

PROCEDURE COVER SHEET

PENNSYLVANIA POWER & LIGHT CO. SUSQUEHANNA STEAM ELECTRIC STATION	
18 MONTH DIESEL GENERATORS B AND D (or E) AUTO START AND ESS BUSES 2B AND 2D ENERGIZATION ON LOSS OF OFFSITE POWER WITH A LOCA - PLANT SHUTDOWN	SE-224-207 Revision 2 Page 1 of 83
EFFECTIVE DATE <u>10/16/89</u>	
PERIODIC REVIEW FREQUENCY AND EXPIRATION DATE (check one): <input checked="" type="checkbox"/> Procedure exempt from periodic review. Procedure will not expire. <input type="checkbox"/> Periodic Review Frequency is: <u>NA</u> Expiration Date: <u>NA</u> Revised Expiration Dates: _____	
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TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 PURPOSE/SCOPE	4
2.0 REFERENCES	5
3.0 SPECIAL TOOLS/EQUIPMENT	9
4.0 PRECAUTIONS	10
5.0 PREREQUISITES AND LIMITATIONS	11
6.0 PROCEDURE	16
6.1 Electrical Maintenance Setup to Perform Test	16
6.2 Pre-test Plant Equipment Lineup	18
6.3 Station Personnel to Support Test	28
6.4 Division 2 LOCA/LOOP Initiation	29
6.5 Division 2 LOCA/LOOP Reset	44
6.6 Diesel Generators B and D (or E if substituted for B or D) Demonstration that Auto Connected Loads do not exceed 4700 KW	49
6.7 Diesel Generator B (or E) Synchronization with Offsite Power and Transfer of Emergency Loads to Offsite Power Source	51
6.8 Diesel Generator D (or E) Synchronization with Offsite Power and Transfer of Emergency Loads to Offsite Power Source	52
6.9 Restoration of Systems	53
6.10 Electrical Maintenance Removal of Test Equipment	64
6.11 Shift Supervision Notification of Test Completion	66
7.0 RECORDS	66

ATTACHMENTS

<u>ATTACHMENT</u>	<u>PAGE</u>
A Data Form SE-224-207-1	67
B Division 2 Permanently Connected Loads	73
C Division 2 Auto Connected and Load Shed Loads	76
D Division 2 Logic Functional Checks	77
E ESS Bus 2B Deenergization and Load Shedding Table	78
F ESS Bus 2D Deenergization and Load Shedding Table	79
G ESS Bus 2B Load Substitution Table	80
H ESS Bus 2D Load Substitution Table	81
I Sample Visicorder Analysis	82

1.0 PURPOSE/SCOPE

- 1.1 To demonstrate at least once per 18 months during shutdown of Unit 2
 - 1.1.1 That on a simulated loss of offsite power and ECCS actuation signal, ESS Buses 2B and 2D deenergize and shed loads. (Acceptance Criteria #13)
 - 1.1.2 That deenergization of ESS buses 2B and 2D initiates load shedding. (Acceptance Criteria #15)
 - 1.1.3 That on a simulated loss of offsite power concurrent with a Unit 2 Division 2 ECCS actuation test signal, Diesel Generators B and D (or E if substituted for B or D) auto-start, energize Unit 2 ESS Buses 2B and 2D with permanently connected loads within 10 seconds, energize the auto-connected loads through the load timers, and operate for greater than or equal to 5 minutes loaded with the emergency loads. Voltage and frequency are maintained at 4160 ± 400 volts and 60 ± 3.0 hz during the test. (Acceptance Criteria #9)
 - 1.1.4 That the non-emergency trip circuit does not trip the engine while running in the emergency mode. (Acceptance Criteria #8)
 - 1.1.5 That the auto-connected Unit 2 loads to Diesel Generators B and D do not exceed 3700 kw. This limit is combined with the shutdown load limits of 1000 kw from SE-124-B02 and SE-124-D02 to verify the total auto connected loads to diesel generators B and D do not exceed 4700 kw. (Acceptance Criteria #14)
 - 1.1.6 The capability of Diesel Generators B and D (or E if substituted for B or D) to synchronize with offsite power while loaded with the emergency loads, transfer the loads to the offsite power source, and be restored to standby status upon a simulated restoration of offsite power. (Acceptance Criteria #10)
 - 1.1.7 That the diesel generator loading sequence timers associated with ESS Buses 2B and 2D are operable with setpoints within $\pm 10\%$ (+20, -10% for RHR Timers) of their design setpoints. (Acceptance Criteria #11)
- 1.2 To perform a portion of the Unit 2 Division 2 Core Spray logic system functional test by demonstrating that Diesel Generator B (or E) starts upon Division 2 Core Spray initiation. (Acceptance Criteria #1)

