SOUTH CAROLINA ELECTRIC & G. COMPANY

VIRGIL C. SUMMER NUCLEAR STATION

NUCLEAR OPERATIONS

INFORMATION ONLY

FIRE EMERGENCY PROCEDURE

FEP-2.0

TRAIN A PLANT SHUTDOWN TO HOT STANDBY DUE TO FIRE

REVISION 3

DISCIPLINE SUPERVISOR

168 23 DAT

SAFETY RELATED

APPROVAL AUTHORITY

RECORD OF CHANGES

CHANGE	TYPE CHANGE	APPROVAL DATE	CANCELLATION DATE	CHANGE LETTER	TYPE CHANGE	APPROVAL DATE	CANCELLATION DATE
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CONTINUOUS USE

Continuous Use of Procedure Required. Read Each Step Prior to Performing.

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1.0 PURPOSE

This procedure provides instructions for plant shutdown from the Control Room using Train A equipment for fires in areas other than the Control Room, Cable Spreading Rooms and Relay Room.

2.0 INITIAL CONDITIONS

- 2.1 Smoke or fire alarms:
 - a. On the Simplex System and
 - b. By personal observation.
- 2.2 RB smoke or fire alarms on the Simplex Fire Alarm System and verified by an increase in RB temperature or personal observation
- 2.3 This procedure is implemented from FEP-1.0.

CAUTION 3.0

In the event of an emergency not covered by an approved written procedure, operating personnel have the authority to take action to minimize personnel injury or damage to the facility and to protect the public health and safety. Such actions shall be documented by the operating personnel.

NOTE 3.0

- a. If any electrical component will not operate from the specified location, attempts should be made to control it per Attachment VII, VIII, IX, or X.
- b. Due to the potential for electrical shorts due to fire, each component that is operated remotely should be checked periodically to ensure that it is in the desired position.

3.0 OPERATOR ACTIONS

NOTE 3.1 through 3.6

Steps 3.1 through 3.6 are Immediate Actions.

- 3.1 The Shift Supervisor shall perform the following:
 - a. Direct implementation of this procedure.
 - Implement the Emergency Plan, Alert condition per EPP-001, Activation And Implementation of Emergency Plan.
- 3.2 Direct the Control Room Supervisor to implement Attachment I.
- 3.3 Direct the Nuclear Reactor Operator At The Controls to implement Attachment II.
- 3.4 Direct the A Nuclear Reactor Operator to implement Attachment III.
- 3.5 Direct the Intermediate Building Operator to implement Attachment IV.
- 3.6 Direct the Auxiliary Building Operator Upper to implement Attachment V.

NOTE 3.7 through 3.11

Steps 3.7 through 3.11 must be completed within 30 minutes of implementation of this procedure.

3.7 Direct Electrical Maintenance personnel to implement Attachment VI.

NOTE 3.8

- a. Steam Generator B and its associated instrumentation must be relied upon for Train A Shutdown. Steam Generators A and C can be used for cooldown, however, primary reliance should be placed on PCV-2010, B SD/PWR RELIEF, and PI-2010, MS LINE B PRESS.
- Any Steamline Power Relief Valve which fails to operate from the Main Control Board may be operated locally.
- 3.8 Maintain Steam Generator pressure between 1000 psig and 1100 psig by throttling the following:
 - PCV-2000, A SD/PWR RELIEF, from the Main Control Board or IB-436 West Pen.
 - PCV-2010, B SD/PWR RELIEF, from the Main Control Board or IB-436 East Pen.
 - c. PCV-2020, C SD/PWR RELIEF, from the Main Control Board or IB-436 East Pen.

NOTE 3.9

If natural circulation is not indicated, increased dumping of steam should restore natural circulation.

- 3.9 Verify natural circulation as follows:
 - a. RCS subcooling is greater than 30° F as determined by the following:
 - 1) PI-403, RCS WR PRESS.
 - 2) TI-423, LOOP B TH.
 - 3) Steam Tables.

- Steam Generator pressure is stable or decreasing as indicated on the following:
 - 1) PI-484, NR PRESS (SG B).
 - 2) PI-2010, LINE B PSIG.
- Reactor Coolant System TH is stable or decreasing as indicated on TI-423, LOOP B TH.
- d. Reactor Coolant System TC is at saturation temperature for Steam Generator pressure as determined by the following:
 - 1) TI-420, LOOP B TC.
 - 2) PI-2010, LINE B PSIG.

NOTE 3.10

Primary reliance should be placed on FCV-3541, MD EFP TO SG B, and LI-484, SG B NR LEVEL.

- 3.10 Maintain Steam Generator level between 55% and 65% Narrow Range by throttling the following valves:
 - FCV-3531, MD EFP TO SG A.
 - b. FCV-3541, MD EFP TO SG B.
 - c. FCV-3551, MD EFP TO SG C.
- 3.11 Verify Reactor Coolant System pressure is greater than 200 psig on PI-403, WR PRESS, and place both RHR pumps in PULL TO LK NON-A.

NOTE 3.12 through 3.15

Steps 3.12 through 3.15 must be completed within 90 minutes of implementation of this procedure.

- 3.12 Ensure Component Cooling Water Pump operation as follows:
 - Verify XPP-0001A, PUMP A, or XPP-0001C, PUMP C TRAIN A is running.

- Verify Component Cooling Pump A (C) discharge pressure is between 60 psig and 70 psig (IB-412).
- 3.13 Ensure proper Seal Injection operation as follows:
 - a. Verify XPP-0043A, PUMP A, or XPP-0043C, PUMP C TRAIN A, is running.
 - b. Close MVT-8112, SEAL WTR RTN ISOL.
 - Verify AB upper has reported Seal Injection is lined up.
- 3.14 Maintain Pressurizer level between 25% and 50% as follows:
 - a. Throttle XVT08389-CS, SEAL INJECTION HEADER FLOW BYPASS VALVE (AB-436 Filter gallery).
 - b. Monitor level on LI-459A, LEVEL %.
 - c. Monitor RWST level on ILI00990A-SF, RWST REMOTE LEVEL INDICATOR (AB-388).
 - d. If additional charging flow is needed, perform either of the following:
 - 1) Restore normal charging.
 - Open MVG-8801A, HI HEAD TO COLD LEG INJ, from the Main Control Board or FH-412.
- 3.15 Maintain RCS subcooling as determined by PI-403, RCS WR PRESS, and TI-423, LOOP B TH greater than 30°F as follows:
 - a. Establish a very slow cooldown.

