Attachment I

PACIFIC GAS AND ELECTRIC COMPANY
STATION CONSTRUCTION DEPARTMENT
DIABLO CANYON PROJECT

Unit 1

TEST PROCEDURE NO. 44.3

SPECIAL LOW POWER TEST PROGRAM

SIMULATED LOSS OF SITE AC POWER

FOR INFORMATION ONLY

Prepared by/Date D.W. Shelley 5-23-80 Startup Engineer

Approved by/Date _____ Lead Startup Engineer

_____ Plant Superintendent

Performed by/Date _____ Startup Engineer

_____ Plant Superintendent

Approved by/Date _____ Lead Startup Engineer

Accepted for Operation by/Date _____ Plant Superintendent

Distribution:

Power Plant Superintendent	(4)	Resident Civil Engineer	(1)
Project Engineer	(2)	Resident Electrical Engineer	(3)
Onsite Q.A.	(1)	Resident Mechanical Engineer	(1)
Westinghouse (site manager)	(2)	Coordinating Q.C. Engineer	(Orig.

S-6 (Rev. 5-23-80)

CLASS-1

Startup Files: Red ____
Green ____

PACIFIC GAS AND ELECTRIC COMPANY
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UNIT 1

TEST PROCEDURE NO. 44.3

SPECIAL TEST - SIMULATED LOSS OF SITE AC POWER

1.0 TEST PURPOSE

To verify upon simulated loss of all on-site and off-site AC power the ability to:

1.1 Maintain hot standby conditions

1.2 Control the Auxiliary Feedwater System (AFWS) by manual means; i.e., with the loss of AC power and instrument air

1.3 Supply vital 120 VAC system with the vital batteries and

1.4 Operate equipment in areas where ventilation has been terminated.

2.0 TEST DESCRIPTION

Initially, selected equipment will be tripped or realigned to simulate loss of A.C. power. Next, with the RCP's running to simulate core decay heat, the Turbine Driven Auxiliary Feed Water Pump will be automatically started and then manually controlled using the pump control switch and the manual operators on the control valves. For the next 2 hours plant conditions will be closely monitored and data recorded.

3.0 REFERENCES

3.1 Piping Schematics:

a)	Turbine Steam Supply System	102004-8
b)	Reactor Coolant System	102007-7
c)	Chemical and Volume Control System	102008-8
d)	Feedwater System	102003-8

3.2 Instrument Schematics:

a)	Flow Instrument Systems	102032-8
b)	Pressure Instrument Systems	102034-8

c) Temperature Instrument Systems 102035-8

d) Multivariable Instrument Systems 102036-7

3.3 Startup Test Procedure 40.0, "Program Outline Initial Core Loading, Initial Criticality, Zero Power Physics and Power Escalation."

3.4 Diablo Canyon Unit 1 Plant Technical Specifications

3.5 Diablo Canyon Plant Manual

3.6 Diablo Canyon FSAR

4.0 PREREQUISITES

4.1 The startup program has progressed to the point where the performance of this test is required per Startup Test Procedure 40.0. _____

4.2 Visicorder (s) set up to monitor the following data. Record test instrumentation data and verify calibration on attached TEST INSTRUMENT LIST.

NOTE: Label each trace with date, time, recorder speed, parameter measured, scaling units and input signal source.

4.2.1 Auxiliary Feedwater Flow

FM 50 Output _____
FM 77 Output _____
FM 78 Output _____
FM 79 Output _____

4.2.2 RCS pressure channels which are controlling the pressurizer power operated relief valves. (Inputs to PC455E and PC456E). Record channel. _____

4.2.3 Steam Generator Pressures - Choose an available pressure channel (1 of 3) for each steam generator. Record channel numbers below and on visicorder trace.

S/G 11	PT _____	S/G 12	PT _____
S/G 13	PT _____	S/G 14	PT _____

4.2.4 Steam Generator Level - Choose an available narrow range level channel (1 of 3) for each steam generator.

Record channel numbers below and on visicorder trace.

