ENCLOSURE (1)

CALVERT CLIFFS NUCLEAR POWER PLANT SIMULATOR
FOUR-YEAR CERTIFICATION REPORT

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## I. INTRODUCTION

The Calvert Cliffs Nuclear Power Plant Simulator four-year Certification Report is a supplement to the Simulation Certification form (NRC Form-474), the Simulator Annual Certification Report, and Simulator Support Unit Procedures. This report briefly provides a description of the simulator, the Certification Resubmittal checklist and a current status of simulator configuration modifications. Additional information concerning specific tests is available upon request. The last report was submitted January 11, 1991.

## II. SIMULATOR INFORMATION

| | |
|---|---|
| Simulator type: | Reference Plant Simulator |
| Manufacturer: | Combustion Engineering |
| Owner/Operator: | Baltimore Gas and Electric Company (BGE) |
| Reference Plant: | Calvert Cliffs Unit One |
| Plant Location: | Lusby, Maryland |
| Plant Type: | Pressurized Water Reactor |
| Plant Rating: | 2700 Mwth |
| Date Available for Training: | January, 1985 |
| Original Certification Date: | January 11, 1991 |
| Type of Report: | Four-Year Certification |
| Applicable Standards: | |
| Design/Testing: | ANSI/ANS 3.8-1985 (Reference 2)<br>NRC RG 1.149-1987 (Reference 3) |

## III. SIMULATOR PROCEDURES

The Simulator is controlled, operated, tested and modified using the following Calvert Cliffs procedures:

TI 15 "Administrative Control of Changes to Training Programs."
TI 16 "Simulator Issue Reports."
TI 19 "Calvert Cliffs Simulator Facility Configuration Management."

## IV. SIMULATOR DATABASE

Controlled drawings and procedures are used as a basis for handler logic and system flow calculations. The plant setpoint file is also used as an input to the simulator data base. Plant or Simulator Support Unit logs are used whenever possible to compare initial condition values. Plant or Engineering data is used when necessary to ensure the simulator data base closely models the plant. Feedback from plant operators, using the Simulator Issue Report (SIR) process, is an essential part of maintaining the simulator current with the plant.

## V. DEVIATIONS SINCE LAST REPORT

Missing three Year One Annual Test hard copies. Documentation of the runs are contained in the Year One Annual Report. All annual tests were completed with satisfactory results.

Missed the performance of ANS 3.8 paragraph C.4 "Hot Standby to Minimum Load" in Year Two. The simulator was subsequently exercised with satisfactory results under the 100% Trip and Recovery test performed in 1994. This test was performed on January 6, 1995, with satisfactory results.

ANS 3.8 C.5 "Turbine Startup and Synchronization" and C.6 "Minimum Load to 100 Percent Power" were delayed two months to allow testing of new input/output (I/O) placed on the simulator in December 1992.

Missed the performance of Year Two Malfunction 165 during 1992. It was run with satisfactory results in 1991. This test was performed on January 5, 1995, with satisfactory results.

No additional major differences exist between the simulator and the reference plant.

## VI. MAJOR CHANGES SINCE THE LAST REPORT

Inclusion of the Digital Feedwater Control System and Lovejoy in the Reference Plant and the Simulator eliminates the "Feedwater Panel" EXCEPTION in the original submittal.

Changed Malfunction 59 [Power Operated Relief Valve (PORV) Leakage] to Malfunction 66 (PORV Leakage) to allow the option for either PORV to be affected.

There were no discrepancies under the "MAJOR Simulator Fidelity" category.

## VII. MAJOR CHANGE MILESTONES OCCURRING WITHIN THE NEXT YEAR

Host and I/O Computer replacement
Instructor Station replacement including workstations
Possible ability to perform Certification Testing off-line
Furniture replacement in the plant and on the simulator
Station Blackout Emergency Diesel Generator panel installation (Per Operations Request, the Simulator Installation will lead Plant Installation to facilitate training.)