- 1.3 To perform a portion of the Unit 2 Division 2 RHR logic system functional test by demonstrating that Diesel Generator D (or E) starts upon Division 2 RHR initiation. (Acceptance Criteria #2)
- 1.4 To perform a portion of the ESS Bus 2B and 2D Loss of Power logic system functional test by demonstrating load shedding upon bus deenergization. (Acceptance Criteria #3)
- 1.5 To perform a portion of the Unit 2 Division 2 Core Spray ECCS response time test by timing from Division 2 Core Spray initiation to Diesel Generator B - Bus 2B breaker closure. (Acceptance Criteria #5)
- 1.6 To perform a portion of the Unit 2 Division 2 RHR ECCS response time test by timing from Division 2 RHR initiation to Diesel Generator D - Bus 2D breaker closure. (Acceptance Criteria #6)
- 1.7 To perform a portion of the Unit 1 and Unit 2 Division 2 ESW logic system functional test by demonstrating that relay K11B energizes on a Division 2 Core Spray initiation. (Acceptance Criteria #12)
- 1.8 To perform a portion of the logic functional test for the Unit 2 4KV degraded grid circuit by testing that relays K11BX4 and K11BX6 operate on a Division 2 Core Spray initiation. (Acceptance Criteria #4)
- 1.9 To perform a portion of the Unit 2 Division 2 Core Spray system functional test by demonstrating that relays K3B and K4B deenergize on a loss of power to the ESS buses. (Acceptance Criteria #7)

NOTE: Refer to Attachment A for the Technical Specifications satisfied by this surveillance.

2.0 REFERENCES

- 2.1 Unit 2 Technical Specification 3.5.1
- 2.2 Unit 2 Technical Specification 3.5.2
- 2.3 Unit 1 and Unit 2 Technical Specification 3.8.1.1
- 2.4 Unit 1 and Unit 2 Technical Specification 3.8.1.2
- 2.5 Unit 2 Technical Specification 3.9.11.1
- 2.6 Unit 2 Technical Specification 4.3.3.2 functions 1b,1c,1d
- 2.7 Unit 2 Technical Specification 4.3.3.2 functions 2a,2b,2d
- 2.8 Unit 2 Technical Specification 4.3.3.2 function 5

- 2.9 Unit 2 Technical Specification 4.3.3.3 functions 1a,1b,1c
- 2.10 Unit 2 Technical Specification 4.3.3.3 functions 2a,2b,2c1
- 2.11 Unit 1 and 2 Technical Specification 4.7.1.2.b
- 2.12 Unit 2 Technical Specification 4.8.1.1.2.d.4a
- 2.13 Unit 2 Technical Specification 4.8.1.1.2.d.6a,6b
- 2.14 Unit 1 and Unit 2 Technical Specification 4.8.1.1.2.d.6.c
- 2.15 Unit 1 and Unit 2 Technical Specification 4.8.1.1.2.9
- 2.16 Unit 2 Technical Specification 4.8.1.1.2.d.10a,10b,10c
- 2.17 Unit 1 and Unit 2 Technical Specification 4.8.1.1.2.d.12
- 2.18 Unit 2 Technical Specification 4.8.1.1.3.d.6(a)(i)(a)
- 2.19 Unit 2 Technical Specification 4.8.1.1.3.d.6(a)(iii)(a),(b)
- 2.20 Unit 1 and Unit 2 Technical Specification 4.8.1.1.3.d.6(a)(iii)(c)
- 2.21 Unit 2 Technical Specification 4.8.1.1.3.d.6(a)(iv)
- 2.22 FSAR Section 8.3.1.4, Standby Power Supply
- 2.23 FSAR Table 8.3-1, Assignment of ESF and Selected Non-ESF Loads to Diesel Generators and Diesel Ratings
- 2.24 FSAR Table 8.3-1a, Diesel Generator Loading
- 2.25 Regulatory Guide 1.108, Periodic Testing of Diesel Generator Units used as Onsite Electric Power System at Nuclear Power Plants
- 2.26 IEEE Standard 603-1980 (Definitions)
- 2.27 SSES Policy Letter 6-84, Control and Verification of Operating Actions
- 2.28 AD-QA-302-8, RHR Full Flow Test Hours Log
- 2.29 AD-QA-302-9, Core Spray Full Flow Test Hours Log
- 2.30 AD-QA-422, Surveillance Testing Program
- 2.31 MT-GE-024, Setup and Calibration of Model 1858 Visicorder for Diesel Generator Surveillances

