR's used plant data from a

past performance of the surveillance in the plant.

The normal plant evolutions (NPE's) were performed using controlled procedures. In three non-continuous tests the simulator was taken from a partial draindown condition to 100% power. In another two tests the plant was taken from full power to cold shutdown with the pressurizer water solid. The sixth test was a trip and recovery back to full rated power.

The SUR's were selected based upon the likelihood that the surveillance would be used in training and how well the surveillance would test different aspects of the simulator. Although not all safety related surveillances were tested in the Certification program, all of them can be performed on the simulator.

The malfunctions were selected to be inclusive of all ANSI/ANS 3.5 requirements and to further test all simulator systems thoroughly. As Table 3-2 illustrates, requirements for Certification testing were more than satisfied. Although in a few instances it requires more than one Certification test to meet an ANSI/ANS 3.5 test requirement, frequently the requirement was meet more than once.

Test Acceptance Criteria is established in accordance with the requirements of ANSI/ANS 3.5, and is listed in Table 3-9.

The abstracts for each of the tests are in Volume II of this submittal. The abstract comprises two pages that contain the following information:

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

One complete test procedure is also included as Appendix A in Volume II. This test procedure is provided as an example of the test format and content.

When the test documentation was complete and had been reviewed by the certification staff, each test was presented to the SCRB. The SCRB reviewed the test

results and disposed of each test in one of the following categories:

1. *Approved the test without discrepancies,*
2. *Approved the test with discrepancies, if they were judged not to be significant and not to detract from training,*
3. *Returned the test with a request for additional information, or*
4. *Rejected the test and returned it for resolution of software or hardware discrepancies.*

A test had to be included in the first two categories, either approved with no discrepancies or approved with discrepancies that do not impact training, before receiving final approval. All questions were resolved and the SCRB members reached unanimity before a test was approved. Meeting minutes were prepared for each SCRB meeting, and were reviewed and signed by the participants. It should be noted that some of the tests were approved by the SCRB without meeting all of the acceptance criteria in Table 3-9. In these cases the SCRB concluded that the discrepancies were sufficiently understood and they did not have a significant impact on training. These deficiencies were assigned the appropriate priority and entered into the Configuration Management System. (Reference 3-2). Table 0-1 in Volume II contains a matrix of all Certification tests with deficiencies written against the test and the current status of those deficiencies.

Signatures on each test report are as follows:

Approved for Use by the Simulator Engineering Coordinator
Performed by the Test Team
Evaluated by the Evaluation Team
Approved by the Simulator Configuration Review Board

Table 3-1 presents a profile of the Turkey Point certification test program by general type of test. Table 3-2 provides a cross-reference between each ANSI/ANS 3.5 test requirement and the associated Turkey Point Certification test(s). Table 3.3 provides a similar Certification Test Matrix in test identification order. This table also includes the evaluation basis for each test.

3.2 FUTURE YEAR TEST PLANS

Per the requirements of Regulatory Guide 1.149, the Simulator Certification test

program will be conducted in its entirety on a four year cycle. All of the ANSI/ANS 3.5 Appendix B tests will be performed annually. Approximately 25% of the remaining tests in the Certification program will be performed each year.

Table 3-4 presents the ANSI/ANS 3.5 tests that will be performed annually. Tables 3-5 through 3-8 present the preliminary test plan for the next four years. The tests planned each year represent a cross section of the various types of tests. In addition, the first year tests include several that were selected specifically because of planned model enhancements and anticipated Simulator changes for plant modifications. This type of substitution/prioritization can be expected to occur in the future. Furthermore, additions of tests to meet new needs and requirements, or the availability of additional plant data from the ERDADS system can also be expected. Some tests may also be deleted if they prove not to be valuable in exercising the Simulator processes or verifying training capabilities.

All changes to the annual test program will be approved by the Simulator Configuration Review Board before being submitted to the Nuclear Regulatory Commission for its approval.

TABLE 3-1
TURKEY POINT CERTIFICATION TEST MATRIX PROFILE

CATEGORY	NUMBER OF TESTS
COMPUTER REAL TIME TEST (RTT)	2
STEADY STATE TESTS (SST)	4
NORMAL PLANT EVOLUTIONS (NPE)	6
OPERATOR CONDUCTED SURVEILLANCE TESTING (SUR)	26
SUBTOTAL	38
PLANT MALFUNCTIONS (M!!)	
CONTAINMENT (MCN)	1
COMMON SERVICES (MCS)	4
CHEMICAL & VOLUME CONTROL SYSTEM (MCV)	5
FEEDWATER (MFW)	8
GENERATOR & GRID (MGG)	4
MAIN POWER DISTRIBUTION (MMP)	8
REACTOR COOLANT SYSTEM (MRC)	8
REACTOR (MRX)	9
STEAM GENERATOR & MAIN STEAM (MSG)	6
STANDBY POWER & SYNCHRONIZATION (MSP)	1
SAFETY SYSTEMS (MSS)	4
TURBINE (MTU)	10
SUBTOTAL	68
TOTAL	106

TABLE 3-2
ANSI/ANS 3.5 CERTIFICATION TEST MATRIX

ANSI/ANS 3.5 TEST	CERTIFICATION TEST	
3.1.1(1)	NPE-001	Plant Fill and Vent from a Partial Drain Down to a Solid Pressurizer
3.1.1(2)	NPE-002	Plant Startup from Cold Shutdown to Hot Standby
	NPE-003	Plant Startup from Hot Standby to Rated Power
	NPE-004	Reactor Trip Followed By Recovery to Rated Power
3.1.1(3)	NPE-003	Plant Startup from Hot Standby to Rated Power
	NPE-004	Reactor Trip Followed By Recovery to Rated Power
3.1.1(4)	NPE-004	Reactor Trip Followed By Recovery to Rated Power
3.1.1(5)	NPE-002	Plant Startup from Cold Shutdown to Hot Standby
	NPE-003	Plant Startup from Hot Standby to Rated Power
	NPE-004	Reactor Trip Followed By Recovery to Rated Power
	NPE-005	Plant Shutdown from Rated Power to Hot Standby
	NPE-006	Cooldown from Hot Standby to Cold Shutdown
3.1.1(6)	NPE-003	Plant Startup from Hot Standby to Rated Power
	NPE-004	Reactor Trip Followed By Recovery to Rated Power
	NPE-005	Plant Shutdown from Rated Power to Hot Standby
3.1.1(7)	NOT APPLICABLE	
3.1.1(8)	NPE-005	Plant Shutdown from Rated Power to Hot Standby
	NPE-006	Cooldown from Hot Standby to Cold Shutdown
3.1.1(9)	SUR-001	Initial Criticality After Refueling, OP-0204.3
	SUR-002	Nuclear Design Check Tests During Startup Sequence After Refueling, OP-0204.5
	SUR-032	Normal Operation of Incore Moveable Detector System and Power Distribution Surveillance, OP-12404.1
3.1.1(10)	NPE-002	Plant Startup from Cold Shutdown to Hot Standby
	NPE-003	Plant Startup from Hot Standby to Rated Power
	NPE-006	Cooldown from Hot Standby to Cold Shutdown
	SUR-003	EDG 8 Hour Load Test and Load Rejection Test, OP-4304.3
	SUR-004	Component Cooling Water Pumps Low Header Pressure Start Test, 3-OSP-030.5
	SUR-005	Reactor Coolant System Leak Rate Calculations, 3-OSP-041.1
	SUR-007	CVCS Boric Acid Transfer Flow Test, 3-OSP-046.2
	SUR-008	Boric Acid Transfer Pump 3-B Transfer and Control Switch Test, 3-OSP-046.5
	SUR-009	Reactor Protection System Logic Test, 3-OSP-049.1
	SUR-010	RHR MOV's/System Pressure Interlock Test, 3-OSP-050.7
	SUR-011	RHR MOV's 750, 751, 862, 863 Interlock Test, 3-OSP-050.8
	SUR-012	Emergency Containment Filter Fans Operating Test, 3-OSP-056.1
	SUR-014	Source Range Nuclear Instrumentation Analog Channel Operational Test, 3-OSP-059.1

	SUR-015	Intermediate Range Nuclear Instrumentation Analog Channel Operational Test, 3-OSP-059.2
	SUR-016	Intermediate Range NIS Setpoint Verification, 3-OSP-059.3
	SUR-017	Power Range Nuclear Instrumentation Analog Channel Operational Test, 3-OSP-059.4
	SUR-018	Power Range Nuclear Instrumentation Shift Checks and Daily Calibration, 3-OSP-059.5
	SUR-019	Process Radiation Monitoring Operability Test, 3-OSP-067.1
	SUR-020	Main Steam Isolation Valve Closure Test
	SUR-021	Standby Steam Generator Feedwater Pumps/Cranking Diesels Test, 3-OSP-074.4
	SUR-022	Auxiliary Feedwater Train 1 Operability Verification, 3-OSP-075.1
	SUR-024	Main Turbine Valves Operability Test, 3-OSP-089
	SUR-026	Engineered Safeguards Integrated Test, 3-OSP-203
	SUR-029	Operational Test of MOV-535, 536 and PORV-455C, 456, OP-1300.2
	SUR-030	Full Length RCC - Periodic Exercise, OP-1604.1
	SUR-031	Inducing Xenon Oscillations to Produce Various Incore Axial Offsets, OP-12304.8
	SUR-032	Normal Operation of Incore Moveable Detector System and Power Distribution Surveillance, OP 12404.1
3.1.2(1)(a)	MRC-001	Steam Generator Tube Rupture
3.1.2(1)(b)	MRC-002	Large Break LOCA Inside Containment With Loss Of Offsite Power
	MCV-003	Charging Line Break Outside Containment
	MRC-003	Small Break LOCA Inside Containment
	MCV-005	Non-Regenerative Heat Exchanger Tube Leak
	MSS-001	Small Leak in Safety Injection Piping Outside Containment
3.1.2(1)(c)	MRC-002	Large Break LOCA Inside Containment With Loss Of Offsite Power
	MRC-003	Small Break LOCA Inside Containment
3.1.2(1)(d)	MRC-004	PORV Failure (Open) Without High Pressure Injection
3.1.2(2)	MCS-004	Instrument Air System Operation and Malfunctions
3.1.2(3)	MGG-002	Loss of 4kV Bus 3A
	MGG-003	Loss of 4kV Bus 3B
	MGG-004	Loss of All AC Power
	MMP-001	Loss of Vital Bus 3P06
	MMP-002	Loss of Vital Bus 3P07
	MMP-003	Loss of Vital Bus 3P08
	MMP-004	Loss of Vital Bus 3P09
	MMP-005	Loss of DC Bus 3A (3D01)
	MMP-006	Loss of DC Bus 3B (3D23)
	MMP-007	Loss of DC Bus 4A (4D01)
	MMP-008	Loss of DC Bus 4B (4D23)
	MSP-001	Bus Stripping and Load Sequencing Tests
3.1.2(4)	MRC-005	Loss of Forced Reactor Coolant Flow