NOTE 3.15.b

If Pressurizer heaters are not available, charging and letdown flows should be controlled to maintain stable RCS pressure.

- Maintain Reactor Coolant System pressure between 2200 psig and 2300 psig by cycling the GRP I backup heaters as necessary.
- Log temperature on Attachment XII at least once per 30 minutes.

NOTE 3.16

Step 3.16 should be completed within 120 minutes of implementation of this procedure.

- 3.16 Establish Reactor Building cooling as follows:
 - Open MVG-3108A, RBCU 64A INLET ISOL.
 - Den MVG-3108B, RBCU 65A INLET ISOL.
 - c. Open MVG-3109A, RBCU 64A OUTLET ISOL.
 - d. Open MVG-3109B, RBCU 65A OUTLET ISOL.
 - e. Verify the AB upper has reported Service Water is lined up for Reactor Building cooling.
 - f. Start XPP-0045A, PUMP A.
 - g. Start XFN0064A-AH, RBCU 1A SLOW.
 - h. Start XFN0065A-AH, RBCU 2A SLOW.

NOTE 3.17 through 3.22

The following steps are not required for safe shutdown and may be impossible for some fire locations. The transition to FEP-2.1 may be made at any time. If manpower is available and the decision has been made to stay in hot standby, then the following steps should be performed.

- 3.17 Verify the TDEFW Pump is operable.
- 3.18 Establish Component Cooling flow as follows:
 - a. Close the following valves:
 - XVB09503A-CC, RH HEAT EXCHANGER A CC INLET VALVE (AB-436).
 - XVB09524B-CC, NON-ESS EQUIP SUPPLY HDR XCONN VALVE (AB-412).

- XVB09525B-CC, NON-ESS EQUIP SUPPLY HDR XCONN VALVE (AB-412).
- XVB09687B-CC, NON-ESS EQUIP CC RETURN HDR XCONN VLV (IB-412).
- 5) XVBC9526B-CC, NON-ESS EQUIP CC RETURN HDR XCONN VLV (IB-412).
- b. Open the following valves:
 - XVB09524A-CC, NON-ESS EQUIP SUPPLY HDR XCONN VALVE (AB-412).
 - XVB09525A-CC, NON-ESS EQUIP SUPPLY HDR XCONN VALVE (AB-412).
 - 3) XVG09625-CC, RB CC INLET HEADER ISOLATION VALVE (AB-412).
 - 4) XVG09626-CC, RB CC INLET HEADER ISOLATION VALVE (AB-412).
 - 5) XVG09568-CC, EXCESS LTDN HX INLET CC HEADER ISOL VLV (AB-436 West Pen.).
 - 6) XVG09606-CC, RB CC RETURN HEADER VALVE (AB-436 West Pen.).
 - 7) XVG09600-CC, RB CC SUPPLY HEADER ISOLATION VALVE (IB-436 E. Pen.).
 - XVB09526A-CC, NON-ESS EQUIP CC RETURN HDR XCONN VLV (RB-436).
 - 9) XVB09687A-CC, NON-ESS EQUIP CC RETURN HDR XCONN VLV (IB-436).
- 3.19 Ensure proper Chilled Water system operation as follows (HVAC Panel):
 - a. Verify XPP-48A, PUMP A, or XPP-48C, PUMP C TRAIN A, is running.
 - Verify XHX-1A, CHILLER 1A, or XHX-1C, CHILLER C TRAIN A, is running.

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Verify IB operator has reported Chilled Water System is lined up.

3.20 If offsite power has been lost, perform the following:

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NOTE 3.20.a

Some breakers, like the Circulating Water Pump breakers, may have to be opened locally from their respective switchgear.

- a. Open all 7.2 KV breakers on the following busses:
 - 1) XSW1A, BUS 1A.
 - 2) XSW1B, BUS 1B.
 - 3) XSW1C, BUS 1C.
- Dpen all 480V feed breakers on the Main Control Board for XSW 1A, XSW 1B, and XSW 1C.
- If offsite power is available, verify OCB 8902, MAIN XFMR FEED, is closed.
- d. Close the following breakers:
 - 1) BUS 1A NORM FEED.
 - 2) BUS 1B NORM FEED.
 - 3) BUS 1C NORM FEED.
- e. Energize selected busses and loads at the discretion of the Shift Supervisor.
- 3.21 If offsite power cannot be restored, implement FEP-2.1, Train A Shutdown From Hot Standby To Cold Shutdown Due To Fire.
- 3.22 Establish Instrument Air as follows:
 - a. Establish Turbine Building Closed Cycle Cooling or backup cooling to Instrument Air Compressor A per SOP-219.
 - b. Start XAC-0003A, INSTR AIR CMPR A.

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- c. Open the following valves:
 - 1) PVA-2659, INST AIR TO RB AIR SERV.
 - 2) PVT-2660, AIR SPLY TO RB.
- d. If either of the following valves will not operate from the Main Control Board, install a jumper around the solenoid to open the valve:
 - XVA02659-IA, RB INSTRUMENT AIR BACK-UP SUP ISOL VLV (AB-436 W. Pen.).
 - XVT02660-IA, RB INSTRUMENT AIR SUPPLY ISOL VLV (ORC) (AB-436 W. Pen.).
- 3.23 Establish normal Letdown to control Pressurizer level as follows:
 - a. Open ITV00144-CC, LETDOWN HX CC OUTLET CONTROL VALVE, by isolating and venting Instrument Air to the valve (AB-412).
 - b. Open PVT-8152, LTDN LINE ISOL.
 - c. If PVT-8152 will not open from the Main Control Board, open it from the CREP or install jumpers around the solenoid to open (AB-412 West Pen.).
 - Close XVG08408A-CS, LTDN HDR PRESS CONT VLV INLET ISOL VLV (AB-424).
 - Throttle open XVT08409-CS, LTDN HDR PRESS CONT VLV BYPASS VALVE, three turns (AB-424).
 - Open the following valves:
 - 1) LCV-459, LTDN LINE ISOL.
 - 2) LCV-460, LTDN LINE ISOL.
 - 3) PVT-8149A, LTDN ORIFICE A ISOL.
 - g. If LCV-459, LCV-46L, or PVT-8149A will not open from the Main Control Board, open them from the CREP or install jumpers around the solenoid to open (RB-412).