- 2.32 SE-200-001, ECCS Response Time Calculation Procedure
- 2.33 E-009 sh 36 480V MCC 2B227
- 2.34 E-009 sh 56 480V MCC 2B126
- 2.35 E-009 sh 67 480V MCC 2B226
- 2.36 E-009 sh 71 480V MCC 2B246
- 2.37 E-023 sh 04 4KV System Meter and Relay Diagram
- 2.38 E-023 sh 06 4KV System DG Meter and Relay Diagram
- 2.39 E-026 sh 01 125V and 250V DC Systems
- 2.40 E-102 sh 32 Plant Aux Load Shedding
- 2.41 E-103 sh 16 4KV Circuit Breaker 2A20201
- 2.42 E-103 sh 17 4KV Emergency Bus 2B
- 2.43 E-103 sh 18 4KV Circuit Breaker 2A20209
- 2.44 E-103 sh 22 4KV Circuit Breaker 2A20401
- 2.45 E-103 sh 23 4KV Emergency Bus 2D
- 2.46 E-103 sh 24 4KV Circuit Breaker 2A20408
- 2.47 E-105 sh 10 DG B 4KV Circuit Breaker Control
- 2.48 E-105 sh 12 DG D 4KV Circuit Breaker Control
- 2.49 E-115 sh 22 Main Turbine LO Vapor Extractor and Mist Elim.
- 2.50 E-146 sh 03 ESW
- 2.51 E-147 sh 07 TBCCW Pump A
- 2.52 E-147 sh 08 RBCCW Pump B
- 2.53 E-147 sh 12 RBCCW Pump A
- 2.54 E-153 sh 105 Isolation Swing Bus MG Sets
- 2.55 E-184 sh 02 Diesel Generator Auto Start Signals
- 2.56 E-184 sh 10 LOCA Isolation Signals

- 2.57 E-192 sh 31 Emergency Switchgear Room Coolers
- 2.58 E-192 sh 47 Equipment Room HVAC Fans
- 2.59 E-213 sh 13 Turbine Building Chiller B
- 2.60 E-214 sh 9B Control Structure Chiller
- 2.61 E-216 sh 13 Reactor Building Chiller B
- 2.62 E-216 sh 25 Emergency Switchgear Room Cooler, Compressor
- 2.63 E-216 sh 26 Emergency Switchgear Room Cooling Comp. Valves
- 2.64 E-221 sh 02 HPCI Room Coolers
- 2.65 E-224 sh 04 Drywell Cooling Fans
- 2.66 E-258 sh 14 Containment Instrument Gas
- 2.67 FF105801 sh 2401 Diesel Generator Controls (A-D)
- 2.68 FF105801 sh 2402 Diesel Generator Controls (A-D)
- 2.69 FF61604 sh 28 Diesel Generator Controls (E)
- 2.70 FF61604 sh 29 Diesel Generator Controls (E)
- 2.71 M1-E11-29(4) RHR System
- 2.72 M1-E11-29(6) RHR System
- 2.73 M1-E21-20(3) Core Spray System
- 2.74 M1-E21-20(4) Core Spray System
- 2.75 ON-004-001 4KV Bus Transfer, Load Shed and Sequencing
- 2.76 ON-259-002 Containment Isolation
- 2.77 OP-024-001 Diesel Generators
- 2.78 OP-030-001 Control Structure Chilled Water System
- 2.79 OP-030-002 Control Structure HVAC
- 2.80 OP-054-001 ESW
- 2.81 OP-070-001 Standby Gas Treatment System