	MRC-006	Loss of a Single Reactor Coolant Pump With Power Below P-8
	MRC-008	Loss of B and C Reactor Coolant Pumps at 100% Power
3.1.2(5)	MFW-001	Loss of Condenser Vacuum, Including Loss of Condenser Level Control
3.1.2(6)	MCS-002	Intake Cooling Water System Operations and Malfunctions
	MCS-003	Turbine Plant Cooling Water Operation and Malfunctions
3.1.2(7)	MSS-003	Loss of RHR While in Cold Shutdown
	MSS-004	Loss of Inventory During a Shutdown and Partial Draindown Condition
3.1.2(8)	MCS-001	Component Cooling Water Operations and Malfunctions up to and Including Total Loss of CCW
3.1.2(9)	MFW-002	Loss of Normal Feedwater
	MFW-006	Failure of Steam Generator Level Channel Providing Input to the Feedwater Controller
	MFW-007	Equivalent TMI-2 Scenario
	MFW-008	Loss of Feedwater/ATWS
3.1.2(10)	MFW-003	Loss of Normal and Emergency Feedwater
3.1.2(11)	MRX-002	Loss of Protection System Channel
3.1.2(12)	MRX-004	Stuck Control Rod
	MRX-005	Uncoupled Control Rod Test
	MRX-006	Dropped Control Rod
	MRX-007	Dropped Rod With Inability to Drive Control Rods
3.1.2(13)	MRX-007	Dropped Rod With Inability to Drive Control Rods
3.1.2(14)	MRX-008	Fuel Cladding Failure Resulting in High Reactor Coolant Activity
3.1.2(15)	MTU-001	Turbine Trip Which Does Not Cause Automatic Reactor Trip
	MTU-002	Turbine Trip from 100% Power
3.1.2(16)	MGG-001	Generator Trip
3.1.2(17)	MCV-001	Uncontrolled Maximum Rate Boron Dilution
3.1.2(18)	MRC-007	Stuck Open Spray Valve
	MCV-002	Charging System Failures
	MCV-003	Charging Line Break Outside Containment
	MCV-004	Letdown and VCT System Operations and Malfunctions
	MCV-005	Non-Regenerative Heat Exchanger Tube Leak
3.1.2(19)	MRX-009	Manual Reactor Trip from 100% Power
3.1.2(20)	MSG-001	Main Steam Line Break Inside Containment
	MSG-002	Main Steam Line Break Outside Containment
	MSG-004	Transmitter Failure Resulting In Maximum Atmospheric Dump Demand
	MFW-004	Feedwater Line Break Inside Containment
	MFW-005	Main Feedwater Line Break Outside Containment
3.1.2(21)	MRX-003	Nuclear Instrumentation Failure During Startup
3.1.2(22)	MRX-001	Spurious Rod Position Indication Resulting in Maximum Rate Runback To 70% Power and Maximum Rate Return To Full Power
	MSG-004	Transmitter Failure Resulting In Maximum Atmospheric Dump Demand

	MSG-005	Failure of Reference Temperature to Steam Dumps
	MSG-006	Closure of a Single MSIV at Several Different Power Levels
	MTU-006	Hydrogen Seal Oil
	MTU-008	Hydrogen Cooling
	MTU-009	Turbine Lube Oil Control and Auto-Stop Oil
	MTU-010	Turbine Lube Oil Pump and Motor
	MTU-011	Failure of Turbine Control Valve Spring
	MFW-006	Failure of Steam Generator Level Channel Providing Input to the Feedwater Controller
3.1.2(23)	MSS-001	Small Leak in Safety Injection Piping Outside Containment
	MSS-002	Accumulator Operations and Malfunctions
	MCN-001	Containment Spray System Operations and Malfunctions
3.1.2(24)	MFW-007	Equivalent TMI-2 Scenario
	MFW-008	Loss of Feedwater/ATWS
A3.1	RTT-001	Simulator Real Time Test
	RTT-002	Simulator Real Time Test Validation Test
B2.1 100% Steady State	SST-003	Steady State 100% Power Heat Balance
75% Steady State	SST-002	Steady State 75% Power Heat Balance
25% Steady State	SST-001	Steady State 45% Power Heat Balance
100% Stability Test	SST-004	100% Power 60 min Null Transient
B2.2(1)	MRX-009	Manual Reactor Trip from 100% Power
B2.2(2)	MFW-003	Loss of Normal and Emergency Feedwater
B2.2(3)	MSG-003	Simultaneous Closure of All MSIV's
B2.2(4)	MRC-005	Loss of Forced Reactor Coolant Flow
B2.2(5)	MRC-005	Loss of Forced Reactor Coolant Flow
B2.2(6)	MTU-001	Turbine Trip Which Does Not Cause Automatic Reactor Trip
B2.2(7)	MRX-001	Spurious Rod Position Indication Resulting in Maximum Rate Runback To 70% Power and Maximum Rate Return To Full Power
B2.2(8)	MRC-002	Large Break LOCA Inside Containment With Loss Of Offsite Power
B2.2(9)	MSG-001	Main Steam Line Break Inside Containment
B2.2(10)	MRC-004	PORV Failure (Open) Without High Pressure Injection

TABLE 3-3
CERTIFICATION TEST MATRIX

TEST ID	DESCRIPTION OF TEST	ANS 3.5 REFERENCE SECTIONS	EVALUATION BASIS
COMPUTER REAL TIME TEST (RTT)			
RTT-001	Simulator Real Time Test	3.1.1 Normal Plant Evolutions 3.1.2 Plant Malfunctions A3.1 Computer Real Time Test	Simulator does not abort on overruns.
RTT-002	Simulator Real Time Test Validation Test	3.1.1 Normal Plant Evolutions 3.1.2 Plant Malfunctions A3.1 Computer Real Time Test	Simulator responds correctly to forced overruns.
STEADY STATE TESTS (SST)			
SST-001	Steady State 45% Power Heat Balance	4.1 Simulator Capabilities A3.2 Steady State and Normal Tests B2. Simulator Operability Test	Comparison of simulator to plant data.
SST-002	Steady State 75% Power Heat Balance	4.1 Simulator Capabilities A3.2 Steady State and Normal Tests B2. Simulator Operability Test	Comparison of simulator to plant data.
SST-003	Steady State 100% Power Heat Balance	4.1 Simulator Capabilities A3.2 Steady State and Normal Tests B2. Simulator Operability Test	Comparison of simulator to plant data.
SST-004	100% Power 60 min Null Transient	4.1.2 Steady State Operation B.2.1 Steady State Performance	Stable and parameters vary less than 2% from their initial values.

NORMAL PLANT EVOLUTIONS (NPE)

NPE-001	Plant Fill and Vent from a Partial Drain Down to a Solid Pressurizer	3.1.1(1)	Plant Startup - Cold to Hot Standby	Plant Data Expert Examination
NPE-002	Plant Startup from Cold Shutdown to Hot Standby	3.1.1(1)	Plant Startup - Cold to Hot Standby	Plant Data Expert Examination
		3.1.1(5)	Operations at Hot Standby	
		3.1.1(10)	Operator Conducted Surveillance Testing on Safety Related Equipment	
NPE-003	Plant Startup from Hot Standby to Rated Power	3.1.1(2)	Nuc Startup-Hot Standby to Rated Power	Plant Data Expert Examination
		3.1.1(3)	Turbine Startup & Gen 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	
NPE-004	Reactor Trip Followed By Recovery to Rated Power	3.1.1(4)	Reactor Trip W/Recovery To Rated Power	Expert Examination
		3.1.1(3)	Turbine Startup and Generator Synch	
		3.1.1(5)	Operations at Hot Standby	
		3.1.1(6)	Load Changes	
		3.1.1(2)	Nuclear Startup from Hot Standby to Rated Power	
NPE-005	Plant Shutdown from Rated Power to Hot Standby	3.1.1(8)	Plant Shutdown From Rated Power To Hot Standby	Plant Data Expert Examination
		3.1.1(6)	Load Changes	
		3.1.1(5)	Operations at Hot Standby	
NPE-006	Cooldown from Hot Standby to Cold Shutdown	3.1.1(8)	Plant Cooldown From Hot Standby to Cold Shutdown	Plant Data Expert Examination
		3.1.1(5)	Operations at Hot Standby	
		3.1.1(10)	Operator Conducted Surveillance Testing on Safety Related Equipment	

OPERATOR CONDUCTED SURVEILLANCE TESTING (SUR)

SUR-001	Initial Criticality After Refueling, OP-0204.3	3.1.1(9) Core Performance Testing	Test Acceptance Criteria Expert Examination
SUR-002	Nuclear Design Check Tests During Startup Sequence After Refueling, OP-0204.5	3.1.1(9) Core Performance Testing	Test Acceptance Criteria Expert Examination
SUR-003	EDG 8 Hour Load Test and Load Rejection Test, OP-4304.3	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Plant Data Expert Examination
SUR-004	Component Cooling Water Pumps Low Header Pressure Start Test, 3-OSP-030.5	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-005	Reactor Coolant System Leak Rate Calculations, 3-OSP-041.1	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems 3.1.2 Plant Malfunctions	Test Acceptance Criteria Expert Examination
SUR-007	CVCS Boric Acid Transfer Flow Test, 3-OSP-046.2	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-008	Boric Acid Transfer Pump 3B Transfer and Control Switch Test, 3-OSP-046.5	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-009	Reactor Protection System Logic Test, 3-OSP-049.1	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-010	RHR MOV's/System Pressure Interlock Test, 3-OSP-050.7	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination

SUR-011	RHR MOV's 750, 751, 862, 863, Interlock Test, 3-OSP-050.8	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-012	Emergency Containment Filter Fans Operating Test, 3-OSP-056.1	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-014	Source Range Nuclear Instrumentation Analog Channel Operational Test, 3-OSP-059.1	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-015	Intermediate Range Nuclear Instrumentation Analog Channel Operational Test, 3-OSP-059.2	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-016	Intermediate Range NIS Setpoint Verification, 3-OSP-059.3	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-017	Power Range Nuclear Instrumentation Analog Channel Operational Test, 3-OSP-059.4	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-018	Power Range Nuclear Instrumentation Shift Checks and Daily Calibration, 3-OSP-059.5	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-019	Process Radiation Monitoring Operability Test, 3-OSP-067.1	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-020	Main Steam Isolation Valve Test	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Plant Data Expert Examination

SUR-021	Standby Steam Generator Feed-water Pumps/Cranking Diesels Test, 0-OSP-074.4	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-022	Auxiliary Feedwater Train 1 Operability Verification, 3-OSP-075.1	3.1.1(10) Operator Conducted Surveillance Testing on Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-024	Main Turbine Valves Operability Test, 3-OSP-089	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-026	Engineered Safeguards Integrated Test, 3-OSP-203	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-029	Operational Test of MOV-535, 536, and PORV 455C, 456, OP-1300.2	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-030	Full Length RCC - Periodic Exercise, OP-1604.1	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination/Plant Data
SUR-031	Inducing Xenon Oscillations to Produce Various Axial Offsets, OP-12304.8	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems	Test Acceptance Criteria Expert Examination
SUR-032	Normal Operation of Incore Moveable Detector System and Power Distribution Surveillance, OP-12404.1	3.1.1(10) Operator Conducted Surveillance Testing On Safety Related Equipment or Systems 3.1.1(9) Core Performance Testing	Test Acceptance Criteria Expert Examination

PLANT MALFUNCTIONS (MII)

CONTAINMENT (MCN)

MCN-001	Containment Spray System Operations and Malfunctions	3.1.2(23) Passive Malfunctions In Engineered Safety Features Systems	Expert Examination