- h. Cycle PVT-8149A, LTDN ORIFICE A ISOL, as necessary to maintain Pressurizer level between 25% and 50%.
- Isolate and vent air from the following valves:
 - LCV00115A-CS, VOLUME CONTROL TANK LEVEL CONTROL (AB-436 Filter Gallery).
 - TCV00143-CS, DEMIN INLET TEMP DIVERSION VALVE (AB-436 Demin Valve Gallery).
 - XVT08541-CS, MODERATING HEAT EXCHANGER BYPASS VALVE (AB-436).
- j. Have the Chemistry Department sample the Reactor Coolant System for boron concentration.
- 3.24 Proceed to FEP-2.1, Train A Shutdown From Hot Standby To Cold Shutdown Due to Fire.

4.0 FINAL CONDITIONS

- 4.1 Reactor conditions are as follows:
 - a. All Rods are inserted.
 - b. The Reactor is subcritical.
 - c. Shutdown Margin is satisfactory.
- 4.2 Reactor Coolant System conditions are as follows:
 - a. Seal Injection is established.
 - b. Natural Circulation is established.
 - c. RCS subcooling is greater than 30° F.
- 4.3 Plant systems in service are as follows:
 - a. Diesel Generator A is supplying XSW1DA loads.
 - Train A CVCS is supplying Reactor Coolant Pump seals.

- c. Steam Dumps or one or more PORV's are supplying secondary heat removal.
- d. Train A Service Water System is running.
- e. Train A HVAC Chilled Water System is running.
- f. Train A Reactor Building Cooling System is in service.
- g. Train A Emergency Feedwater is in service.
- h. Train A Component Cooling System is in service.
- 4.4 Additional plant systems that may be in service are as follows:
 - BOP electrical busses may be energized.
 - b. Instrument Air System may be in service.
 - c. CVCS Letdown may be controlling Pressurizer level between 25% and 50%.
 - d. Pressurizer heaters are controlling Pressurizer pressure between 2200 psig and 2300 psig.

5.0 REVISION SUMMARY

- 5.1 Incorporated changes A.
- 5.2 Updated format.
- 5.3 Corrected nomenclature.
- 5.4 Updated Attachment XIII to new values.

FEP-2.0 ATTACHMENT I PAGE 1 OF 1 REVISION 3

DUTIES OF THE CONTROL ROOM SUPERVISOR

NOTE 1 through 4

Steps 1 and 2 are Immediate Actions. Steps 3 and 4 must be completed within 30 minutes.

- 1. Verify proper response when the Reactor and the Turbine are tripped.
- Verify Pressurizer level and pressure are recovering as indicated on the following:
 - a. PI-403, WR PRESS (RCS).
 - b. LI-459A, LEVEL % (PZR).
- 3. Evaluate the plant page and radio systems for communication.
- After 15 to 20 minutes, verify that Source Range NI-31B indicates power decreasing or stable in the source range.

FEP-2.0 ATTACHMENT II PAGE 1 OF 2 REVISION 3

DUTIES OF THE NUCLEAR REACTOR OPERATOR AT THE CONTROLS

NOTE 1 through 5

Siteps 1 through 5 are Immediate Actions.

- 1. Trip the Reactor manually from the Main Control Board and verify the following:
 - a. Reactor Trip and Eypass Breakers are open.
 - b. All rod bottom lights are lit.
 - c. Reactor power level is decreasing.
- If the Reactor did not trip, direct the IB Operator to trip the Reactor locally.
- Ensure the Turbine trips as follows:
 - a. Turbine MAIN STOP VLVS are closed.
 - b. Generator trips after a 30 second delay.
 - c. Trip the EXC FIELD BKR.
- Trip all Reactor Coolani, Pumps.
- Close the following valves:
 - a. PVM-2801A(B)(C), A(E)(C) ISOL VLV (Main Steam).
 - b. PVM-2869A(B)(C), A(B)(C) BYP VLV (Main Steam Bypass).
 - c. PVG-503A(B)(C), A(B)(C) ISOL (Steam Generator Blowdown).
 - d. MVG-8000A(B)(C), RELIEF 445A(444B)(445B) ISOL.
 - e. PVT-8149(A)(B)(C), LTDN ORIFICE (A)(B)(C) ISOL.
 - f. LCV-459(460), LTDN LINE ISOL.

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- g. PVT-8152, LTDN LINE ISOL.
- h. PVT-8153 (8154), XS LTDN ISOL.
- i. MVG-8107, CHG LINE ISOL.
- Disable the Reactor Building Spray System as follows:
 - a. Place XPP-0038A, PUMP A, in PULL TO LK NON-A.
 - b. Place XPP-0038B, PUMP E, in PULL TO LK NON-A.
 - c. Close MVG-3001A, RWST TO SPRAY PUMP A SUCT.
 - d. Close MVG-3001B, RWST TO SPRAY PUMP B SUCT.
- Verify BUS 1B1-1DA1 TIE BKR is open within 30 minutes.
- 8. Reduce Reactor Coolant Pump seal leakoff within 90 minutes by closing the following:
 - a. MVT-8112, SEAL WTR RTN IBOL.
 - XVT08100-CS, RC PUMP SEAL RETURN HDR ISOL VLV (ORC)(AB-412 West Pen.).

FEP-2.0 ATTACHMENT III PAGE 1 OF 3 REVISION 3

DUTIES OF THE A NUCLEAR REACTOR OPERATOR

NOTE 1 and 2

Steps 1 and 2 are Immediate Actions. All other steps must be completed within 30 minutes.

- Select PWR RLF and close the following valves:
 - a. PCV-2000, A SD/PWR RELIEF.
 - b. PCV-2010, B SD/PWR RELIEF.
 - c. PCV-2020, C SD/PWR RELIEF.
- 2. De-energize the following by opening their respective Disconnect Switches located inside the Main Control Board:
 - a. Sub Panel-19A (XCP-6112).

