

PROCEDURE COVER SHEET

PENNSYLVANIA POWER & LIGHT CO. SUSQUEHANNA STEAM ELECTRIC STATION	
18 MONTH DIESEL GENERATORS A AND C (OR E) AUTO START AND ESS BUSES 1A AND 1C ENERGIZATION ON LOSS OF OFFSITE POWER WITH A LOCA - PLANT SHUTDOWN	SE-124-107 Revision 4 Page 1 of 96
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SE-124-107



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## 1.0 PURPOSE/SCOPE

- 1.1 To demonstrate at least once per 18 months during shutdown of Unit 1,
  - 1.1.1 That on a simulated loss of offsite power and ECCS actuation signal, ESS buses 1A and 1C deenergize and shed loads. (Acceptance Criteria #10 and #16)
  - 1.1.2 That on a simulated loss of offsite power concurrent with a Unit 1 Division 1 ECCS actuation test signal, Diesel Generators A and C (or E if substituted for A or C) auto-start, energize Unit 1 ESS buses 1A and 1C 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  $4160 \pm 400$  volts and  $60 \pm 3.0$  hz during the test. (Acceptance Criteria #11 and #17)
  - 1.1.3 That the auto-connected Unit 1 and common loads to Diesel Generators A and C do not exceed 3700 kw. This limit is combined with the shutdown load limits of 1000 kw from SE-224-A02 and SE-224-C02 to verify the total auto connected loads to diesel generators A and C do not exceed 4700 kw. (Acceptance Criteria #12)
  - 1.1.4 The capability of Diesel Generators A and C (or E if substituted for A or C) 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 #13 and #18)
  - 1.1.5 That the diesel generator loading sequence timers associated with ESS buses 1A and 1C are operable with setpoints within  $\pm 10\%$  (+20, -10% for RHR timers) of their design setpoints. (Acceptance Criteria #14)
- 1.2 To demonstrate at least once per 18 months that ESW Pumps A and C automatically start when their associated diesel generators start. (Acceptance Criteria #8)
- 1.3 To perform a portion of the Unit 1 and Unit 2 Division 1 ESW logic system functional test by demonstrating that relays 4XLOCA1 and 4XLOCA2 at OC521A deenergize on an A Diesel Generator automatic start and that relay K11A energizes on a Division 1 Core Spray initiation. (Acceptance Criteria #9 and #16)

- 1.4 To perform a portion of the Unit 1 Division 1 Core Spray logic system functional test by demonstrating that Diesel Generator A (or E) starts upon Division 1 Core Spray initiation. (Acceptance Criteria #1)
- 1.5 To perform a portion of the Unit 1 Division 1 Core Spray system functional test by demonstrating that relays K3A and K4A deenergize on a loss of power to the ESS buses. (Acceptance Criteria #7)
- 1.6 To perform a portion of the logic functional test for the Unit 1 4KV degraded grid circuit by testing that relays K11AX3 and K11AX5 operate on a Division 1 Core Spray initiation. (Acceptance Criteria #3)
- 1.7 To perform a portion of the Unit 1 Division 1 RHR logic system functional test by demonstrating that Diesel Generator C (or E) starts upon Division 1 RHR initiation. (Acceptance Criteria #2)
- 1.8 To perform a portion of the ESS Bus 1A and 1C Loss of Power logic system functional test by demonstrating load shedding upon bus deenergization. (Acceptance Criteria #4)
- 1.9 To perform a portion of the Unit 1 Division 1 Core Spray ECCS response time test by timing from Division 1 Core Spray initiation to Diesel Generator A (or E) to Bus 1A breaker closure. (Acceptance Criteria #5)
- 1.10 To perform a portion of the Unit 1 Division 1 RHR ECCS response time test by timing from Division 1 RHR initiation to Diesel Generator C (or E) to Bus 1C breaker closure. (Acceptance Criteria #6)
- 1.11 Refer to Attachment A for the Technical Specifications satisfied by this surveillance.

## 2.0 REFERENCES

- 2.1 Unit 1 and 2 Technical Specification 3.7.1.2
- 2.2 Unit 2 Technical Specification 3.8.1.1
- 2.3 Unit 1 Technical Specification 3.8.1.2
- 2.4 Unit 1 Technical Specification 4.3.3.2 functions 1a,1b,1d
- 2.5 Unit 1 Technical Specification 4.3.3.2 functions 2a,2b,2d
- 2.6 Unit 1 Technical Specification 4.3.3.2 function 5
- 2.7 Unit 1 Technical Specification 4.3.3.3 functions 1a,1b
- 2.8 Unit 1 Technical Specification 4.3.3.3 functions 2a,2b