COMMON SERVICES (MCS)

MCS-001	Component Cooling Water Operations and Malfunctions up to and Including Total Loss of CCW	3.1.2(8) Loss of Component Cooling System	Expert Examination
MCS-002	Intake Cooling Water System Operations and Malfunctions	3.1.2(6) Loss of Service Water or Cooling To Individual Components	Expert Examination
MCS-003	Turbine Plant Cooling Water Operation and Malfunctions	3.1.2(6) Loss of Component Cooling System or Cooling to Individual Components	Expert Examination
MCS-004	Instrument Air Operation and Malfunctions	3.1.2(2) Loss of Instrument Air	Expert Examination

CHEMICAL & VOLUME CONTROL SYSTEM (MCV)

MCV-001	Uncontrolled Maximum Rate Boron Dilution	3.1.2(17) Failure in Automatic Control Systems That Affect Reactivity and Core Heat Removal	Expert Examination
MCV-002	Charging System Failures	3.1.2(18) Failure of Reactor Coolant System Pressure and Volume Control Systems	Expert Examination
MCV-003	Charging Line Break Outside Containment	3.1.2(1,b) Loss of Coolant Outside Containment 3.1.2(18) Failure of Volume Control System	Expert Examination

MCV-004	Letdown and Volume Control Tank System Operations and Malfunctions	3.1.2(18) Failure of Reactor Coolant System Pressure and Volume Control Systems	Expert Examination
MCV-005	Non-Regenerative Heat Exchanger Tube Leak	3.1.2(1.b) Loss of Coolant Outside Containment 3.1.2(18) Failure of Volume Control System	Expert Examination
FEEDWATER (MFW)			
MFW-001	Loss of Vacuum Tests, Including Loss of Condenser Level Control	3.1.2(5) Loss of Condenser Vacuum Including Loss of Condenser Level Control	Expert Examination
MFW-002	Loss of Normal Feedwater	3.1.2(9) Loss of Normal Feedwater or Feedwater System Failure	Best Estimate Analysis Expert Examination
MFW-003	Loss of Normal and Emergency Feedwater	3.1.2(10) Loss of All Feedwater (Normal and Emergency) B2.2(2) Simultaneous Trip of All Feedwater Pumps	Best Estimate Analysis Expert Examination
MFW-004	Feedwater Line Break Inside Containment	3.1.2(20) Main Steam Line As Well As Main Feed Line Breaks (Both Inside and Outside Containment)	Best Estimate Analysis Expert Examination
MFW-005	Main Feedwater Line Break Outside Containment	3.1.2(20) Main Steam Line As Well As Main Feed Line Breaks (Both Inside and Outside Containment)	Expert Examination
MFW-006	Failure of Steam Generator Level Channel Providing Input to the Feedwater Controller	3.1.2(9) Loss of Normal Feedwater 3.1.2(22) Process Instrumentation, Alarm, and Control System Failures	Expert Examination
MFW-007	Equivalent TMI-2 Scenario	3.1.2(9) Loss of Normal Feedwater 3.1.2(24) Failure of Automatic Reactor Trip	Expert Examination
MFW-008	Loss of Feedwater/ATWS	3.1.2(9) Loss of Normal Feedwater 3.1.2(24) Failure of Automatic Reactor Trip	Best Estimate Analysis Expert Examination

GENERATOR & GRID (MGG)

MGG-001 Generator Trip	3.1.2(16) Generator Trip	Expert Examination
MGG-002 Loss of 4KV Bus 3A	3.1.2(3) Loss of Electrical Power	Expert Examination
MGG-003 Loss of 4KV Bus 3B	3.1.2(3) Loss of Electrical Power	Expert Examination
MGG-004 Loss of All AC Power	3.1.2(3) Loss or Degraded Electrical Power to the Station Including Loss of Offsite Power	Expert Examination

MAIN POWER DISTRIBUTION (MMP)

MMP-001 Loss of Vital Bus 3P06	3.1.2(3) Loss or Degraded Electrical Power to the Station Including Loss of AC Inst Buses	Expert Examination
MMP-002 Loss of Vital Bus 3P07	3.1.2(3) Loss or Degraded Electrical Power to the Station Including Loss of AC Inst Buses	Expert Examination
MMP-003 Loss of Vital Bus 3P08	3.1.2(3) Loss or Degraded Electrical Power to the Station Including Loss of AC Inst Buses	Expert Examination
MMP-004 Loss of Vital Bus 3P09	3.1.2(3) Loss or Degraded Electrical Power to the Station Including Loss of AC Inst Buses	Expert Examination
MMP-005 Loss of DC Bus 3A (3D01)	3.1.2(3) Loss or Degraded Electrical Power to the Station Including Loss of AC Inst Buses	Expert Examination
MMP-006 Loss of DC Bus 3B (3D23)	3.1.2(3) Loss or Degraded Electrical Power to the Station Including Loss of AC Inst Buses	Expert Examination
MMP-007 Loss of DC Bus 4A (4D01)	3.1.2(3) Loss or Degraded Electrical Power to the Station Including Loss of AC Inst Buses	Expert Examination

MMP-008	Loss of DC Bus 4B (4D23)	3.1.2(3) Loss or Degraded Electrical Power to the Station Including Loss of AC Inst Buses	Expert Examination

REACTOR COOLANT SYSTEM (MRC)

MRC-001	Steam Generator Tube Rupture	3.1.2(1,a) Significant PWR Steam Generator Leaks	Best Estimate Analysis Expert Examination
MRC-002	Large Break LOCA Inside Containment With Loss Of Offsite Power	3.1.2(1,b and c) Loss of Coolant: Large and Small Breaks, Inside and Outside Containment B.2.2(8) Maximum Size Reactor Coolant System Rupture Combined With Loss of Offsite Power	Expert Examination
MRC-003	Small Break LOCA Inside Containment	3.1.2(1,b and c) Loss of Coolant: Large and Small Breaks, Inside and Outside Containment	Best Estimate Analysis Expert Examination
MRC-004	PORV Failure (Open) Without High Pressure Injection	3.1.2(1,d) Failure of Safety & Relief Valves B.2.2(10) Slow Primary Depressurization To Saturated Conditions Using A Pressurizer Relief or Safety Stuck Open Without Activation of ECCS	Best Estimate Analysis Expert Examination
MRC-005	Loss of Forced Reactor Coolant Flow	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	Plant Data Expert Examination
MRC-006	Loss of a Single Reactor Coolant Pump With Power Below P-8	3.1.2(4) Loss of Forced Core Coolant Flow Due to Single or Multiple Pump Failure	Expert Examination
MRC-007	Stuck Open Spray Valve	3.1.2(18) Failure of Reactor Coolant System Pressure and Volume Control Systems	Expert Examination
MRC-008	Loss of B and C Reactor Coolant Pumps at 100% Power	3.1.2(4) Loss of Forced Core Coolant Flow Due to Single or Multiple Pump Failure	Plant Data Expert Examination

REACTOR (MRX)

MRX-001	Spurious Rod Position Indication Resulting in Maximum Rate Run-back to 70% Power and Maximum Rate Return to Full Power	B2.2(7), Maximum Rate Power Ramp (100% Down to Approximately 75% and Back to 100% Power) 3.1.2(22) Process Instrumentation, Alarm, and Control System Failures	Expert Examination
MRX-002	Loss of Protection System Channel	3.1.2(11) Loss of Protection System Channel	Expert Examination
MRX-003	Nuclear Instrumentation Failure During Startup	3.1.2(21) Nuclear Instrumentation Failures	Expert Examination
MRX-004	Stuck Control Rod	3.1.2(12) Control Rod Failures Including Stuck, Uncoupled, Misaligned, and Dropped Rods	Expert Examination
MRX-005	Uncoupled Control Rod Test	3.1.2(12) Control Rod Failures Including Stuck, Uncoupled, Misaligned, and Dropped Rods	Expert Examination
MRX-006	Dropped Control Rod	3.1.2(12) Control Rod Failures Including Stuck, Uncoupled, Misaligned, and Dropped Rods	Expert Examination
MRX-007	Dropped Rod with Inability to Drive Control Rods	3.1.2(12) Control Rod Failures Including Stuck, Uncoupled, Misaligned, and Dropped Rods 3.1.2(13) Inability To Drive Control Rods	Expert Examination Plant Data
MRX-008	Fuel Cladding Failure Resulting In High Reactor Coolant Activity	3.1.2(14) Fuel Cladding Failure Resulting In High Activity In the Reactor Coolant	Expert Examination
MRX-009	Manual Reactor Trip from 100% Power	3.1.2.(19) Reactor Trip B2.2(1) Manual Reactor Trip	Expert Examination

STEAM GENERATOR & MAIN STEAM (MSG)

MSG-001	Main Steam Line Break Inside Containment	3.1.2(20) Main Steam Line As Well As Main Feed Line Breaks (Both Inside and Outside Containment) B2.2 (9) Maximum Unisolable Main Steam Line Rupture	Best Estimate Analysis Expert Examination
MSG-002	Main Steam Line Break Outside Containment	3.1.2(20) Main Steam Line As Well As Main Feed Line Breaks (Both Inside and Outside Containment)	Expert Examination
MSG-003	Simultaneous Closure of All MSIV's	B2.2(3), Simultaneous Closure of All MSIVs	Expert Examination
MSG-004	Transmitter Failure Resulting In Maximum Atmospheric Dump Demand	3.1.2(22) Process Instrumentation, Alarms, and Control System Failures 3.1.2(20) Main Steam Line as well as Main Feed Line Breaks (Both Inside and outside Containment)	Expert Examination
MSG-005	Failure of Reference Temperature to Steam Dumps	3.1.2(22) Process Instrumentation, Alarms, and Control System Failures	Expert Examination
MSG-006	Closure of a Single MSIV at Several Different Power Levels	3.1.2(22) Process Instrumentation, Alarms, and Control System Failures	Expert Examination

STANDBY POWER & SYNCHRONIZATION (MSP)

MSP-001	Bus Stripping and Load Sequencing Tests	3.1.2(3) Loss or Degraded Electrical Power to the Station Including Loss Emergency Power	Expert Examination

SAFETY SYSTEM (MSS)

MSS-001	Small Leak In Safety Injection Piping Outside Containment	3.1.2(23) Passive Malfunctions In Systems, Such As Engineered Safety Features & Aux Feedwater 3.1.2(1,b) Loss of Coolant Outside Primary Containment	Expert Examination

MSS-002	Accumulator Operations and Malfunctions	3.1.2(23) Passive Malfunctions In Systems, Such As Engineered Safety Features & Aux Feedwater	Expert Examination
MSS-003	Loss of RHR While In Cold Shutdown	3.1.2(7) Loss of Shutdown Cooling	Expert Examination
MSS-004	Loss of Inventory During a Shutdown and Partial Draindown Condition	3.1.2(7) Loss of Shutdown Cooling	Expert Examination
TURBINE (MTU)			
MTU-001	Turbine Trip Which Does Not Not Cause Automatic Reactor Trip	3.1.2(15) Turbine Trip B2.2(6), Main Turbine Trip From Power Level That Does Not Cause a Reactor Trip	Expert Examination
MTU-002	Turbine Trip from 100% Power	3.1.2(15) Turbine Trip	Expert Examination
MTU-003	Turbine Lube Oil System (Bearings)	3.1.1 Normal Plant Evolutions 3.1.2 Plant Malfunctions	Expert Examination
MTU-004	Turbine Gland Seal System	3.1.1 Normal Plant Evolutions 3.1.2 Plant Malfunctions	Expert Examination
MTU-005	Turbine Turning Gear Operation	3.1.1 Normal Plant Evolutions 3.1.2 Plant Malfunctions	Expert Examination
MTU-006	Hydrogen Seal Oil	3.1.2(22) Process Instrumentation, Alarms, Controls and Control System Failures	Expert Examination
MTU-008	Hydrogen Cooling	3.1.2(22) Process Instrumentation, Alarms, Controls and Control System Failures	Expert Examination
MTU-009	Turbine Lube Oil Control and Auto-Stop Oil	3.1.2(22) Process Instrumentation, Alarms, Controls and Control System Failures	Expert Examination