Switch

- Valve Number
- 1) DS-32 IPV-445A
- 2) DS-33 IPV-445B
- b. Sub Panel-19B (XCP-6113).

Switch Valve Number

- 1) DS-31 IPV-444B
- 2) DS-13 XVT-8145
- Establish Train A Component Cooling Water flow using CCW Pump A(C) by starting XPP001A, PUMP A, or XPP-0001C, PUMP C TRAIN A.
- Establish Train A Charging using Charging Pump A(C) as follows:

a. Open LCV-115B, RWST TO CHG PP SUCT.

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- Open LCV-115D, RWST TO CHG PP SUCT.
- c. Open MVT-8109A(C), CHG PP A(C) (Miniflow Isolation).
- Ensure MVG-8106, CHG PP (Miniflow Isolation), is open.
- e. Open MVG-8130A, LP A SUCT TO CHG PP C.
- Open MVG-8130B, LP A SUCT TO CHG PF C.
- g. Start XPP-0043A, PUMP A, or XPP-0043C, PUMP C TRAIN A.
- h. Close LCV-115E, VCT OUTLET ISOL.
- 5. On the Integrated Fire Service panel, select POWER SELECT to BUS A.
- Remove power from Bus 1DB as follows:
 - Verify that BUS 1DB DG FEED breaker is open.
 - Verify the IB Operator has reported Diesel Generator B is disabled.
 - c. Open BUS 1DB NORM FEED breaker.
 - Open BUS 1DB ALT FEED breaker.
- 7. Establish power to Bus 1DA from Diesel Generator A as follows:
 - a. Start Diesel Generator A by depressing the EMERG START pushbutton.
 - Verify normal voltage and frequency indications.
 - c. Verify BUS 1DA ALT FEED breaker is open.
 - d. Open BUS 1DA NORM FEED breaker.
 - e. Verify BUS 1DA DG FEED breaker is closed.
- Ensure the following Train A loads start:
 - a. Charging Pump.

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- b. RHR Pump.
- c. Service Water Pump.
- d. HVAC Chilled Water Pump.
- e. Component Cooling Pump.
- f. Motor Driven Emergency Feedwater Pump.
- g. RBCU 64A and 65A (slow).
- h. Fuel Handling Building Exhaust Fan.
- i. Service Water Booster Pump.
- J. HVAC Chiller.
- k. XFN-32A, SPLY FAN A (Control Room).
- I. XFN-36A, RELAY RM CLG FAN A.
- m. XFN-38A/XFN-39A, SPLY & EXH FANS (Battery Charger Room).
- n. XFN-50, ESF SWGR 1DA RM CLG FAN.
- o. XFN-80A, VENT FAN A.
- p. XFN-106A, SPD SW/EVAC CLG FAN A.
- q. XFN-81A, SWBP CLG FAN A.
- r. XFN-132, AB MCC RM A.
- Ensure the following ventilation is aligned as specified (HVAC Board):
 - a. XFN-46A, CHG PUMP A CLG FAN, is running.
 - XFN-47, CHG PUMP C CLG FAN, is running if Charging Pump C is the Train A pump.
 - c. XDP-113A, Relay Room Recirc Damper is open.

FEP-2 ATTACHMENT IV PAGE 1 OF 2 REVISION 3

DUTIES OF THE INTERMEDIATE BLDG OPERATOR

NOTE 1

Step 1 is an Immediate Action.

- If directed by the Nuclear Reactor Operator At The Controls, trip the Reactor locally at XSW0001-CR by opening the following (IB-463):
 - a. XSW0001-RTA, REACTOR TRIP BREAKER A.
 - b. XSW0001-RTB, REACTOR TRIP BREAKER B.
 - c. XSW0001-BYA, REACTOR TRIP BYPASS BREAKER A.
 - d. XSW0001-BYB, REACTOR TRIP BYPASS BREAKER B.
- 2. Obtain plant keys, tool bag and flashlight from the IB-436.
- Disable the Diesel Generator B as follows within 30 minutes:
 - Verify XSW1DB 10, DIESEL GEN B XEG0001B-DG, breaker is open (IB-436).
 - Den all three DC breakers RRP, RRT, and RRPA inside XSW1DB 10 (IB-436).
 - Place the LOCAL/REMOTE/MAINT switch for Diesel Generator B in MAINT (DB-436).
 - Report to the A Nuclear Reactor Operator that Diesel Generator B is disabled.

FEP-2 ATTACHMENT IV PAGE 2 OF 2 REVISION 3

- 4. Ensure proper Service Water Pump House ventilation damper positions by isolating Instrument Air to the Service Water Pump House within 90 minutes as follows:
 - Close XVA12969-SA, SW PUMP HOUSE INST AIR HDR SUPPLY VALVE (SW-440).
 - Den XVT22923-SA, SW SA SUPPLY HEADER LOW POINT DRAIN VLV (SW-440), to depressurize the header.
- Insure proper Chill Water System operation within 90 minutes as follows (IB-412):
 - a. Open XVB03126A-SW, HVAC CHILLER CONDENSER A SW SUPPLY VLV.
 - Dpen XVB03128A-SW, HVAC CHILL COND C SW HDR A IN ISOL VLV, if Chiller C is running.
 - Report to the Control Room that the Chilled Water System is lined up.

FEP-2.0 ATTACHMENT V PAGE 1 OF 3 REVISION 3

DUTIES OF THE AUXILIARY BLDG OPERATOR (UPPER)

NOTE 1

Step 1 is an Immediate Action.