- 2.82 OP-214-001 RBCCW
- 2.83 OP-215-001 TBCCW
- 2.84 OP-216-001 RHR Service Water
- 2.85 OP-217-001 120V Instrument AC Distribution System
- 2.86 OP-225-001 Containment Instrument Gas System
- 2.87 OP-234-001 Reactor Building Chilled Water System
- 2.88 OP-234-002 Reactor Building HVAC Zone 2 & 3
- 2.89 OP-249-001 RHR System
- 2.90 OP-249-002 RHR Shutdown Cooling
- 2.91 OP-251-001 Core Spray System
- 2.92 OP-255-001 CRD Hydraulic System
- 2.93 OP-258-001 RPS Distribution System
- 2.94 OP-260-001 Drywell Ventilation System
- 2.95 OP-275-001 24V DC System
- 2.96 OP-288-001 250V DC System

3.0 SPECIAL TOOLS/EQUIPMENT

NOTE: RECORD M&TE identification and calibration information on Data Form SE-224-207-1 as applicable.

- 3.1 Model 1858 Visicorder - Diesel B (E)
- 3.2 Model 1858 Visicorder - Diesel D (E)
- 3.3 Stopwatch - 2C681 (2)
- 3.4 Stopwatch - 0C653 (CS)
- 3.5 Stopwatch - 0C653 (RHR)
- 3.6 Diesel Surveillance Boards (2 req'd)
- 3.7 Indicating Lights (05 req'd)

- 3.8 ECCS Test Switch
- 3.9 Eight (8) Alligator Clip jumpers
- 3.10 Ohmmeters (3 required)

4.0 PRECAUTIONS

4.1 The following test mode shutdown signals are bypassed during this test because the diesel generator is operating in the emergency mode:

- Turbocharger lube oil low pressure
- Main and connecting rod bearing high temperature
- Engine vibration
- Turbocharger thrust bearing failure
- High jacket water temperature
- Generator reverse power
- Generator high bearing temperature
- Generator loss of field
- Generator overexcitation
- Generator underfrequency
- Generator overvoltage
- Incomplete Sequence
- Turbocharger Overspeed (E D/G only)

If any of the shutdown signals above are received, the associated alarm will sound, but the engine will continue to run. Monitor the abnormal condition in accordance with the applicable alarm response procedure and initiate shutdown of the diesel generator if deemed necessary.

- 4.2 Ensure circulation pumps and heaters have been running long enough for the engine to be up to keep-warm temperature of 120 +10/-20°F before starting.
- 4.3 Refer to ON-004-001 for effects of deenergization of 4KV Busses 2B and 2D.

- 4.4 Test switches to be operated in this procedure are energized even when open. Care should be taken not to contact metal portion of switches.
- 4.5 Minimize the time during which CRD pump 2P132B is removed from service to minimize crud accumulation in the CRDM's and depleting HCU accumulator pressure. CRD Pump 2P132A should be running throughout the test.
- 4.6 Reactor Water Cleanup System may be in service, but will isolate during this test.
- 4.7 Both Containment Instrument Gas compressors will trip during this test. The compressors can be restarted after the Core Spray Initiation is reset.
- 4.8 Visicorder data may be used to verify load sequencing timers if the load start is clearly visible and other means of timing have failed.
- 4.9 Manual initiation of Core Spray Loop B disables Unit 1 Core Spray Loop B LOCA start (Step 6.4.16.a). Refer to Tech Specs 3.5.1 and 3.5.2.
- 4.10 Steps 6.4.3 and 6.4.5 prevent Diesel Generators B and D from auto starting on loss of power to ESS buses 2B and 2D. The B and D (or E) Diesel Generators are inoperable until steps 6.5.5 and 6.5.6 are performed.
- 4.11 All circuit breaker racking will be performed in accordance with OI-AD-036.
- 4.12 Attachment I can be used as an aid for using visicorder traces in measuring the performance of the diesel generators and load sequence timers.

5.0 PREREQUISITES AND LIMITATIONS

NOTE (1): The following prerequisites apply for testing B and D diesel generators or the E diesel generator if substituted for B or D. Perform required actions for the two diesels to be tested. Portions of steps applicable to the E diesel generator are indicated in parenthesis.