## VIII. OUTSTANDING ITEMS FROM LAST SUBMITTAL

The following discrepancies have not been corrected:

| SIR No. | Discrepancy | Corrective Actions |
|---|---|---|
| S1700 | During 100% Power Trip & Recovery, at 20% Reactor Power the transfer from First Stage Pressure Feedback Out to First Stage Pressure Feedback In caused enough perturbations to cause a Reactor Trip. | Pending. Modifications were made to the software to reflect plant design. These changes caused major differences in other indications. After this attempt failed, the First Stage Pressure Feedback failed in the plant causing plant operations in First Stage Pressure Feedback OUT only, except for valve testing. |
| S1879 | During the 75% Power Steady State Test MWE output was too high. | Pending. With the simulator matching plant conditions (summer time) the MWE fell into specification, but other indications fell out of specification. |

## IX. CERTIFICATION TESTING CHECKLIST

The attached Calvert Cliffs Nuclear Power Plant Simulator Certification Report Checkoff Sheet [Attachment (1)] indicates the audit completed to maintain simulator certification. Specific data is available upon request.

Certification tests are divided into three groups:

| | | |
|---|---|---|
| Annual Tests | - | Performed each year (Certification file on the simulator) |
| Performance Tests | - | Performed over a four-year period (Certification file on the simulator) |
| Malfunction Tests | - | 25% per year in accordance with the testing schedule (Certification file on the simulator) |

## X. ADDITIONAL TESTING

SPIN Testing: Every time a "SPIN" (new training load) occurs, we run an integration test to ensure the changes are incorporated and that the changes do not detract from training. This testing includes ANS 3.8 2i "Main Steam Line Break" and 2h "LOCA with Loss of Offsite Power" because these tests exercise most of the computer models. Affected malfunction tests may also be used. Credit for this testing is not considered in the Certification Testing.

The computer replacement project included BENCHMARK testing to ensure the continued certification of the Calvert Cliffs Simulator. This testing included taking the simulator from "100% to Cold Shutdown," "Mass/Energy Balance" testing, "Simultaneous Trip of Both Steam Generator Feed Pumps,"

"Simultaneous Closure of Both Main Steam Isolation Valves," "Reactor Trip and Recovery from 100 Percent Power" and selected Malfunctions from Year Four.

The following MALFUNCTIONS were developed, tested and added to our test plan for the 1995-1998 Certification cycle:

| | | |
|---|---|---|
| Malfunction 5 | Wide Range Nuclear Instrument Failure | Yr 3 |
| Malfunction 52 | Switchyard Breaker Fails to Trip | Yr 3 |
| Malfunction 63 | Pressurizer Pressure Safety Channel Failure | Yr 1 |
| Malfunction 74 | Tube Leak in the Non-Regenerative Heat Exchanger | Yr 3 |
| Malfunction 97 | Digital Feedwater Control System Central Processing Unit Failure | Yr 4 |
| Malfunction 106 | Loss of Steam Flow Input to Digital Feedwater Control System | Yr 3 |
| Malfunction 107 | Feed Flow Element F1111A/1121A Failure | Yr 2 |
| Malfunction 152 | Steam Generator Blowdown Fails to Isolate on High Radiation Signal | Yr 2 |
| Malfunction 187 | Low Pressure Safety Injection (LPSI) Pump Suction Break | Yr 4 |
| Malfunction 195 | Low Level in the Safety Injection Tank | Yr 1 |
| Malfunction 214 | Service Water Leak in Auxiliary Building | Yr 1 |
| Malfunction 215 | Service Water Leak in Turbine Building | Yr 2 |
| Malfunction 217 | Saltwater System Leak | Yr 3 |
| Malfunction 218 | Area Radiation Monitor Failure | Yr 1 |
| Malfunction 231 | Component Cooling Water Leak in Containment | Yr 4 |
| Malfunction 240 | Main Steam Isolation Valve (MSIV) Fails to Shut on Engineered Safety Feature Actuation Signal | Yr 1 |
| Malfunction 241 | Automatic Containment Isolation Signal (CIS) Fails to Actuate | Yr 2 |
| Malfunction 242 | Manual CIS Fails to Actuate | Yr 3 |
| Malfunction 243 | Automatic Steam Generator Isolation Signal (SGIS) Fails to Actuate | Yr 4 |
| Malfunction 244 | Spurious SGIS Actuation | Yr 2 |
| Malfunction 245 | Containment Radiation Monitor Failure | Yr 4 |
| Malfunction 246 | Failure of Shutdown Sequencer (SDS) Bus 11 to Unblock | Yr 1 |
| Malfunction 247 | Failure of SDS Bus 14 to Unblock | Yr 2 |
| Malfunction 248 | Failure of Loss-of-Coolant Incident Sequencer (LOCIS) Bus 11 to Unblock | Yr 3 |
| Malfunction 249 | Failure of LOCIS Bus 14 to Unblock | Yr 4 |
| Malfunction 250 | Steam Generator Wide Range Level Transmitters Fail | Yr 3 |
| Malfunction 251 | Failure of No. 12 Steam Generator Pressure Transmitters | Yr 4 |
| Malfunction 252 | Failure of No. 12 Steam Generator Protection Level Transmitters | Yr 1 |
| Malfunction 253 | Blockage of Salt Water Components | Yr 4 |