- Secure any radioactive liquid or gas releases by closing the following:
 - a. PVD-6910, LIQUID EFFLUENTS TO FAIRFIELD PENSTOCKS.
 - b. HCV-14, WASTE GAS DISCHARGE CONTROL VALVE.
- Obtain plant keys, tool bag, flashlight and a copy of ATTACHMENT XI of this procedure from the AB-412.
- 3. Align the 1A-1B Battery Charger per Attachment XI within 30 minutes (IB-412).
- 4. Verify the Control Room has disabled the Reactor Building Spray Pumps, then close the following valves within 30 minutes (AB-397):
 - a. XVG03001A-SP, RB SPRAY PP A RWST SUCTION HDR VALVE.
 - b. XVG03001B-SP, RB SPRAY PP B RWST SUCTION HDR VALVE.
- Close the following valves within 90 minutes (AB-397):
 - XVG08812A-SI, RH PUMP A SUCTION HEADER VALVE.
 - b. XVG08812B-SI, RH PUMP B SUCTION HEADER VALVE.
- Align seal injection within 90 minutes as follows:
 - a. Open XVT08109A-CS, CHARGING/SI PUMP A MINI FLOW ISOL VALVE (AB-388).
 - Dpen XVT08109C-CS, CHARGING/SI PUMP C MINI FLOW ISOL VALVE (AB-388).
 - Open LCV00115B-CS, CHG PUMP A SUCTION HDR RWST ISOL VALVE (AB-400).

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- d. Open XVG08130A-CS, CHG PUMPS A TO C SUCT XCONN VALVE (AB-400).
- e. Open XVG08130B-CS, CHG PUMPS A TO C SUCT XCONN VALVE (AB-400).
- f. Open XVG08132A-CS, CHG PUMPS A TO C DISCH XCONN VALVE (AB-400).
- g. Open XVG08132B-CS, CHG PUMPS A TO C DISCH XCONN VALVE (AB-400).
- Dpen XVG08133B-CS, CHG PUMPS B TO C DISCH XCONN VALVE (AB-400).
- Open XVG08133A-CS, CHG PUMPS B TO C DISCH XCONN VALVE (AB-400).
- j. Open XVG08106-CS, CHARGING PUMPS MINI FLOW HDR ISOL VALVE (AB-424).
- Close LCV00115E-CS, VOLUME CONTROL TANK OUTLET HDR ISOL VLV (AB-424).
- Close XVG08706A-RH, CHG/SI PUMP SUCT HDR RH HDR A INLET VLV (AB-412, A RHR HX ROOM).
- m. Open XVT08102A-CS, RC PUMP A SEAL SUPPLY ISOL VALVE (ORC) (AB-412 W. Pen.).
- n. Close XVG08107-CS, CHARGING PUMPS DISCHARGE HDR ISOL VALVE (AB-412 West Pen.).
- Close XVG08801A-SI, HI HEAD INJ VALVE (FH-412).
- p. Close XVG08801B-SI, HI HEAD INJ VALVE (FH-412).
- q. Open XVT08102B-CS, RC PUMP B SEAL SUPPLY ISOL VALVE (ORC) (IB-412 E. Pen.).
- r. Open XVT08102C-CS, RC PUMP C SEAL SUPPLY ISOL VALVE (ORC) (IB-412 E. Pen.).

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- s. Open XVT08389-CS, SEAL INJECTION HEADER FLOW BYPASS VALVE (AB-436, Filter Gallery)
- t. Close XVT08105-CS, SEAL INJECTION HEADER ISOLATION VALVE (AB-436).
- u. Report to the Control Room that seal injection is lined up.
- 7. Align Service Water for Reactor Building Cooling within 120 minutes as follows:
 - a. Open XVB03106A-SW, SW BOOSTER PUMP A DISCHARGE VALVE (AB-463).
 - Dpen XVG03107A-SW, SW POND RBCU 1A&2A RETURN ISOLATION VLV (AB-463).
 - c. Open XVG03103A-SW, RBCU 1A&2A RETURN HEADER ISOLATION VLV (AB-463).
 - Verify IPI04520, SW BOOSTER PUMP A SUCTION PRESSURE IND (IB-412), indicates greater than 20 psig.
 - Notify the Control Room that Service Water is lined up for Reactor Building cooling.

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DUTIES OF ELECTRICAL MAINTENANCE PERSONNEL

NOTE 1 through 4

Steps 1 through 4 must be completed within 30 minutes.

- 1. Report to the Control Room and obtain radio, tool bag and keys.
- Align XET-4006, Security System transfer switch (CCW Speed Switch B Room) (IB-436) to Train A as follows:
 - a. Locate the terminal board above the components mounted on the cabinet door.
 - b. On terminal 3 cut the top black wire.
 - c. On terminal 4 cut the top black wire.
 - On terminal 11 cut the top black wire.
 - e. Ensure the letter N is showing on the switch position indicator located on the back wall of the cabinet.
 - f. If the letter E is showing, momentarily jumper from terminal 3 to terminal 4 and verify the indicator shifts to N.
- Verify that Operations has completed sequencing loads onto Diesel Generator A.

NOTE 4 AND 5

- a. Maintenance personnel should stand by at the areas directed by Steps 4 and 5 but should not perform the steps until the loads are sequenced on to Diesel Generator A.
- b. Individuals may mark each cubicle in whatever manner chosen to keep track of breakers opened.
- 4 Open the following indicated (non-shaded) breakers on XMC1DA2X(IB-463):



MCC-XMC1DA2X 463' IB

		XMC1DA2X 03AD COMP COOLING NON ESSENTIAL ISO LOOP A XVB9526A-CC	XMC1DA2X 04AD MOTOR OPER GATE ISOL RC PUMP AT REAC BLDG XVG9600-CC
XMC1DA2X 01DE CONTROLLED ACCESS COOLING SUPPLY FAN MOTOR XFN0026-AH	•	XMC1DA2X 03EH COMP COOLING NON ESSENTIAL ISO LOOP B XVB9687B-CC	XMC1DA2X 04EH VLV ISOL EMERGENCY SUCTION A XVG1001A-EF
XMC1DA2X 01FH CONTROLLED ACCESS EXH FAN A XFN0028A-AH			
		XMC1DA2X 03IM COMP COOLING RETURN FROM RB IRC XVG9605-CC	XMC1DA2X 04IL VLV ISOL EMERGENCY TURBINE PUMP XVG1C08-ES