S/G 11	LT _____	S/G 12	LT _____
S/G 13	LT _____	S/G 14	LT _____

4.2.5 Event Marker - Monitor the Solid State output contacts which start the Turbine Driven AFW pump on RCP Bus undervoltage. Output contacts (either Train) on TB 632 terminals 9, 10 will close to start the pump. _____

4.3 At least one of the source range channels set up to NR-45 so that any changes in the core flux level can be monitored. _____

4.4 Record requested information and verify calibration for permanent plant and test instrumentation listed on attached TEST INSTRUMENT LIST. _____

4.5 Request Station Test or Nuclear Plant Operations (NPO) Instr. Dept. prepare to simulate loss of voltage on both RCP 12 KV Buses (See step 6.8 for devices that will be tripped). _____

4.6 Setup phones at the Turb. Driven AFW pump control valves.

LCV 106	_____	LCV 108	_____
LCV 107	_____	LCV 109	_____

4.7 Safeguard blocks set up per Appendix 8. _____

4.8 Have a temporary temperature monitoring device setup in the Turb. Driven A.F.W. pump room to allow monitoring at the Temperature Monitoring scanner located at the Aux. Control Board. Record instrument data and verify calibration on attached TEST INSTRUMENT LIST. _____

4.9 Portable H_2 detector available for H_2 detection in the battery rooms. Record instrumentation data and verify calibration on attached TEST INSTRUMENT LIST. _____

4.10 Sufficient personnel available to complete test:

4.10.1 A Minimum of 4 test personnel available to take data and monitor areas where ventilation has been terminated. _____

4.10.2 A minimum of 4 NPO personnel will be needed outside the Control Room to do required electrical switching and manipulate equipment. _____

4.11 Prepare material needed to block ventilation to the Turbine Driven AFW Pump Room (see step 6.1). _____

5.0 INITIAL CONDITIONS

5.1 The reactor is shutdown and borated to ensure adequate shutdown margin.

5.1.1 NPO has performed a shutdown margin calculation (STP R-19). _____

5.1.2 Record the boron concentration used in the above calculation (this should be the most recent RCS boron concentration). _____ ppm

5.1.3 Verify that the concentration recorded above is greater than 783 ppm. _____

5.2 The following HOT STANDBY conditions are being maintained:

5.2.1 RCS pressure controlled by Pressurizer heaters at normal operating pressure (~ 2235 psig).
Record value _____psig.
Time _____
Date _____

5.2.2 RCS temperature at no-load Tave (~ 547°F).
Record value _____°F
Time _____
Date _____

5.2.3 Pressurizer level at No-load programmed level (~ 22%), being maintained by normal charging and letdown in the automatic mode.
Record value _____%
Time _____
Date _____

5.2.4 All four Reactor Coolant Pumps are in operation. _____

5.3 The steam generators are in a No-load condition with:

5.3.1 Steam pressure at approx. 1005 psig and being maintained via steam dump to the condenser (pressure mode).
Record value _____psig
Time _____
Date _____

5.3.2 S.G. level being maintained at approx. 33% on the narrow range indicators by use of a (the) motor driven AFW pump (s) and its (their) associated control valves.
Record levels: S/G 11 _____%
S/G 12 _____%
S/G 13 _____%
S/G 14 _____%
Time _____
Date _____

5.4 Verify Turbine Driven AFW Pump aligned to automatically start per Operation's OP D-1: I. _____

5.5 Verify feature cutout switches for both Motor Driven AFW pumps automatic start on Main F.W. pump trip are in cutout position.
AFW Pp. 1-2 _____
AFW Pp. 1-3 _____

5.6 Vital 120 V Instrument A.C. Panels, PY11, PY12, PY13, PY14, being supplied in the normal configuration by their own respective Instrument Inverters (not by Backup Transformers).
IY 11 _____
IY 12 _____
IY 13 _____
IY 14 _____

5.7 Verify that the 125 volt D.C. System is setup in the normal configuration with each battery and distribution panel being supplied by one battery charger. Verify a full charge on each battery (~ 130 volts)

Battery 11 _____
Battery 12 _____
Battery 13 _____

5.8 Verify charging is set up in automatic control (charging - pressurizer level - can be placed in manual during the duration of the test, if required). _____

5.9 Verify the Auxiliary Boiler is in service to meet auxiliary steam needs of the plant. _____

5.10 Isolate for the duration of the test, Pressurizer Aux. Spray by closing containment isolation valve 8145. Also verify bypass valve to 8145, 8148, is closed.