DIESEL GENERATORS FOR THIS TEST
(Circle One)

B and D
B and E
E and D

NOTE (2): Test equipment setup per section 6.1 may be performed prior to the completion of the prerequisites without affecting the operability of any equipment.

PROCEDURE COVER SHEET

PENNSYLVANIA POWER & LIGHT CO. SUSQUEHANNA STEAM ELECTRIC STATION		SE-249-001 Revision 3 Page 1 of 148
18 MONTH RHR SYSTEM AND LOGIC FUNCTIONAL TEST (DIV 1)		
EFFECTIVE DATE <u>3/04/91</u>		
PERIODIC REVIEW FREQUENCY AND EXPIRATION DATE (check one): <input checked="" type="checkbox"/> Procedure exempt from periodic review. Procedure will not expire. <input checked="" type="checkbox"/> Periodic Review Frequency is: <u>N/A</u> Expiration Date: _____ Revised Expiration Dates: _____		
PROCEDURE TYPE (check one): <input checked="" type="checkbox"/> PORC <input type="checkbox"/> NON-PORC REVIEW TYPE (check one): <input type="checkbox"/> Expedited Review. PORC Review not required. <input checked="" type="checkbox"/> Alternate Review. PORC Review not required. <input type="checkbox"/> PORC Review. PORC Meeting No. _____		
Prepared by <u>Stephen D. Sadovany</u>	Date <u>2/4/91</u>	
Reviewed by <u>Arthia Smith</u> Responsible Supervisor	Date <u>2/25/91</u>	
Recommended <u>George J. Kumpinski</u> Section Head/Manager	Date <u>2-27-91</u>	
Approved by <u>[Signature]</u>	Date <u>2/28/91</u>	

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 PURPOSE/SCOPE	4
2.0 REFERENCES	4
3.0 SPECIAL TOOLS/EQUIPMENT	7
4.0 PRECAUTIONS/NOTES	8
5.0 PREREQUISITES AND LIMITATIONS	8
6.0 PROCEDURE	12
6.1 PLACE LPCI IN TEST	12
6.2 LPCI INITIATION ALIGNMENT	19
6.3 MANUAL LPCI INITIATION	21
6.4 LPCI INITIATION AUTOMATIC ACTUATIONS	23
6.5 LPCI INITIATION INTERLOCK CHECKS	24
6.6 LPCI INITIATION RELAY CHECKS	27
6.7 CONTAINMENT SPRAY AND HX BYPASS VALVE PERMISSIVE CHECKS	28
6.8 MANUAL INITIATION RESET	31
6.9 AUTOMATIC INITIATION TESTS	34
6.10 REACTOR VESSEL LOW PRESSURE PERMISSIVE FOR THE INJECTION VALVES TEST	48
6.11 PREPARE FOR RESPONSE TIME TESTING	64
6.12 RESPONSE TIME TESTING	67
6.13 RHR PUMP 2P202A AND RHR PUMP 2P202C CONTROL LOGIC TEST	75
6.14 RESTORATION OF RHR PUMP 2P202A AND C BREAKERS	100
6.15 REACTOR RECIRCULATION VALVE PERMISSIVE TEST	103

TABLE OF CONTENTS (Cont'd)

<u>SECTION</u>	<u>PAGE</u>
6.16 RESTORATION	121
6.17 LOGIC POWER AVAILABLE ANNUNCIATOR TEST	124
6.18 SHUTDOWN COOLING VALVE INTERLOCK TEST	125
7.0 RECORDS	139

ATTACHMENTS

<u>ATTACHMENT</u>	<u>PAGE</u>
A ACCEPTANCE CRITERIA	140
B INTERNAL CONNECTION DIAGRAM FOR HFA RELAYS	144
C INTERNAL CONNECTION DIAGRAM FOR HMA RELAYS	145
D TEST SYNOPSIS	146
E 2C617 & 2C618 REAR VIEW LAYOUT SKETCHES	148

1.0 PURPOSE/SCOPE

- 1.1 To perform a system and logic system functional check of the RHR Division I including a simulated automatic actuation throughout the emergency operating sequence and verifying each valve in the flowpath actuates to its correct position at least once per 18 months.
- 1.2 To perform a Division I LPCI mode system response time test verifying that the LPCI System will respond on an actuation signal and develop rated conditions within specified limits at least once per 18 months. Conformance with 40 second requirement is verified in SE-200-001, 18 Month ECCS Response Time Calculation.
- 1.3 This test will not initiate the Diesel Generators. This test will check the related logic of the Reactor Recirculation System and trip the Reactor and Turbine Building Chilled Water Compressors.
- 1.4 This test will provide sufficient testing overlap with those systems which receive initiation or trip signals from the Division I RHR logic.