## XI. REFERENCES

1. Title 10, Code of Federal Regulations, Part 55, "Operators' Licenses."

2. ANSI/ANS 3.8-1985 American Nuclear Society "Nuclear Power Plant Simulators for Use in Operator Training

3. United States Nuclear Regulatory Guide 1.149 "Nuclear Power Plant Simulation Facilities for Use in Operator License Exams" April 1987.

## ATTACHMENT (1)

## CALVERT CLIFFS UNIT ONE -- REFERENCE PLANT SIMULATOR
## DUAL UNIT SIMULATOR -- CHECKOFF SHEET

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| | | INIT / DATE |
|---|---|---|
| 1. | Review SPIN and Annual Reports and list major changes since the last report. List these under Section VI. | EK 1/10/95 |
| 2. | Review SPIN and Annual Reports for any changes to the simulator environment (lighting, painting, etc.) List these under Section VI. | EK 1/10/95 |
| 3. | Review SPIN and Annual Reports for any major model changes, or model changes on SIRs which had "MAJOR Simulator Fidelity" checked. List these under Section VI. | EK 1/10/95 |
| 4. | List all FCRs which were incorporated on the simulator since the last report. Have this list available for review. | EK 1/10/95 |
| 5. | List any outstanding items to be completed within the next year. List these under Section VII. | EK 1/10/95 |
| 6. | Verify Certification Documentation: | |
| | a. List all tests from last report and include the dates they were run, Simulator Issue Reports written and resolution. | EK 1/10/95 |
| | b. Verify testing was performed in accordance with the testing schedule last submitted or reasons for deviation documented in Section V. | EK 1/10/95 |
| | c. List additional testing performed including SPIN tests. | EK 1/10/95 |
| 7. | Give up to date evaluation of the simulator: | |
| | a. Have differences list available for review. | EK 1/10/95 |
| | b. List any major differences between the reference plant and the simulator concerning panels, communications, furniture and plant computer. If differences exist which were not addressed in the original submittal, include them in Section V. | EK 1/10/95 |
| | c. List all of the initial conditions. Ensure conditions under the original submittal are still being met. | EK 1/10/95 |
| | d. Have SIR list available for review. | EK 1/10/95 |
| | e. Attach the test plan for the next four years. [Attachment (2)] | EK 1/10/95 |
| | f. List any additional exceptions to the standard. | EK 1/10/95 |
| | g. Review Examiners comments from exams performed including our reply. Have these available for review. | EK 1/10/95 |
| | h. List any deviations from the standard. Include these in Section V. | EK 1/10/95 |
| | i. List the qualifications of persons who performed, reviewed or approved testing over the last four years: | |

| | |
|---|---|
| Charles Andrews | Former Licensed SRO (CCNPP) |
| Richard Best | Attached |
| Edmund Chrzanowski | Licensed SRO (CCNPP) |
| James Macklin | Licensed SRO (CCNPP) |
| Patrick Murphy | Former Licensed RO (CCNPP) |
| Douglas Tilton | Attached |