- 2.9 Unit 1 Technical Specification 4.5.1.c.1
- 2.10 Unit 1 and 2 Technical Specification 4.7.1.2.b,c
- 2.11 Unit 1 Technical Specification 4.8.1.1.2.d.6.a,b
- 2.12 Unit 1 Technical Specification 4.8.1.1.2.d.9
- 2.13 Unit 1 Technical Specification 4.8.1.1.2.d.10
- 2.14 Unit 1 and Unit 2 Technical Specification 4.8.1.1.2.d.12
- 2.15 Unit 1 and Unit 2 Technical Specification 4.8.1.1.3.d.6.a.iii.a,b
- 2.16 Unit 1 and Unit 2 Technical Specification 4.8.1.1.3.d.6.a.iv
- 2.17 FSAR Section 8.3.1.4, Standby Power Supply
- 2.18 FSAR Table 8.3-1, Assignment of ESF and Selected Non-ESF Loads to Diesel Generators and Diesel Ratings
- 2.19 FSAR Table 8.3-1a, Diesel Generator Loading
- 2.20 Regulatory Guide 1.108, Periodic Testing of Diesel Generator Units used as Onsite Electric Power System at Nuclear Power Plants
- 2.21 IEEE Standard 603-1980 (Definitions)
- 2.22 SSES Policy Letter 6-84, Control and Verification of Operating Actions
- 2.23 AD-QA-302, System Status and Equipment Control
- 2.24 AD-QA-422, Surveillance Testing Program
- 2.25 MT-GE-024, Setup and Calibration of Model 1858 Visicorder for Diesel Generator Surveillances
- 2.26 SE-224-A02, 18 Month Diesel Generator A (or E) Auto Start and ESS Bus 2A Energization on Loss of Offsite Power - Plant Shutdown
- 2.27 SE-224-C02, 18 Month Diesel Generator C (or E) Auto Start and ESS Bus 2C Energization on Loss of Offsite Power - Plant Shutdown
- 2.28 SE-100-001, ECCS Response Time Calculation Procedure
- 2.29 ON-159-002, Containment Isolation
- 2.30 ON-004-001, 4.16 KV Bus Transfer, Load Shedding, and Sequential Loading on Bus Undervoltage

- 2.31 OP-102-001, 125 VDC System
- 2.32 OP-202-001, 125 VDC System
- 2.33 OP-114-001, RBCCW
- 2.34 OP-115-001, TBCCW
- 2.35 OP-116-001, RHR Service Water
- 2.36 OP-117-001, 120V Instrument AC Distribution System
- 2.37 OP-124-001, Diesel Generators
- 2.38 OP-125-001, Containment Instrument Gas System
- 2.39 OP-030-001, Control Structure Chilled Water System
- 2.40 OP-030-002, Control Structure HVAC
- 2.41 OP-133-001, Turbine Building Chilled Water System
- 2.42 OP-134-001, Reactor Building Chilled Water System
- 2.43 OP-134-002, Reactor Building HVAC Zone 1 & 3
- 2.44 OP-138-001, Condensate Demineralizer System
- 2.45 OP-149-001, RHR
- 2.46 OP-149-002, RHR Operation in the Shutdown Cooling Mode
- 2.47 OP-151-001, Core Spray System
- 2.48 OP-153-001, Standby Liquid Control System
- 2.49 OP-054-001, Emergency Service Water
- 2.50 OP-155-001, CRD Hydraulic System
- 2.51 OP-158-001, RPS Distribution System
- 2.52 OP-160-001, Drywell Ventilation System
- 2.53 OP-070-001, Standby Gas Treatment System
- 2.54 OP-175-001, 24V DC System
- 2.55 OP-188-001, 250V DC System



- 2.56 LA-0521-001, Alarm Response DG Panel OC521A
- 2.57 LA-0521-003, Alarm Response DG Panel OC521C
- 2.58 LA-0521-005, Alarm Response DG Panel OC521E
- 2.59 OI-024-002, Diesel Generator Start Log
- 2.60 E-1 (SH 2) Station Single Line Diagram
- 2.61 E-5 (SH 1,15) 4.16 KV Single Line Diagram
- 2.62 E-8 (SH 4) 480V Load Centers
- 2.63 E-9 (SH 1,9,11,19,37,39,40,43,45,54,77,78) 480V MCC
- 2.64 E-11 (SH 1) 250 VDC Control Centers
- 2.65 E-23 (SH 1) 4 KV Bus Meter and Relay Diagram
- 2.66 E-25 (SH 1) Instrument Air
- 2.67 E-26 (SH 1) 125/250 VDC
- 2.68 E-102 (SH 32) 13.8 KV
- 2.69 E-103 (SH 1,2,3,7,8,9) 4 KV Bus Breaker Control and Aux Relays
- 2.70 E-146 (SH 1) ESW
- 2.71 E-147 (SH 1,2,13) TBCCW & RBCCW
- 2.72 E-166 (SH 3) Standby Liquid Control
- 2.73 E-184 (SH 2) Diesel Generator Auto Start Signals
- 2.74 E-192 (SH 7,8) Reactor Building HVAC
- 2.75 E-193 (SH 1) Diesel Generator Building HVAC
- 2.76 E-197 (SH 1,2) CREOASS
- 2.77 E-198 (SH 1) Battery Room HVAC
- 2.78 E-201 (SH 5) SBGTS LOCA Trip & Reset (Dampers)
- 2.79 E-202 (SH 1,2) SBGTS Fans
- 2.80 E-207 (SH 1,2) ESSW Pump House HVAC