8145 _____
bypass valve to 8145, 8148 _____

5.11 Put the following points in computer block (s).

a. RCS Tavg

Loop 1	Loop 2	Loop 3	Loop 4
T0400A_____	T0420A_____	T0440A_____	T0460A_____

b. Pressurizer Pressure - Select channel controlling pressure, record below:

Channel 1	Channel 2	Channel 3	Channel 4
P0408OA_____	P0481A_____	P0412A_____	P0483A_____

c. Steam Generator level (narrow range)

SG 1-1	SG 1-2	SG 1-3	SG 1-4
LO 400A_____	LO 420A_____	L0440A_____	L0460A_____

d. Pressurizer Level Channels- select channel controlling level, record below.

L0480A_____	L0481A_____	L0482A_____

5.12 Appropriate backup pneumatic supply (supplied) cut into

	N_2	Air Bottle
a. 10% steam dump valve PCV 19	_____	_____
PCV 20	_____	_____
PCV 21	_____	_____
PCV 22	_____	_____

6.0 TEST INSTRUCTIONS

PRECAUTION: The system configuration for this test is an abnormal one. The participants of this test procedure should therefore be alert to any unanticipated events that may occur during the course of this test, and react in accordance with existing emergency and normal operating procedures. Appendix A lists the Technical Specification exceptions for this test.

PRECAUTION: An operator initiated safety injection should be performed only for one or more of the following conditions:

a)	Reactor Coolant System Subcooling	$\leq$ 10°F
b)	Sudden Unexplained Decrease in Pressurizer Level of	10%
	or to an indicated level of	$\leq$ 10%
c)	Sudden Unexplained in any S/G level to	$\leq$ 76% wide range
	or	$\leq$ 0% Narrow Range
d)	Unexpected Pressurizer pressure drop	$\geq$ 200 psi

PRECAUTION: Also the following other precautions should be followed:

a) Maintain RCP Seal Injection flow above 6 gpm and CCW flow to the thermal barriers.

b) Monitor one of the source range NIS channels (N31, N32) on NR 45 for any "unexpected changes."

c) To assure a safe margin below the first steam generator safety setpoint of 1065 psig, do not allow Tavg to exceed 550°F.

d) Do not allow steam generator pressures to reach a 100 psid difference.

e) When equilibrium is established after the initial transient, avoid any large changes in Auxiliary Feedwater flow or in the Steam Generator water level.

f) If H_2 levels in the battery rooms exceed 2% during the performance of this test, immediately establish ventilation to the battery rooms.

6.1 Isolate all ventilation (exhaust and supply) to the Turbine Driven AFW pump room by:

6.1.1 physically blocking the supply damper located above pump. _____

6.1.2 close all doors into room. _____

6.2 Open the following 480 V breakers to simulate loss of vital AC power to the LCV's for the Turbine Driven AFW Pump.

a) LCV 106 - breaker 52-1G-44 _____

b) LCV 107 - breaker 52-1G-68 _____

c) LCV 108 - breaker 52-1G-69 _____

d) LCV 109 - breaker 52-1G-70 _____

6.3 Manually adjust HC455G and HC455F to zero % output (closes pressurizer spray valves) and leave the controllers in manual control. _____

6.4 Record data indicated on Data Sheet I. _____

Note: The following steps (6.5.1 - 6.5.8) should be conducted immediately before initiating the simulated loss of voltage to the RCP buses.

6.5 As quickly as possible shutdown the following equipment. As many people as possible should be utilized to complete this step so that a close approximation to a blackout can be simulated.

6.5.1 Disable pressurizer heater groups 11 and 13 by placing each individual control switch in the "OFF" position.

Group 11 _____
Group 13 _____

6.5.2 Disable pressurizer heater groups 1-2 and 1-4 by tripping heaters and then opening the D.C. breaker to the control circuits.