MTU-010	Turbine Lube Oil Pump and Motor	3.1.2(22) Process Instrumentation, Alarms, Controls and Control System Failures	Expert Examination
MTU-011	Failure of Turbine Control Valve Spring	3.1.2(22) Process Instrumentation, Alarms, Controls and Control System Failures	Expert Examination

Table 3-4
Annual Tests

MFW-003	Loss of Normal and Emergency Feedwater
MRC-002	Large Break LOCA Inside Containment With Loss Of Offsite Power
MRC-004	PORV Failure (Open) Without High Pressure Injection
MRC-005	Loss of Forced Reactor Coolant Flow
MRX-001	Spurious Rod Position Indication Resulting In Maximum Rate Runback To 70% Power and Maximum Rate Return To Full Power
MRX-009	Manual Reactor Trip from 100% Power
MSG-001	Main Steam Line Break Inside Containment
MSG-003	Simultaneous Closure of All MSIV's
MTU-001	Turbine Trip Which Does Not Cause Automatic Reactor Trip
SST-001	Steady State 45% Power Heat Balance
SST-002	Steady State 75% Power Heat Balance
SST-003	Steady State 100% Power Heat Balance
SST-004	100% Power 60 min Null Transient

Table 3-5
1991 Test Plan

MFW-002	Loss of Normal Feedwater
MFW-007	Equivalent TMI-2 Scenario
MGG-002	Loss of 4KV Bus 3A
MGG-003	Loss of 4KV Bus 3B
MGG-004	Loss of All AC
MMP-001	Loss of Vital AC Bus 3P06
MMP-002	Loss of Vital AC Bus 3P07
MMP-003	Loss of Vital AC Bus 3P08
MMP-004	Loss of Vital AC Bus 3P09
MMP-005	Loss of DC Bus 3A (3D01)
MMP-006	Loss of DC Bus 3B (3D23)
MMP-007	Loss of DC Bus 4A (4D01)
MMP-008	Loss of DC Bus 4B (4D23)
MRC-006	Loss of a Single Reactor Coolant Pump With Power Below P-8
MRC-007	Stuck Open Spray Valve
MSP-001	Bus Stripping and Load Sequencing Tests
NPE-002	Plant Startup Cold Shutdown to Hot Standby
NPE-003	Plant Startup from Hot Standby to Rated Power
SUR-001	Initial Criticality after Refueling, OP-0204.3
SUR-002	Nuclear Design Check Tests During Startup Sequence after Refueling, OP-0204.5
SUR-026	Engineered Safeguards Integrated Test, 3-OSP-203
SUR-030	Full Length RCC - Periodic Exercise, OP-1604.1
SUR-031	Inducing Xenon Oscillations to Produce Various Incore Axial Offsets, OP-12304.8
SUR-032	Normal Operation of Incore Moveable Detector System and Power Distribution Surveillance, OP-12404.1

Table 3-6
1992 Test Plan

MCV-001	Uncontrolled Maximum Rate Boron Dilution
MCV-002	Charging System Failures
MCV-004	Letdown and Volume Ccontrol Tank System Operations and Malfunctions
MFW-004	Feedwater Line Break Inside Containment
MFW-006	Failure of Steam Generator Level Channel Providing Input to the Feedwater Controller
MRC-003	Small Break LOCA Inside Containment
MSG-006	Closure of a Single MSIV At Several Different Power Levels
MTU-003	Turbine Lube Oil System (Bearings)
MTU-004	Turbine Gland Seal System
MTU-005	Turbine Turning Gear Operation
MTU-009	Turbine Lube Oil Control & Auto-Stop Oil
MTU-010	Turbine Lube Oil Pump & Motor
MTU-011	Failure of Turbine Control Valve Spring
NPE-005	Plant Shutdown from Rated Power to Hot Standby
NPE-006	Cooldown from Hot Standby to Cold Shutdown
SUR-004	Component Cooling Water Pumps Low Header Pressure Start Test, 3-OSP-030.5
SUR-007	CVCS Boric Acid Transfer Flow Test, 3-OSP-046.2
SUR-008	Boric Acid Transfer Pump 3B Transfer and Control Switch Test, 3-OSP-046.5
SUR-009	Reactor Protection System Logic Test, 3-OSP-049.1
SUR-012	Emergency Containment Filter Fans Operating Test, 3-OSP-056.1
SUR-015	Intermediate Range Nuclear Instrumentation Analog Channel Operational Test, 3-OSP-059.2
SUR-017	Power Range Nuclear Instrumentation Analog Channel Operational Test, 3-OSP-059.4
SUR-020	Main Steam Isolation Valve Closure Test

Table 3-7
1993 Test Plan

MCS-001	Component Cooling Water Operations and Malfunctions Up To and Including Total Loss of CCW
MFW-001	Loss of Vacuum Tests, Including Loss of Condenser Level Control
MGG-001	Generator Trip
MRC-001	Steam Generator Tube Rupture
MRC-008	Loss of B and C Reactor Coolant Pumps at 100% Power
MRX-003	Nuclear Instrumentation Failure During Startup
MRX-006	Dropped Control Rod
MRX-007	Dropped With Inability to Drive Control Rods
MSG-004	Transmitter Failure Resulting In Maximum Atmospheric Dump Demand
MSG-005	Failure of Reference Temperature to Steam Dumps
MTU-002	Turbine Trip from 100% Power
NPE-001	Plant Fill and Vent from a Partial Drain Down to a Solid Pressurizer
SUR-003	EDG 8 Hour Load Test and Load Rejection Test, OP-4304.3
SUR-005	Reactor Coolant System Leak Rate Calculations, 3-OSP-041.1
SUR-010	RHR MOV's/System Pressure Interlock Test, 3-OSP-050.7
SUR-011	RHR MOV's 750, 751, 862, 863, Interlock Test, 3-OSP-050.8
SUR-021	Standby Steam Generator Feedwater Pumps/Cranking Diesels Test, 0-OSP-074.4
SUR-022	Auxiliary Feedwater Train 1 Operability Verification, 3-OSP-075.1
SUR-024	Main Turbine Valves Operability Test, 3-OSP-089

Table 3-8
1994 Test Plan

MCN-001	Containment Spray System Operations and Malfunctions
MCS-002	Intake Cooling Water System Operations and Malfunctions
MCS-003	Turbine Plant Cooling Water Operation and Malfunctions
MCS-004	Instrument Air System Operation and Malfunctions
MCV-003	Charging Line Break Outside Containment
MCV-005	Non-Regenerative Heat Exchanger Tube Leak
MFW-005	Main Feedwater Line Break Outside Containment
MFW-008	Loss of Normal Feedwater/ATWS
MRX-002	Loss of Protection System Channel
MRX-004	Stuck Control Rod
MRX-005	Uncoupled Control Rod Test
MRX-008	Fuel Cladding Failure Resulting in High Reactor Coolant Activity
MSG-002	Main Steam Line Break Outside Containment
MSS-001	Small Leak in Safety Injection Piping Outside Containment
MSS-002	Accumulator Operations and Malfunctions
MSS-003	Loss of RHR While in Cold Shutdown
MSS-004	Loss of Inventory During A Shutdown and Partial Draindown Condition
MTU-006	Hydrogen Seal Oil
MTU-008	Hydrogen Cooling
NPE-004	Reactor Trip Followed By Recovery to Rated Power
RTT-001	Simulator Real Time Test
RTT-002	Simulator Real Time Test Validation Test
SUR-014	Source Range Nuclear Instrumentation Analog Channel Operational Test, 3-OSP-059.1
SUR-016	Intermediate Range NIS Setpoint Verification, 3-OSP-059.3
SUR-018	Power Range Nuclear Instrumentation Shift Checks and Daily Calibration, 3-OSP-059.5
SUR-019	Process Radiation Monitoring Operability Test, 3-OSP-067.1
SUR-029	Operational Test of MOV-535, 536, and PORV 455C, 456, OP-1300.2

TABLE 3-9
TEST ACCEPTANCE CRITERIA

COMPUTER REAL TIME TESTS

1 - Simulation does not halt during execution of test transients.

2 - Simulation halts when forced to run out of real time.

STEADY STATE TESTS

1 - Simulator instrument error shall be no greater than that of the comparable plant instrument. (ANSI/ANS 3.5, Section 4.1)

2 - Simulator values for critical parameters shall not deviate from plant values by more than +/- 2% of the equivalent plant instrument range. (ANSI/ANS 3.5, Section 4.1, note exception)

3 - Simulator values for noncritical parameters shall not deviate from plant values by more than 10% of the equivalent plant instrument range. (ANSI/ANS 3.5, Section 4.1, note exception)

4 - Simulator values for critical and noncritical parameters shall respond such that they do not detract from training. (ANSI/ANS 3.5, Section 4.1)

5 - Simulator computed values for steady state, full power operation with the plant control system configuration shall be stable and not vary more than 2% of their initial values over a 60 minute period. (ANSI/ANS 3.5, Section 4.1)

TRANSIENT TESTS

Includes: Normal Plant Evolution Tests
Surveillance Tests
Malfunction Tests

1 - The observable change in the monitored parameters shall correspond in direction to those expected based on available validation data and the assessment of the Test Team or Evaluation Team. (ANSI/ANS 3.5, Section 4.2.1)

2 - The observable response of the monitored parameters shall not violate the physical laws of nature. (ANSI/ANS 3.5, Section 4.2.1)

3 - The simulator shall respond with all alarms and automatic actions which would result from the same conditions in the plant, and shall produce no alarms or automatic action which would not result from the same conditions in the plant. (ANSI/ANS 3.5, Section 4.2.1)

4 - The response of the simulator to control manipulations and automatic control systems shall be such that the operator shall not observe differences between simulator and plant response which would detract from training. (ANSI/ANS 3.5, Section 3.1)

5 - The simulator controls for systems which are controlled outside the control room shall allow performance of those functions which directly or indirectly interact with observable indications in the control room. (ANSI/ANS 3.5, Section 3.3.2)