EK 1/10/95

## ATTACHMENT (2)

## CALVERT CLIFFS UNIT ONE -- REFERENCE PLANT SIMULATOR
## DUAL UNIT SIMULATOR

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## ANNUAL TEST PLAN

| | |
|---|---|
| ANS 3.8-1d | 100% Power Drift Check<br>Operability Check of Real Time Simulation |
| ANS 3.8-1a | 25% Power Energy/Mass Balance |
| ANS 3.8-1b | 50 ANS 3.8-1% Power Energy/Mass Balance |
| ANS 3.8-1c | 75% Power Energy/Mass Balance |
| ANS 3.8-1d | 100% Power Energy/Mass Balance |
| ANS 3.8-2a | Manual Reactor Trip |
| ANS 3.8-2b | Trip of 11 & 12 Steam Generator Feedwater Pumps |
| ANS 3.8-2c | Closure of 11 & 12 MSIVs |
| ANS 3.8-2d | Trip of All Reactor Coolant Pumps (RCPs) |
| ANS 3.8-2e | Trip of 12A RCP at 80% Power |
| ANS 3.8-2f | Main Turbine Trip at 12% Power |
| ANS 3.8-2g | Maximum Power Ramp 100% - 75% - 100% Power |
| ANS 3.8-2g | Large Break Loss-of-Coolant Accident with Loss of Offsite Power |
| ANS 3.8-2i | Main Steam Line Rupture |
| ANS 3.8-2j | Slow Reactor Coolant System Depressurization with Engineered Safety Feature Actuation System failed |

ATTACHMENT (2)

CALVERT CLIFFS UNIT ONE -- REFERENCE PLANT SIMULATOR
DUAL UNIT SIMULATOR

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YEAR ONE TEST PLAN

## I. PROCEDURES

Cold Shutdown to Hot Standby
Operation in Hot Standby

## II. MALFUNCTIONS

002 Wide Range Nuclear Instrumentation Channel High Voltage Power Supply Failure
012 Power Range Subchannel Linear Amplifier Fails High
016 Reactor Protective System (RPS) Channel B Bistable Trip Relay Contact Fails to Open on Trip
019 Failure of Manual Reactor Trip
027 Uncoupled Control Element Assembly (CEA)
033 Individual CEA Reed Switch Position Indication Fails
035 Reactor Trip
036 Loss of Control Element Drive Mechanism Motor Generator Set
048 Failure of RCP First Stage Seal
063 Pressurizer Pressure Safety Channel Failure
073 Loss of Normal Letdown Due to 1-CVC-516 Failing Closed
082 Failure of Boric Acid Pump
083 Volume Control Tank Level Transmitter Fails Hi/Lo
093 MSIV Stuck at 90% of Full Open
094 MSIV Fails Closed
103 Turbine Bypass Valve's Fail Open (Any Combination)
108 Failure of Turbine Bypass Valve Control Loop From 1PIC-4056
109 Turbine Bypass Valve Controller Fails in Automatic Mode
110 Failure of Steam Flow Transmitter Hi/Lo
112 Atmospheric Dump Valve Controller Fails while in Automatic Mode
137 Main Generator Trip
140 Main Generator Automatic Voltage Regulator Misoperation
141 Loss of Stator Liquid Cooling
147 Loss of Unit Two Vital Instrument Bus
157 Loss of Pressurizer Heater Motor Control Centers
160 Loss of 250 VDC Emergency DC Bus
161 Failure of Emergency Diesel Generator to Start
171 Feedwater Regulating Valve Fails Full Open or Closed in Automatic Control
186 Failure of Auxiliary Feedwater Actuation System to Actuate
191 High Pressure Safety Injection (HPSI) Valves Fail-as-is
195 Low Level in Safety Injection Tank
203 Failure of Recirculation Actuation Signal to Actuate on Automatic Demand
207 Failure of Containment Cooling Fans
214 Service Water Leak in the Auxiliary Building
218 Area Radiation Monitor Failure

## ATTACHMENT (2)

## CALVERT CLIFFS UNIT ONE -- REFERENCE PLANT SIMULATOR
## DUAL UNIT SIMULATOR

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223 Loss of Component Cooling Pump
224 Loss of Service Water Pump
225 Loss of Salt Water Pump
234 Loss of Motor Driven Auxiliary Feed Pump
239 Core Exit Thermocouple Detector Failure
240 Failure of MSIV to Close on SGIS
246 Failure of SDS Bus 11 to Unblock
252 Failure of No. 12 Steam Generator Protection Level Transmitters

ATTACHMENT (2)

CALVERT CLIFFS UNIT ONE -- REFERENCE PLANT SIMULATOR
DUAL UNIT SIMULATOR

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YEAR TWO TEST PLAN

## I. PROCEDURES

Hot Standby to 10% Power
Turbine Startup and Generator Synchronization
10% to 100% Power