Group 1-2 72-1339D _____
Group 1-4 72-1237D _____

6.5.3 Close Main Stm. Iso. Valves and associated bypass valves from control room.

S/G 11	FCV 41	_____
	FCV 25	_____
S/G 12	FCV 42	_____
	FCV 24	_____
S/G 13	FCV 43	_____
	FCV 23	_____
S/G 14	FCV 44	_____
	FCV 22	_____

6.5.4 Terminate ventilation to the following areas by opening indicated breakers for the fans in these areas:

<u>120 V D.C. Battery Rooms</u>

Supply Fans S-27	Breaker 52-1F-37	_____
Exhaust Fan E-27	Breaker 52-1H-56	_____

<u>Inverter & 120 Volt D.C. Switchgear Rooms</u>

Supply Fan S-43	Breaker 52-12J-06	_____
Supply Fan S-44	Breaker 52-12I-07	_____

Note: The following steps (6.5.6 - 6.5.7) will remove the 480V vital supply to the 125 VDC Vital Battery Chargers and the 120 VAC Vital Nuclear Instrument Inverters which places the entire 125 VDC and 120 VAC Vital load on the batteries.

6.5.5 Prior to shutting down Battery Chargers, record the initial conditions for each battery and Nuclear Instr. Inverter on Data Sheet II. _____

6.5.6 Open the 480V supply breakers to the Battery Chargers presently in service. Record below Battery charger in service and 480V breaker opened.

Battery	Battery Charger In Service	Breaker Opened
11		
12	_____	_____
13	_____	_____
	_____	_____

6.5.7 Open 480V supply to each Nuclear Instr. Inverter:

IY 11	52-1F-59	_____
IY 12	52-1G-35	_____
IY 13	52-1H-64	_____
IY 14	52-1H-52	_____

6.5.8 Retake and record on Data Sheet II, battery and inverter conditions immediately following the simulated blackout. _____

6.6 Start the computer trend printer at 30 seconds intervals. _____

6.7 Shutdown both motor driven A.F.W. pumps:

AFW Pp. 1-2 _____
AFW Pp. 1-3 _____

Note: This demonstration will last at least 2 hours. Use the clock in the control room for recording the time of day during the test.

6.8 Start the visicorder, noting time and date on the trace and then have the RCP bus undervoltage relays tripped. Indicate below which 2 devices (one per bus) have been tripped.

12KV Bus D	12KV Bus E
27VDR 1_____	27VER 1_____
27VDR 2_____	27VER 2_____

6.9 Begin monitoring and recording data for parameters listed on Data Sheet II at intervals indicated. _____

6.10 Verify the Turbine Driven AFW pump has started and flow is established to each steam generator.

S.G. 11 _____
S.G. 12 _____
S.G. 13 _____
S.G. 14 _____

6.11 For the duration of the test, control A/W flow to maintain steam generator levels at approximately 33% by a combination of:

6.11.1 Having operators take manual control of each Turb. Driven A.F.W. pump LCV, throttling valves to modulate flow as required. _____

6.11.2 Starting and stopping the pump to control level. _____

6.12 For a two-hour period from the time of simulated blackout, maintain Hot Standby conditions. Use atmospheric dump in conjunction with A.F.W. flow to maintain Tavg at 547°F, or, correspondly, steam generator pressures at approximately 1005 psig. After initial transient, change trend to 1 minute intervals. _____

6.13 At the end of the 2 hour period, turn visicorder off and note the time on the chart. Also stop trend printer and secure the printer log paper. _____

6.14 Re-establish ventilation to the following areas by means indicated:

6.14.1 <u>125 VDC Battery Rooms</u> - Close breakers for fans and verify fans start. (E-27 may not start depending on temperature in battery rooms).

S-27 _____
E-27 _____

6.14.2 <u>Inverter and 125 V.D.C. switchgear rooms</u> - check control switch in "AUTO" and then close breakers for fans.