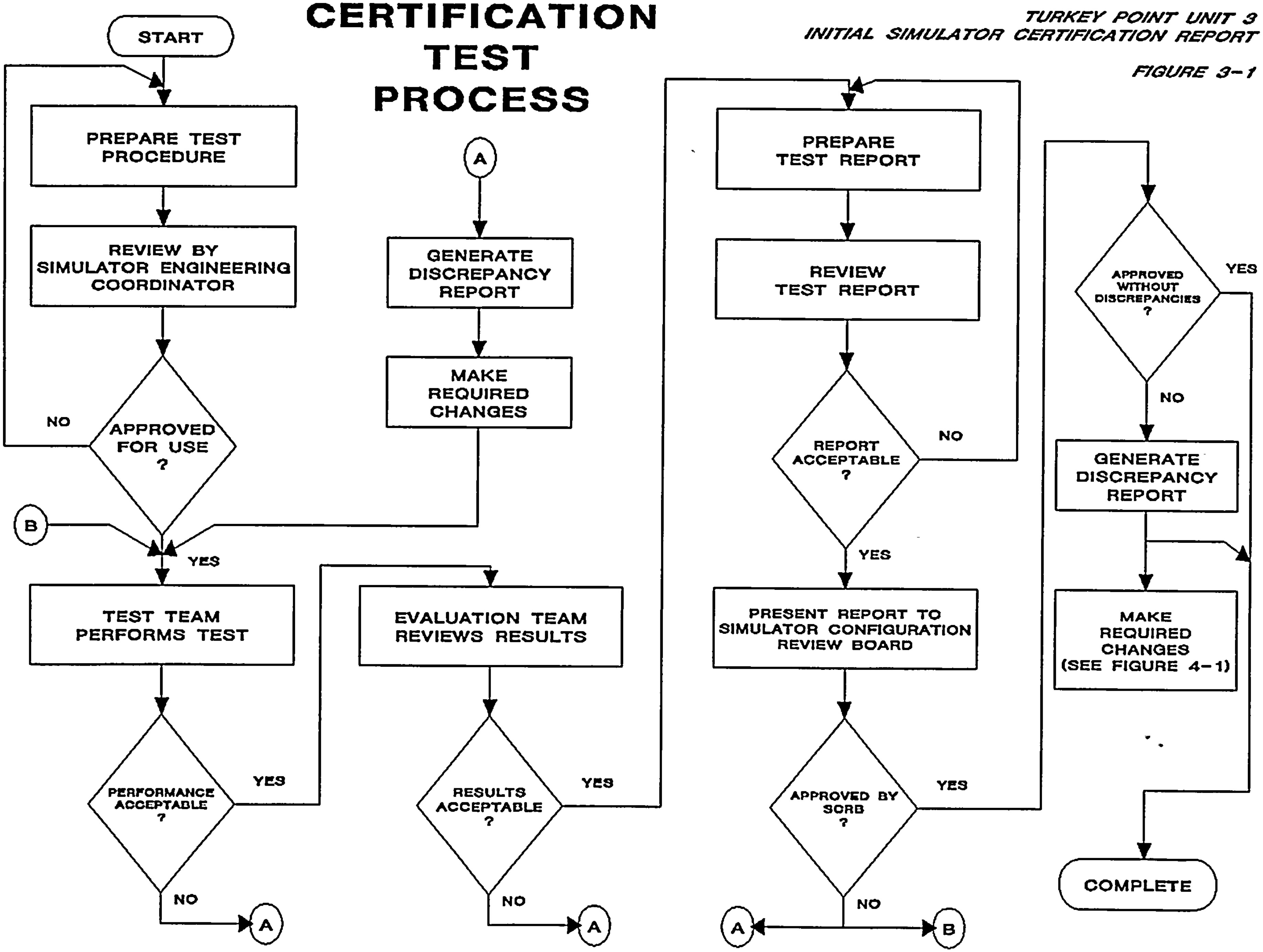
6 - The response of the simulator shall be such that the operator is required to take the same actions as those taken in the plant using similar procedures. (ANSI/ANS 3.5, Section 3)

7 - For Surveillance Tests, the simulator shall satisfy the acceptance criteria stated in the applicable plant procedure. (ANSI/ANS 3.5, Section 3.1.1)

8 - For Malfunction Tests, the introduction of a malfunction shall not alert the operator to the impending malfunction in any manner other than would occur in the plant. (ANSI/ANS 3.5, Section 3.4.2)

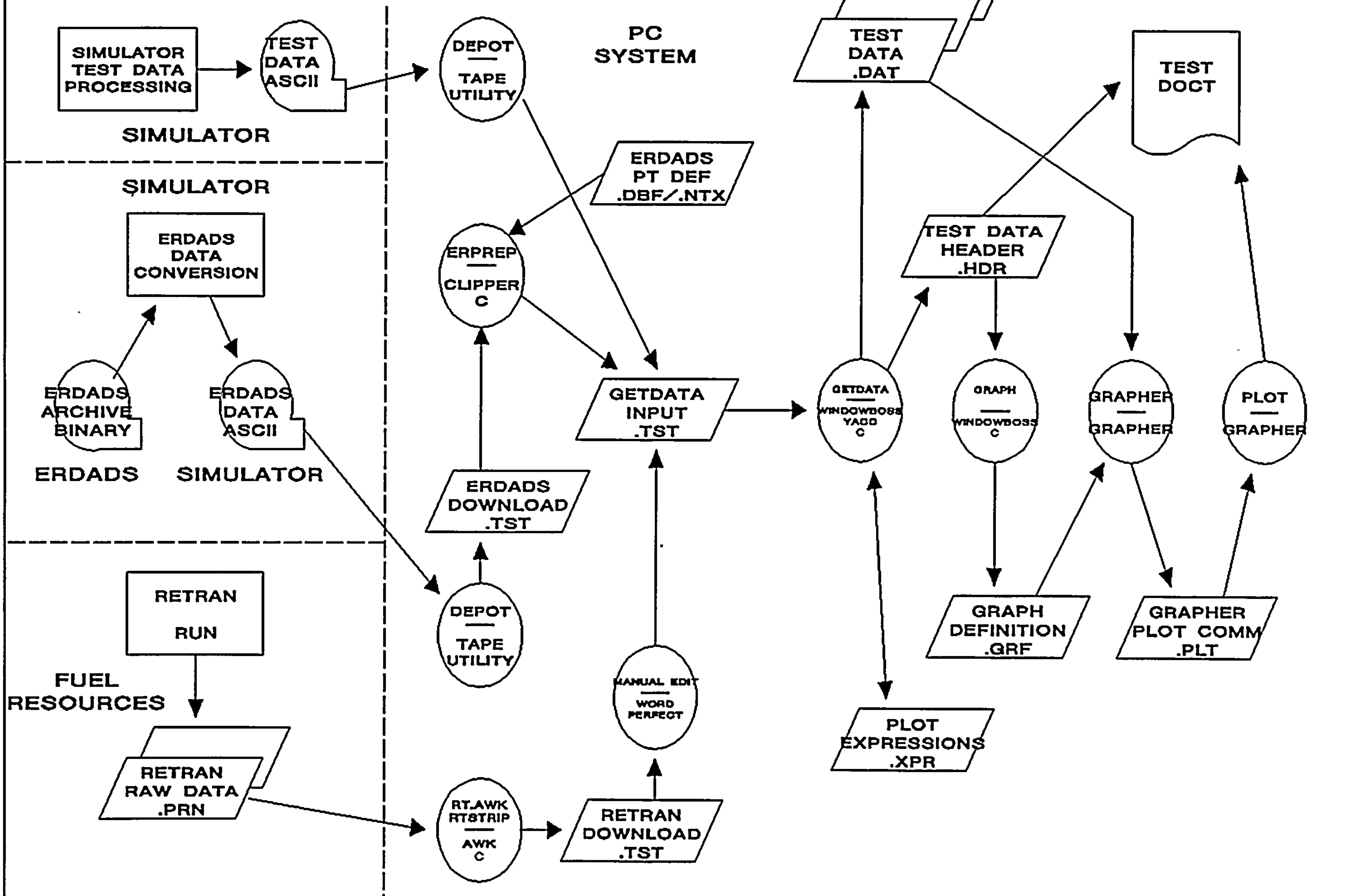
FIGURE 3-1

CERTIFICATION TEST PROCESS



SIMULATOR TEST DATA DOCUMENTATION SYSTEM

FIGURE 3-2



REFERENCES

3-1 Turkey Point Simulator Test Documentation System User's Guide.

3-2 Turkey Point Simulator Engineering Instruction 5, Operation of the Configuration Management System, January 31, 1990.

4.0 SIMULATOR DISCREPANCY AND UPGRADE PROGRAM

4.1 SIMULATOR CONFIGURATION MANAGEMENT SYSTEM

The Simulator Configuration Management System is defined and controlled by Administrative Procedure 0-ADM-305, Simulator Configuration Management (Reference 4-1). This procedure describes simulator configuration management and further details the steps and procedures to be used for identification and collection of potential modifications; evaluation of possible simulator modifications; implementation, testing, and documentation of simulator modifications; certification testing and documentation; simulator records management; and simulator status monitoring. Figure 4-1 is a flow chart illustrating the process implemented by this procedure. Details for the implementation of 0-ADM-305 can also be found in the appropriate Simulator Engineering Instruction (SEI).

Identification and Collection of Potential Modifications

This section defines how potential modifications will enter the Simulator Configuration Management process. The steps cover all potential modifications, including simulator discrepancies, plant changes or modifications, and changes in training requirements.

Evaluation of Possible Simulator Modifications

This section defines the manner in which all potential modifications to the simulator are evaluated, the change disposition specified, and the priority for modifications established.

Implementation, Testing, and Documentation of Simulator Modifications

This section establishes the requirements for the management of changes to the simulator hardware, software, test plans, and documentation.

Certification Testing and Documentation

The requirements for conducting certification testing and preparing the required NRC documentation are defined in this section.

Simulator Records Management

This section defines the requirements and functions of simulator records management. This includes the storage and control of Simulator documentation, and the maintenance of the computerized records system.

Simulator Status Monitoring

This section defines the requirements for monitoring the status of simulator modifications from identification through completion.

4.2 SIMULATOR DISCREPANCY REPORTING INSTRUCTIONS

The procedure that describes the complete handling of a deficiency report (DR) is 0-ADM-305 and is described above in Section 4.1. Simulator Engineering Instruction 4, Simulator Discrepancy Reporting (Reference 4-2), provides detailed instruction to the originator of a possible discrepancy. It explains how to fill out a DR and what information to provide.

4.3 PLANT DESIGN CHANGE TRACKING

Simulator Engineering Instruction 10, Plant Design Change Tracking (Reference 4-3), details the process used for plant design change tracking. Basically, plant design changes are received by two paths, (1) PC/M and DEEP distribution by document control and (2) PNSC meeting materials. Simulator Engineering Instruction 10 describes how material is received from each source, reviewed for applicability to the simulator, filed, and scheduled for implementation.

4.4 SIMULATOR WORK ORDER STATUS

Figures 4-2 and 4-3 present a snapshot of the simulator work order status as of December 7, 1990. The summary was prepared from the Simulator Configuration Management System, a PC based database system that serves as a repository for information on all requests for modification to the Simulator. (Reference 4-4).

A Simulator Work Request Number (SWRN) is a unique work order number assigned to a simulator discrepancy or other potential modification. A Plant

Change/Modification (PCM) is a plant change document. Some PCM's require a simulator modification and are entered into the Simulator Configuration Management System. Figures 4-2 and 4-3 display the number of outstanding simulator work items in each priority level for both discrepancies and PCM's.