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MCC-XMC1DA2X 463' IB

XMC1DA2X 05AD SW INLET TO HVAC CHILLER A XVB3126A-SW	XMC1DA2X 06AD CRDM COOLING WATER INLET VALVE XVG7501-AC	XMC1DA2X 07AE REAC HEAD VENT VV TO PRZR RELIEF TANK XVT8096A-RC	XMC1DA2X 08AE ACCUMULATOR A ISO VALVE XVG8808A-SI
XMC1DA2X 05EH EF PUMP MAIN STEAM BLOCK VLV XVG2802A-MS	XMC1DA2X 06EH RB SPRAY HDR ISO VALVE ORC CIRCUIT A XVG3003A-SP	XMC1DA2X 07FJ RHR LOOP 1 INLET ISO VALVE IRC XVG8701A-RH	XMC1DA2X 08FJ ACCUMULATOR C ISO VALVE XVG8808C-SI
XMC1DA2X 05IM REACTOR HEAD VENT VLV TO PRZR RELIEF TANK XVT8095A-RC	XMC1DA2X 06IM PRESSURIZER PRESSURE RELIEF ISO VALVE XVG8000B-RC		





MCC-XMC1DA2X 463' IB

XMC1DA2X 13AD	XMC1DA2X 14AD	XMC1DA2X 15AD	
INDUST COOLING WTR TO RB SW SYS ORC XVB3110A-SW	RB SERVICE WTR OUTLET A ORC XVG3103A-SW	FEEDWATER PUMP C DISCHG VALVE XVK1606C-FW	e • • •
XMC1DA2X 13EH	XMC1DA2X 14EH	XMC1DA2X 15EH	XMC1DA2X 16EH
RB SERVICE WTR OUTLET A ISO VLV XVG3111A-SW	RB SER WTR LOOP A RETURN TO SW POND XVG3107A-SW	CHEMICAL FD ISOL VALVE XVK1633C-FW	FEEDWATER PUMP A DISCHG VALVE XVK1606A-FW
XMC1DA2X 13IJ			
CONTROL ACCESS LAB HOOD SUPPLY FAN XFN0055-AH			

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5. Open the following indicated (non-shaded) breakers on XMC1DA2Y (AB-412):



MCC-XMC1DA2Y 412' AB

	XMC1DA2Y 02AD	XMC1DA2Y 03AD	XMC1DA2Y 04ABL	XMC1DA2Y 05AD
	RWST TO CHARGING PP VLV LCV-115B XVG0115B-CS	CHG PUMP SUCTION HDR ISO XVG8130A-CS	POST ACCIDENT ANALYZER SYSTEM XPN7251A-HR	VALVE ISOLATION RHR HY A XVB9503A-CC
XMC1DA2Y 01DG	XMC1DA2Y 02EH	XMC1DA2Y 03EH	XMC1DA2Y 04EH	XMC1DA2Y 05EH
CHARGING PUMP MINIFLOW VALVE XVG8106-CS	VCT TO CHARGING PUMP ISOL VALVE LCV-115C XVG0115C-CS	CHG PUMP SUCTION HDR ISO XVG8131A-CS	CHG PUMP DISCHG HDR ISO XVG8132A-CS	CC NON-ESSEN HDR X-CONN VLV XVB9524A-CC
XMC1DA2Y 01HK			XMC1DA2Y 04IL	XMC1DA2Y 05IL
RCS CHARGING LINE VLV XVG8107-CS			CHG PUMP DISCHG HDR ISO XVG8133A-CS	CC NON-ESSEN HDR X-CONN VLV XVB9525B-CC





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MCC-XMC1DA2Y 412'AB

•		<i>(</i> .		XMC1DA2Y 10AD LOW HEAD INJECTION TO HOT LEG RECIRC LINE XVG8887A-SI
XMC1DA2Y 06EH COMP COOLING WTR TO REACTOR BLDG XVG9568-CC	XMC1DA2Y 07EH HI HEAD TO COLD LEG INJECTION XVG8801A-SI	XMC1DA2Y 08EH RWST TO RHR PUMP A ISO XVG8809A-SI	XMC1DA2Y 09EH CONTAINMENT SUMP ISO VALVE ORC XVG8812A-SI	
XMC1DA2Y 06IL RB CC INLET HDR ISOL VLV XVG9625-CC	XMC1DA2Y 07IJ POWER LOCKOUT FOR XVG-8133A-CS		XMC1DA2Y 09IM RECIRC SUMP TO RHR PUMP A ISO VALVE XVG8811A-SI	XMC1DA2Y 10JK XTF5032

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MCC-XMC1DA2Y 412' AB

XMC1DA2Y11ABL MU WTR STOR TK HEAT TRACE PNL A XPN2007-ET	XMC1DA2Y11ABR RWST HEAT TRACE CONTR PNL A XPN2005-ET 2Y 11CD	XMC1DA2Y 12AD HIGH HEAD TO HOT LEG INJECT HDR ISO VLV XVG88884-SI	XMC 1DA2Y 13AC <u>POWER LOCKOUT</u> <u>FOR</u> XVG8889-84-88A-SI <u>XVG 8106-CS</u>	XMC1DA2Y 14ABL EQUIPPED SPACE XMC1DA2Y 14CG	XMC1DA2Y 15CG
RAD MC PLANT VI IRMA00	N MAIN ENT EXH 003-RM			VLV REACTOR BLDG RECIRC UNIT B ISOLATION XVB3109B-SW	VLV REAC BLDG RECIRC UNIT B ISOL XVG3108B-SW
XMC1DA RAD MON RB PU IRMA00	<u>2Y 11EF</u> RGE EXH PUMP 004-RM				,
					XMC1DA2Y 15HL VLV REAC BLDG RECIRC UNIT A ISOL XVG3109A-SW
		XMC1DA2Y 12KL SPACE HEATERS FOR 1DA2Y			

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	MCC-XMC1DA2Y	412' AB	
XMC1DA2Y 16AD	XMC1DA2Y 17AD	XMC1DA2Y 18AD	
VLV RB SUMP ISOLATION XVG3005A-SP	RWST TO RB SPRAY PUMP A SUCTION XVG3001A-SP	RHR PUMP A MINIFLOW FCV-602A XVT0602A-RH	
XMC1DA2Y 16EH	XMC1DA2Y 17EH	XMC1DA2Y 18EH	
VALVE BLDG SERVICE OUTLET B ISOLATION XVG3112B-SW	NAOH TD TO RB SPR PP A SUCT XVG3002A-SP	RHRS TO CHARGING PUMP VALVE XVG8706A-RH	
			XMC1DA2Y 19HK
			VLV CHEMICAL FEED ISOL XVK1633A-FW
XMC1DA2Y 16IM	XMC1DA2Y 17IM	XMC1DA2Y 18IM	1
VLV REAC BLDG RECIRC UNIT A ISOL XVG3108A-SW	CNTMT BLDG SUMP ISO VLV IRC XVG03004A-SP	RHR LOOP 3 INLET ISO VALVE XVG8701B-RH	
			XMC1DA2Y 19LML SODIUM HYD SPRAY HEAT TRACE CONTROL PNL A XPN2009-RT

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6. Contact the Control Room when Step 5 is completed.