S-43 _____
S-44 _____

6.15 Return 480V supply power to the Nuclear Instrument Inverters. Follow standard operating procedure to do this:

IY 11 _____
IY 12 _____
IY 13 _____
IY 14 _____

6.16 Return to service battery chargers taken out of service in step 6.5.6. Follow standard operating procedure to do this:

Battery 11 _____
Battery 12 _____
Battery 13 _____

6.17 Have pressurizer spray PCV's hand controllers returned to "AUTO". PCV455 A _____
PCV455 B _____

6.18 Having first matched the pressurizer control signals with the present RCS pressure, return pressurizer heaters to service (see step 6.5) and then have RCS pressure returned slowly to the normal operating pressure (~2235 psig). _____

6.19 Re-establish Motor Driven AFW pump system steam generator level control and maintain steam generator levels at or near the normal no-load operating levels (~ 33% NR) as required to limit RCS temperature to 547°F. ____

6.20 Close the breakers for the Turbine Driven AFW LCV's. ____

LCV 106	52-1G-44 ____
LCV 107	52-1G-68 ____
LCV 108	52-1G-69 ____
LCV 109	52-1G-70 ____

6.21 Return RCP bus undervoltage relays to normal (see step 6.8). ____

6.22 Have Turbine Driven AFW system put into automatic standby per Operation's OP. D-1:I. ____

6.23 Return ventilation to Turbine Driven AFW pump room to normal (see step 6.1). ____

6.24 Re-establish main steam to secondary side of plant by first using MSIV warmup bypass valves to heatup main steam piping, and then open the MSIV's. Have steam dump re-aligned to the condenser in automatic control. ____

6.25 Have the Auxiliary Steam System re-aligned to main steam, if required. ____

6.26 Disconnect, or realign visicorder for continuance of Startup Test Program per Test Procedure 40.0 ____

6.27 Have the temporary temperature monitoring device setup in the Turb. Driven A.F.W. pump room removed (see step 4.8). ____

6.28 Remove Safeguard blocks as instructed in Appendix B. ____

6.29 Proceed with Startup Program per program outline Test Procedure #40.0 ____

7.0 ACCEPTANCE CRITERIA

7.1 Verify that the following Acceptance Criteria have been met throughout the test.

7.1.1 Verify Tavg for each loop was kept below 550°F. [This temperature was chosen to keep S.G. pressure below the first S.G. safety setpoint (1065 psig ± 1%) which corresponds to a Tavg of 554°F. The calibration of the associated instrumentation is well within the above 4°F safety margin].

7.1.2 Verify for each steam generator that the Turbine Driven AFW system can be manually operated to maintain steam generator levels at the no-load level of 33 ± 4%.

7.1.3 During the two hours of the test, verify the voltage of each battery doesn't fall below 110 VDC. (This voltage was chosen to keep well above the minimum voltage of 105 VDC given in the FSAR).

FOR INFORMATION ONLY

DATA SHEET 1

INITIAL CONDITIONS (SEE STEP 6.3)

PARAMETER	DATA	TIME (hours)
Pressurizer Pressure (Use channel selected in step 5.11d)	_____ psig	
Loop 1 Tavg - T0400A	_____ %	
Loop 2 Tavg - T0420A	_____ °F	
Loop 3 Tavg - T0440A	_____ °F	
Loop 4 Tavg - T0460A	_____ °F	
S.G. 11 Level (N.R.) - L0400A	_____ °F	
S.G. 12 Level (N.R.) - L0420A	_____ %	
S.G. 13 Level (N.R.) - L0440A	_____ %	
S.G. 14 Level (N.R.) - L0460A	_____ %	
S.G. 11 Pressure (Use channel selected in step 4.2.3)	_____ psig	
S.G. 12 Pressure (Use channel selected in step 4.2.3)	_____ psig	
S.G. 13 Pressure (Use channel selected in step 4.2.3)	_____ psig	
S.G. 14 Pressure (Use channel selected in step 4.2.3)	_____ psig	
NIS Channel N31	_____ counts/sec	
NIS Channel N32	_____ counts/sec	
Temperature in Turb. Driven A.F.W. Pp Rm (see step 4.8)	_____ °F	