The system used to prioritize the various work orders is described in Simulator Engineering Instruction 6, Priority and Disposition of Potential Simulator Modifications. (Reference 4-5). The system for prioritizing discrepancies is based on an adaptation of approach developed by the Electric Power Research Institute and documented in NP-5746, Evaluation of Simulator Discrepancies on the Basis of Operational Impact, April 1988 (Reference 4-6). Figure 4-4, Assignment of Discrepancy Operational Priority, illustrates the decision hierarchy leading to the priority designation. The prioritization of plant changes is performed as described in SEI-6. There are four categories: A = Significant training impact, including hardware, B = Significant training impact, no hardware, C = Minimal training impact, and D = No direct training impact, sources of potential validation data. Figure 4-2 includes only Simulator discrepancies (priorities 1-8). Figure 4-3 includes only training impact items (priorities A-C).

FIGURE 4-1

SIMULATOR CONFIGURATION MANAGEMENT INFORMATION FLOW DIAGRAM

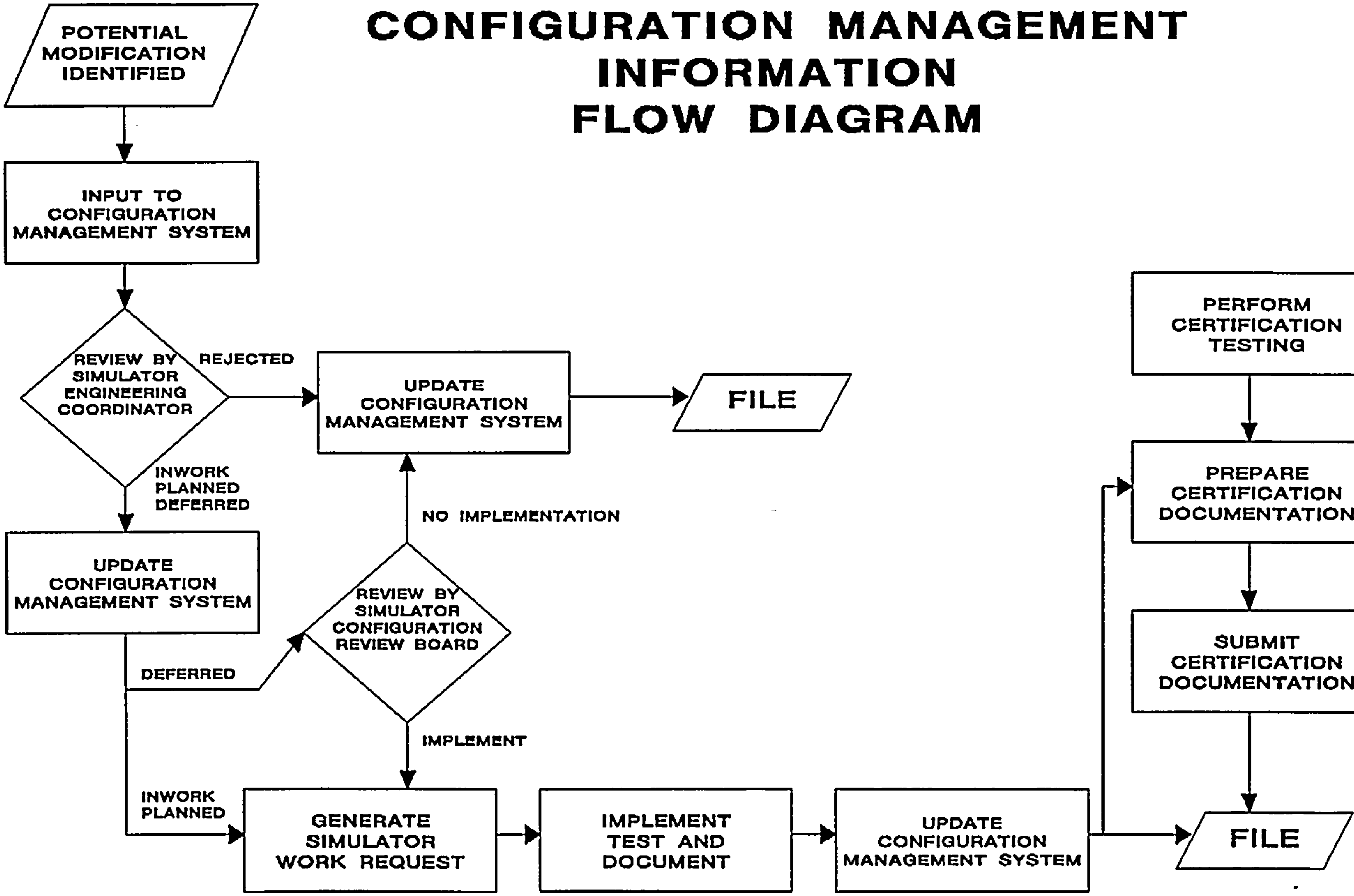
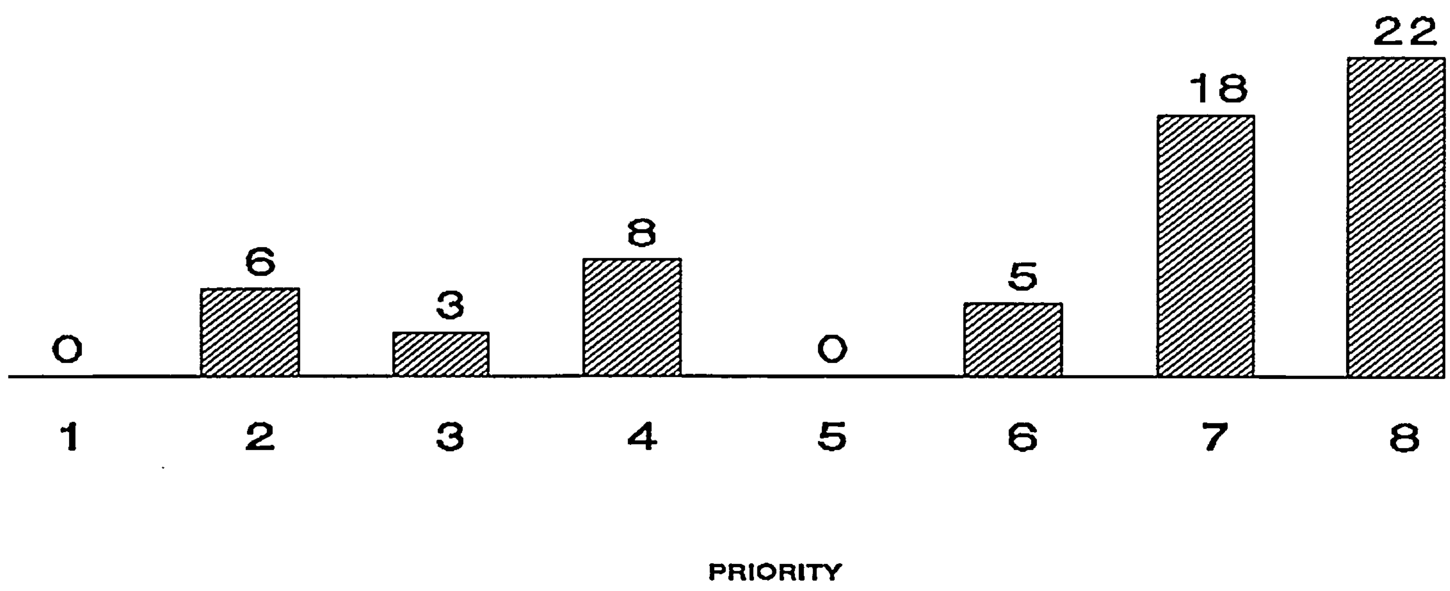
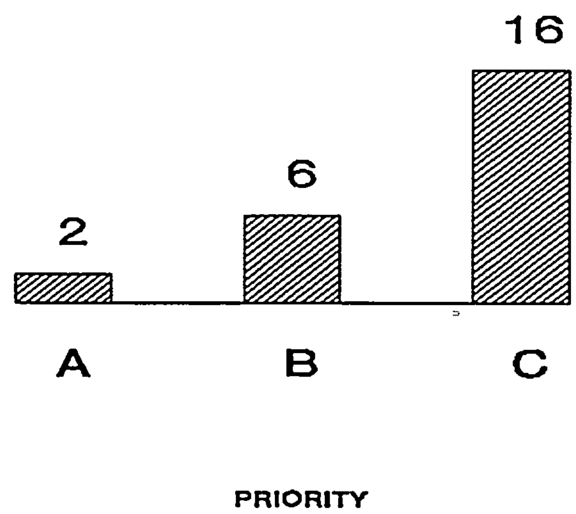


FIGURE 4-2

OUTSTANDING DISCREPANCIES BY PRIORITY

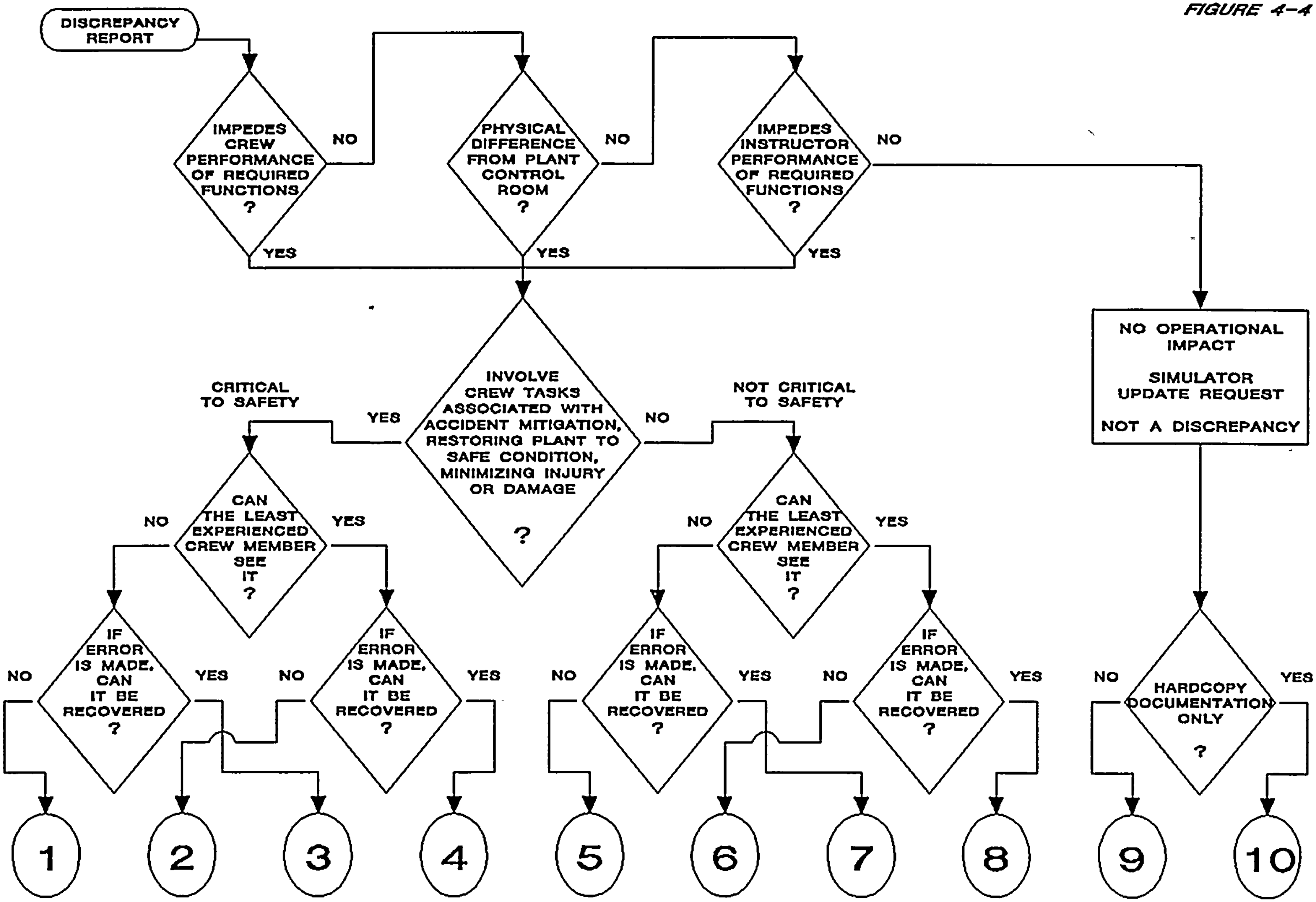


OUTSTANDING PC/Ms BY PRIORITY



ASSIGNMENT OF DISCREPANCY OPERATIONAL PRIORITY

FIGURE 4-4



REV - 10/26/90

(BASED ON EPRI NP-5746)

REFERENCES

4-1 Simulator Configuration Management, Turkey Point Plant Procedure 0-ADM-305, November 1, 1988.