## II. MALFUNCTIONS

003 Wide Range Nuclear Instrumentation Channel Pre-amp Output Fails Low
008 Power Range Safety or Control Channel Detector Output Fails Low
011 Power Range Safety or Control Channel Output From Power Summer Fails Low
017 Failure of RPS Logic Matrix Relay AB-1
020 RPS Logic Matrix Power Supply Failure
028 CEAs Fail to Move on Demand (Manual)
029 Control Pulses Sent But CEA Doesn't Move. CEA is Trippable
030 Stuck CEA. Will Not Trip
037 Inadvertent Opening of Individual Reactor Trip Breakers
049 Failure of RCP Second Stage Seal
050 Failure of RCP Third Stage Seal
070 Loss of Flow From Charging Pump
077 Volume Control Tank Level Transmitter LT-227 Fails Hi/Lo
091 Steam Generator Tube Leakage
096 Steam Generator Level Transmitter For Protection Channels Fails Hi/Lo
102 Inadvertent Slow Closure of MSIV
105 Steam Line Rupture Outside Containment
107 Feed Flow Element F1111A/1121A Failure
115 Failure of Automatic Turbine Trips. Manual Trip Will Function
131 Variable High Vibration on Main Turbine
135 Moisture Separator Relief Valve Fails Open
152 Failure of Steam Generator Blowdown to Isolate on RMS Alarm
153 Loss of 4 KV Bus
154 Loss of 480 V Bus
155 Loss of 480 V Reactor Motor Control Center
163 Loss of Condenser Vacuum
164 Hotwell Level Control Problems
166 Loss of Condensate Pump
167 Loss of Condensate Booster Pump
170 Steam Generator Feed Pump Trip
174 Feedwater Regulating Valve Differential Pressure Transmitter Fails Hi/Low
180 Loss of Heater Drain Pump
183 Loss of Auxiliary Feedwater Pump
189 Failure of LPSI Pump
190 Failure of Containment Spray Pump

| | |
|---|---|
| 215 | Service Water Leak in the Turbine Building |
| 241 | Failure of Automatic CIS Actuation |
| 244 | Spurious SGIS Actuation |
| 247 | Failure of SDS Bus 14 to Unblock |

## ATTACHMENT (2)

## CALVERT CLIFFS UNIT ONE -- REFERENCE PLANT SIMULATOR
## DUAL UNIT SIMULATOR

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## YEAR THREE TEST PLAN

### I. PROCEDURES

100% Power to Cold Shutdown

### II. MALFUNCTIONS

005 Wide Range Nuclear Instrumentation Failure
010 Power Range Safety or Control Channel Output From Power Summer Fails High
018 Failure of Automatic Reactor Trip
021 Failure of CEA Withdrawal Interlocks to Block Outward CEA Motion
023 Uncontrolled Withdrawal of Individual CEA or Group of CEAs
025 Uncontrolled Withdrawal of a Single CEA
026 Uncontrolled Insertion of a Single CEA
032 Dropped CEA
038 Loop 12B Double-ended Rupture of RCS Cold Leg
042 Failure of Reactor Vessel Level Detector
043 RCP Trip
047 Failure of RCP Lift Pump to Reach Operating Pressure When Running
052 Switchyard Breaker Fails to Trip
054 Pressurizer Spray Valve 100E Fails Open
062 Pressurizer Pressure Control Fails Hi/Lo
064 Low Range Pressurizer Pressure Transmitters Fail Hi/Lo
065 Pressurizer Level Control Fails Hi/Lo
074 Tube Rupture in Non-Regenerative Heat Exchanger
075 Loss of Component Cooling to the Non-Regenerative Heat Exchanger
078 Failure of the Boronometer
079 Inadvertent Boration
098 Steam Generator Pressure Transmitters Fail Hi/Lo
104 Steam Line Rupture Inside Containment
106 Steam Flow Input to Digital Feedwater Control System Failure
113 Main Steam Safety Valve's Fail Open
114 Turbine Trip
116 Turbine Control Valve Fails Open
150 Loss of 13 KV Service Transformer
151 Loss of 13 KV Bus
156 Loss of a Turbine Motor Control Center
162 Loss of 125 Vital DC Bus
165 Gross Condenser Tube Leakage
172 Feedwater Regulating Valve Mechanical Failure
177 Feed Line Rupture Outside of the Containment
185 Auxiliary Feedwater Pipe Rupture
188 Failure of HPSI Pump
204 Failure of the Diverse Scram System (DDS) to open
217 Salt Water System Leak

| | |
|---|---|
| 219 | High Radiation Alarms on Process Radiation Monitors |
| 221 | Intake Structure Traveling Screens Obstructed |
| 226 | Loss of Service Water to Turbine Building |
| 242 | Failure of Manual CIS Actuation |
| 248 | Failure of LOCIS Bus 11 to Unblock |
| 250 | Steam Generator Wide Range Level Transmitters Fail |