2.0 REFERENCES

- 2.1 Technical Specification 4.3.3.1, Table 4.3.3.1 - 1.2.d
- 2.2 Technical Specification 4.3.2.2, Table 4.3.2.1 - 1.1.a(3)
- 2.3 Technical Specification 4.3.3.2, Table 4.3.3.1 - 1.2.a
- 2.4 Technical Specification 4.3.3.2, Table 4.3.3.1 - 1.2.b
- 2.5 Technical Specification 4.3.3.2, Table 4.3.3.1 - 1.2.c.1
- 2.6 Technical Specification 4.3.3.2, Table 4.3.3.1 - 1.2.c.2
- 2.7 Technical Specification 4.3.3.2, Table 4.3.3.1 - 1.2.d
- 2.8 Technical Specification 4.3.3.3, Table 3.3.3 - 3.2.a
- 2.9 Technical Specification 4.3.3.3, Table 3.3.3. - 3.2.b
- 2.10 Technical Specification 4.3.3.3, Table 3.3.3. - 3.2.c.1
- 2.11 Technical Specification 4.3.3.3, Table 3.3.3. - 3.2.c.2
- 2.12 Technical Specification Section 4.5.1.c.1
- 2.13 Technical Specification Section 4.5.1.e.2
- 2.14 Technical Specification Section 4.7.1.2.b

- 2.15 Technical Specification Section 3.3.2
- 2.16 Technical Specification 3.3.3
- 2.17 Technical Specification 3.5.1
- 2.18 Technical Specification 3.5.2
- 2.19 Technical Specification 3.7.1.2
- 2.20 Technical Specification 3.8.4.2.1
- 2.21 Technical Specification 3.9.11.1
- 2.22 Technical Specification 3.9.11.2
- 2.23 FSAR Section 6.3.1.1.2.14
- 2.24 FSAR Section 6.3.1.2.3
- 2.25 FSAR Section 6.3.2.2.4
- 2.26 P&ID M-2151 Sheets 1,2,3 and 4
- 2.27 Electrical Schematic E-103 Sheet 14
- 2.28 Electrical Schematic E-146 Sheets 5 and 7
- 2.29 Electrical Schematic E-151 Sheets 25 and 29
- 2.30 Electrical Schematic E-153 Sheets 46, 50, 58, 100 and 110
- 2.31 Electrical Schematic E-184 Sheet 2
- 2.32 Electrical Schematic E-185 Sheet 16
- 2.33 Electrical Schematic E-213 Sheets 12, 21
- 2.34 Electrical Schematic E-216 Sheets 12 and 20
- 2.35 Electrical Schematic E-331 Sheet 4
- 2.36 GE - Elementary M1-E11-66 Series (FF 124510) Unit 1 RHR
- 2.37 GE - Elementary M1-E21-20 Series (FF 126510) Unit 2 Core Spray
- 2.38 GE - Elementary M1-E11-29 Series (FF 124510) Unit 2 RHR
- 2.39 GE - Elementary M1-E41-59 Series (FF 127260) Unit 2 HPCI