4-2 Simulator Discrepancy Reporting, Simulator Engineering Instruction Number 4, January 31, 1990.

4-3 Plant Design Change Tracking, Simulator Engineering Instruction Number 10, September 12, 1990.

4-4 Turkey Point Simulator Engineering Instruction Number 5, Operation of the Configuration Management System, January 31, 1990

4-5 Turkey Point Simulator Engineering Instruction 6, Priority and Disposition of Potential Simulator Modifications, July 26, 1990.

4-6 Electric Power Research Institute NP-5746, Evaluation of Simulator Discrepancies on the Basis of Operational Impact, April, 1988.

APPENDIX A: QUALIFICATIONS OF THE CERTIFICATION TEAM, SCRB, AND SCRB ALTERNATES

This Appendix consists of abstracts from the resumes of the members of the Certification team, the SCRB, and the SCRB alternates.

CERTIFICATION TEAM

James F. Harrison - Simulator Certification Engineer

Has nineteen years of experience in various water reactor areas including software development, safety analysis, coordination of licensing activities, and fluid systems engineering.

Planned and directed the Florida Power & Light Turkey Point Simulator Certification Test Program and conducted a number of the tests. He provided a technical evaluation of simulator process models for the Florida Power & Light, St. Lucie and Turkey Point plants and the Rochester Gas & Electric, Ginna plant. He was a principal in the development of models for the nuclear boiler for several BWR plants. He has participated in a project sponsored by Electric Power Research Institute (EPRI) to develop methods to qualify simulator models using RETRAN.

In the area of system transient model development and safety analysis, Mr Harrison has participated in the development of models for a wide variety of plants, including Westinghouse, three & four loop plants, Babcock and Wilcox raised & lowered loop plants, General Electric jet pump & non-jet pump plants, and the Combustion Engineering System 80. These activities included preparation of models for the RCS, steam generators, emergency systems, control systems, trip systems, and the balance of plant. Mr. Harrison has been involved in an equally broad spectrum of analysis activities ranging from safety analysis to plant operational improvement studies.

Mr. Harrison coordinated the preparation of the EPRI PWR Transient Analysis Guidelines for the Reactor Analysis Support Package (RASP) and has performed independent analyses and assessments of the RETRAN03 code for the Electric Power Research Institute.

Mr. Harrison has a BS in Mechanical Engineering and is a Registered Professional Engineer in Virginia.

Robert J. Ginsberg - Simulator Certification Test Team Member

Nuclear Training Instructor at Surry Power Plant. Senior Reactor Operator License. Developed material for and conducted Licensed Operator Requalification Program for 9 months, developed and taught Surry Technical Staff and Manager training program for 3 years.

US Navy Nuclear Officer on two submarines for 5 years. Qualified as Engineer Officer of navy nuclear propulsion units.

BS in Engineering, US Naval Academy, 1979.

Jerry W. Johnson - Simulator Certification Test Team Member

Two years experience as Simulator Validation Engineer responsible for 10CFR55.45/ANSI/ANS 3.5 compliance. Developed a UNIX computer based validation database using plant modification documentation. Developed software in C to handle PC to UNIX data transfer. Performed software modifications to the Browns Ferry Simulator in SEL assembler under MPX 2.0. Compiled preliminary requirements for annual testing per ANSI/ANS 3.5.

Two years as Computer Applications Engineer at the South Texas Nuclear Project. Responsible for vendor interface of Emergency Response Facility computer systems during acceptance testing, supervision of installation and tech staff representation during start-up. Performed analysis and critique of ERF and SPDS displays. Developed dBASE III software procedures for automated production of I/O point verification documents and configuration management.

Four years experience responsible for implementation, maintenance and testing of software executing on a SEL 32/77 under MPX 2.0 at the Waterford 3 nuclear plant. Performed software development and modification in FORTRAN 77. Responsible for modifications to the Safety Parameter Display System per NRC commitments prior to full power operation. Performed testing of software during pre-operational testing of the Plant Computer.

Successfully completed a seven month Shift Technical Advisor training program. Served as Staff Test Engineer during ANO-2 Cycle 2 reload physics tests and Waterford 3 precore hot functional testing.

B.S. Nuclear Engineering, Mississippi State University

Kenneth D. White - Simulator Certification Test Team Member

Nuclear Training Instructor for 2 years at Rancho Seco Power Plant. Developed system manuals and conducted operator training classes.

Nuclear Power Plant Reactor Operator for 2 years at the Koeberg Nuclear Power Station in South Africa.

Nuclear Power Plant Operator for 7 years at Arkansas Nuclear One, Unit One. Acted as all levels of plant operator up to and including Shift Supervisor. Senior Reactor Operator license.

US Navy submarine nuclear machinist's mate for 6 years.

BA Economics, University of South Florida, 1974.

SIMULATOR CONFIGURATION REVIEW BOARD

Richard G. Mende - Operations SCRB Member

Operations Supervisor (Department Head) for last 3 1/2 years. Supervises 160 operators and a budget of $9 million. SRO license since July 1984.

Reactor Engineering Supervisor (Department Head) for 1 1/2 years. Supervised engineering personnel performing core physics monitoring, plant process and safety computer systems, and Emergency Planning. Also acted as license class and licensed operator requalification instructor.

Reactor and Plant Engineer for 8 years, including 7 years as Reactor Engineer. Performed core physics monitoring calculations, core reload work, and plant performance calculations.

BS in Biology from University of Miami with minor in Chemistry. Senior status in Mechanical Engineering at University of Miami.

John E. Crockford - Operations Alternate SCRB Member

Assistant Operations Superintendent for last 2 years and for three years from 1984 to 1986. Responsible for review of changes and modifications to the plant, plant Surveillance, and other duties as assigned. Licensed Senior Reactor Operator.

Nuclear Operations Training Supervisor for 2 years from 1987 to 1989. Responsible for licensed operator training and requalification programs and for Shift Technical Advisor training.

Plant Supervisor, Nuclear for five years. Responsible for day-to-day operation of the nuclear units.

Nuclear Watch Engineer for 6 years and plant operator (unlicensed) for 2 more years. 7 years of Navy nuclear experience.

Hugh H. Johnson Jr. - Operations Alternate SCRB Member

Assistant Operations Supervisor for last 18 months. Responsible for various operations tasks associated with outage support. Participated in SRO license class and received SRO license.

Unit One Operations Manager at South Texas Project for Houston Power and Light for 4 and 1/2 years from 1985 to 1989. Responsible for overall unit operations during preoperation, startup and commercial operations. SRO licensed on units One and Two.

Assistant Nuclear Plant Supervisor at Florida Power and Light's St. Lucie Plant for 5 years from 1981 to 1985. RO and SRO licensed on units 1 and 2 at St. Lucie Plant.

Robert E. Dodson II - Simulator Engineering SCRB Member, SCRB Chairman

Simulator Engineering Coordinator for last 4 years. Responsible for all hardware and software changes and maintenance as well as certification and budget activities.

Simulator Procurement Engineer for 3 years. Participated in development of procurement specifications, design reviews, acceptance testing and other tasks associated with procurement of the Turkey Point Simulator.

Three years of licensed nuclear power plant operations. Held RO and SRO licenses at Turkey Point. Seven years of Nuclear Training Instructor experience, five of which are at Turkey Point, including licensed operator training and requalification training.

BS in Industrial Technology, Florida International University, 1979.

Kay A. Lovell - Simulator Engineering Alternate SCRB Member

Simulator Process Engineer for last 5 years. Responsible for developing the procurement specifications for and maintaining the fidelity of the Turkey Point Simulator. Tests software and hardware changes and clears discrepancies. Reviews plant changes for simulator impact. Controls the software configuration.

Shift Technical Advisor and Plant Systems Engineer for four years at Turkey Point. Licensed as Senior Reactor Operator at Turkey Point.

BS in Mechanical Engineering with a minor in Power Production at University of Tennessee, Knoxville, 1981.

Leo Goebel - Simulator Training SCRB Member

Simulator Training Coordinator for last 4 1/2 years. Responsible for total implementation of all simulator training activities, including training needs analysis, material development, procedure validations, and INPO accreditation.

Licensed Operator Requalification Program Supervisor for 2 years. Initial license class instructor for 2 years.

Plant licensed operator and Senior Reactor Operator for 2 years at Turkey Point.

Charles A. Coker - Simulator Training Alternate SCRB Member

Simulator Training Instructor for last 3 years. Responsible for training of licensed operators and license candidates.

Plant Supervisor, Nuclear and Licensed Senior Reactor Operator for 12 years at Turkey Point. Responsible for all operations shift activities, maintenance planning and scheduling, procedure writing. Also served as outage coordinator for several outages.

Nuclear Watch Engineer and Licensed Senior Reactor Operator for 5 years. Twelve additional years as power plant operator at conventional plants.

NRC FORM 474 (1-90)
10 CFR 55.45(b), 55.4 and 55.5

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0138
EXPIRES: 9-30-92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 120 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0138), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

SIMULATION FACILITY CERTIFICATION

INSTRUCTIONS. This form is to be filed for initial certification, recertification (if required), and for any change to a simulation facility performance testing plan made after initial submittal of such a plan. Provide the following information, and check the appropriate box to indicate reason for submittal.

FACILITY
TURKEY POINT NUCLEAR GENERATING UNIT NUMBER 4

DOCKET NUMBER
50- 251

LICENSEE
FLORIDA POWER AND LIGHT COMPANY

DATE
12/31/90

This is to certify that:

1. The above named facility licensee is using a simulation facility consisting solely of a plant-referenced simulator that meets the requirements of 10 CFR 55.45.
2. Documentation is available for NRC review in accordance with 10 CFR 55.45(b).
3. This simulation facility meets the guidance contained in ANSI/ANS 3.5, 1985, as endorsed by NRC Regulatory Guide 1.149. If there are any exceptions to the certification of this item, check here [X] and describe fully on additional pages as necessary.