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480V BREAKER OPERATION

- Local opening of breakers is accomplished as follows:
 - a. For electrically operated types, disable the breaker closing ability by positioning the charging power switch on the breaker front to OFF.
 - Depress the TRIP pushbutton (left pushbutton where two exist).
 - c. Verify the breaker trips and remains open.
- Local closing of manual type breakers (large closing handle) is accomplished as follows:
 - a. Pull down the closing handle.
 - b. Verify the breaker closes and remains closed.
 - Investigate the cause if the breaker does not remain closed.
- Local closing of electrically operated type breakers is accomplished as follows:
 - Open the panel directly behind the breaker on back of the switchgear.
 - Open both the CLOSE CP BRKR and the TRIP CP BRKR for the breaker to be operated.
 - Verify the breaker closing springs are charged.
 - d. If the breaker closing springs are discharged, perform step 1 or 2 for the appropriate size breaker:
 - For 2000 or 3000 amp frame sizes, charge the springs as follows:
 - a) Insert a manual spring charging handle into the slot in the breaker front.
 - b) Pump the handle until the breaker indicates charged.

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- For 600 and 1600 amp frame sizes, charge the springs as follows:
 - a) Open the door on the breaker cubicle.
 - Engage a manual charging handle into the slots of the pawl carrier.

NOTE 3.d.2).c)

The pawl carrier is located on the breaker, on centerline, between the silver colored charging motor on the right and the black auxiliary switch assembly on the left. Occasionally, the charging motor will coast to a stop in such a position that the driving pawl does not engage the next tooth on the ratchet wheel.

When the driving pawl is not engaged on the ratchet wheel, a screwdriver blade may be inserted along the right side of the pawl carrier against the roller on the charging motor output eccentric and the roller may be pushed to manually rotate it. Afterwards, the charging handle should be inserted.

- Operate the handle until the breaker indicates charged.
- e. Lift (or pull) the manual CLOSE lever.
- f. Verify the breaker closes and remains closed.

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7.2 KV BREAKER OPERATION

- 1. Perform local opening of breakers as follows:
 - Open the door to the appropriate switchgear cubicle.
 - Open the Closing Power breaker RRP (located on the right hand side of the cubicle).
 - c. Depress the MANUAL TRIP lever on the breaker.
 - Verify the breaker trips and remains open.
- Perform local closing of breakers as follows:

CAUTION 2.a

If any relay flags are tripped, closing of breaker with no protection could be a personnel hazard.

- Verify no relays have tripped on the associated breaker.
- b. Open the door to the appropriate switchgear cubicle.
- c. Verify the closing springs are charged.
- d. If the closing springs are not charged, perform the following:
 - Open the Closing Power breaker RRP (located on the right hand side of the cubicle).
 - Use a ratchet and 5/8" socket to turn the charging motor until the breaker indicates charged.
- Depress the MANUAL CLOSE pushbutton on the breaker.
- Verify the breaker closes and remains closed.

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- g. If the breaker does not close, pe form the following:
 - Disconnect and tape all leads at terminals 361, 363 and 364 on terminal board C.
 - 2) Charge the springs per step 2.d above.
 - Ensure the Trip Power breaker RRT (located on the right hand side of the cubicle) is closed.
 - 4) Depress the MANUAL CLOSE pushbutton on the breaker.
 - 5) Verify the breaker closes and remains closed.

FEP-2.0 ATTACHMENT IX PAGE 1 OF 1 REVISION 3

OPERATION OF EQUIPMENT FROM 480 VOLT MOTOR CONTROL CENTERS

NOTE IX

This attachment is developed to operate pump motors or any continually operating piece of equipment, not motor operated valves.

- Locate the appropriate cubicle in the Motor Control Center.
- Position the breaker to OFF (RESET).
- Open the cubicle door.
- Remove the fuse from the cubicle.

CAUTION 5

- The line side terminals of the breaker will be energized and should not be shorted or grounded.
- This installation bypasses all equipment protection interlocks except breaker overcurrent protection.
- Disconnect the existing feed (Wire No. 3) from the contactor coil.
- Connect one end of a jumper to the hot side of the fuse holder (Wire No. X1).
- Connect the free end of the jumper to the contactor coil where the feed wire (Wire No. 3) was removed.
- Close the cubicle door.
- 9. Use the breaker ON-OFF handle to operate the equipment.

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REMOTE OPERATION OF VALVES FROM 480V MOTOR CONTROL CENTERS

NOTE 1

MVG-8106 and 8133A are Power Lockout valves. Power Lockout valves require both Power Lockout and Valve Motor starter relays to be actuated simultaneously for remote operation. MVG-8106 starter relays are located in XMC1DA2Y 01DG and XMC1DA2Y 13AC. MVG-8133A starter relays are located in XMC1DA2Y 04IL and XMC1DA2Y 07IJ.

- Locate the Motor Control Center Cubicle(s) for the valve to be operated.
- Position the breaker(s) to OFF(RESET).
- Open the cubicle door(s).
- Remove the control power fuse for motor starter with fuse pullers.
- 5. Locate the two motor starter relays in the appropriate cubicle.
- Place a clamp-on ammeter around one of the following:
 - a. The heavy wires connected between the top of the motor starter relays and the circuit breaker.
 - b. One field motor lead.
- Perform Step 7.a for digital ammeters or Step 7.b for analog ammeters as follows:
 - a. When using digital ammeters, perform the following:
 - 1) Ensure switch on face of meter is in C position.
 - 2) Depress and hold the red pushbutton on the meter side.
 - Verify the display lights up.