- 2.40 GE - Elementary M1-B31-178 Series (FF 116510) Unit 2 Recirc
- 2.41 GE Panel 2C617 Connection Diagrams M1-H12-894(1) thru (6)
- 2.42 GE Panel 2C618 Connection Diagrams M1-H12-355(1) thru (5)
- 2.43 2A20102 Switchgear Schematic E109-16(58) (Foreign File No 103090 Sheet 1658)
- 2.44 2A20302 Switchgear Schematic E109-19(52) (Foreign File No 103090 Sheet 1952)
- 2.45 OP-233-001 Turbine Building Chilled Water System
- 2.46 OP-234-001 Reactor Building Chilled Water System
- 2.47 OP-249-001 Residual Heat Removal System
- 2.48 OP-249-002 RHR Shutdown Cooling Mode
- 2.49 OP-054-001 Emergency Service Water System
- 2.50 OP-264-001 Reactor Recirculation System
- 2.51 AD-QA-422 Surveillance Testing Program
- 2.53 SE-200-001 18 Month ECCS Response Time Calculation
- 2.53 SE-224-107 18 Month Diesel Generator A and C Auto Start on ESS Buses 2A and 2C Energization on Loss of Offsite Power with a LOCA - Plant Shutdown
- 2.54 SE-224-207 18 Month Diesel Generator B and D Auto Start and ESS buses 2B and 2D Energization on Loss of Offsite Power with a LOCA - Plant Shutdown
- 2.55 SE-249-002 18 Month RHR System and Logic Functional Test (Div II)
- 2.56 IEEE Standard 603 - 1980 (Definitions)
- 2.57 SI-280-301 Quarterly Calibration of Reactor Vessel Pressure Channels, PS-B21-2N021A,C,E,G and PIS-B21-2N021B,D
- 2.58 SI-280-413 18 Month Time Response Test of Reactor Vessel Water Level Switches LIS-B21-2N031A&C
- 2.59 SI-280-423 18 Month Time Response Test of Reactor Vessel Water Level Switches LIS-B21-2N031B&D

- 2.60 SI-251-411 18 Month Time Response Test of Drywell Pressure High Switches PS-E11-2N011A&C
- 2.61 SI-251-421 18 Month Time Response Test of Drywell Pressure High Switches PS-E11-2N011B&D
- 2.62 SI-280-411 18 Month Time Response Test of Reactor Vessel Pressure Switches, PS-B21-2N021-A,C,E,G
- 2.63 SI-280-421 18 Month Time Response Test of Reactor Vessel Pressure Switches PS-B21-2N021B&D
- 2.64 SI-280-430 18 Month Time Response Test of Reactor Vessel Pressure Auxiliary Relays E11A-K31A&B, K32A&B, K36A&B and K44A&B
- 2.65 NSSS Surveillance (SE) Format Standard
- 2.66 Policy Letter 89-003 Control and Verification of Operating Actions
- 2.67 AD-QA-302 System Status and Equipment Control
- 2.68 EMERG. CORE CLG. BENCHBOARD 2C601, J-2802 Sheets 4, 5, 6 and 7

3.0 SPECIAL TOOLS/EQUIPMENT

- 3.1 Stop Watch (5)
- 3.2 ECCS test switch (3)
- 3.3 Voltmeter (2)
- 3.4 Jumper with toggle switch (8)
- 3.5 Jumpers (4)
- 3.6 Jumper with indicating light - 120 VAC (2)
- 3.7 Nutdrivers (5/16 and 3/8) for isolation cans

4.0 PRECAUTIONS/NOTES

- 4.1 Do not run any RHR Pump that does not have adequate oil in its motor upper and lower oil reservoirs.
- 4.2 Water from Suppression Pool should not be injected into the Reactor Vessel under test conditions.

- 4.3 The A Reactor Bldg and A Turbine Bldg Chillers will not be available for the duration of this test.
- 4.4 When visually confirming the status of HMA and/or HFA relays the contact fingers are pulled in (making contact) when energized and when de-energized the fingers are pulled away and not making contact.
- 4.5 When installing an ECCS test switch into a jack, the test jacks' relays E11A-K99A/B & E11A-K110A/B will energize and will de-energize when the ECCS test switch is removed.

5.0 PREREQUISITES AND LIMITATIONS

- 5.1 Unit 2 is in Operational Condition 4 or 5.

Confirmed By

- 5.2 When testing the RHR System ensure no maintenance or other testing is being conducted on the Core Spray System, Diesel Generator, or ESW, which would prevent the minimum ECCS requirements from being met.

Confirmed By

- 5.3 The Emergency Service Water System is available to supply cooling water to the RHR System.

Confirmed By

- 5.4 The Reactor Recirculation System is shutdown in accordance with OP-264-001.

Confirmed By

- 5.5 ESTABLISH communication for applicable portions of this surveillance between:

- 5.5.1 The Unit 2 Control Room and Unit 2 Upper and Lower Relay Rooms.

Confirmed By