DATA SHEET II

SHEET 1 OF 2

DATE _____

BATTERY AND NUCLEAR INSTRUMENT INVERTER OUTPUT VOLTAGE AND CURRENT

TIME	BATTERY 11		BATTERY 12		BATTERY 13		120 VAC. NUC. INST. INV. 1Y11		120 VAC. NUC. INST. INV. 1Y12		120 VAC. NUC. INST. INV. 1Y13		120 VAC. NUC. INST. INV. 1Y14	
	VOLTS	AMPS	VOLTS	AMPS	VOLTS	AMPS	VOLTS	AMPS	VOLTS	AMPS	VOLTS	AMPS	VOLTS	AMPS
INITIAL CONDITIONS														
IMMEDIATELY FOLLOWING BLACKOUT														
T + 10 MIN.														
T + 20 MIN.														
T + 30 MIN.														
T + 40 MIN.														
T + 50 MIN.														
T + 60 MIN.														
T + 70 MIN.														
T + 80 MIN.														
T + 90 MIN.														
T + 100 MIN.														
T + 110 MIN.														
T + 120 MIN.														

DATA SHEET II

SHEET 2 OF 2

DATE _____

VITAL ROOM TEMPERATURES AND H_2 AND LEVELS

TIME	BATTERY ROOM 11		BATTERY ROOM 12		BATTERY ROOM 13		I & 125 VDC SWGR. RM 11	I & 125 VDC SWGR. RM. 12	I & 125 VDC SWGR. RM. 13	AFW Pp 11 ROOM
	TEMP.	% H_2	TEMP.	% H_2	TEMP.	% H_2	TEMP.	TEMP.	TEMP.	TEMP.
INITIAL CONDITION										
T + 10 MIN.										
T + 20 MIN.										
T + 30 MIN.										
T + 40 MIN.										
T + 50 MIN.										
T + 60 MIN.										
T + 70 MIN.										
T + 80 MIN.										
T + 90 MIN.										
T + 100 MIN.										
T + 110 MIN.										
T + 120 MIN.										

REMARKS:

CAUTION: IF H_2 CONCENTRATION APPROACHES 2%, TURN VENTILATION ON.

FOR INFORMATION ONLY

APPENDIX A

Technical Specifications Exceptions

The table below identifies those technical specification items which are temporarily bypassed or require special test exceptions to the limiting conditions for operation during the performance of this and all other special tests.

TECHNICAL	SPECIFICATION	44.1					44.2	44.3
		1.1	1.2	1.3	1.4	1.5		
2.1.1	Safety Limits	X	X	X	X	X		
3.1.1.3	Moderator Temperature Coefficient					X		
3.1.1.4	Minimum Temperature for Criticality					X		
3.3.1	Various Reactor Trips							
	Overtemperature ΔT	X	X	X	X	X		
	Overpower ΔT	X	X	X	X	X		
3.3.2	Safety Injection							
	All Automatic Functions	X	X	X	X	X		
3.4.1	Reactor Coolant Loops							
	Normal Operation	X	X	X	X	X		
3.4.4	Pressurizer		X	X				X
3.7.1.2	Auxiliary Feedwater Sys.				X			X
3.8.1.1	A. C. Sources				X			
3.8.2.1	Onsite Power							
	A. C. Distribution				X			X
3.8.2.3	Onsite Power							
	D. C. Distribution				X			X

FOR INFORMATION ONLY

APPENDIX B

ENGINEERED SAFETY FEATURES AND REACTOR PROTECTION MODIFICATIONS

During the performance of these tests, modifications will be made to the Engineered Safety Features and the Reactor Protection systems. The systems will operate as specified below.

A. All automatic Safety Injection (SI) functions, except reactor trip, will be blocked. A Safety Injection actuation signal will result in the following:

1. Reactor Trip
2. Control Room Trip Indication and Alarms

B. Safety Injection actuation can be initiated by manual switch operation.

C. Overtemperature ΔT and Overpower ΔT Reactor Trip signals will be blocked.

The specific method to implement the above modification is presently being formulated..