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- b. When using analog ammeters, perform the following:
 - Ensure meter pointer is unlocked (switch to left).
 - 2) Set Meter Scale to 0-6A.
- Close the circuit breaker(s).
- 9. If applicable, actuate the Power Lockout relay contactor and hold.

NOTE 10

- a. Starting current for large valves may cause the ammeter to indicate full scale. Current should stabilize on scale within one to two seconds at the nominal value of running current listed for the valve on Attachment XIII.
- b. While motor is running, meter will read low.
- c. When valve is at the end of its travel, the motor stalls at about five times its running current.
- 10. Actuate the desired motor starter relay contactor (left contactor to close the valve or right contactor to open the valve) by depressing through the left slot with a screwdriver blade.
- 11. Observe current on the ammeter for the following:
 - If current remains high, release contactor; valve is in the required position already.
 - b. If low, release contactor when current begins to rise sharply.
- 12. If applicable, release the Power Lockout relay contactor.
- 13. Re-open the circuit breaker(s).
- 14. Remove the ammeter and close the cubicle door(s).

FEP-2.0 ATTACHMENT XI PAGE 1 OF 2 REVISION 3

CROSS TRAIN CONNECTION OF BATTERY CHARGER XBC1A-1B

(ALIGNING AC FROM TRAIN A AND DC TO TRAIN B)

CAUTION

It is of primary importance to keep a battery charger supplying DPN-1HA. If XIBC1A is not operable, leave XBC1A-1B on DPN-1HA and warn the Control Room that they will have to use local manual control of the Steamline Power Reliefs and the Emergency Feedwater Flow Control Valves when the Train B battery is exhausted.

- Verify that XBC1A-1B, SWING BATTERY CHARGER, is not supplying DPN-1HA (TRAIN A-DC breaker is OFF).
- Open both TRAIN A-AC and TRAIN B-AC breakers and both TRAIN A-DC and TRAIN B-DC breakers on XET-4003.
- Insert the spare interlock key into the TRAIN A-AC or TRAIN B-DC interlock key slot on XET-4003 and bypass the interlock.
- Close the TRAIN A-AC breaker on XET-4003.
- Close the TRAIN B-DC breaker on XET-4003.
- 6. Open DPN-1HA-ED 13, BATTERY CHARGER 1A-1B FEED TO DPN1HA.
- 7. Close the following on XBC1A-1B Battery Charger:
 - a. DC OUTPUT.
 - b. AC INPUT.
- Verify DC OUTPUT VOLTMETER stabilizes between 129 and 140 volts.

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NOTE 9

Allow five to ten seconds for the capacitors to fully charge and the battery charger to stabilize.

 Verify the capacitors are fully charged by observing that the red indicator lights on XPN5294-ED, BATT CHARGER CAP BOX, are illuminated.

NOTE 10

If XBA1B has been on a constant discharge, the battery charger voltage may drop below 129 volts with a high charging rate of a nominal 360 amps, but voltage will return to between 129 and 140 volts as the battery recharges.

- 10. Close DPN-1HB-ED 13, BATTERY CHARGER 1A-1B FEED TO DPN1HB.
- 11. Notify the Control Room that XBC1A-1B is cross connected.



FEP-2.0 ATTACHMENT XII PAGE 1 OF 1 REVISION 3

COOLDOWN DATA SHEET

TIME	COOLDOWN RATE	LOOP B TH TI-423A	LOOP B TC TI-420A	ΔΤ	TH+TC 2	STEAMLINE POW RELIEFS % OPEN		WER	RCS SUBCOOLING
						A	В	C	
								ļ	

NOTE: Data should be logged every 30 minutes while cooling down and once per hour while maintaining stable plant conditions.

FEP-2.0 ATTACHMENT XIII PAGE 1 OF 1 REVISION 3

NOMINAL RUNNING CURRENT FOR MOTOR OPERATED VALVES

VALVE NUMBER	RUNNING CURRENT (AMPS)	VALVE NUMBER	RUNNING CURRENT (AMPS)
XVB09503A-CC	0.75	XVG08000A-RC	3.5
XVB09503B-CC	0.75	XVG08000B-RC	3.5
XVB09524A-CC	0.75	XVG08000C-RC	3.5
XVB09524B-CC	0.75	XVG08701A-RH	5.8
XVB09525A-CC	0.75	XVG08701B-RH	5.8
XVB09525B-CC	0.75	XVG08702A-RH	5.8
XVB09526A-CC	0.75	XVG08702B-RH	5.8
XVB09526B-CC	0.75	XVG08706A-RH	3.5
XVG09568-CC	0.95	XVG08706B-RH	3.5
XVG09600-CC	1.0	XVG08801A-SI	3.5
XVG09606-CC	0.95	XVG08801B-SI	3.5
XVG09625-CC	0.95	XVG08812A-SI	13.8*
XVG09626-CC	0.95	XVG08812B-SI	13.8*
XVG08106-CS	3.5	XVG03001A-SP	2.4
XVG08107-CS	3.5	XVG03001B-SP	2.4
XVG08108-CS	3.5	XVB03106A-SW	0.75
XVG08131A-CS	2.4	XVB03106B-SW	0.75
XVG08131B-CS	2.4	XVG03103A-SW	4.0
XVG08132A-CS	3.5	XVG03103B-SW	4.0
XVG08132B-CS	3.5	XVG03107A-SW	4.0
XVG08133A-CS	3.5	XVG03107B-SW	4.0
XVG08133B-CS	3.5	XVG03108A-SW	2.3
XVT08100-CS	2.3	XVG03108B-SW	2.3
XVT08102A-CS	2.3	XVG03108C-SW	2.3
XVT08102B-CS	2.3	XVG03108D-SW	2.3
XVT08102C-CS	2.3	XVG03109A-SW	2.3
XVT08109A-CS	2.3	XVG03109B-SW	2.3
XVT08109B-CS	2.3	XVG03109C-SW	2.3
XVT08109C-CS	2.3	XVG03109D-SW	2.3

* Will require setting ammeter to higher scale.



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