- 2.81 E-213 (SH 1) Turbine Building Chilled Water
- 2.82 E-214 (SH 1,4,7,8,9,9A) Control Structure Chilled Water
- 2.83 E-216 (SH 1) Reactor Building Chilled Water
- 2.84 E-220 (SH 1) RCIC Pump Room Cooling Fans
- 2.85 E-222 (SH 1) Core Spray Pump Room Cooling Fans
- 2.86 E-223 (SH 1) RHR Pump Room Cooling Fans
- 2.87 E-224 (SH 1) Drywell Cooling Fans
- 2.88 E-229 (SH 1) Computer Room A/C Cooling Fans
- 2.89 E-242 SH 3,4,5) Control Structure HVAC
- 2.90 E-258 (SH 5,16) Containment Instrument Gas
- 2.91 E-259 (SH 5,8,16) Diesel Generator Auxiliaries
- 2.92 M1-E11-66(4) RHR System
- 2.93 FF 61604 (SH 28,29) E Diesel Generator Controls
- 2.94 FF 105801 (SH 2401,2402) Diesel Generator Controls (A-D)

### 3.0 SPECIAL TOOLS/EQUIPMENT

NOTE: RECORD M&TE identification and calibration information on Data Form SE-124-107-1 as applicable.

- 3.1 Model 1858 Visicorder - Diesel A
- 3.2 Model 1858 Visicorder - Diesel C
- 3.3 Stopwatch - 1C681
- 3.4 Stopwatch - 0C877A-B
- 3.5 Stopwatch - 0C876A-A
- 3.6 Stopwatch - 0C653 (CS)
- 3.7 Stopwatch - 0C653 (RHR)
- 3.8 Diesel Surveillance Boards (2 req'd)

3.9 Indicating Lights (11 req'd)

3.10 ECCS Test Switch

3.11 Jumpers (8 req'd)

3.12 Ohmmeters (4 req'd)

#### 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 Do not smoke near the diesel day tanks.

4.3 Take care near hot exhaust piping including insulated portions.

- 4.4 Do not attempt to restart a diesel generator after an automatic shutdown occurs or if an overheating condition exists, until the problem is identified and corrected.
- 4.5 Ensure circulation pumps and heaters have been running long enough for the engine to be up to keep-warm temperature of  $\geq 100^{\circ}\text{F}$  before starting.
- 4.6 Prior to starting any pumps ensure piping is filled and vented.
- 4.7 Test switches to be operated in this procedure are energized even when open. Care should be taken not to contact metal portion of switches.
- 4.8 Minimize the time during which CRD pump 1P132A is removed from service to minimize crud accumulation in the CRDM's and depleting HCU accumulator pressure. CRD pump 1P132B should be running throughout the test.
- 4.9 Reactor Water Cleanup System may be in service, but will isolate during this test.
- 4.10 RPS Bus 1A should be aligned to the alternate supply for performance of this test. Loss of ESS Bus 1A, if RPS is powered from normal supply, will cause a loss of RPS Bus 1A which will result in a Division 1 isolation and half scram.
- 4.11 Refer to ON-004-001 "4.16 KV Bus Transfer, Load Shedding, and Sequential Loading on Bus Under Voltage" for a list of loads on ESS Bus 1A and 1C.
- 4.12 Visicorder data may be used to verify settings of load sequencing timers in the event of a malfunction during the test. The start of the load must be clearly visible on the visicorder trace.
- 4.13 Manual initiation of Core Spray Loop A disables Unit 2 Core Spray Loop A LOCA start (Step 6.4.17). Refer to Tech Specs 3.5.1 and 3.5.2.
- 4.14 Steps 6.4.3 and 6.4.5 prevent Diesel Generators A and C from auto starting on loss of power to ESS buses 1A and 1C. The A and C Diesel Generators are inoperable until steps 6.5.5 and 6.5.6 are performed. See Unit 2 Tech. Spec. 3.8.1.1.
- 4.15 Attachment I can be used as an aid for using visicorder traces in measuring the performance of the diesel generators and load sequence timers.
- 4.16 If "E" DG is being tested, Operations support will be required to maintain Intake Air temperatures between  $95^{\circ}\text{F}$  -  $110^{\circ}\text{F}$  as described per OP-024-001.