ATTACHMENT (2)

CALVERT CLIFFS UNIT ONE -- REFERENCE PLANT SIMULATOR
DUAL UNIT SIMULATOR

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YEAR FOUR TEST PLAN

## I. PROCEDURES

100% Power Reactor Trip and Recovery to 100% Power

## II. MALFUNCTIONS

004 Wide Range Nuclear Instrumentation Channel Startup Rate Degradation
024 Uncontrolled Insertion of Individual CEA or Group of CEAs
031 Stuck CEA. Will Trip
034 Rupture of Control Element Drive Mechanism Housing (CEA #1)
039 RCS Leak into Containment
045 Locked Rotor on RCP 11B
060 PORV Minor Leakage
061 Pressurizer Safety Valve Leakage
066 Major Leakage of PORVs (Previously Malfunction 59)
068 Leak in Letdown Line Inside Containment (Between Check Valve & 1-TE-221)
069 Leak in Letdown Line in Penetration Room
086 Leakage Through Letdown Line Relief Valves
087 Charging Pump Primary Packing Leak
092 Steam Generator Gross Tube Failure
097 Digital Feedwater Control System Central Processing Unit Failure
100 Steam Generator Differential Pressure Transmitter Fails Hi/Lo
138 Load Rejection
149 Loss of Off-site Power
158 Loss of Non-Vital 120/208 VAC Instrument Bus
159 Loss of 120 VAC Vital Instrument Bus
173 Erratic Operation of Feedwater Regulating Valve
175 Feedwater Line Rupture Inside the Containment; Before Check Valve
176 Feedwater Line Rupture Inside the Containment; After Check Valve
181 Feedwater Flow Transmitter Input to Control Channel Fails
187 LPSI Pump Suction Break
196 Failure of Safety Injection Actuation Signal (SIAS) to Actuate on Automatic Demand
197 Failure of SIAS Manual Initiation
199 Failure of Containment Spray Actuation Signal (CSAS) to Actuate on Automatic Demand
200 Failure of CSAS Manual Initiation
205 Spurious CIS
213 Failed Fuel Equivalent to 1 Fuel Pin
216 Accidental Release of Gaseous Waste
227 Loss of Instrument Air
228 Loss of Instrument Air in Containment
231 Component Cooling Water Leak in Containment
233 Loss of Component Cooling Water to Containment
238 Core Exit Thermocouple Meter Failure
243 Failure of Automatic SGIS Actuation

| | |
|---|---|
| 245 | Containment Radiation Monitor Failure |
| 249 | Failure of LOCIS Bus 14 to Unblock |
| 251 | Failure of No. 12 Steam Generator Pressure Transmitters |
| 253 | Blockage of Salt Water Components |

**RICHARD L. BEST**
Instructor

| | |
|---|---|
| **EDUCATION** | US Navy Nuclear Power School |
| **LICENSE AND CERTIFICATIONS** | NRC Reactor Operator License, Salem 1 and 2<br>Senior Reactor Operators Certification, Salem 1 and 2 |
| **WORK EXPERIENCE 1993-PRESENT** | **NPS Technical Services**<br>Mr. Best is assigned to the Procedures Upgrade Project, revising Abnormal Operating Procedures by verifying them against the latest revisions of plant drawings and reference materials. |
| **1992-1993** | **General Physics Corporation**<br>Mr. Best was assigned to the Operations Training Unit at Calvert Cliffs, working for the Simulator Support Group. He conducted ANSI 3.5 testing to maintain simulator certification, verified Simulator Modification Requests and tested software modifications prior to inclusion into training loads. |
| **1980 - 1992** | **Public Service Electric & Gas, Salem 1 and 2**<br>As the Salem Simulator Configuration Engineer, Mr. Best's responsibilities included tracking of Design Changes for applicability on the simulator and design of the work package to implement and test the changes. During this period the Salem Simulator gained NRC Certification under his supervision. Mr. Best maintained his SRO and Instructor Certification by teaching a minimum of five sessions per quarter.<br><br>As the Lead Simulator Instructor, Mr. Best was responsible for the development of the initial training materials used on the simulator for New Licensed and Requalification Training. During this period he assisted in the development of Salem Emergency Operating Procedures and their subsequent verification and validation in accordance with Westinghouse Emergency Response Guidelines. He also developed the operations portions of the plant Emergency Response drills. |