NAME *(or other identification)* AND LOCATION OF SIMULATION FACILITY
TURKEY POINT SIMULATOR
9½ MILES EAST OF FLORIDA CITY ON PALM DRIVE
FLORIDA CITY, FLORIDA 33034

[X] SIMULATION FACILITY PERFORMANCE TEST ABSTRACTS ATTACHED. *(For performance tests conducted in the period ending with the date of this certification)*

DESCRIPTION OF PERFORMANCE TESTING COMPLETED *(Attach additional page(s) as necessary, and identify the item description being continued)*

SEE ATTACHED DOCUMENT

[X] SIMULATION FACILITY PERFORMANCE TESTING SCHEDULE ATTACHED. *(For the conduct of approximately 25% of performance tests per year for the four year period commencing with the date of this certification.)*

DESCRIPTION OF PERFORMANCE TESTING TO BE CONDUCTED. *(Attach additional page(s) as necessary, and identify the item description being continued)*

SEE ATTACHED DOCUMENT

[ ] PERFORMANCE TESTING PLAN CHANGE. *(For any modification to a performance testing plan submitted on a previous certification)*

DESCRIPTION OF PERFORMANCE TESTING PLAN CHANGE *(Attach additional page(s) as necessary, and identify the item description being continued)*

INITIAL CERTIFICATION - NOT APPLICABLE

[ ] RECERTIFICATION *(Describe corrective actions taken, attach results of completed performance testing in accordance with 10 CFR § 55.45(b)(5)(iv). Attach additional page(s) as necessary, and identify the item description being continued.)*

INITIAL CERTIFICATION - NOT APPLICABLE

Any false statement or omission in this document, including attachments, may be subject to civil and criminal sanctions. I certify under penalty of perjury that the information in this document and attachments is true and correct.

SIGNATURE – AUTHORIZED REPRESENTATIVE	TITLE	DATE
	VICE PRESIDENT - TURKEY POINT	

In accordance with 10 CFR § 55.5, Communications, this form shall be submitted to the NRC as follows:

BY MAIL ADDRESSED TO: Director, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555

BY DELIVERY IN PERSON TO THE NRC OFFICE AT: One White Flint North, 11555 Rockville Pike, Rockville, MD

FLORIDA POWER AND LIGHT COMPANY
TURKEY POINT UNIT 4
INITIAL SIMULATOR CERTIFICATION REPORT

TABLE OF CONTENTS

1.0 INTRODUCTION

Turkey Point Unit 4, Docket 50-251, License DPR-41, simulator training will be performed using the Unit 3 training simulator. The performance tests were run for Unit 3 certification. The differences between the two units were evaluated and differences which could have training impact are identified in Section 2.

2.0 UNIT 3 VERSUS UNIT 4 DIFFERENCES

2.1 EXCEPTIONS TO ANSI/ANS 3.5 STANDARD

The exceptions to ANSI/ANS 3.5 noted for Unit 3 were evaluated and are considered applicable to Unit 4.

2.2 OPERATOR TRAINING

Operator training for initial license classes and operator requalification classes include differences training as part of the normal classroom, simulator, and on-the-job training. In addition, the above training segments include segments and practice on common system failures and appropriate operator actions.

2.3 FACILITY DESIGN & SYSTEMS RELEVANT TO CONTROL ROOM PERSONNEL

The Facility Design Control Process, under which plant modifications are performed, includes reviews by several organizations within FPL. It is FPL policy wherever possible to control plant modifications such that the design similarity of Turkey Point Units 3 and 4 is maintained.

The following items list the differences identified between Units 3 and 4 for facility design and systems. All the differences were reviewed by the SCRB and it was determined that none are significant enough to have a negative effect on operator training or examinations.

2.3.1 ROD POSITION INDICATIONS

The power supplies to the rod position indications are different between Unit 3 and Unit 4 as Unit 3 uses a DC power supply and a motor control center where Unit 4 uses a DC power supply, a motor control center and a lighting panel.

2.3.2 RHR PUMP SUCTIONS AND DISCHARGES

Unit 3 takes a suction on the C loop hot leg while Unit 4 takes a suction on the A loop. The alternate discharge for the Unit 3 pump is loop C and the alternate discharge of Unit 4 is loop A.

2.3.3 BORIC ACID STORAGE

The 'B' Storage tank and the Batch tank are shared between the two Units. The batch tank alarms only exist on Unit 3.

2.3.4 SAFETY INJECTION SYSTEMS

Portions of the safety injection systems of the two units are shared. For example, all four safety injection pumps (two for each unit) start on an SI on either unit. The portions of Unit 4 needed for Unit 3 simulation are included in the Unit 3 simulator. Unit 4 operates similarly to Unit 3 otherwise.

2.3.5 EMERGENCY CONTAINMENT COOLER FILTERS AND FANS

On a loss of offsite power, three ECC filters and fans start in Unit 3 while only two start on Unit 4.

2.3.6 SPENT FUEL PIT EXHAUST SYSTEMS

The Unit 3 spent fuel pit exhaust fans exhaust to a dedicated vent. The Unit 4 fan exhausts to the plant vent.

2.3.7 RADIATION MONITORING SYSTEMS

Plant common areas are monitored on the Unit 3 side of the control room (and are included in the simulator). The plant vent and liquid release radiation monitors only alarm on Unit 3.

2.3.8 MAIN STEAM ISOLATION VALVE BACKUP AIR (NITROGEN) SUPPLY

Unit 3 has backup nitrogen bottles for emergency closure of the MSIV's. Unit 4 has had an air accumulator installed to assure MSIV closure during a loss of instrument air.

2.3.9 AUXILIARY FEEDWATER PUMPS

The three AFW pumps are shared between the two units and have power supplies for the supply valves from both units. Unit 4 is modelled in the simulator sufficiently to provide the correct Unit 4 supplies.

2.3.10 GENERATOR MONITORING

Unit 3 vertical board contains the monitoring cabinet for both units' main generators. Unit 4 has a local panel that contains a radiofrequency detector to detect arcing in the generator. This detector was never installed on Unit 3.

2.3.11 MAIN GENERATOR EXCITERS

The Unit 4 exciter has slightly quicker response characteristics and has different protection settings than the Unit 3 exciter. Unit 4 has no startup exciter current limiter.

2.3.12 EMERGENCY COMMUNICATION FACILITIES

The Plant Supervisor - Nuclear station is common to both units and is provided in the simulator. The fire horn pushbutton, fire phone, and the local government radio are on the Unit 3 side only. The radio set used as a backup method for communication with FPL Load Dispatchers is in the Unit 4 side of the control room and is not included in the Simulator.

2.3.13 ELECTRICAL DISTRIBUTION

Some of the bus backup power supplies operate slightly differently between the units, and some of the similar loads have breaker numbers which are different. The differences are covered in classroom or simulator training as appropriate, but do not have any significant effect on training with a Unit 3 simulator.

The Unit 3 simulator has the Unit 4 buses modelled to the extent necessary to support Unit 3 operation including backup power supplies. The Unit 4 DC buses share some components, such as battery chargers, with Unit 3. The emergency diesel generators are currently shared between the two units. During the dual unit outage of 1991, two additional EDG's will be added and each unit will then

have its own EDG's. The EDG's will operate similarly between the units.

2.3.14 BACKUP ELECTRIC INSTRUMENT AIR COMPRESSORS

The Unit 4 backup electric instrument air compressors have the same functions as Unit 3, but one of the Unit 4 backup compressors is a 500 SCFM horizontal type while the other Unit 4 and both Unit 3 backup compressors are 325 SCFM vertical type compressors.

2.3.15 COMPONENT COOLING WATER HEAT EXCHANGERS

The Unit 4 CCW heat exchangers have a local digital temperature readout panel which was not installed on Unit 3.

2.3.16 WASTE DISPOSAL

The Waste Disposal system is shared by the two units for the most part. Those components which are unit specific operate similarly between the two units.

2.3.17 METEOROLOGICAL RECORDERS

The meteorological recorders are only on Unit 3 and are included in the simulator.

2.3.18 TURBINE RUNBACK SELECTOR SWITCH

The Turbine Runback Selector Switch on Unit 4 does not have a keylock as it does on Unit 3.

2.3.19 MISCELLANEOUS ANNUNCIATORS

The Breathing Air System Trouble, Control Room Chiller Trouble and the Demin System Trouble alarms are only on Unit 3. The Fire Damper Closed alarm is only on Unit 4.

2.3.20 LOOP RTD BYPASS LINE LOW FLOW ALARM

The Unit 4 "B" loop RTD bypass line experienced lower flow conditions than the other bypass lines in both units. An analysis was done and the alarm setpoint for this bypass line was reduced from 175 gpm to 145 gpm. All the other 5 loops in the two units have remained at the 175 gpm setpoint.

2.3.21 ALTERNATE SHUTDOWN PANELS (ASP)

Each unit has its own alternate shutdown panel. Only the Unit 3 ASP is modelled but only minor differences exist between the two units' ASPs so that the Unit 3 simulator can be used to train for Unit 4 ASP operations.

2.4 TECHNICAL SPECIFICATIONS

The Turkey Point Technical Specifications are common for both Units 3 and 4 with a few minor exceptions to account for differences in unit operation since construction. For example, the pressure temperature limit curves of Section 3.1 are unit specific due to differences in initial construction and neutron irradiation of the two reactor vessels. No differences exist which would affect simulator training. In addition, it is FPL policy to maintain the Technical Specifications as similar as possible, within the limits of actual design and operation, in order to facilitate plant operation.

2.5 OPERATING, OFF-NORMAL, AND EMERGENCY PROCEDURES

Due to the similarity of the two units, there are minimal differences in the Operating Procedures, Off-Normal Operating Procedures, and Emergency Operating Procedures between the two units. No differences exist which would negatively affect simulator training.

2.6 CONTROL ROOM DESIGN AND INSTRUMENTATION LOCATIONS

The Turkey Point main control room serves as the control room for both units 3 and 4. The Unit 3 benchboards and vertical panels are located on the left hand side of the Plant Supervisor - Nuclear (PS-N) office. The Unit 4 main control benchboards are a duplicate of the Unit 3 benchboards and are located on the right hand side of the Plant Supervisor - Nuclear (PSN) office. The Unit 4 vertical boards are similarly offset to the right of the PSN's office, but the boards are

rotated to enclose the front and right side of the control room. The left-right relationship of the panels is maintained from one unit to the other. There is a common annunciator panel, designated the "X" panel, which contains annunciators common to both units. This panel is included in the Unit 3 simulator.

Other panels which are different between the units are the control room ventilation panel which is on the Unit 4 side of the main control room, and the area radiation monitoring panel which is only on the Unit 3 side of the main control room. The control room ventilation panel is included in the Unit 3 simulator, but is located in a small room adjacent to the simulator which is not in the actual plant control room. This room also contains the simulated Unit 3 alternate shutdown panel and the reactor coolant pump vibration monitor cabinet for both units. The common fire alarm panel is located between the units at the back of the control room in the plant. The same panel is located in its same position in the simulator and it is included in the simulation.

2.7 OPERATIONAL CHARACTERISTICS

Due to the almost identical design and operation of Units 3 and 4, there are no significant operational differences and no differences in operational characteristics which would negatively affect operator training.