**DOUGLAS R. TILTON**

**EDUCATION** B.S., Nuclear Engineering Technology, Thomas Edison State College

**LICENSES AND CERTIFICATIONS** Licensed Senior Reactor Operator, Seabrook Station
Licensed Reactor Operator, Salem Nuclear Generating Station
Certified Classroom and Simulator Instructor, Calvert Cliffs

**EXPERIENCE**

**5/89 - Present** General Physics Corporation

Mr. Tilton was assigned to the Calvert Cliffs Nuclear Power Plant supporting the Initial Operator Training Unit. He conducts classroom and simulator training in all areas including theory, plant systems, integrated operations and transients. He also served as the simulator operator during numerous NRC License examinations.

As a member of the License Operator Requalification Training Unit, he conducted both classroom and simulator training. He served as a utility representative for three NRC Requal Exams and was also responsible for validation of NRC requalification exam and Emergency Plan simulator scenarios. He is also responsible for writing and reviewing simulator issue reports and malfunction testing.

**6/85 - 5/89** New Hampshire Yankee, Seabrook Station

As a Senior Simulator Instructor, Mr. Tilton provided simulator training for licensed and non-licensed operators. He was also responsible for modification and malfunction testing of the simulator. After a core model upgrade he validated the new model and tested core response prior to releasing the model for training. Mr. Tilton developed the simulator instructor station operating procedures. He acted as Technical Assistant to the Emergency Operations Manager during Emergency Plan activation.

**10/81 - 6/85** Public Service Electric and Gas Company, Salem Nuclear Generating Station

As a Nuclear Control Operator, Mr. Tilton was licensed on both Units. He was responsible for 10 equipment and utility operators. He participated in normal plant operations, surveillance testing and several refueling outages. Mr. Tilton was part of a team that validated the response of the Salem simulator after initial delivery.

**RICHARD L. BEST**
Instructor

**EDUCATION**

US Navy Nuclear Power School

**LICENSE AND CERTIFICATIONS**

NRC Reactor Operator License, Salem 1 and 2
Senior Reactor Operators Certification, Salem 1 and 2

**WORK EXPERIENCE**

**1993-PRESENT**

**NPS Technical Services**
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**1992-1993**

**General Physics Corporation**
Mr. Best was assigned to the Operations Training Unit at Calvert Cliffs, working for the Simulator Support Group. He conducted ANSI 3.5 testing to maintain simulator certification, verified Simulator Modification Requests and tested software modifications prior to inclusion into training loads.

**1980 - 1992**

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**RICHARD L. BEST**

As Training Supervisor, Mr. Best acted as the Plant/Trainer liaison to the vendor during the last nine months of the simulator construction at the factory. In this capacity he oversaw the merge of the simulation models and Integrated Operations testing, and conducted the on site Acceptance Test once the simulator was delivered to the training center.

As Training Specialist, Mr. Best developed the Theory and Instrument & Controls portion of the New Licensed Operator training program. He taught both Licensed and Non-Licensed operator courses. He also received his NRC Reactor Operator License during this period.

**1973-1980**

U.S. Navy

While stationed at the Nuclear Power Training Unit, Windsor, Ct., Mr. Best held the position of Crew Training Coordinator and was a member of the Staff Training Group. He qualified as Reactor Operator, Engineering Watch Supervisor, and Engineering Officer of the Watch.

Mr. Best was stationed on board the USS George Bancroft, and qualified as Reactor Operator and Engineering Watch Supervisor.

(6/93)

**DOUGLAS R. TILTON**

**EDUCATION** B.S., Nuclear Engineering Technology, Thomas Edison State College

**LICENSES AND CERTIFICATIONS**
Licensed Senior Reactor Operator, Seabrook Station
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Certified Classroom and Simulator Instructor, Calvert Cliffs

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**6/85 - 5/89** New Hampshire Yankee, Seabrook Station

As a Senior Simulator Instructor, Mr. Tilton provided simulator training for licensed and non-licensed operators. He was also responsible for modification and malfunction testing of the simulator. After a core model upgrade he validated the new model and tested core response prior to releasing the model for training. Mr. Tilton developed the simulator instructor station operating procedures. He acted as Technical Assistant to the Emergency Operations Manager during Emergency Plan activation.

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